



# Magazine

# ABSOLICON

S O L A R C O L L E C T O R S

CONCENTRATING SOLAR COLLECTORS FOR INDUSTRY, DISTRICT HEATING AND SOLAR COOLING NO. 4



## WE'VE DONE IT!

The highest efficiency measured  
in the world: 76.6%

The first production line  
installed in China



Solar collector T160  
generates most heat

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Absolicon develops new  
solar energy materials

Page 5

Stores solar heat  
from summer to winter

Page 8

## EDITORIAL

# We've done it!



Joakim Byström founder and CEO

**Our first production line** manufacturing the world's best concentrated solar collector is in place in Sichuan. It was a fantastic feeling when the first solar collectors were wheeled out on the production line.

The time has gone quickly since Absolicon was listed on Spotlight Stock Market on June 22, 2016, with a plan for how we would become world leaders on concentrated solar energy for industry and district heating.

We first developed the T160 to be simple and cheap to mass produce and it was given the highest optical efficiency in the world, 76.6%.

We have then packaged our knowledge into a production line and built a patent portfolio

with up to the present day ten approved or applied for patents.

We have now installed our first line and proved we can handle the entire chain from sales to finished delivery.

Absolicon is now making a profit for the first time. The result (EBIT) was 4.5 millions SEK and together with a half a million currency exchange profit the earnings totalled around 5 millions SEK.

**Now we're taking our next step:**

Absolicon is now switching over to become a sales organisation. We're not only employing sales personnel but also resetting the entire organisation so that all employees are spending some of their working time on sales activities.

Our new efforts to become material suppliers to solar collector factories are exciting. In addition to sales of automated production lines and income from licences for manufactured solar collectors, Absolicon also earns money from sales of materials.

With a limited investment in manufacturing tools, the cost of components for solar collectors can be substantially reduced.

Absolicon has a promising material development, which in a while can give a large income and further raise the efficiency of solar collectors. We shall further improve the world's best concentrated solar collector while maintaining our unique position in the industry.

Come with us on our exciting journey!



## Welcome to Absolicon

When you get in touch with Absolicon, it will probably be **Christer Olsson** or **Bianka Magyari** who answer. Together, they take care of our guests, customers and shareholders.

Absolicon has an efficient administration for dealing with large or small projects. Office manager Christer Olsson has been with us since 2007.

Together with Bianka Magyari, he makes certain that everything is functioning. He is responsible for day-to-day contacts with suppliers, Swedish customers and the Absolicon shareholders.

# Listen to Johan Rockström!

At Absolicon, we follow climate research and see how increasingly more researchers are worried about our emissions of greenhouse gases causing climate change that suddenly escalates and becomes larger and larger without humanity being able to stop it.

Researchers believe that if we can keep temperature increases well below 2 degrees, we should be able to avoid pushing the globe over such an unexpected precipice. However, this would mean stopping the emission of carbon dioxide into the atmosphere in just a few decades.

Together with his team of researchers, Johan Rockström has introduced the principle of Carbon Law for halving CO<sub>2</sub> emissions every ten years.

Humanity's emissions shall be halved from **40 Gt** in 2020 to **20 Gt** in 2030 and then to **10 Gt**



in 2040 to finally reach the target of **5 Gt** in 2050. At the same time, humanity must develop methods to remove carbon dioxide from the atmosphere and in 2050 bind **-5 Gt** so the sum is consequently zero.

After 2050, humanity can then "clean up" the atmosphere and remove the carbon dioxide that has been released since the start of industrialisation.

The absurdity of not making (profitable) efforts to reduce CO<sub>2</sub> emissions today and instead passing on the problem of cleaning up after us to our children is blatantly obvious.

Absolicon's major solar heating installations can replace oil and gas with a high yield. The yield in Botswana is 50% on invested capital, in Kenya 20% and in Sweden solar collectors give a 6% to 10% yield

These profitable installations demand an infrastructure with production lines and material suppliers. Together with financiers and technical companies around the world, we will create this framework and initiate a global solar heating revolution for industry and district heating.

## Absolicon Magazine

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The snow-rich winter in Härnösand was useful to Absolicon by allowing half a day on the Vårdkasbacken hill with our personnel. The photograph shows Jonatan Mossegård (research manager), Robin Vestner (project manager), Josefin Nilsson (project manager, FoU), Leif Mellin (engineer), Joakim Byström (CEO), Christer Pekkala (engineer), Anders Rammsy (project manager, Sichuan), Joshua Goldman, (student).



Pär Holmgren, Eva Goes and Joakim Byström

## PÄR HOLMGREN at the Absolicon Day

Pär Holmgren attracted 350 invited visitors to the Absolicon Day in Härnösand

A guest at this year's Absolicon Day was meteorologist Pär Holmgren, who worked for the SVT, the Swedish public television broadcaster, for 20 years but now assists the Länsförsäkringar insurance company with climate issues. He told us about what you can do yourself to make a difference.

The day included the inauguration of Absolicon's new lab and workshop in Härnöverken by the Governor of Västernorrland, Berit Högman. In total, Absolicon now rents 3500 m<sup>2</sup> of floorspace in workshop and office.



