



## SAVE ENERGY COSTS BY OPTIMIZING COOLING WITH CORE TEMPERATURE

### REDUCE ENERGY, IMPROVE FOOD QUALITY

Increasing energy bills and risks of blackouts are affecting food retailers everywhere. Energy is the second highest operation expense retailers must deal with, which is why the importance to reduce energy consumption thus decreasing costs, is top of the agenda. In food retail, refrigeration and cooling is responsible for the largest amount of energy use and achieving energy efficiency is the priority when upgrading any new system.

For example, typical store refrigerators and freezers are largely over cooling food products. Because they measure air temperature, any fluctuations like leaving a door open too long or a defrost cycle, will result in the coolers ramping up, and that's a lot of energy wasted.

### Axino Fresh Benefits

- Improved food quality & safety
- Simplified store operations & Reduced labour costs
- Food waste reduction
- Energy savings
- Reduced maintenance costs
- Fast ROI

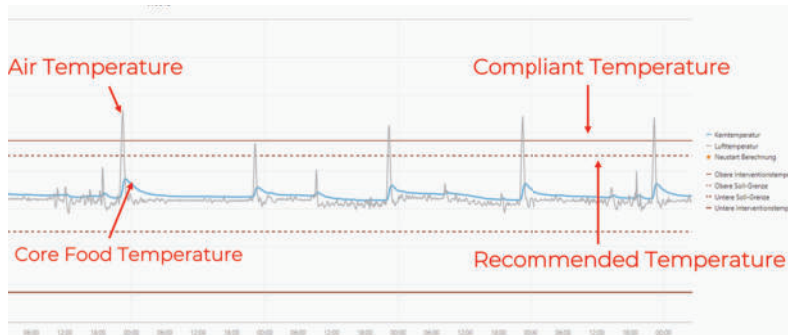
### Axino Fresh Features

- Automated Core Temperature for all food groups
- Plug & Play: retrofit any existing system
- Notification & Alerting
- Independent of power supply
- Fully scalable

## TEMPERATURE BUFFERS

To maintain safety compliance, cooler air thermometers have thresholds for high- and low- temperatures. For example, if the air temperature increases quickly, the coolers will correct for the increase in temperature, ramping up and bringing the air temperature down.

However, because air temperature fluctuates quicker than food temperature, by measuring Core Temperature of food, threshold gaps for high- and low- air temperature can be closed. This reduces the energy requirements and minimizes overcooling.

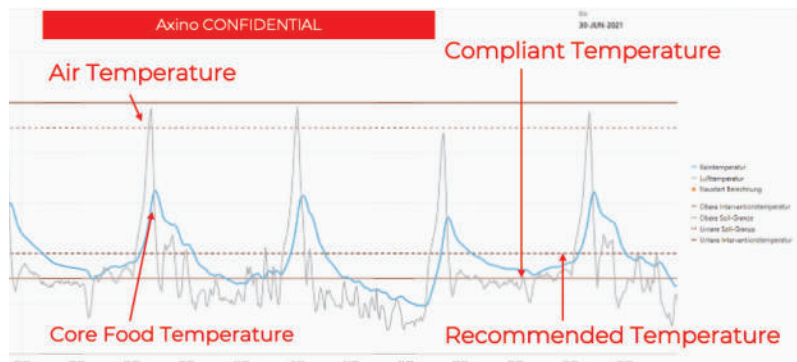


### Example Deep Freezers

- Potential to reduce overcooling is up to 7°C
- Core temperature of the product on average -23°C
- Cooling based on air & core temperature

### Example Plus Coolers

- Potential to reduce overcooling up to 6.5°C
- Maximum core temperature is 4°C or lower than necessary
- Average temperature below 0°C



## BY THE NUMBERS

We crunched the numbers and found that if temperature is reduced by 1°C this equates to 5% of energy savings! No less, an additional 1% energy savings can be achieved if a cooler is operating under optimized parameters



6°C



## Save 6% on energy per degree Celsius

- Transmission losses are calculated
- Overall, 100% of the losses are linear to about 20°C (or Kelvin).
- So if the temperature difference is reduced by 1°C, 1/20 less generation energy is needed, which is equivalent to 5%.
- 1% additional saving we have assumed as system optimization potential, if e.g. a critical refrigeration unit can be optimized and thus the system can be operated with optimized parameters (e.g. evaporating pressure).



**ASSUMPTIONS BY RETAILER**

Assumption saving = 6% of energy per 1 °C

Assumption savings per cooler at 1 °C = 300 kWh/a Chiller length = ø 2m.

Assumption price kWh 0.3 Euro

Refrigerated cabinets (incl ready to plug in)	Plus Coolers	Deep Freezers	Total
Example: 100 stores	4,100	1,200	5,300

**CALCULATIONS**

2.0°C Optimization potential average for plus cooler

5.0°C Optimization potential average for deep freezer

Cooler Type	Number of coolers	Temperature buffer °C	Optimization potential °C	Savings per cooler
Plus Coolers	4,100	8030	2.01	302 kWh/yr
Deep Freeze	1,200	5998	5.00	750 kWh/yr

**SAVINGS IN ENERGY COSTS**

Energy savings / yr	Plus Coolers	Deep Freeze	Savings Plus Coolers	Savings Deep Freeze	Total Savings
Savings per store	12,407 kWh/yr	9128 kWh/yr	€3722/yr	€ 2738/yr	€6460/yr

**THE POTENTIAL SAVINGS ARE HUGE!**

The only solution with patented Core Temperature measurement

## INNOVATION FOR MAXIMUM FOOD FRESHNESS

By combining Axino IoT sensors and data algorithms, you'll get key data insights for energy savings

Simplify store operations with the Visual Navigator and retrofit any existing cooling system with API integration.

Benefit from automated Health and Safety compliance reporting. With Axino, grocers can save energy and reduce food waste for maximum freshness.



**CONTACT US FOR  
YOUR PILOT  
INSTALLATION**

## BE COOL, STAY FRESH

Axino combines IoT sensor technology with patented AI algorithms to ensure freshness while reducing energy consumption. By digitizing and automating quality management process, we take the guess work out of food safety (HACCP) compliance. Learn more at [www.axino.ai](http://www.axino.ai)