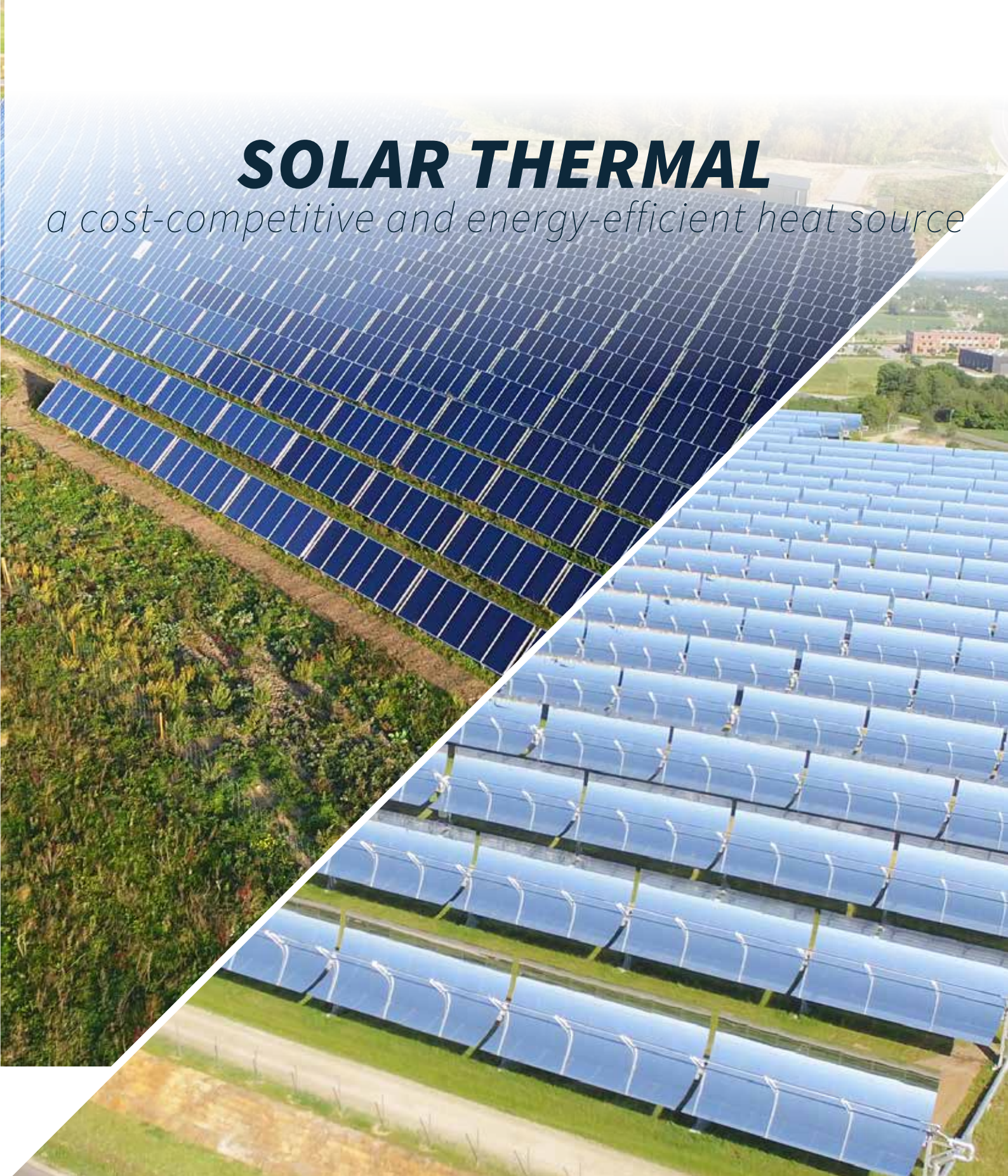


SOLAR THERMAL

a cost-competitive and energy-efficient heat source



SOLAR THERMAL INTEGRATION

for energy independence



The recent years' increase in fossil fuel prices has contributed to an acceleration of the green energy transition and both energy independence and security of supply is of high priority. The sun is the most abundant and freely available renewable energy source on earth and is a 100% green alternative to fossil fuels.

By integrating solar heat into their existing energy supply, district heating plants and utility companies as well as factories in need of low-temperature process steam – e.g., dairies, meat processing industries, breweries, and greenhouses among others – are able to reduce their natural gas dependency and achieve a greener and more efficient energy supply. Solar heat integration, likewise, supports the companies and industries in stabilizing the energy prices towards the consumers. Moreover, solar heat integration helps strengthen both security of supply and energy independence.

As an experienced developer and supplier of solar-thermal solutions, Aalborg CSP A/S utilizes the sun's energy for hot water production and combined heat and power generation as well as for process steam production.

A LONG-TERM INVESTMENT

in a cost-competitive heat source

Compared to PV (photovoltaic) panels, flat solar-thermal collectors have a higher yield per square metre and produce, on average, three to four times as many kilowatt hours.

Although integrating solar heat is a considerable investment, it is a great long-term investment in a cost-competitive, environmentally friendly, and energy-efficient heat source. Besides being operationally reliable, solar heating systems also have low operation and maintenance costs.

SOLAR HEAT BENEFITS

- ✓ 100% CO₂ free heat source
- ✓ Cheapest green heat (<180C°)
- ✓ Low and stable price for >25 years
- ✓ Optimum utilization of available land
- ✓ Simple operation with a minimum of maintenance required
- ✓ Easy integration with other technologies

To supply our clients' individual energy needs in the most optimal way, we provide a variety of solar-thermal technologies including flat solar-thermal panels and parabolic troughs. Aalborg CSP is technology agnostic and as such we support our clients in finding the most suitable collector type for the individual project.

