



Ecoice
Kälte GmbH

Eco ice systems mean you use innovative technology for cost-effective and environmentally friendly production of heat and cold.

Eco ice Kälte GmbH is based in Borna near Leipzig. Since 2013, we have been working on the development and serial production of absorption refrigerators for customers in the industrial and commercial field. We endeavour to provide you with complete systems from one source.



Our production facility on a 25,000 m² premises in the heart of Central Germany

- Our own series production
- Our own testing station
- Testing station for research and development purposes

Our core competencies

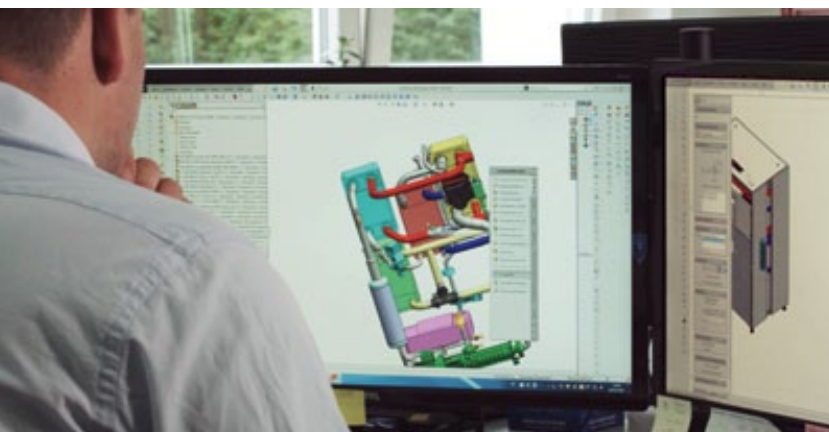
Our new **absorption refrigerator ("AKM")** produces cold by recycling unused heat. A particularly energy-saving, ecological, and sustainable system. Our scope of supply includes all components necessary for the operation of the plant, like an adiabatic cooling tower, a latent-cold storage unit, an ice storage tank, a heat storage unit and a cascade for low-temperature refrigeration.

Eco ice works closely with academic and industrial partners and uses the synergies that result from these cooperations in the area of research and development. They have led to another of our innovations, which is a **plant for the use of the cold energy released during the process of regasification.**

The premises of the Eco ice Kälte GmbH (view from above)

Reduce costs and use energy sensibly

Save energy costs and reduce your energy consumption significantly. At the same time, you're making an important contribution to environmental protection. The best way to demonstrate how this works specifically for you is in a personal conversation.



Engineer during the development of an AKM



Inside one of our production halls in Borna

Application areas for the Eco ice technologies



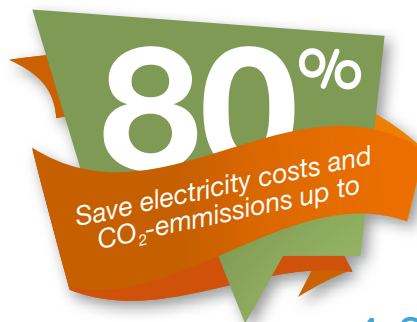
The technologies by Eco ice facilitate typical normal cooling applications as well as providing temperatures for deep-freezing or air conditioning. This is often used in connection with a CHP to generate additional power and achieve trigeneration. Your application possibilities in various company divisions are increasing substantially through additional usage of peripheral aggregates, like ice storages or CO₂ cascades:

- Freezing and chilling in process technology
- Refrigeration applications in distribution warehouses
- Air conditioning applications in buildings
- Refrigeration applications in agriculture
- Decentralised independent electricity

Our core competencies and focus: Creating cold from heat. This is how it works.

1. Making use of free available surplus heat

- Absorption cooling technology can make use of thermal energy, i.e., of surplus heat from a CHP engine or a solar thermal installation.
- Instead of an electrical motor, the formerly wasted thermal energy drives the cooling process.
- You save up to 80% electricity, electricity costs and CO₂ emissions.
- Our Eco ice absorption refrigerators run at temperatures below 100°C (85-95°C).



