INDUSTRIAL SOLAR

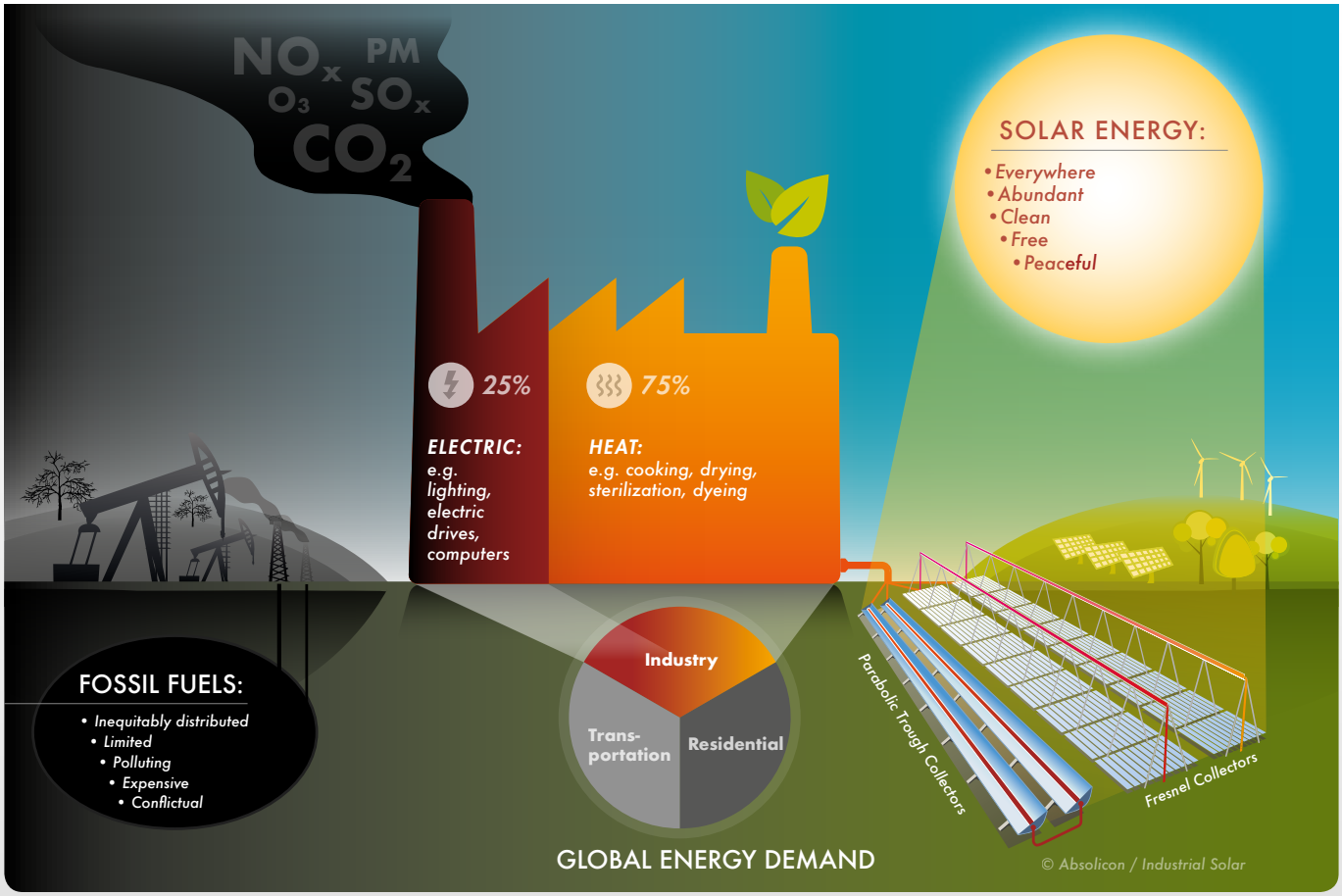
renewables onsite

Solutions for a Carbon Free Industry

The Market for Solar Process Heat

Industry is responsible for one third of the total final energy consumption, with the major part of it being used for process heating. Currently, this demand is almost completely covered by the combustion of fossil fuels causing not only high production costs but also the climate crisis and pollution. Despite its importance, this demand, has only been insufficiently addressed in the past and, accordingly, the share of industrial CO_2 emissions will double by 2050. A significant reduction is necessary and will not be possible without a massive use of solar thermal process heat supply.

