



Remote performance optimisation.  
Saving you energy on your heating and refrigeration plant

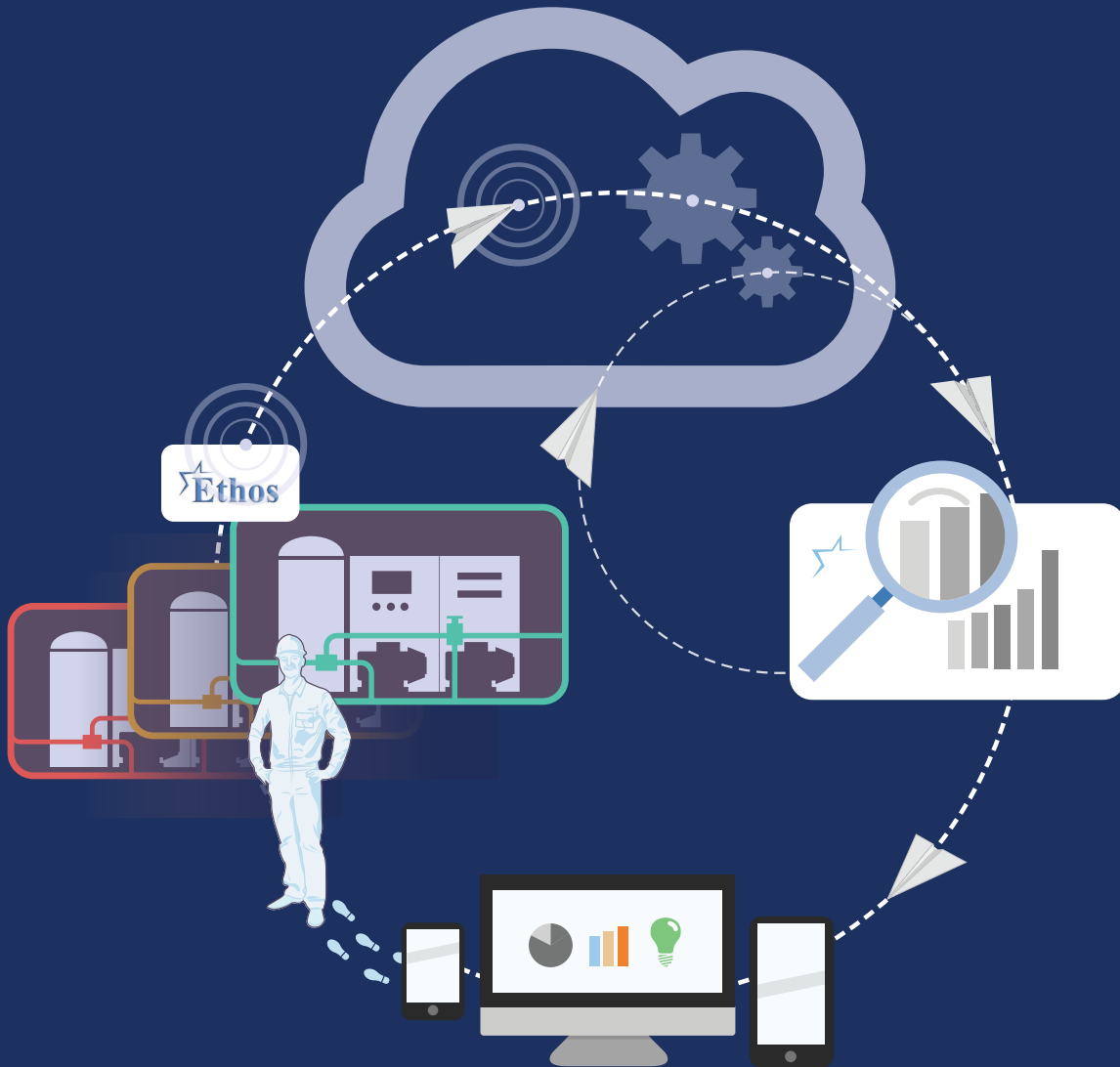


“ The average system costs five or more times its purchase price over its lifetime. Ethos aims to ensure you never waste a penny. ”





# Ethos Remote Performance Optimisation



## How we do it

Our standalone equipment collects relevant data from your refrigeration plant by a combination of the following: a data logger with sensors, a network based data logger or a web API.

Ethos analysis software then applies the live site data to a 'dynamic digital twin' of the cooling or heating plant to measure the gap between the ideal and the actual operating conditions.

This enables it to identify problems and suggest corrective actions to reduce energy usage and meet environmental goals. These **insights** are displayed on an online dashboard, along with energy usage data and equipment performance alerts to warn of any irregular behaviour. They also provide advice on specific and immediate actions to prevent unforeseen maintenance and energy costs.