3. Heat surplus still available for other applications

- Remaining thermal energy can be used for heating of office or sales spaces, hot water generation, thawing and defrosting processes, etc. That will make your energy system even more cost efficient.
- With the Eco ice system, you will use any primary energy invested in your system and minimise remaining surpluses in the best possible way.

2. Production of cold at different temperature levels

It can supply various areas of the business venues with different temperature levels.

- Air conditioning (18 to 24°C)
- Standard cooling in cold storage (-2 to 4°C)
- Deep-freezing in combination with a CO₂ Cascade with electric compressor (-18 to -30°C)

4. Safer and environmentally friendly cooling due to separate circuits for refrigeration and cooling distribution

- Primary circuit for refrigeration using ammonia as a natural refrigerant inside the absorption refrigerator.
- Secondary circuit for cooling distribution with brine as a non-toxic and non-flammable coolant.

The AKM by Eco ice: the ecological refrigerator



Our absorption refrigerator (“AKM”) can be operated at a very low heating level.

Our AKM is compact and can be combined with various cooling systems (e.g. cold brine systems, cold water systems, or direct expansion systems). Due to the small number of mechanical components for connecting individual systems, it requires very little maintenance. The AKM can easily be integrated in building management and control systems and IT network systems. The system can be monitored and controlled via Internet remote access from anywhere. The system is also highly ecological. It does not contribute to the greenhouse effect nor to harming the ozone layer.

Absorption refrigerator and recooling unit

The perfect solution for your business

The Eco ice absorption technology is mainly suitable for commercial applications within the small and medium power range. It thus serves an area that previously could not be served by absorption refrigerators, which are mostly used in large process engineering and air conditioning systems.

User-friendly and suitable for temperatures below 0°C

Unlike other known medium-sized cooling systems that use heat as the drive, the Eco ice absorption refrigerator is also designed for effective temperatures below 0°C. With our easy to use technology, air conditioning is also applicable. Larger cooling capacities can be achieved here than those indicated for low temperatures (please see table below).

Powered by heating temperatures below 100°C

The Eco ice absorption refrigerator is widely independent of electrical energy. It is powered by heat and is limited to heating temperatures below 100°C.

Quiet operation

The Eco ice absorption refrigerator does not require mechanical compressors. Only the pumps and coolers make noise.



*Compact design
Low weight 550 kg*

Heating power requirement Q	56 kW	Flow temperature	90-95°C
Temperature room	Temp. water/brine	Cooling capacity	COP
Normal refrigeration -2 to 4°C	-6/-3°C	25 kW	0.38 - 0.48
Air conditioning 18 to 24°C	6/12°C	50 kW	0.68 - 0.75
Server/Machine cooling	about 18°C	70 kW	0.78 - 0.84

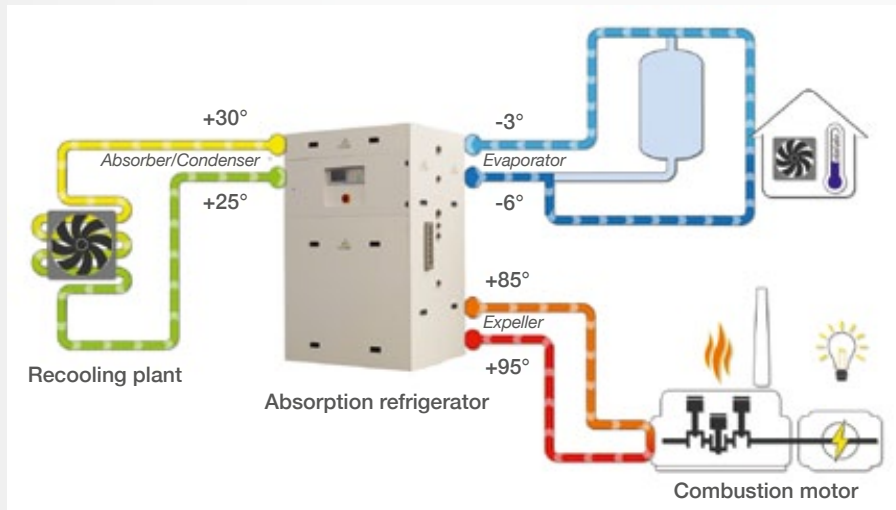
The absorption refrigerator (AKM) produces cold from the energy of excess heat, which is used to drive it. The driving heat can be provided in the following ways:

