

## Bakery Weller, Dreieich

**MIWE can  
Weller Bakery created new refrigeration space using  
CO<sub>2</sub> as a future-safe refrigerant. MIWE was the only pro-  
vider willing to take on the challenge. Successfully!**

"Investments must be future-safe," reasons Master Baker Matthias Weller. Together with his father, Hartmut, he has grown the bakery to a medium-sized company. In 2001, they transferred production from the inner city to an industrial park. At the time, Weller had five branches. Now there are 22, and the production space has grown to 1,000 m<sup>2</sup>. However, it is now reaching its limits again. That is why the Weller family purchased a neighbouring hall.

Another production area totalling 1,700 m<sup>2</sup> was converted in just under eight months. The old hall is now only used for proofing, baking and order picking. "All dough production, preparation and refrigeration facilities are located here," is Matthias Weller's explanation of the processes in the production area. The refrigeration area plays a key role – in

terms of space too.

"Refrigeration is immensely important," explains Matthias Weller and admits that the refrigeration space planned during the last expansions was too small. Now, large refrigeration spaces have been created, which also facilitate expansion. But Matthias Weller wanted to make its refrigeration system future-safe in other ways too. CO<sub>2</sub> is to be used as a refrigerant.

The refrigerants currently used on the market are being phased out. The EU introduced the regulation colloquially known as the "F Gas Regulation" (EU Regulation No. 517/2014), which defines how long each refrigerant can be used. The aim is to minimise the proliferation of greenhouse gases.

The refrigerants are measured in CO<sub>2</sub> units based on the GWP figure (Global Warming Potential). CO<sub>2</sub> has a GWP figure of 1, while the common refrigerant R404a has a GWP of 3,922. As of 2020, refrigerants with a GWP greater than 2,500 may no longer be used. →



Matthias Weller has already built refrigeration systems twice – they soon became too small both times. This time, he chose a more spacious system using a future-safe refrigerant.



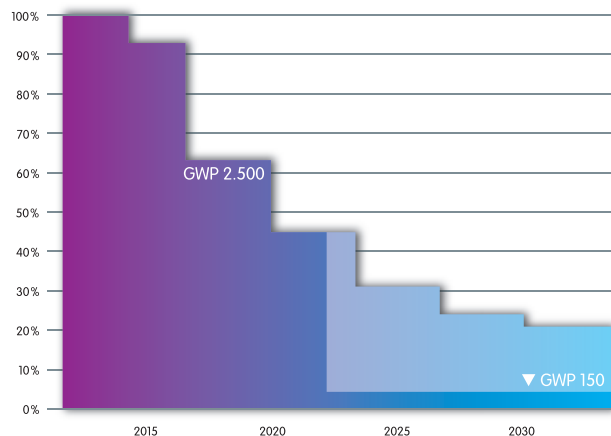
The main system is a large block with refrigeration cells (left), a flash freezer (centre) and a large deep-freeze storage unit (right).

For refrigeration systems with over 40 kW, the GWP must not exceed 150 from 2022 on. "You need to know that when looking into refrigeration technology," says Matthias Weller, who also holds a business degree. He has researched the topic extensively "just to be able to hold his own in conversations with the providers."

Besides MIWE, Weller sent inquiries to another leading provider of refrigeration systems for the baking industry. "Only MIWE was confident in its ability to deliver an integrated system with CO<sub>2</sub> as a refrigerant," recalls Weller. The other provider wanted to offer a system with individual machines, only some of which ran on CO<sub>2</sub>.

"Only MIWE was willing to accept the challenge of building a "transcritical" system that can cover a large temperature range (flash freezing to normal cooling)," is how Weller remembers the meetings with the providers. A key challenge for such systems is that the heat is dissipated isobarically (at constant pressure) on the high pressure side and not isothermally (at constant temperature). The intelligent control system ensures optimal pressure with regard to the respective operating conditions.

An integrated system means that multiple cooling cells – even at different temperatures – are cooled via one overall system. At Weller, one of these is a MIWE SF flash freezer for three rack trolleys. CO<sub>2</sub> means that products can be flash-frozen much faster, which improves the product quality (faster stoppage of enzyme activity, less drying). The flash freezing interlock transfers the dough pieces into the downstream dough preservation plant MIWE TLK for



Starting in 2022, operators of refrigeration systems with a connected load of more than 40 kW may only use refrigerants with a maximum GWP of 150. For smaller systems, a more gradual phase-out is planned, as shown by the lighter stages in this graphic.

approx. 130 rack trolleys.