Patrik Blidefalk, patent engineer

## 10 patents protect the technology

Absolicon has now submitted new patent applications, for both solar collectors and for production lines.

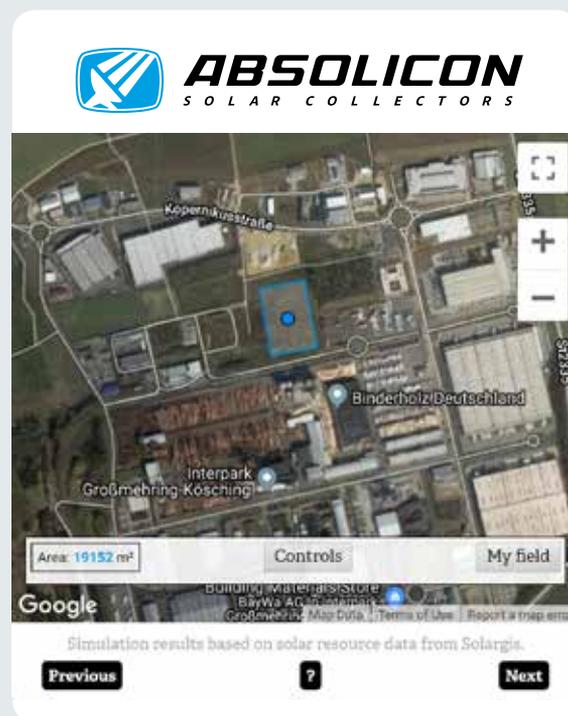
In total, Absolicon now has ten applications or patents granted.

–“By applying a combination of patent, design rights and trade marks, Absolicon can create a strong protection for both its solar collectors and its production line”, Patrik Blidefalk, patent engineer at the company, tells us.

Absolicon submits a new patent application every other month and plans to have a portfolio of around twenty patents accepted in the field of solar energy by 2020.

# Absolicon is pleased to introduce FIELD SIMULATOR

Enter the street address to design your own solar collector field



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# Efficiency of 76,6%



## THE BEST CONCENTRATING SOLAR COLLECTOR IN THE WORLD

In tests Absolicon solar collector has shown to have an efficiency of 76.6%. This is the highest number ever achieved for a small parabolic trough.

The Absolicon T160 Solar Collector, manufactured in Härnösand, has received tremendous results in Switzerland! The T160 has been tested to 76.6%, which is the highest efficiency for converting solar radiation into heat that has

ever been measured for a small parabolic dish.

The Swiss Institut für Solartechnik (SPF) in Rapperswil is one of the oldest and most renowned institutes in Europe for carrying out solar heating testing. These tests form the basis for calculating annual yield and therefore state grants, so demands are high.

Absolicon chose SPF as they are able to handle measurements of

up to 160 degrees celsius, something that is unusual in this industry.

The tests are carried out so that the solar collectors are directed toward the sun and the thermal energy generated is measured accurately at various temperatures.

The durability of the solar collector is also tested by loading it with over 500 kg and blasted with a pneumatic cannon charged with 25 mm hailstones. Another violent test was

heating the solar collector to its maximum temperature and then rapidly filling it with cold water so that steam was spurting out!

After passing these tests and with such a high measured efficiency, Absolicon has received an important stamp of quality.

Absolicon will find it easier to sell production lines and projects now they can offer the best concentrated solar collector in the world!

### How to interpret the test results!

The solar collector parameters for the T160

$\eta_0 = 76,6\%$	Proportion of direct sunlight converted to heat
$K_d = 8,586\%$	Proportion of diffused light converted to heat
$a_1 = 0,3677$	Heat loss depending on working temperature of solar collector
$a_2 = 0,003224$	Heat loss depending on working temperature of solar collector squared

$$\text{Output} = \eta_0 G_b + K_d G_d - a_1 \Delta T - a_2 \Delta T^2$$

Solar radiation at midday comprises 1000 W direct sunlight and 50 W diffused sunlight. The equation above then gives an energy yield of 700 W per square metre. Methods for dynamic testing of solar collectors have been developed by the Swedish researcher Bengt Perers, who nowadays works at DTU.

### Danish test verifies top numbers

Absolicon T160 has been tested at DTU and the annual yield has been verified in practical tests.

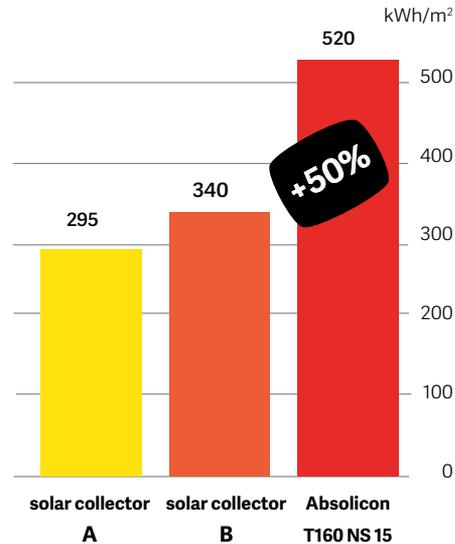
Absolicon T160 has been tested at DTU and the annual yield has been verified in practical tests.