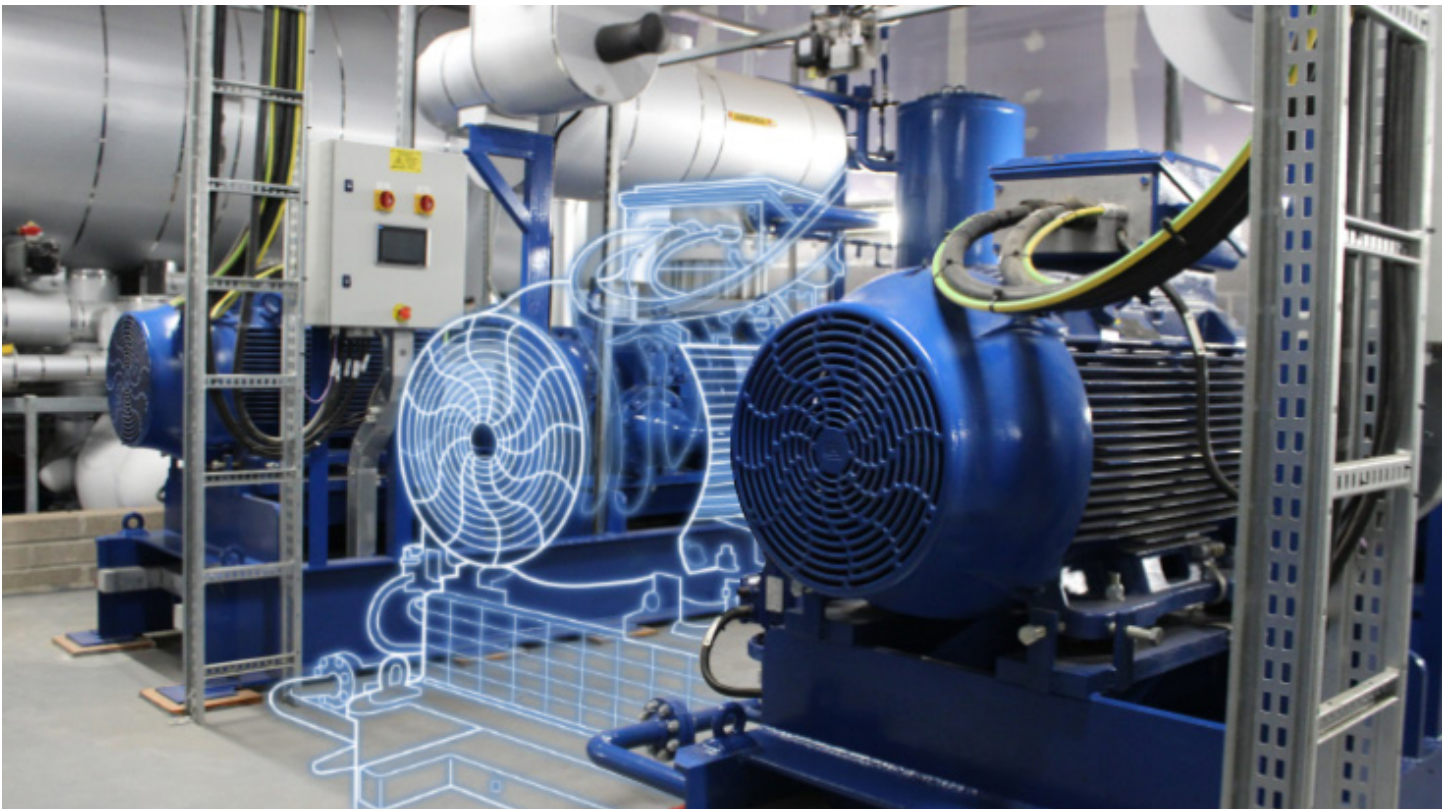


# Who we are

In this age of the internet of things, Star Refrigeration has for some time recognised the importance of data. It is for this reason we invested in using real time data for the optimisation of refrigeration plants.

Drawing on Star Refrigeration's 50 years of industry experience, a new business unit, Star Data Analytics (SDA), was set up to fill a gap in the market for strategic insight data services.

A team of award-winning senior refrigeration consultants, field engineers and software engineers joined efforts to develop Ethos, a one-of-a-kind bespoke data driven analysis software. The performance optimisation provided by Ethos finds ways for end users to reduce energy costs and CO<sub>2</sub> emissions.



# Why we do it

Ethos will reduce your energy consumption. It is also a tool to help you meet with the Climate Change Agreement (CCA) obligation. Ethos provides the answer to questions such as: "What is my plant duty? What is my actual refrigeration plant efficiency? Do I know if my plant is running how the designer intended?"

Since new energy goals set in 2017, the UK government has increased its decarbonisation ambitions by adopting the legal requirement to reduce carbon emissions to net zero by 2050. Around the world similar targets are being set by governments; Ethos is internationally available.