"We didn't have a flash freezer before. We use it to prevent moisture entering the freezer chamber, and it also enables us to improve the quality of our products," explains Matthias Weller. This new quality refers, for example, to pretzels, which had been baked centrally until now. Now the lye-dipped dough pieces can be flash-frozen and refrigerated. They are transported to the branches and baked fresh on an ongoing basis in MIWE condo deck ovens.

Weller produces 100 percent of its baked goods in-house. "We are proud of this and communicate it externally," states the Master Baker proudly. The new refrigeration capacities will allow other products to be produced efficiently in batches and managed via deep freezing.

The large refrigeration block in the new system also contains two cooling chambers: A MIWE NK for dough and a MIWE SK (cream cold storage) for mixes. In addition to this there is an area for raw material delivery, another deep-freeze storage unit MIWE TK and a normal refrigerating chamber MIWE NK. Matthias Weller: "The main thing was ensuring compliance with current and future hygienic and quality assurance regulations."

MIWE has been building integrated systems like these for many years. Compared with refrigeration systems which each have their own machines, the key advantage is that they are more energy-efficient. Combined with refrigeration machines controlled by frequency inverters, the systems run more smoothly and ensure constant refrigeration

performance. Among other things, this reduces the load on system components and increases their service life.

If CO<sub>2</sub> is used as a refrigerant, the system runs at a far higher pressure than usual systems. "That might put some people off, but food markets have been using them for several years," explains Matthias Weller. The lower energy consumption in particular is the reason retailers choose this refrigerant.

Weller had the expected energy consumption for both variants calculated. "Although I am generally critical of model calculations," he states from a commercial perspective. He finds them difficult to assess. "However, MIWE's calculations were quite conservative." In spite of this, it was clear that CO<sub>2</sub> saves a lot of energy. However, it must also be borne in mind that the investment entails higher costs. On the other hand, a government subsidy offsets this almost completely. "In the end, we have been saving electricity and money from day one," explains Weller.

Using CO<sub>2</sub> saves in two ways. Because CO<sub>2</sub> has higher pressure outlet temperatures, there is a higher temperature level for heat recovery. Generating new energy from waste heat is not new for Weller Bakery. The first expansion at the new location in 2008 already included a heat recovery system connected to the ovens. It is used to heat water in the old building.

Using refrigeration systems to generate heat makes sense. After all, what a refrigeration system does is dissipate heat from a room. Good insulation prevents heat flowing in from outside. That cools the space. The refrigerant dissipates the

heat. The heat is generally fed into the ambient air. If plate heat exchangers are installed in the return cooling line instead, much of the heat can be diverted and reused.

In the new hall, Matthias and Hartmut Weller had to consider a heating system. There are no ovens there that dissipate heat, and the hall itself had no heating system. "That was another reason for us to choose CO<sub>2</sub>," recalls Weller. The integrated system can dissipate water at a temperature of roughly 60°C via heat exchangers.

It fills a large buffer storage tank. The waste heat from the refrigeration systems is used to heat the space. Large panel radiators are secured to the ceiling of the hall for heating. The service water in the new hall can also be heated using waste heat from the refrigeration system. In very cold conditions, auxiliary heating is also available.

"That was the right decision," says Matthias Weller after the first weeks in full operation. The system is running at 100 percent. The production workflows in the new hall now run smoothly. "Next, we are going to demonstrate to customers that the investment makes us more environmentally friendly," explains Weller when asked about the next steps for the company. Another reason to choose CO<sub>2</sub> systems!

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The technology for the refrigeration system is housed "neatly" in a separate room.



All dough pieces for deep freezing pass through the flash freezer, which significantly improves their quality.



Weller's production facility is located in the Dreieich industrial estate. It also houses a store and café.

## A brief overview of Bakery Weller

Managing Directors Hartmut and Matthias Weller  
 Dieselstraße 11  
 63303 Dreieich

Branch outlets:	22
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### Employees:

Production:	35, of whom 4 are apprentices
Sales:	120, of whom 13 are apprentices
Shipping department/logistics:	13
Administration:	6

### Sample prices:

Rolls	0,35 Euro
Special rolls	0,60 - 0,80 Euro
Mixed flour bread 1,000 g	2,99 Euro
Danish-style pastry	1,40 Euro