It is well known that concentrated solar collectors are better than flat ones at higher temperatures.

However, researchers at the Technical University of Denmark in Copenhagen (DTU) were surprised when their results showed that Absolicon T160 produces 50% more thermal energy at 85°C.

Absolicon has therefore installed a solar collector at DTU for independent evaluation. DTU has now concluded that all numbers and calculations are correct and they presented their results at a large solar heating conference in Austria in the spring of 2018.

The annual yield in Denmark for three separate solar collectors with an 85 degree operating temperature



# Absolicon becomes supplier of COMPONENTS AND MATERIALS

**Absolicon is investing to supply materials to their customers on production lines and simultaneously reduce the cost and raise the performance of the world's best solar collector.**

The sale of solar collector factories is a good deal but there is also lots of money to earn in supplying materials to solar collector factories. Absolicon is now investing in tools and development to also become the best supplier of component materials in the world.

The investment is divided in two – partly investing in tooling to be able to manufacture cheap

components, partly producing materials with unique properties that improve the performance of solar collectors.

– “Taking control of the supply of materials together with sub-contractors is a strategic step”, Joakim Byström, CEO of Absolicon Solar Collector AB, explains. “We help our licensees to reduce their costs for solar collectors at the same time as we increase Absolicon’s share of the deal.”

The supply of materials will sell for large sums. Ten production lines in full operation need to purchase materials for

1 billion SEK a year. Absolicon is aiming at supplying half of this.

– “It’s not about manufacturing ourselves in the first place. Our investment is taking place together with sub-contractors we have considered to be suitable. We invest in their manufacturing process and receive a share of the sales in the form of royalties”, says Christer Pekkala, engineer at Absolicon.

With its investment, Absolicon is counting on both earning more money and lowering the cost of solar collectors, which shortens pay-off times when solar energy replaces oil and gas.



**Christer Pekkala** is responsible for CAD and design at Absolicon. Together with purchasers from Absolicon and the team working on research and development, he produces cost-efficient components and materials for those who have purchased Absolicon production lines.

## Material projects with **GREAT POTENTIAL**

**There are three components that determine how much energy a concentrated solar collector can produce – the glass, the reflector and the receiver tube.**

Absolicon has, through its own research and various collaborations, found methods that reduce cost and raise performance levels of their products.

But the projects are still in their development stages. The first finished materials from this work are expected during 2019.

– “It’s fascinating that our small firm has found these methods that should be able to considerably improve all these three components”, **Erik Zäll**, industrial PhD student for Absolicon at Umeå University, tells us.

These projects are partially financed by the Swedish Energy Agency and Absolicon is also looking for new funding that is earmarked for development work in businesses.

The new components would be an important input in Absolicon solar collectors and could also be sold to other manufacturers.

Material	Effect	Price	Value per year	Possibility
Glass	+1%	-20%	40 MSEK	★★★★★
Reflector	+0%	-70%	40 MSEK	★★★★★
Receiver tube	+2%	-10%	30 MSEK	★★★★★

Value calculated in comparison with present materials in connection with sales of materials to 500,000 m<sup>2</sup> solar collectors annually.

### Cost for formed rear bulkhead in aluminium-zinc sheet metal



## Reduced cost of components

**Just over half the cost of solar collectors are components of sheet metal and plastic. This makes it easy to cut costs through tool investments.**

One example is the rear bulkhead holding the reflector plates in place. By investing in advanced press tooling that automatically produces the whole rear bulkhead from a roll of sheet metal, costs can be cut to one tenth of what a small series would cost.

Another example is the plastic

components that are turned in lathes today. By investing in dies, the cost can be reduced to one sixth, which directly impacts on the cost of the finished solar collector.

– “Our customers of production lines require cheap components for the manufacture of solar collectors. By investing in tooling, we can give them the lowest possible cost, even before they reach large volumes”, says Christer Pekkala.



# The first production line **IN PLACE IN CHINA**



**Absolicon has installed its first production line in China at Heli New Energy. The robots on the line together with five operators can produce one solar collector every six minutes, 100,000 m<sup>2</sup> annually.**

The first T160 solar collector, the best concentrated solar protector in the world, was made on 28 April 2018 in Absolicon's first robotic production line. This production line had first been constructed in Sweden and approved by the customer and then shipped in ten containers to the town of Mianzhu in Sichuan, China.

The Chinese customer, Heli, is a company owned jointly by the energy advisory firm Jointeam in Beijing and Xinkun Machinery,

a family-owned industrial business in Mianzhu, who also stands for premises and personnel. Jointeam has offices in several Chinese provinces and good political connections.

Together with Heli, Absolicon is now installing pilot installations to be exhibited to Chinese customers.

But investment in solar energy is not controlled solely by market forces. The leaders of China are planning for rapidly growing solar heating and on

the question of how much Heli will be selling, the response is "it's political".

China is making large investments in replacing coal-fired power and from attempting to replace coal with gas and later with electricity from wind and solar cells, they are now concentrating on replacing coal with solar heating.

Absolicon is now working together with Heli in both selling large installations and selling more production lines in China.