- Surplus heat from cogeneration, gas turbine, or fuel cell. This makes trigeneration possible.
- Surplus heat from process engineering and steam condensate.
- Solar heat that is available right when cooling is needed.
- District heating, which can be used in the summer months and is available at low cost at that time.

Eco ice Technician during the implementation of an AKM in combination with a CHP at one of our customers from the food trade sector

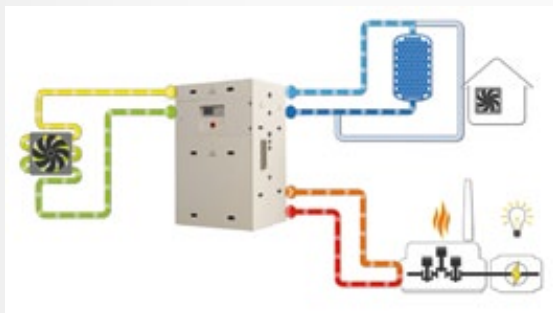


Absorption refrigerator active principle

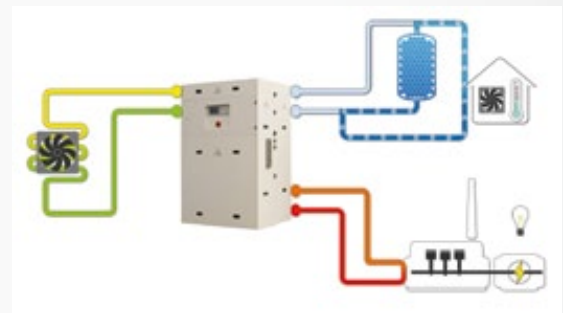


Operating states of the absorption refrigerator in combination with a cold storage. Thereby you are able to cool in an optimized and cost-effective manner, depending on your actual demand.

Variant 1
Normal operation without storage



Variant 2
Latent cold storage charge



Variant 3
Latent cold discharge

Cold from natural gas (LNG)

High-quality deep-freeze cold is one of the most expensive energies that we know on Earth. Our patented Eco ice regasification system uses a cold source that accumulates along the way with no additional cost.



For this innovation the Eco ice Kälte GmbH received the “Deutscher Kältepreis 2016” (German Cooling Award), awarded by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety.



Particularly suitable for autonomous applications

LNG applications make especially good economic sense in poorly developed areas that are not connected to a gas supply system. These areas often lack the capacity for high-throughput electrical connections. Producing low temperatures with conventional compressor technology thus becomes a problem. Since regasification cold works almost without electricity, only low-power connections are required.

Suitable for commercial applications

Regasification cold by Eco ice is also suitable for applications in commercial refrigeration. It can be used for system sizes of less than 100 kW cooling capacity. This area is still largely overlooked in the recovery of cold for the regasification of LNG.

Applications in freezing

In contrast to other known cooling systems that can be operated without mechanical compressors, the regasification cold by Eco ice is suitable for effective temperatures up to -38°C . At the same time, applications to the freezing point and air-conditioning applications can also be achieved.

Quiet operation

Regasification cold by Eco ice does not need mechanical compressors. There is only one pump for circulating the brine, which operates very quietly.

