# Thermal Storage Concepts

**Cold**Logic

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# Typical use of thermal storage in wineries

A. The thermal mass of the stored wine

This can be used in combination with a good tank temperature control system to shift the majority of non vintage cooling including cold stab to utilise off peak power.

This will give you energy savings and also reduced power costs of up to 10%.

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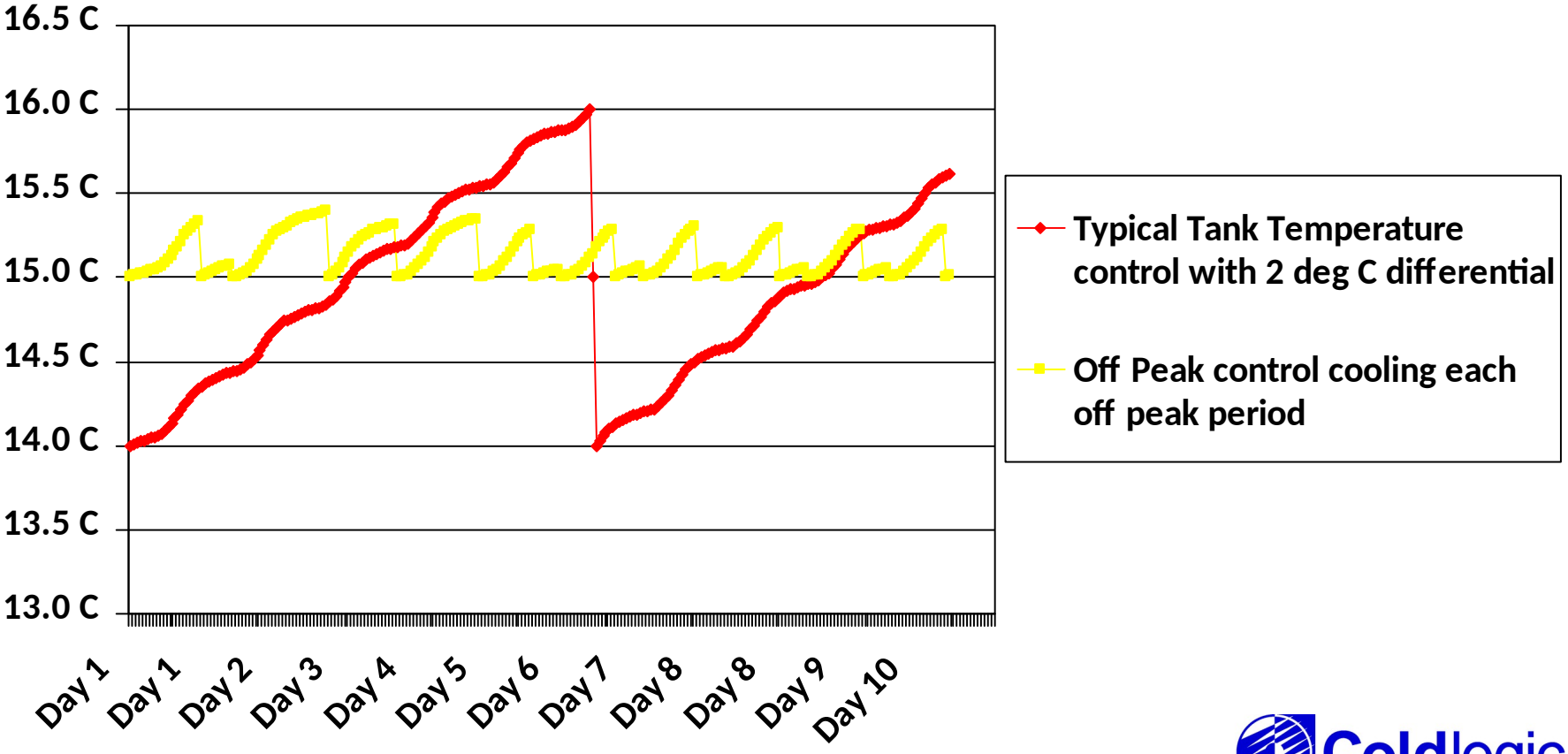
# Typical use of thermal storage in wineries