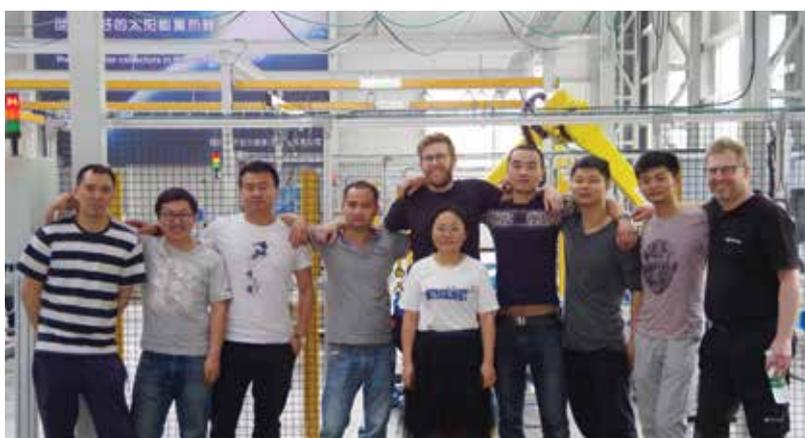
## **Pilot installation in Baotou**

Absolicon is installing a pilot installation together with Heli in the town of Baotou in the autonomous Chinese province of Inner Mongolia. The installation is being shipped straight from Sweden complete with solar collector and solar central.

– "The solar central is constructed completely in stainless steel and is dimensioned to handle temperatures up to 160°C", says **Olle Olsson**.

Inner Mongolia has the perfect weather conditions for concentrated solar energy. Days are clear and sunny while nights are chilly.

This installation is the first in a series at strategically important industrial customers to market Absolicon's products in China.



*Daniel Agrell and Christer Pekkala together with parts of the Chinese team of operators and sales staff.*



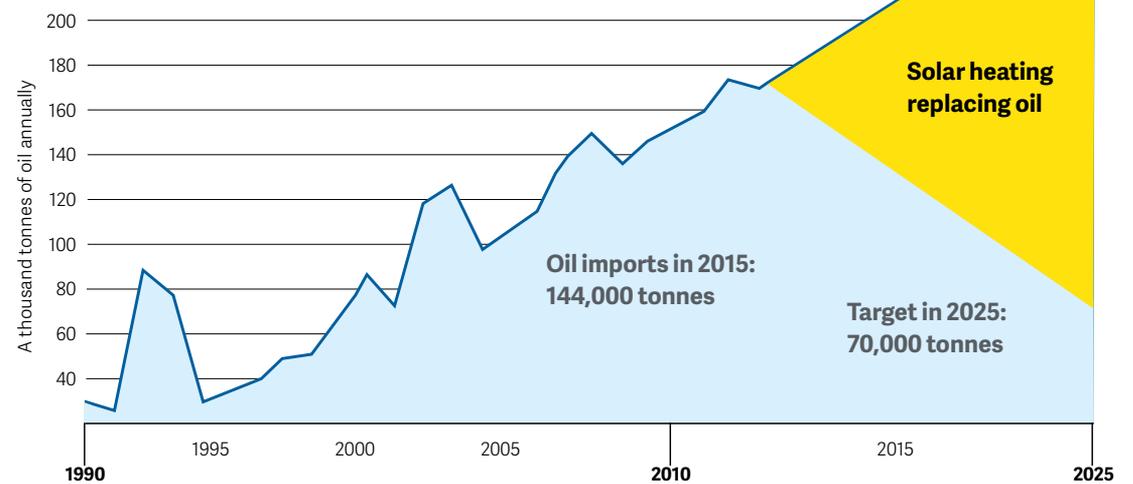
*Anders Rammsy (right) with his Chinese colleague Adam Wang.*

Right: The diagram shows Botswana's import of diesel oil for industrial use and how the country can switch to solar energy. Data from IEA.

Below: Governor Gunnar Holmgren invited the African guests to lunch at his residence.



Oil imports for industrial heating in Botswana 1990 – 2025 if the country installs 100,000 m<sup>2</sup> solar collectors per year.



## Visit from Botswana's environment minister

The country of Botswana is one of the most sun-rich countries in the world but the country uses large amounts of diesel oil to generate heat for its industries. A project together with Absolicon could radically change this situation.

After Absolicon had presented their technology in Botswana's capital Gaborone during the winter, environment minister Tshekedi Stanford Khama arrived on 6 March.

Botswana has 2.3 million inhabitants and thanks to diamond deposits has gone from a low-income country to a medium-income country. They have very good solar radiation

but use expensive fuels in their industries in the form of imported diesel oil.

Absolicon presented to the minister how an investment of €3 million in a production line for Absolicon T160 would quickly change the conditions for their industry. The food industry in Botswana today has three times more expensive fuel costs than their European competitors. But if they could use the sun to efficiently supply steam to their industrial processes, it would conversely be the African producers who would have the lowest energy costs.

Aircraft manufacturer SAAB was the host for

the visit. The minister also visited SAAB's unique installation in Sundsvall, where the air traffic controllers for the airport in Örnsköldsvik are located and remotely start and land aircraft via cameras. One possible solution for the many small airfields in Botswana.

