

HEAT PUMP INTEGRATION

for optimum energy utilization and flexibility



INCREASED SYSTEM FLEXIBILITY

with sector coupling



A heat pump's ability to recover energy and create synergies between energy systems makes the technology a key element in the green energy transition. By integrating a heat pump in a district heating supply, district heating plants and utility companies are able to achieve higher levels of flexibility in their energy production thereby providing the consumers with a less expensive, while still stable heat supply.

Integrating a heat pump with other heat sources such as e.g. solar heating- and biomass plants can prove profitable in terms of improved efficiency and flexibility.

At Aalborg CSP we are not obliged to make use of one specific heat pump technology. Instead, we support our clients in finding the most suitable heat pump for the individual project. By choosing the right type of heat pump, an optimization of the heat production can be obtained, while still reducing the electricity consumption in order to ultimately achieve a lower price on heat; which is less sensitive to fluctuating electricity prices.

Aalborg CSP's in-depth understanding of individual energy needs and year-long experience in integrating and combining solutions and technologies to propose the most value-adding solution allows us to offer turnkey integrated heat pump systems.

OPTIMIZED EFFICIENCY

with heat pump integration

Depending on the individual energy requirement, a heat pump can act as an independent stand-alone unit or as an add-on to an existing heat source, such as a solar heating- or biomass plant. District heating supplies with an already existing heat source can benefit from heat pump integration as a heat pump can be used for optimization of the existing heat source.

By integrating a heat pump in e.g. a solar heating plant, it is possible to obtain and utilize valuable synergies between natural energy sources and thereby optimize both the flexibility and efficiency of the heat supply. In such combination plants, waste heat from transformers and engines is utilized while integrating solar heat. This increases the yield of solar heat, while the COP (Coefficient Of Performance) is likewise improved. Calculations show that the yield from an existing solar heating plant can be increased significantly by 8% to 28% through intelligent integration of a solar and heat pump solution.

Furthermore, it is possible to integrate the heat pump solution in the existing energy infrastructure in a way that enables district heating plants to sell regulation services to the electricity companies. The district heating plant is able to run the heat pump in accordance with the development in the electricity price.



A heat pump can be integrated with other energy sources; e.g. utilized to optimize the efficiency of a solar heating plant

This means that besides running the heat pump when there is an actual demand for heat, the heat pump can also run when the price on electricity is low or even negative. The heat produced during this time is then stored inside a heat storage accumulation tank. By doing so, the district heating plant profits on purchasing electricity for their heat production.

CUSTOMIZED SOLUTIONS

for optimum energy utilization

Aalborg CSP matches individual energy needs with various technologies as well as integrates and combines solutions with existing energy systems to create optimum value for our customers. A number of parameters are essential when choosing and establishing a heat pump.

Choice of heat source is one of the key parameters in district heating systems, as the heat content of the energy source is of significant importance. The higher the heat content of the energy source is, the lower amount of energy is required to raise the temperature to the desired level.

In some cases, it is possible to combine energy sources to achieve the best efficiency – COP – and thus the most financially favourable solution.

ENERGY SOURCE

- Outdoor air
- Excess industrial heat
- Biomass
- Waste water
- Sea water
- Existing solar heat as efficiency improvement
- Condensation improvement in existing boiler
- Other

The various energy sources each have their own advantage. Outdoor air is easily accessible in large quantities and is an energy source with relatively few technical challenges. A heat pump using outdoor air as energy source uses approx. ½ million m³ of air/hour per MW heat produced. Moving such large amounts of air is not a problem, but it may cause noise. It is therefore important to carefully consider the location and dimensioning of the energy absorbers to make sure they will not disturb the surroundings.

In addition to using natural and renewable energy sources, heat pump solutions designed by Aalborg CSP also uses natural refrigerants. Ammonia and CO₂ – which are both efficient and sustainable refrigerants – have been used in the solutions provided so far. We are not obliged to make use of one specific technology but deliver the solution most suitable for the individual project. However, for environmental and safety reasons, we have deselected to make use of synthetic, fossil and highly explosive refrigerants.

When establishing a heat pump, it is furthermore important to make a thorough analysis of the future flow temperature needs. The lower the flow temperature you can accept, the cheaper the investment in and operation of the heat pump.

FROM IDEA TO REALITY

...we support you all the way

Aalborg CSP will support and assist you in finding the most suitable energy source and location for your heat pump system – a solution where both noise and recirculation are taken into consideration. In connection with requirement analysis and calculations, various available calculation tools are used - including Aalborg CSP's own system integration calculations. These tools enable us to assist our clients in choosing the right size and type of heat pump, while guaranteeing the lowest possible heat price.

We assist our clients in all aspects of the process from identification of energy needs to day-to-day operations. We are happy to assist with information and clarifications of technical and financial matters as early in the process as possible, in order for the optimum solution for the individual district heating plant to be defined.



CHANGING ENERGY

around the world

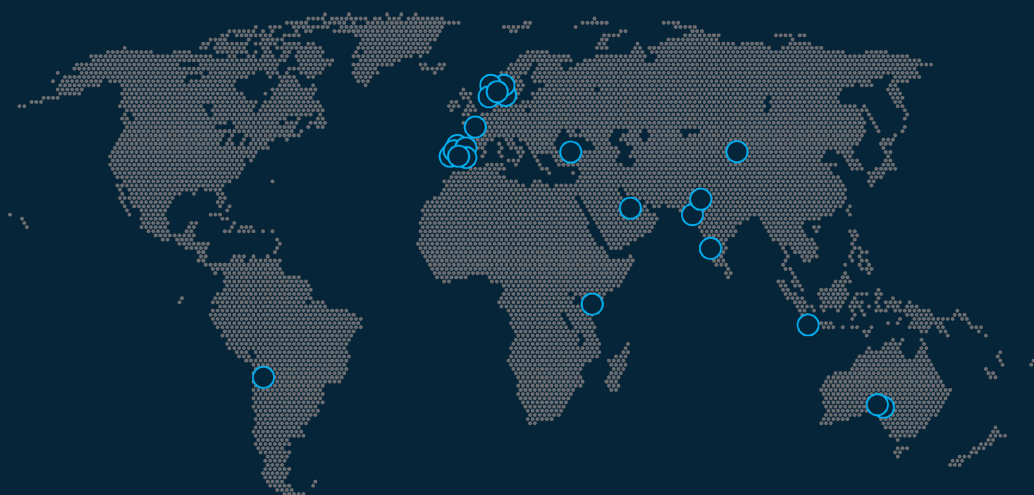
Aalborg CSP A/S is a leading developer and supplier of innovative, renewable technologies with the vision Changing Energy aiming at changing the way energy is produced and stored today. We design and supply green solutions and integrated energy systems based on solar power, energy storage within power-to-X (PTX_{HEAT} and PTX_{SALT}), 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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