Solutions for medium temperature solar process heat (up to 400°C) are available, and Industrial Solar has proven their technical and commercial viability. Ultimately, solar thermal energy - being abundant, free of charge, available everywhere, clean and conflict-free - will be a corner stone for the future industrial heat supply. Industrial Solar already today provides reliable and efficient solar process heating solutions to cut industrial energy costs. As a market- leading company we are perfectly positioned to be part of the upcoming industrial transformation.



VISION:	MISSION:
• *100% renewable energy in industry*	• *Reduce industrial energy costs and emissions by implementing reliable and efficient renewables onsite.*

Turnkey Solutions

Industrial Solar provides tailormade solutions of renewable energies and energy efficiency in the medium power range for industrial and commercial customers. While focusing on industrial heating, we also address cooling and power supply. Our projects start with a comprehensive assessment of the actual energy demand, efficiency potential, renewable resource as well as local site constraints. We then identify the optimal solutions, engineer suitable systems and implement the project.

Our turnkey solutions for heat, cold and power supply comprise all peripheral components needed to operate the systems and to smoothly integrate the energy into the processes. Reliability is always the most central design guideline. In addition, we offer support services for the operation to ensure maximum savings over the complete lifetime.

We cut your energy costs by implementing renewables onsite.

ADVANTAGES FOR OUR CLIENTS:

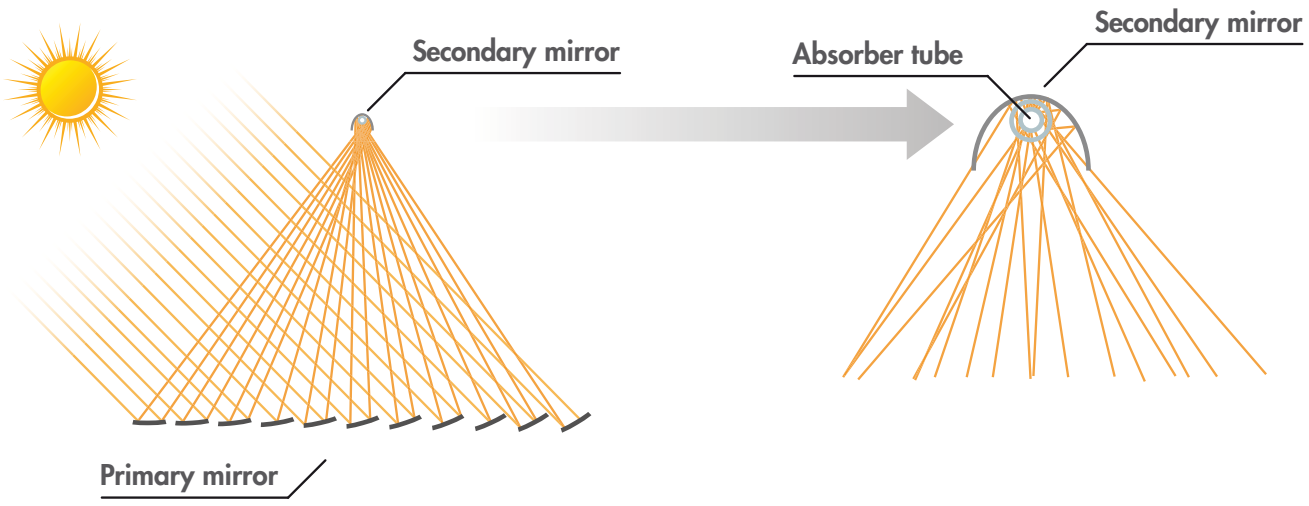
- *Reduction of fuel consumption, energy costs and price fluctuations*
- *Reduction of the carbon footprint*
- *Market share gain through climate sensitive customers*
- *Increased attractiveness for climate sensitive investors*
- *Substantial public relation effect through various media channels*