Absolicon has some connections also with private parties in Botswana but the government in Botswana is now contemplating whether to collaborate with Absolicon and, in that case, how a production line could be financed.



Tea plantation burning running metres of eucalyptus to dry tea. An installation of 10,000 m<sup>2</sup> solar collectors would cover 50% of the energy needed and replace 100 hectares of plantation forest.

## The tea industry in Kenya wants to replace eucalyptus with solar energy

As the African countries are developing, energy needs are increasing.

In Kenya, the natural forests have given way to enormous

eucalyptus plantations in order to supply the tea industry with fuel.

Eucalyptus is a very water consuming plant and the use of it

is one of the reasons of drought in eastern Africa.

Five tonnes of wood burnt in large boilers are required to produce one tonne of tea.

Eucalyptus plantations stretch for hundreds of hectares around tea plantations and have forced natural forests and fauna to give way. Watercourses have dried out and eucalyptus changes the land so that no other plants thrive there.

The Kenyan government and the tea industry are trying to stop wood burning. Absolicon, with financing from SIDA and the Swedish Agency for Economic and Regional Growth, has made a proposal of how the tea industry could switch fuels from wood to solar. Each hectare of solar collectors installed replace 100 hectares of plantation forest.

Absolicon is cooperating with WWF in Kenya and already has a local partner who wants to run a production line.

The next step is to build pilot installations where the tea factories can test Absolicon's solar collectors.



Storage pit under construction in Vojens, Denmark, with a solar heating field of 70,000 m<sup>2</sup>.  
Photo Arcon-Sunmark.

## DANISH SEASONAL STORAGE CAN STORE HEAT FROM SUMMER TO WINTER

**Storage pit where hot water is saved under an insulating cap can be the solution for the sun to provide energy all year round.**

The district heating network of the future is probably not dependent on one large boiler but instead a combination of many different energy sources.

An expansion of wind power will on windy days enable an excess of electricity to be

stored in a heat store.

Waste heat from industry and shops can be used and solar heating from large fields can also be fed into one and the same large heat store.

Energy can then be taken from this heat store for use in the district heating network, either directly if the temperature is sufficient or with the use of heat pumps.

### Storage pit in Vojens

Heat storage with 200,000 cubic metres of water shall together with 70,000 m<sup>2</sup> of solar collectors stand for up to 45% of the Danish town's heating needs. Heating from solar collectors is combined with three gas turbines that generate electricity and heat, an electric boiler and a large heating pump.

Internally, the pit is lined with a plastic matting and an insulating cap is floating on the surface. Maximum temperature in the store is 95 degrees.

The installation is financed with a loan at a low, fixed interest rate and a 25-year write-off period. The installation is built entirely on commercial grounds without grants.

## European cities planning for fossil-free future

# WHAT WILL REPLACE COAL AND GAS?

**Many European cities are wondering how their district heating networks that burn enormous amounts of coal and gas can be replaced with renewable energy. Time is running short – many cities have furnaces that must soon be replaced. Heat storage and large fields of solar collectors may be the answer.**

When district heating networks were being constructed in Europe in the 70s and 80s, mostly coal-fired furnaces and later gas turbines were used. But the payoff from gas turbines has dropped in tact with the expansion of wind power and coal furnaces only last for 50 years, so their technical lifetime is soon at an end.

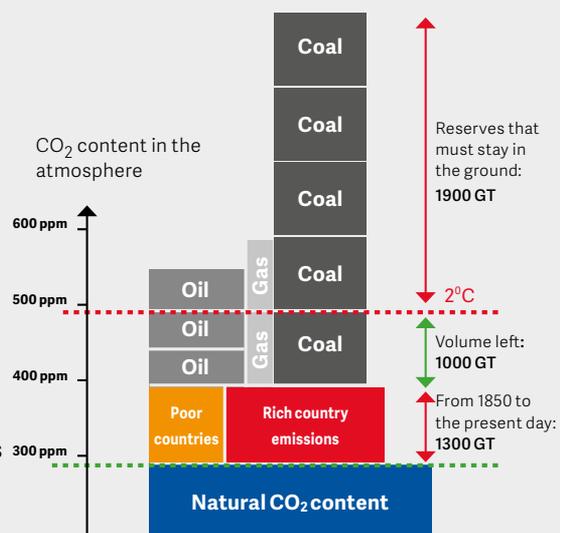
Germany and Poland have large resources of coal but if we are to meet the 2-degree target, this coal must stay in the ground.

In many cases, furnaces are being temporarily repaired waiting for politicians to decide on the energy source to replace coal and gas.

Burning bio-fuels such as wood chips and pellets is not considered to be an alternative – not even in forest-rich countries such as Austria is there the volume that is needed.

Now more and more cities are considering whether solar heating in large fields together with seasonal storage could be an alternative solution.

The Danish form of solar heating with seasonal storage can provide as much as 50% of the heat in a district heating network. However, large numbers of solar collectors will be needed when solar heating replaces ageing coal furnaces – tens of millions of square metres in Austria alone.





The team from Absolicon needed only three days to install the Absolicon sun-tracking solar collectors in Graz.