Cost-saving, economical, and sustainable

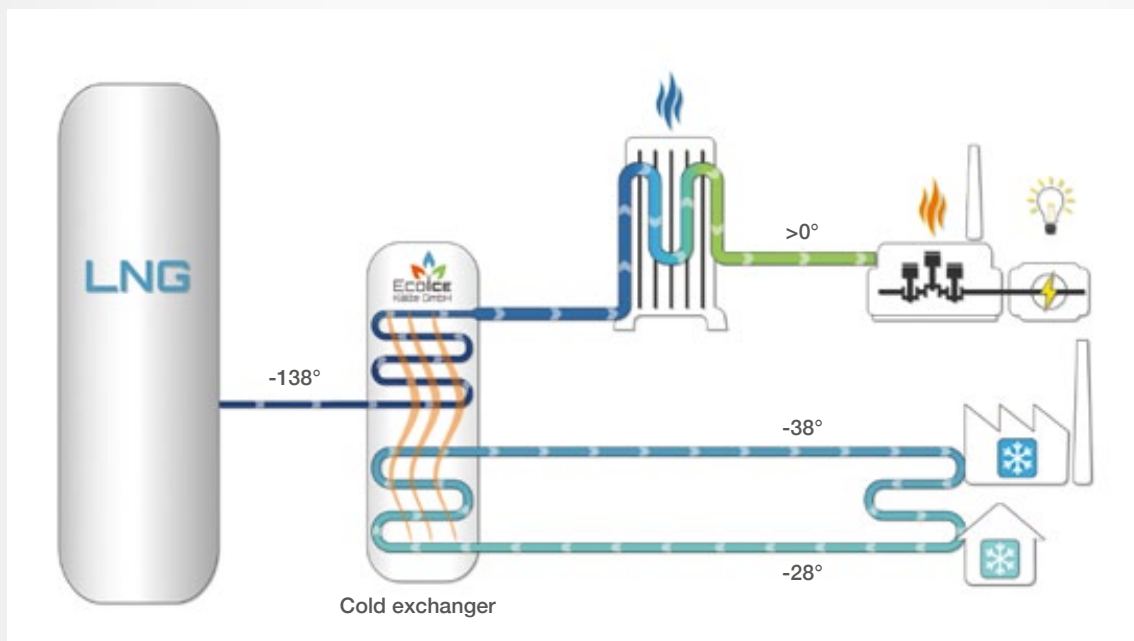
Due to the use of stainless steel in the essential components, high operational reliability and system availability is ensured. Regasification cold by Eco ice has very few moving parts and is therefore virtually maintenance-free and very long-lasting. Expensive maintenance requirements resulting from the F-Gas Regulation (Regulation (EU) no. 517/2014 on fluorinated gases) are not a problem because only “waste cold” is used here, which would otherwise have been released into the environment, and no refrigerant with ozone depletion and global warming potential is used.



Natural gas (NG) in its normal state is a gaseous, i.e. voluminous fuel. To downsize natural gas, it must be cooled down to -162°C so that it is transportable. The gas becomes a liquid – LNG (Liquefied Natural Gas), which requires only one six-hundredth of its original volume. LNG can be much better stored and transported as a gaseous natural gas as a result of this reduction in volume. LNG is often stored in what is called a satellite system (double-walled, vacuum-insulated storage). In order to use the natural gas from such a satellite system as a fuel, it must again be converted into a gaseous state. This process (also called regasification) produces valuable cooling energy.

Cold exchanger within the LNG system

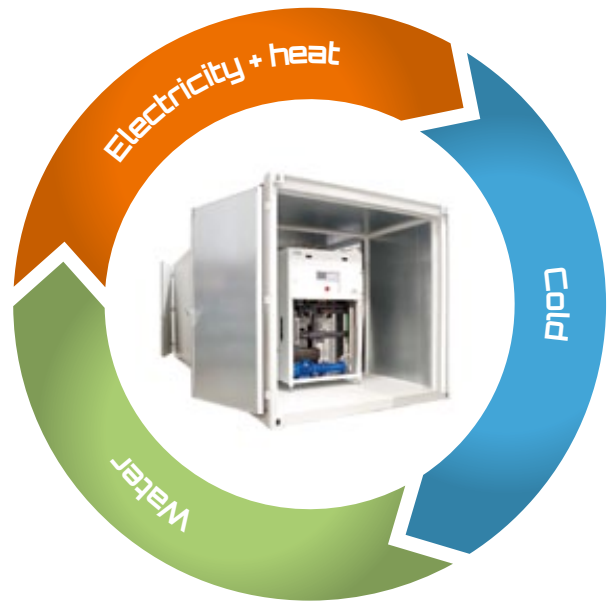
Regasification active principle



To use the regasification cold, it is transferred without an electric compressor solely by heat transfer from the vaporised gas to a brine circuit. The cold can be supplied to multiple consumers with different effective temperature levels via this brine circuit.