Fresnel Collector Technology

As solar thermal energy will cover a major share of the industrial heat consumption, Industrial Solar has developed a solution to explicitly address this huge demand: the LF-11 Fresnel Collector. It is a concentrating solar thermal collector with uniaxially tracked mirror rows directing the irradiation on a central absorber tube through which the heat carrier circulates. From the very beginning, the collector was designed for industry. It is currently the most applied Fresnel Collector in industrial applications worldwide and the only one with long-term commercially proven direct steam generation. At the same time, the collector is being continuously improved, mainly in respect to lower production costs and installation time. This ensures that the Industrial Solar LF-11 Fresnel Collector remains the most attractive solution for solar process heat.

Its unique features are:

- *Lightweight structure allows rooftop installations*
- *Collector design provides highest ground space efficiency*
- *Vacuum receiver minimizes heat losses*
- *Modular design can adapt to site constraints*
- *Control allows precise setpoint selection*
- *Absorber can use all kinds of heat carriers*



FURTHER SOLUTIONS:	FURTHER SERVICES:
• *Photovoltaic power generation*	• *Engineering*
• *Non-concentrating solar thermal collectors*	• *Consulting*
• *District heating systems*	• *Financial assessment*
• *Thermal storage*	• *Financing solutions*
• *Efficient cooling systems*	• *Operation and maintenance*

Lighthouse Projects

JTI (Jordan)

In 2017, the Jordan facility of Japan Tobacco International (JTI) became the first tobacco factory in the world to use solar steam generation. A Fresnel collector field from Industrial Solar was installed on the roof of the facility and provides solar steam for the processes as well as for a thermally driven chiller used for air-conditioning. This allowed JTI to drastically cut both carbon emissions and fuel costs.

Capacity: 0.70 MW_{th}
Annual yield: 1,350 MWh_{th}
CO_2 emission reduction: 500 tons per year

MTN (South Africa)

Mobile Telephone Networks (MTN) is the largest telecommunication company in Africa. A major share of its energy consumption is needed for cooling the data centers. In 2014, MTN decided to cut power consumption by installing a Fresnel Collector from Industrial Solar to run an absorption chiller cooling a data center in Johannesburg.

Capacity: 0.28 MW_{th}
Annual yield: 390 MWh_{th}
CO_2 emission reduction: 200 tons per year

Pfizer (Germany)

Pfizer had a solar thermal system comprised of four air collector fields installed. The generated heat is used for the regeneration of a sorption wheel which, as part of the air-conditioning system, removes humid air from the production area. This system is already the second one installed at the site.

Capacity: 0.80 MW_{th}
Annual yield: 110 MWh_{th}
CO_2 emission reduction: 36 tons per year

RAM (Jordan)

Since its commissioning in 2015, the direct steam generation system at RAM Pharma provides solar steam to run processes such as drying or sterilization within the pharmaceutical production and significantly cut energy costs. Moreover, the project won several renowned awards such as the Inter Solar Award (2017) or the Emirates Energy Award (2017).

Capacity: 0.22 MW_{th}
Annual yield: 350 MWh_{th}
CO_2 emission reduction: 200 tons per year

Process Heat
Direct Steam
Process Cold
Renewable Energy Solutions Onsite
Desalination
Photovoltaic
Air Conditioning
Polygeneration
Power Generation
Process Air
Combined Heat and Power
Water Treatment

Renewable Energy Solutions Onsite

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