The town of Graz in Austria is planning a project to replace its ageing coal-fired furnace with seasonal storage of heat and 500,000 m<sup>2</sup> solar collectors. A small test field has been prepared by the city to show the advantages and disadvantages of various technologies. Photo S.O.L.I.D.

# INSTALLATION OF T160 IN GRAZ

The Austrian town of Graz, like so many others in northern Europe, has a district heating network that is driven with coal and gas.

An ageing coal-fired power station is now to be taken out of service and the town is planning to replace it with 500,000 m<sup>2</sup> of thermal solar collectors.

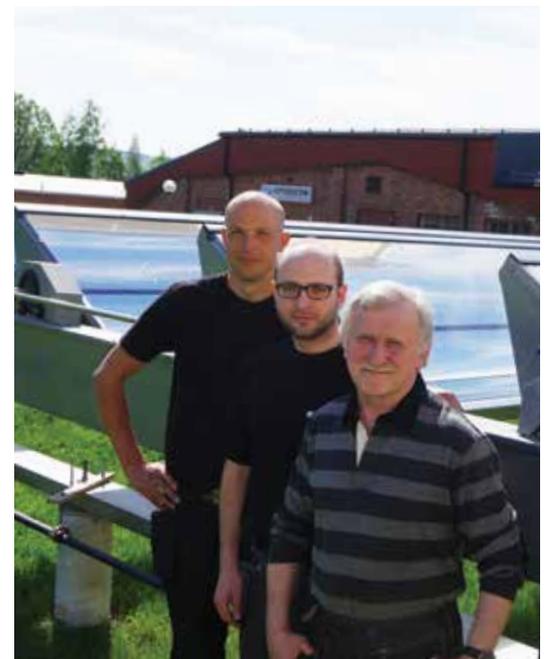
Graz, with its population of 300.000, has today a district heating network driven by a large, old coal-fired furnace and gas-fired turbines.

Coal furnaces have reached the end of their technical life expectancy and gas turbines are no longer profitable to use in competition with wind power and solar cells.

The power company that has been running them has chosen not to extend their contracts after 2020.

The city is now planning for 500,000 m<sup>2</sup> of solar collectors and a heat store of 1.8 million cubic metres of water to generated 20% of its district heating needs. Heat loss in the heat store is estimated to be only 5%.

Absolicon has been invited to demonstrate the T160 solar collector and in three days in April, Absolicon installed 88 m<sup>2</sup> of concentrated solar collectors in Graz. The installation will be evaluated and the information used in future procurement.



Markus Tallre, Ramez Shabani and Ingmar Öhman work with installation and service.

# CHINA INVESTING IN TIBET

Life is not easy in the sparsely populated villages of Tibet. The province has just over 3 million inhabitants and is situated on a high plateau at an altitude of 3,500 metres where the weather is nearly always clear sunshine and very seldom rain. However, at night it gets very cold. In the summer 5°C and in winter down to -15°C. Despite this, the houses are poorly insulated and rarely heated.

In their efforts to modernise Tibet, China has decided to install solar driven district heating in several small towns. Around a dozen projects have started and the first installations are under way.

Each solar heating installation has several tens of thousand square metres of solar collectors and a heat store of Danish model, a pit as big as a lake covered with polystyrene that stores heat from summer to winter.

Qingtai Jiao, head engineer at Sunrain, has at an international solar heating conference reported how they are now constructing their first installation of 35,000 m<sup>2</sup> of solar collectors in Tibet. Work is difficult at this height, where many people find it difficult to be due to altitude sickness.

The first installation in Tibet of district heating from solar collectors is planned to be ready during 2018.





## WWF spurs climate work of major companies

The WWF founded the Science Based Target in order to bring about a new global standard as a benchmark for businesses to get below the two degree global heating target. Over 100 large businesses have already made far-reaching commitments.

– “This growing pool of businesses is creating a powerful momentum that means ever more businesses are singing on. But research and the Paris agreement show that ambitions must increase further in attempts to reach 1.5°C and at least well under 2 degrees”, says Stefan Henningsson, responsible for climate, energy & innovation at WWF.

The aims the companies have taken on are impressive, in most cases greater commitments than the politicians have made in the countries in which they work.

– “Decisive now that our targets are in place is that the investment to reach them is also made”, Stefan concludes.



Stefan Henningsson at WWF

# Multinationals show the way

A quiet revolution is under way among the big multinational companies. Over one hundred major global companies have taken on the science-based climate aim of a below 2°C rise in temperature, in line with the Paris Agreement.

Several companies have committed themselves to reducing CO<sub>2</sub> emissions to zero as soon as 2030, Unilever and Carlsberg for example.

The Paris Agreement from December 2015 was a huge success for the diplomatic efforts to unite around the climate issue. All the countries in the world at last were united in a joint vision of limiting temperature increases to well below 2°C and attempting to reach 1.5°C.

Another important part of the agreement was that the total emissions of carbon dioxide must reach zero during the second half of this century. The Science Based Targets organisation has taken this on and is working together with major multinational companies to get them to accept science-based climate targets.

And while the countries of the world slowly try to adapt their

legislation, business is reacting faster. Today, over 100 companies with a total stock value of 30,000 billion SEK have approved and accepted science-based targets and just over another 300 companies have accepted to set similar targets. Another 800 companies are expected to be added by the year 2020.