## Tank Temperature profile - Insulated Tank during Summer

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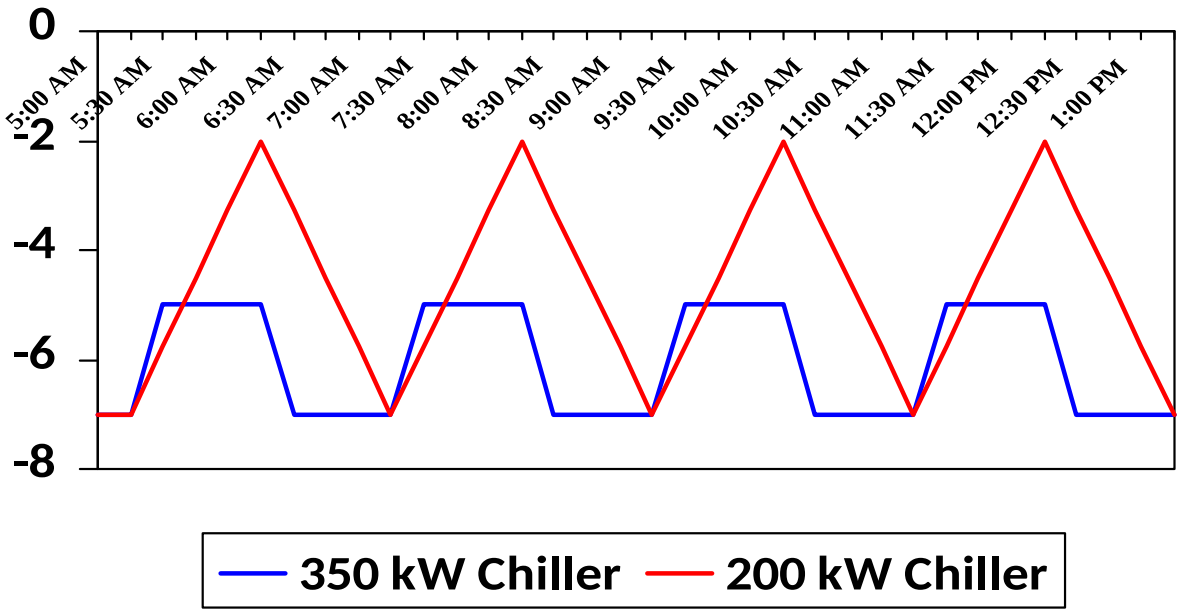
# Typical use of thermal storage in wineries

## B. Thermal flywheel provided by the brine tank

Used to minimise the required chiller capacity by reducing the peak load imposed by must chilling.




- 25 kL brine tank
- Must chill 20 tonne per hour from 25˚C to 10˚C
- 20 tonne batches and 1 hour between batches

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# Typical use of thermal storage in wineries

- Both of these applications utilise “Sensible Heat” changes
- Brine and wine are similar – Cooling 1 kL of wine by 1°C will warm 1 kL of brine by just over 1°C

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# Thermal Energy Storage (TES)

- Essentially what a TES system does is to store “cold” that is produced when power is at its lowest cost, the refrigeration plant can operate at its most efficient and cooling capacity is under utilized
- TES systems have been in use for decades, typically using water in Ice Banks for the air conditioning and dairy industry
- Utilise Latent Heat Change instead of sensible heat change

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# Phase Change Material

- A Phase Change Material or “PCM” is frozen during the charge cycle of TES system – Storing “Cold”

- The PCM is then thawed during the discharge cycle – releasing its “Cold”

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# TES Systems - Types

- Nodule systems such as Cristopia
- Ice Slurry systems (ethanol or glycol) such as Flow-ICE

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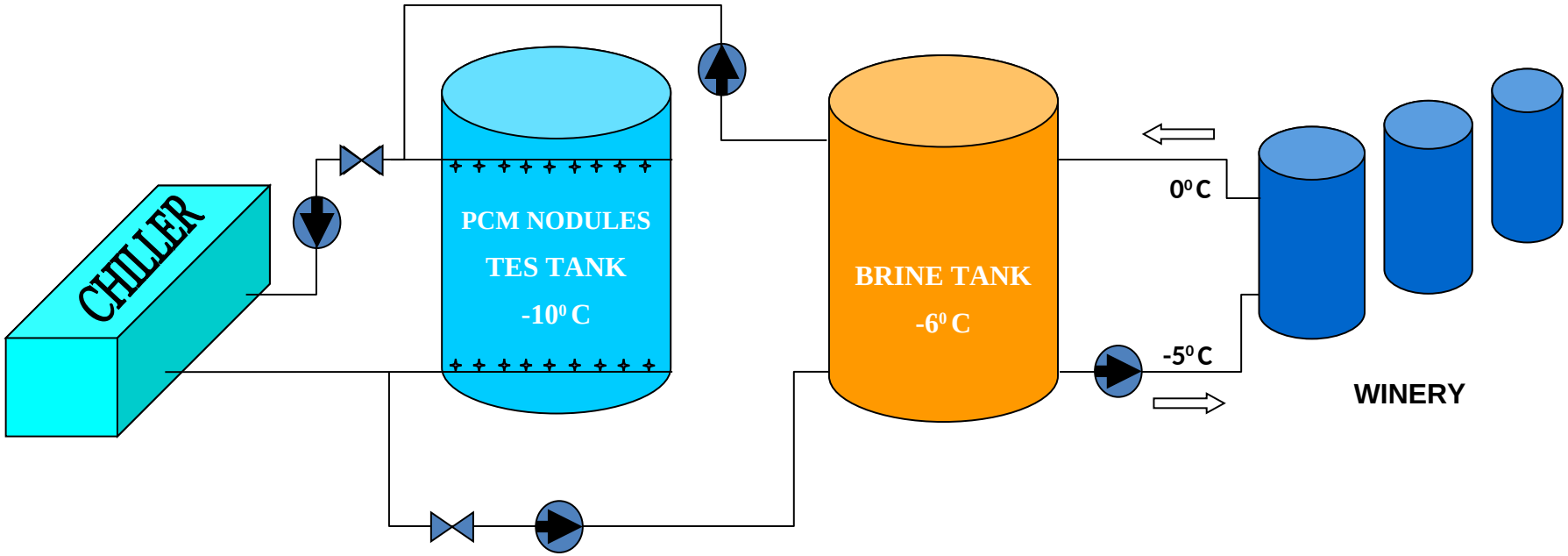
# RETRO FIT INTO EXISTING BRINE SYSTEM

