The Road to Efficient Temperature Controlled Cold Storage

David Wallace, Director of Sales

Star Refrigeration

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30% increase in energy prices in 12 months

Increase in Climate Change Levy (CCL)

Energy costs can be second only to labour/transport costs

Energy Consumption needs to be addressed!
INITIAL QUESTIONS

• How much does your store cost to run?

• How does this compare to your competition and best practice?

• How will increasing energy prices affect profitability?

• How much does your store cost to maintain?

• Is your refrigeration plant fully optimised?
THE ROAD TO ENERGY EFFICIENT TEMPERATURE CONTROLLED STORAGE

Planning
- Minimise heat loss in store
- Site location and layout
- Product throughput and temperatures
- Ambient design temperature

Building Construction
- Minimise heat ingress
- Building fabrication and configuration
- Joisting and vapor seals
- Roof panels

Refrigeration System Design
- Select a robust solution which is optimised for your site
- System sizing and functionality
- Refrigerant choice and defrost methodologies
- Performance enhancing technologies and efficient controls

Maintenance
- Ensure system longevity and avoid breakdowns
- Proactive maintenance regime
- Robust response plan
- Knowledgeable and capable service partner

System Analysis and Monitoring
- Monitor operation and identify continuous improvement opportunities
- Assessment of system performance and power consumption
- Benchmarking
- Reporting and system feedback

System and Controls Optimisation
- Optimise ongoing performance as your site evolves
- Setpoint adjustment
- Compressor sequencing and control
- Address underperforming equipment

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PLANNING

- Site location
- Ambient design temperature
- Room temperatures
- Loading bay design
- Building operational usage
- Product throughput and temperature
- Refrigeration plant layout
- Minimise heat load in store!
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- Robust jointing and vapour seals on panels
- Thermographic scan of building fabric
- Assess door suitability and operation
- Roof panel colour and absorptivity
- Air curtains or strip curtains

Average monthly - £1238.55
Month with unsealed door - £1956.16
Extra spent per month - £717.60
Extra spend per year - £8611.20

Chill store refrigeration energy consumption
CONSTRUCTION

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REFRIGERATION SYSTEM DESIGN

- Plant matched to design and average load
- Variable speed drives
- EC Fans
- Floating head/suction pressure
- Defrost
- Air-cooled vs evaporative

![Graph showing comparison between Air Cooled and Evaporative systems]
Maintenance

- O&M Manuals
- Maintenance Checks
- Remote Monitoring
- Oil analysis
- Vibration Analysis
- Thermographic Scan

Capital Plan

Regulatory Inspections

AHA:
- DSEAR - Flammability
- MHSWR - Toxicity

PSII:
- PSSR – Dangers from pressure
- PUWER – Dangers from leaks
- To EN378

Safe & Legal
Compliant
Reliable
Efficient
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- Protective maintenance regime
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• Power consumption
• Specific Energy Consumption (SEC)
• Benchmark
• Analysis tool
• Low capital measures first
• Plan for capital investment
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1. Reduced operating pressures
2. Identification of underperforming equipment
3. Set point adjustment
4. Compressor sequencing and control
5. Energy analysis vs ambient/previous
6. Justification for CAPEX spend
7. Load profile generation
SYSTEM AND CONTROLS OPTIMISATION

- Efficiently controlled SYSTEM
- Demand management and frequency response
- Peak and off peak operation
- Set point increase
- Solar panels
CASE STUDY – DISTRIBUTION CENTRE

System analysis tool (Ethos) Installation

Targeted Diagnostics
Reports on efficiency gap
System performance reporting

Condenser cleaning
Float replacement
Passing control valves
Compressor Vi setting

Annual savings: £98k/year (14.2%)
190 tons of CO2

Capital investment actions can be justified by energy saving predictions.

Opportunity to install Frequency Response – Maximise energy savings by monitoring the national grid power supply.
Total consumption of sites to date:
8.6 million kWh/year installed

Non-CAPEX savings:
1.39 million kWh/year saved (16%) (£151,000)

Further savings with CAPEX:
1.2 million kWh/year savings proposed (14%)

Total consumption of sites by 2020:
47.6 million kWh/year installed

Non-CAPEX savings:
5.29 million kWh/year saved (11%) (£582,000)

Further savings with CAPEX (estimated):
4.7 million kWh/year savings proposed (10%)
SUMMARY

- Engage with an expert
- Benchmark your store
- Assess Opportunities
- Implement an energy reduction programme
- Continuous optimisation and improvement
- Reduced downtime and increased profitability

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Questions?

1. Star Refrigeration Ltd – Stand B24
2. Benchmarking tool
3. Analysis tool system dashboard
4. Maintenance expert
5. New energy efficient refrigeration systems
6. Construction and doors – (ISD Partner Stand B22)