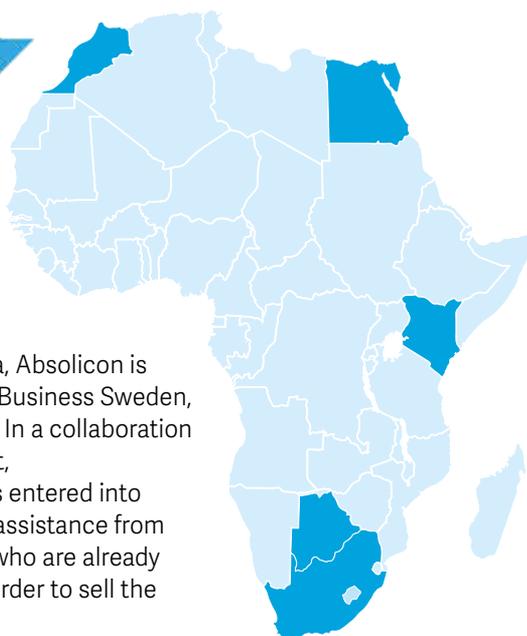
Unilever, with 500 factories around the world that burn the equivalent of 2000 tank trucks of oil every day, have decided on having zero CO<sub>2</sub> emissions by 2030. Carlsberg, with their 150 breweries, will also by the end of 2030 have stopped their emissions of carbon dioxide. H&M has also a target of zero CO<sub>2</sub> emissions from all production of textiles and the sewing of clothes.



## AFRICA

### Sales agreement in Africa

In order to strengthen sales in Africa, Absolicon is taking the help of consultants from Business Sweden, formerly the Swedish Trade Council. In a collaboration agreement between Morocco, Egypt, Botswana and South Africa that was entered into in April 2018, Absolicon is to obtain assistance from senior Swedish export consultants who are already in place in the African countries in order to sell the production lines.



## INDIA

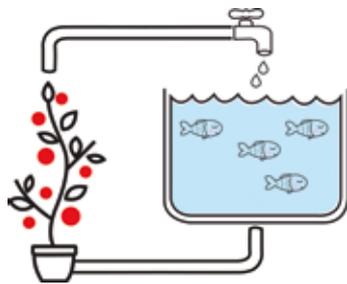
Absolicon has entered into an agreement with the Indian technical company Opti Engineering concerning collaboration to establish a production line in the Indian states of Gujarat and Rajasthan. This agreement is the result of working with the Swedish Energy Agency, who helped Swedish energy companies come into contact with interested Indian parties.

– “India is one of the countries that is very dedicated to investing in solar energy to provide their industries with heat”, Emilie Nordlander, who is writing her master thesis as energy engineer, tells us Indian dairy and textile industries are investing in solar heating to replace coal and oil.

– “Unfortunately, it’s been very hard for Indian solar collector manufacturers to obtain sufficient quality and performance from their solar collectors. Absolicon can here play an important role in India”, Emilie believes.

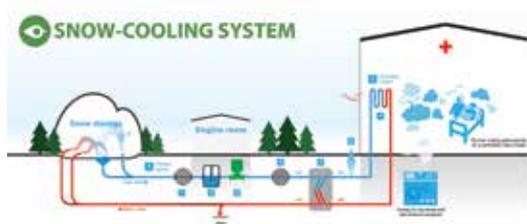
# Härnösand has exciting environmental technology

Absolicon is working with other environmental technology companies in the region and has produced a catalogue to invite foreign investors to Härnösand. Read below about three examples of environmental technology in the region!



## 1. Tomatoes and fish in the circle of life

Peckas Kretsloppsodling in Härnösand has just started Europe's largest aquaponic farm facility that produces tomatoes and table fish. The nutritious water from the fish farm, that otherwise would contaminate lakes and seas, is circulated through the tomato cultivation where it is purified and fertilises the tomatoes.



## 2. Cooling with snow chill

The regional hospital saves snow from the winter for cooling the building during the summer. A seven-metre deep pit is filled with snow during the winter and then covered with insulating wood chips. Cold air from the melting snow replaces the compressor chill and this technology has reduced the consumption of electricity by 90%



## 3. Black pellets replaces coal

Härnösand has Sweden's largest pellets factory using sawdust to produce fuel for pellets furnaces.

By heating these pellets to 300°C, a fuel is created with the same energy value as coal that is easy to transport and can directly replace coal in furnaces or chemical and metallurgic processes.