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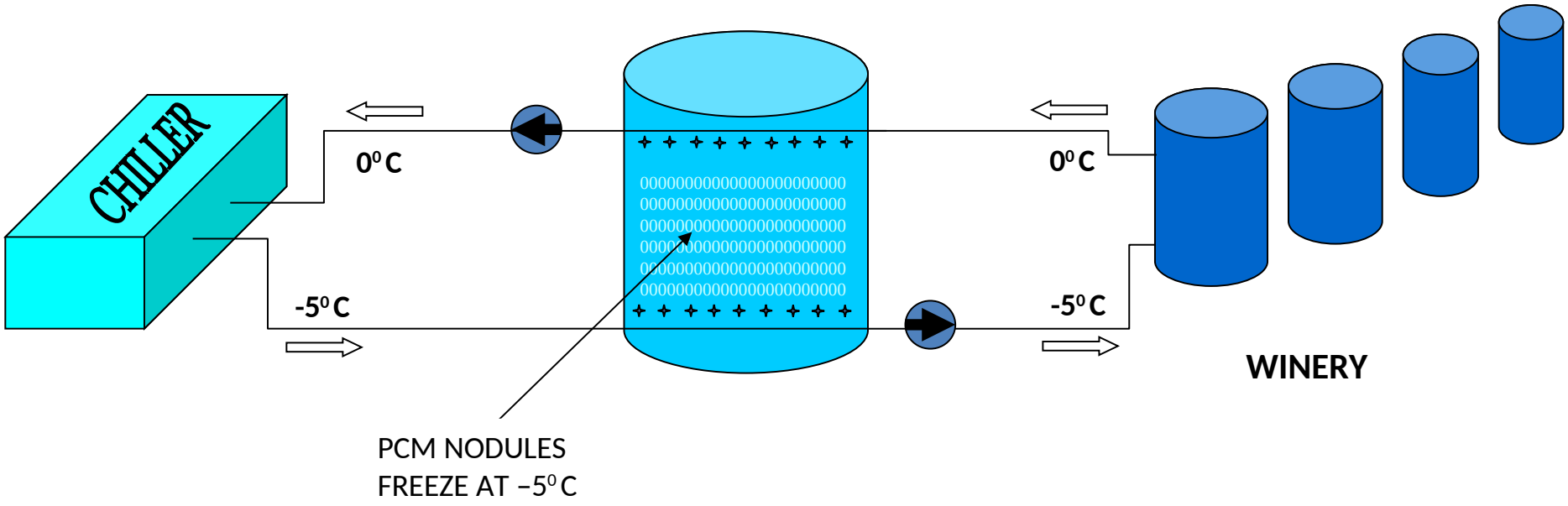
# NEW SYSTEM WITH A TES TANK

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# TES Requirements

- Specifically designed brine tank
- Specialist Design and Application advice
- Generally Smaller Chiller capacity
- Smaller power supply

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# TES Applications in Wineries

- Where power supplies are restricted a TES system can be used to minimise the required capacity of the refrigeration plant by spreading the load over the full 24 hours

  For a winery crushing 12 hours per day this may allow the refrigeration plant capacity to be reduced by 25% to 40%.

- As power costs increase the costs the payback time for these systems will reduce to be more viable

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# Summary

A well designed and installed TES system will require a smaller refrigeration plant than a standard brine system.

Initial capital cost comparable to standard system when power supply is considered.

Wine industry load profile means power cost savings are not as substantial as other industries.

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