

Regional-Eisbahn Sense-See AG, Dürdingen FR

Thanks to the new refrigeration system, training on the Dürdingen ice rink can take place as early as August. The new system also cuts electricity costs by around 36 % and heating oil consumption by 80 %.

'It's just not acceptable that the canton of Fribourg has only one ice rink' – so said a few sports enthusiasts in Dürdingen in the early 1990s, so they founded the Regional-Eisbahn Sense-See AG. 'Almost everyone in the village bought at least one share', recalls businessman Hans-Jörg Schweizer, who was one of the co-founders of the company. The new rink opened in 1996. Since then it has kept pace with the development of winter sports in the region: changing rooms, stands, club rooms and equipment storage rooms were added progressively and the season was extended as teams advanced to higher leagues. In addition to HC Dürdingen Bulls and EHC Bösingen, two other clubs are based on the premises; during the week, around 20 schools hire the ice rink. Including public ice skating, the ice rink hosts around 55 000 entries each year. Approximately 1800 people from the region now hold shares in the company.

Roughly 30 kilometres of glycol lines are installed in the concrete slab under the ice rink. An ammonia refrigeration system cools the glycol to the required temperature and dissipates the excess heat to the outside air via a heat exchanger on the roof. The original refrigeration system was designed for operation during the cold winter months. With the earlier start to the season, however, the energy-intensive icing of the rink was brought forward in summer to the end of August. The equipment regularly reached its limits. At the same time, the upgrading of the adjacent rooms increased the requirement for heating and hot water. When even higher maintenance costs were incurred for the ageing refrigeration system, the management decided on an innovative solution. This not only has

sufficient cooling reserves for hot days but can also cover the heating requirements of the ice rink most of the time without using fossil fuels, and even uses less electricity compared to the old system.

The new cooling system is connected to an industrial heat pump via a desuperheater, which covers most of the heating requirement for heating and hot water. The existing oil heater only needs to be used if the outdoor tempera-



External view of the ice rink with the new heat exchanger on the roof. Photo: Philippe Clerc.



The ice rink in operation. Photo: Alexander Raemy.

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ture falls below -2°C . The heat exchanger on the roof was enlarged and adiabatic cooling was added. The cooling of the water produced during evaporation means that the refrigeration system can work at full performance even at an outdoor temperature of 35°C . Out of season, the heat pump uses the heat exchanger as a heat source. The system is also equipped with efficient IE3 motors and variable frequency drives (VFD), which can control the output with extreme precision according to the temperature of the ice.

After two seasons, the operators are extremely satisfied with the new refrigeration system, which can be operated much more conveniently and consumes significantly less energy. The electricity consumption for the entire ice rink decreased from 500 000 to around 320 000 kWh per year. It has been possible to eliminate a large proportion of heating oil consumption: instead of 15 000 litres of heating oil per year, only 3000 litres are now used.

This project was supported by the ProKilowatt subsidy programme under the auspices of the Swiss Federal Office of Energy.



Philippe Clerc,
Operations Manager

'The transition to renewable energy is imminent, we need to radically change our way of thinking. I am happy to send out one small signal after another, our children shouldn't have to carry this burden alone!'

Topmotors

About one-third of the electricity consumption in Switzerland comes from industry. More than 70% is due to electric motor systems. Topmotors' priority is to give an impulse by encouraging the use of highly efficient motors and intelligent controls. All the Topmotors events, together with practical information, can be found here: www.topmotors.ch



Left: The old refrigeration system. Photo: Philippe Clerc. Right: One of the two new compressors with a 110 kW IE3 motor. Photo: Topmotors.

Comparison before / after		
	Before	After
Installation(s)	York International, built in 1996	Wettstein Kältetechnik, 2x Grasso V 600
Motor(s)	can no longer be determined	2 x ABB M3BP, 110 kW, IE3
Transmission	directly	directly
Maximum refrigerating capacity	400 kW	550 kW
Coefficient of performance*	1.9 – 3.15	2.65 – 4.7
Electricity consumption	350 703 kWh/a	235 050 kWh/a

- Energy savings per year: 115 653 kWh electricity and approx. 12 000 litres fuel oil
- Cost savings per year: 17 348 CHF for electricity and 11 280 CHF for fuel oil; total 28 628 CHF
- Investment costs: 783 000 CHF, including ProKilowatt subsidies: 35 000 CHF
- Payback: 27.4 years without subsidies, 26.1 years with subsidies

* depending on external temperature