**Welcome to the world of Absolicon - send contact form**



**Fill in your contact to receive our newsletter and an offer online**

### Industry field

- |  |   |
|--|---|
| <input type="checkbox"/> Food & Beverage | <input type="checkbox"/> Plastic          |
| <input type="checkbox"/> Pharmaceutical  | <input type="checkbox"/> District Heating |
| <input type="checkbox"/> Chemicals       | <input type="checkbox"/> Energy Provider  |
| <input type="checkbox"/> Pulp & Paper    | <input type="checkbox"/> Entrepreneur     |
| <input type="checkbox"/> Textile         | <input type="checkbox"/> Energy Research  |
| <input type="checkbox"/> Automotive      | <input type="checkbox"/> Other .....      |

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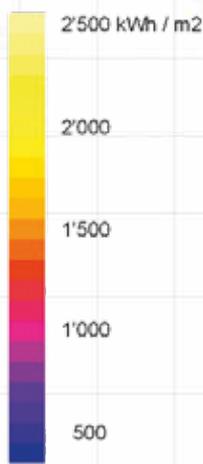
**Absolicon Solar Collector AB**  
Fiskaregatan 11,  
87133 Härnösand, Sweden

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sales@absolicon.com

**Take a picture and send to:**  
+46 73 988 89 85

**Online:**  
www.absolicon.com/contact

Solar radiation map showing the annual influx of direct solar radiation at various locations around the world.



# The sun shines all over the world!

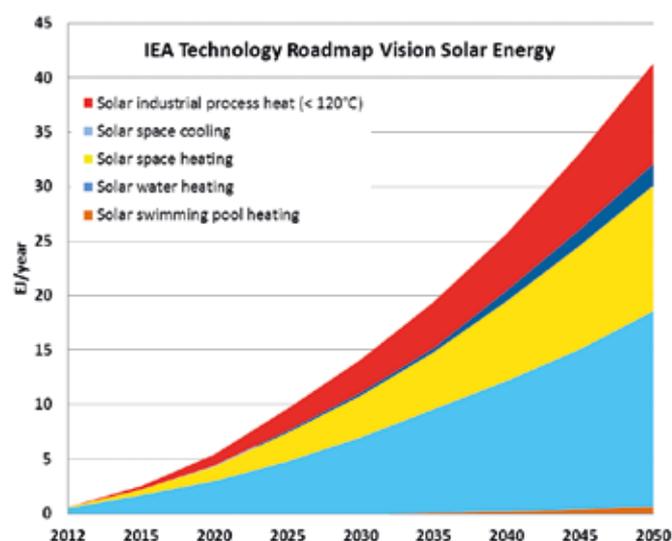
Solar energy can be used anywhere in the world, from sunny California to the South Pole. Absolicon's solar collector has been proven to work well in Sweden but it will provide three times the yield in southern Spain.

Absolicon's solar collector focuses light in the same way as a magnifying glass. Absolicon has the expertise to manufacture solar collectors that produce heat and solar steam at up to 160°C. Solar collectors work efficiently in large fields in any climate, even in Sweden. But of course, the more the sun shines, the greater the production!

### IEA prognoses for growth in the solar energy sector

The International Energy Agency (IEA) has presented its roadmap for solar heating and solar cooling. Based on this, Absolicon has estimated how many m<sup>2</sup> of solar collectors will be required and what investment this will entail.

The IEA's conclusion is that, by 2050, 15-20% of the world's space heating, industrial process heat and cooling can be supplied by solar energy. The necessary investment in solar collectors is € 500 billion. For electricity, the IEA believes that parabolic solar collectors and flat solar cells will be able to provide 27% of world needs.



The diagram shows the IEA's Technology Roadmap Vision for how solar heating and solar cooling may develop up to 2050.

## SOLAR ENERGY



### SOLAR STEAM

Industry currently uses enormous amounts of fossil fuels. Industries often use a oil-burning or natural gas powered steam boiler for supplying steam around the factory to provide heat for various processes.

**Potential:** Using concentrated solar collectors, it is possible to produce solar steam that is fed directly form the steam boiler. According to IEA prognoses, 3 billion m<sup>2</sup> of solar collectors could be installed in industry by 2050.

**Our installations:** Pilot installation at Energiparken in Härnösand.



### SOLAR COOLING

Solar heat can run a solar chiller to generate cost-free air conditioning for a building.

**Potential:** Through the use of heat from solar collectors, it is possible to generate cooling. According to IEA prognoses, 1 billion m<sup>2</sup> of solar collectors for air conditioning could be installed by 2050.

**Our installations:** Absolicon have carried out an installation with solar cooling for the local hospital in Härnösand. During 2015, a similar installation was supplied to a regional hospital in northern Spain.



### SOLAR HEATING

Industry uses enormous amounts of fossil fuels. Industries often use an oil-burning or natural gas powered steam boiler for supplying steam around the factory to provide heat for various processes.

**Potential:** Using concentrated solar collectors, it is possible to produce solar steam that is fed directly form the steam boiler. According to IEA prognoses, 3 billion m<sup>2</sup> of solar collectors could be installed in industry by 2050.

**Our installations:** Installation providing process heat to the factory of Colgate-Palmolive in Athens.



### SOLAR DISTRICT HEATING

District heating is used for 90% of the multifamily houses in Sweden and is rapidly expanding in southern Europe and China. Solar energy can be used to reduce the cost of fuel and the CO<sub>2</sub> emissions.

**Potential:** Denmark is planning hundreds of thousands of m<sup>2</sup> every year and to completely switch from natural gas to renewable energy in the district heating. In the future China has planned for 7 million m<sup>2</sup> of solar district heating installed in 2020.

**Our installations:** GB-school, HFHS, Energy park, Travel Center, Delfinen.