They require very little ongoing maintenance in the form of routine inspections and operation of auxiliary equipment; this to ensure the panels' ability to efficiently absorb sunlight.

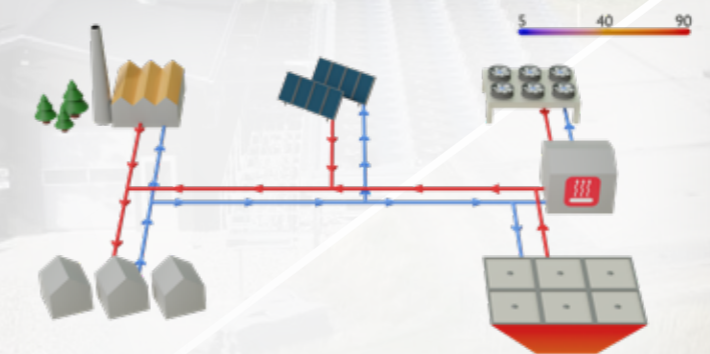
A solar heating plant is not only sustainable in operation. The equipment primarily consists of glass, steel, and aluminium – materials that can easily be reused, when the solar heating plant has served its time.

COMBINING GREEN TECHNOLOGIES

for improved efficiency and flexibility

Depending on the individual energy requirement, a solar-thermal plant can act as an independent stand-alone unit or in co-generation with other heat sources – regenerative or fossil.

Solar heat can be combined with one or several other renewable technologies including heat pumps, biomass plants or Pit Thermal Energy Storage (PTES) systems. All four technologies can, likewise, be combined within one system for optimum energy utilization and system flexibility.



Combining multiple green technologies within one system provides the client with a more efficient and flexible heat supply.

Naturally, the peak output of a solar plant occurs during the summer months. However, it works throughout the seasons producing hot water year-round even in partially cloudy conditions. The efficiency of a solar plant and subsequently the district heating production can be greatly extended by integrating a PTES into the heat supply. Solar heat in combination with an accumulation tank typically covers 20-25% of a district heating plant's annual heat supply, whereas solar heat in combination with a PTES can cover up to 50-60%, depending on the climatic conditions of the specific geography.

In heating supplies with an existing biomass boiler, a solar heating plant can be integrated in a way that allows for the boiler to be used as a temperature booster. There are, likewise, valuable synergies to be obtained and utilized by integrating a solar heating plant with a heat pump.

By combining several technologies, the heat production can be made either serial or parallel meaning that solar heat can be utilized to boost the temperature in another technology (serial production) or both technologies can receive and deliver the same temperature (parallel production). Integrating and combining multiple green technologies, enables the client to adapt the operation of the plant in accordance with the existing conditions – weather, electricity prices, etc – providing the client with a more efficient and flexible heat supply.

DESIGN, EPCM, TURNKEY DELIVERY

...we support you all the way

Aalborg CSP has 30 years of experience in designing and developing boilers, complex systems, renewable energy technologies and energy storage. We thereby have a deep understanding of individual energy needs, technology- and system integration as well as optimization with key competences such as performance modelling and system design.

We match individual energy needs with the right systems and technologies and integrate and combine solutions to achieve synergies between both sectors and technologies. We do so in order to create optimum value for our clients, while also optimizing the utilization of the world's energy sources aiming for a CO₂ neutral future.

We offer turnkey solutions and assist our clients in all aspects, from identification of energy needs to day-to-day operations. Besides turnkey systems, we also provide EPCM services, (pre-) feasibility studies and engineering consultancy supporting developers and investors in the conceptualization of the project and early project development. We, likewise, offer fast and efficient service when needed, as well as preventive maintenance in the form of a service agreement that ensure a reliable and optimal production.

IDENTIFYING NEEDS

- Optimised solution based on individual needs
- Specifying project requirements

PROJECT DEVELOPMENT

- Close collaboration with the customer/advisors
- Support in regulatory approvals
- Material and supplier selection

PRICE QUOTE PRESENTATION

- Fixed price and delivery time
- Presentation for stakeholders

PROJECT MANAGEMENT

- Pipework
- Integration
- SRO - Control, Regulation and Monitoring
- Start-up, Commissioning and Testing
 - Training in operation
- Operation and maintenance plan

CHANGING ENERGY

around the world

Aalborg CSP A/S is a leading developer and supplier of innovative, renewable technologies with the vision Changing Energy aiming at changing the way energy is produced and stored today. We design and supply green solutions and integrated energy systems based on solar power, energy storage within power-to-X (PTXHEAT and PTXSALT), heat exchange and much more for industries and power plants worldwide.

Since 1988, Aalborg CSP has utilized its immense expertise within design and delivery of boilers, complex systems, renewable energy technologies and energy storage. Thereby, we have a deep understanding of individual energy needs, technology- and system integration as well as optimization with key competences such as performance modelling and system design.

Aalborg CSP A/S places strong focus on R&D activities and works both internally within the company and externally with Danish and international knowledge-based companies and institutions in continuously creating innovative and sustainable technologies.

Aalborg CSP offers a wide variety of renewable energy solutions including high- and low temperature energy storage, solar panels, heat pumps, boilers, integrated energy systems as well as customized Power-to-X solutions. We match individual energy needs with the right systems and technologies and integrates and combines solutions to achieve synergies between both sectors and technologies. We do so in order to create optimum value for our clients, while also optimizing the utilization of the world's energy sources aiming for a CO₂ neutral future.

Headquartered in Aalborg (Denmark) and with a sales & service office in Spain, Aalborg CSP A/S has realized cost-effective green energy solutions worldwide.



AALBORG CSP
- Changing Energy

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