AUTARK - Autarchy through innovative container solutions

Electricity, heat, cold, and water – we produce customised container solutions “Made in Germany” for you with which you can supply your locations in poorly served areas. Here at Eco ice, we develop innovative container systems jointly with our partners in heat and waste water technology with which you can ensure that you are supplied optimally and without high assembly efforts at new sites.



Well accomodated in poorly served areas:

- Interim solutions for newly developed industrial parks
- Hotel facilities in isolated regions
- Camps and military bases
- Agricultural applications
- Supply of the population in remote territories

In particular, we offer:

- Power generated by an oil- or gas-based cogeneration plant (CHP plant or gas turbine)
- Heat for heat supply
- Water heating
- Refrigeration for the kitchen areas and food storage
- Air conditioning for the cooling of accommodations
- Purification of waste water
- Wastewater treatment to produce process water

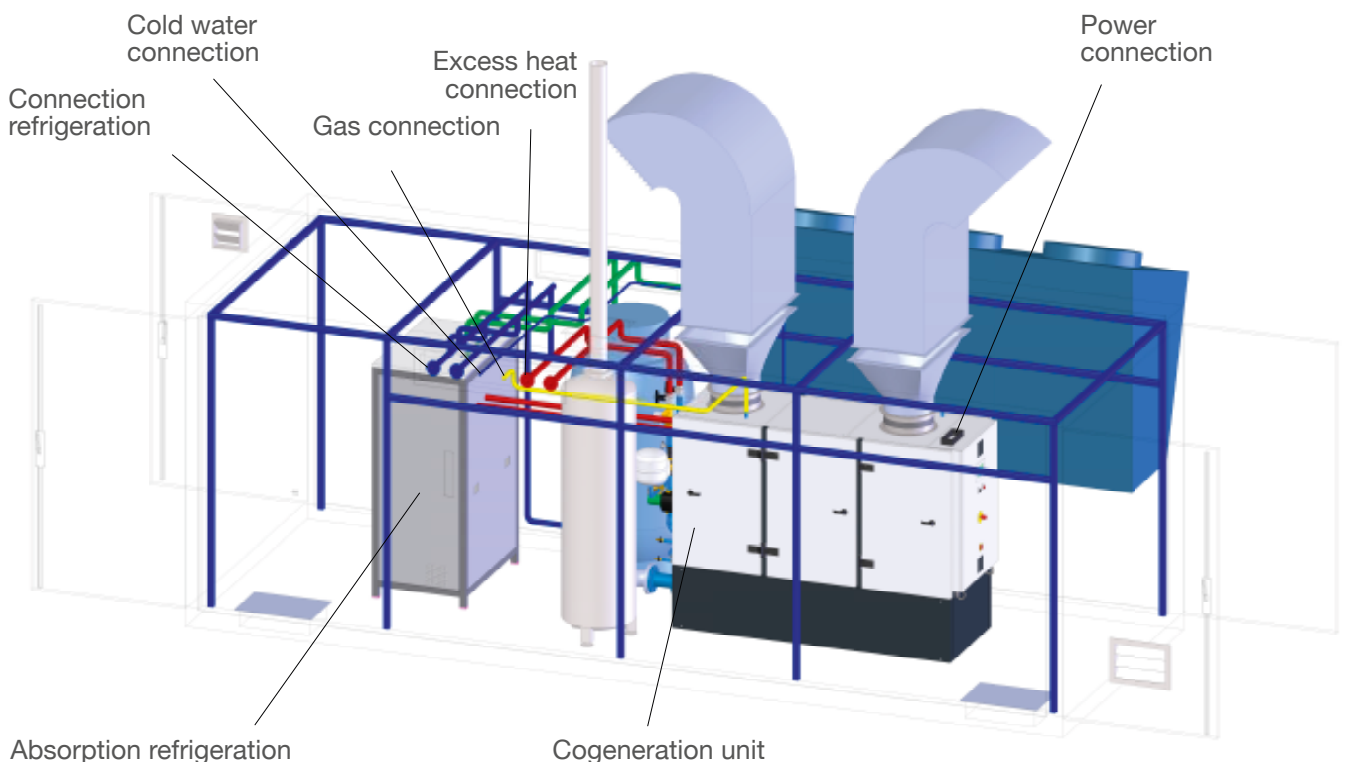


Illustration of a container including AKM, CHP and recooling unit



You decide what you need – we manufacture for you.

Our container solutions can be divided into three requirement areas: Electricity + Heat, Cold and Water. Our sophisticated engineers are able to develop and manufacture containers precisely tailored to your needs.

Electricity + Heat

- CHP in the desired performance class (electrical power 50 kW and more), Heat on diesel-, fuel oil- or gas base (thermal output up to 80 kW)
- Storage tank for fuel for at least 2 days
- Hot water tank for heating and hot water supply
- Control cabinet for electricity distribution

Cold

- Absorption refrigerator to produce cold -2°C to 4°C for cooking and food storage (refrigerating capacity 25 kW and more)
- Adiabatic coolers for the absorption chiller
- Ice storage for air conditioning of rooms during peak loads

Water

- Wastewater treatment plant with an innovative membrane technology
- Wastewater treatment plant for the production of process water

Absorption technology and cold recovery from liquefied natural gas are amongst the most environmentally friendly technologies in the field of refrigeration.



Eco ice stands for climate-friendly cold production.

- the absorption technology applied at Eco ice is the most eco-friendly technology for the generation of cooling due to its high primary energy efficiency if surplus heat is used.
