# Low temperature heat grid enables excess heat to be used for economical heating and cooling supply

Climate change is in full swing and we need to act urgently – politicians are aware of this and are enacting a series of new laws to accelerate the transformation to a $CO_2$-neutral energy supply.

In Germany the most important are: the Energy Efficiency Act (expansion of renewable energies, mandatory use of excess heat for companie), the Building Energy Act (use of renewable energies in buildings) and the law on comprehensive heat planning (grids with renewable energies / excess heat).

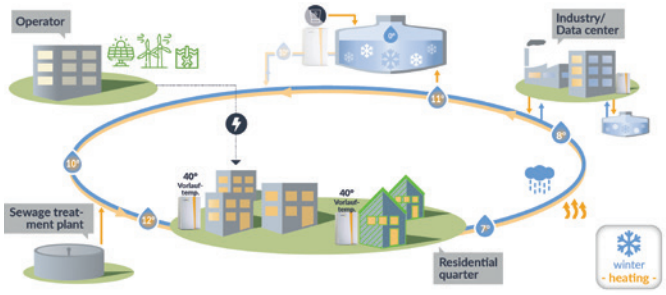
**Only by reducing energy consumption, switching to renewable energies and thus also reducing greenhouse gases we can make a sustainable contribution to climate protection. The focus of politics is on heating grids and heat pumps.**

But how can this be implemented in practice? Which renewable/ sustainable energies should be used to supply the many heating grids and heat pumps? In addition, many of the requirements of these laws present those affected with enormous challenges that are seemingly insoluble - companies see their existence threatened. Excess heat-intensive businesses (e.g. food processors, data centers, etc.) are required by law to reuse a difined amount of their excess heat. They would even give away the excess heat generated, if a user could be found. Municipal utilities and grid operators are usually not interested, as the temperature of the excess heat generated is often only around 30 °C and therefore cannot be used for existing grids or new ones.

**BUT WHAT IF...**
excess heat could be used, even at low temperatures, to heat buildings? An energy grid that ensures energy supply in a climate-neutral, low-loss and cost-effective manner by integrating excess heat and heat pumps (operated by renewable electricity)? A grid that not only provides sustainable heating energy, but can also provide environmentally friendly cooling in summer?

caldoa GmbH has developed a way to realize this type of energy supply based on energy-optimized, cold heat grids and seasonal latent heat storage, so-called ice storage*.

In this combination, even excess heat below 30 °C can be transported over many kilometers without thermal loss and extremely cost-effectively, stored for months and made available on demand with a high degree of security. These grids are operated all year round at a temperature of approx. 10 °C and can therefore not only supply heating energy, but also cooling energy for industrial processes and/or buildings.




**Exemplary illustration of a low temperature heat grid and its participants**

This dual use makes such grids more economical as conventional “hot grids” cannot be operated economically in summer due to the low demand. As cold heat grids do not require thermal insulation, the costs for installation are significantly lower than for comparable hot grids.

**Conclusion:**
**The technology described makes it possible to use almost any form of excess heat to supply municipal grids – even over long distances.**

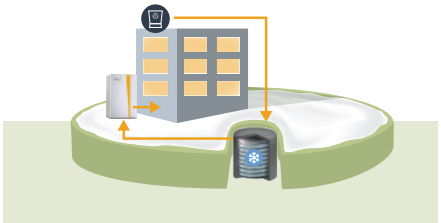
**These grids supply $CO_2$-neutral heating and cooling to consumers, are particularly economical and also solve the problem of many companies that are obliged by the Energy Efficiency Act to make the excess heat they produce usable.**

*** How does an ice storage work?**

The ice storage uses the so-called heat of crystallization. This is released when a substance changes its physical state from liquid to solid. When 0 °C cold water freezes into 0 °C cold ice, as much heat is released as would be needed to heat the same amount of water from 0 °C to 80 °C.

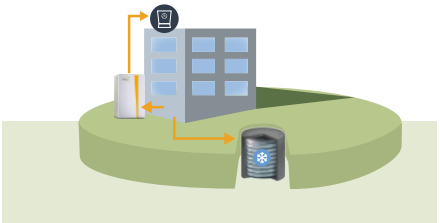
**winter**
The heat for the building is extracted - via the heat pump - from the ice storage[1] and indirectly from the ambient air.
**The building is heated (heat supply).**

[1] Due to the heat extraction in the ice storage, the water in the storage ices up.



**summer**
The heat in the building is given off directly to the ice storage[2] or – via the heat pump – to the ambient air.
**The building is cooled (heat extraction).**

[2] As heat is withdrawn from the building, the ice in the storage melts.



caldoa GmbH · Donaustraße 12 · 88046 Friedrichshafen · Tel: +49 7541 / 599 767 0 · www.caldoa.de · info@caldoa.de