- our cooling system is being operated using a natural cooling agent, ammonia, which has outstanding thermodynamic properties and excellent ecological characteristics (GWP: 0 / ODP: 0)*.
- cooling units based on the Eco ice system are exempt from ever stricter regulations concerning CFCs and HFCs.
- we integrate cooling and ice storage for greater efficiency and sufficiently high performance for brief strong cooling demand.
- deep-freeze cooling can be generated energy-efficiently and eco-friendly through regular cooling produced by the absorption refrigerator using a cascade with CO₂ as a cooling agent.
- at Eco ice, we guarantee an eco-friendly manufacturing process of the containers with no need for gas and oil due to the usage of a blow moulding process.

* GWP = Global Warming Potential,
OPD = Ozone Depletion Potential



Green light for nature

Energy-efficient technologies without investment costs

Would you like to benefit from the modern Eco ice technologies to cut down your costs of electricity, heat and cold?

Make use of the Eco ice technologies without the need of capital! In addition to the planning, installation, commissioning and maintenance of the energy-efficient plants we support you with:

- the search for (public) funding opportunities
- the application for funding
- the search for partners who take care of the financing.



How does it work?

- We analyse potential savings and develop jointly with you an individual plant concept based on the energy-saving Eco ice technologies.
- We arrange contracts for you with companies that sell electricity, heat and cold to you in a framework of a contracting contract and thus finance you an energy-efficient system.
- You will have the opportunity to buy the plant after the contracting period.
- Thus you continue to benefit from the realised savings even after the contracting period.

Are you interested in our products and/or services?

Then please contact us. Send us your most relevant data on electricity, gas, heating and cooling - and we will calculate the potential savings for your company regarding the supply of electricity, heating and cooling.

Please fill out the online-form you will find on our website by scanning the QR-Code or visit directly at:

www.eco-ice.net/en/kontakt/downloads/



Eco ice Kälte GmbH

Am Heiligen Holz 10
04552 Borna / Germany

Phone +49 (0)3433 74 66 70
Email info@eco-ice.net

www.eco-ice.net

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of Kälte-Klima-Sachsen GmbH.
www.kaelte-klima-sachsen.de



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regionale Entwicklung