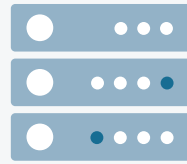


# Markets we serve

Ethos is suitable for use across a variety of industry sectors, from the food processing market to data centres, leisure facilities to district heating.



Leisure & Ice



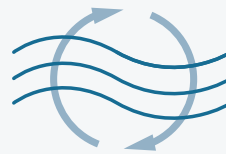
Data Centres



Food Production



Freezing & Chilling



Heating



TCS&D

## Ethos gives you the answers to questions like...

For full details on how <sup>4</sup>Ethos could benefit your business, get in touch with our team.

[ethos@star-ref.co.uk](mailto:ethos@star-ref.co.uk)

How can I be sure that my plant has been commissioned properly?

Do I have spare plant capacity?

Did the plant performance improve after the last maintenance visit?

How can I work towards meeting my energy reduction targets?





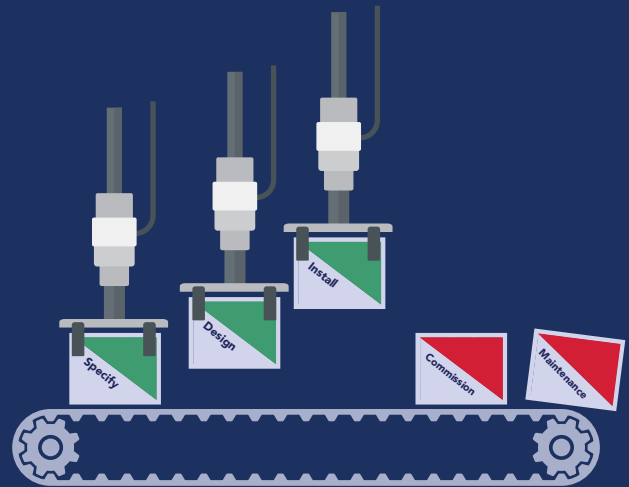
# How we save energy

Ethos has a proven track record of identifying up to 30% energy savings and sometimes more. Most of the energy saving actions are delivered by low cost maintenance actions or control changes. The rest are delivered by advising on capital spend projects.

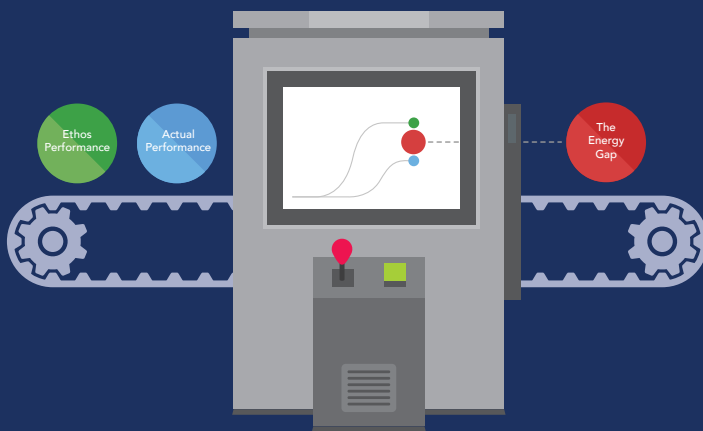
## Maintaining control of your energy spending

Ethos means you stay in control of your energy efficiency by keeping the spotlight on energy once the plant is up and running.

No matter how efficient the design and specification of the equipment, consistent attention still needs to be given to energy to avoid unnecessary costs.

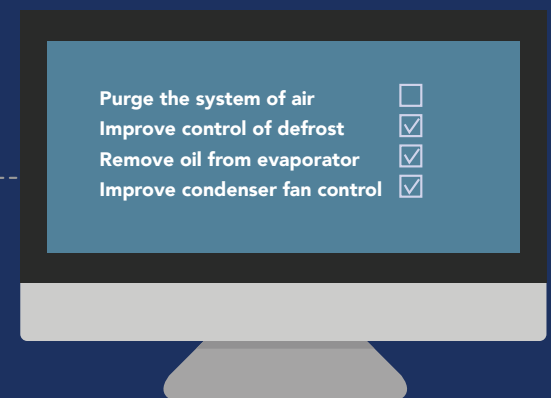


## How does Ethos give me control?



By using a digital twin, which shows the energy gap between how the plant is performing and how it should perform.

Ethos then goes a step further and advises on the reasons for the gap. Finally it helps you take action to close it and ensure it stays closed.





# Dashboard



## Tailored to your needs

We prioritise customer feedback so that every feature gives invaluable information about your site's performance.

## Live data

Ethos gauges your site's performance by analysing:

- › The system capacity (kW) and the current load
- › The local ambient temperature (read from the nearest weather station)
- › Current site COP (system efficiency) - The red and green adjust based on past performance so you can see if your system is improving

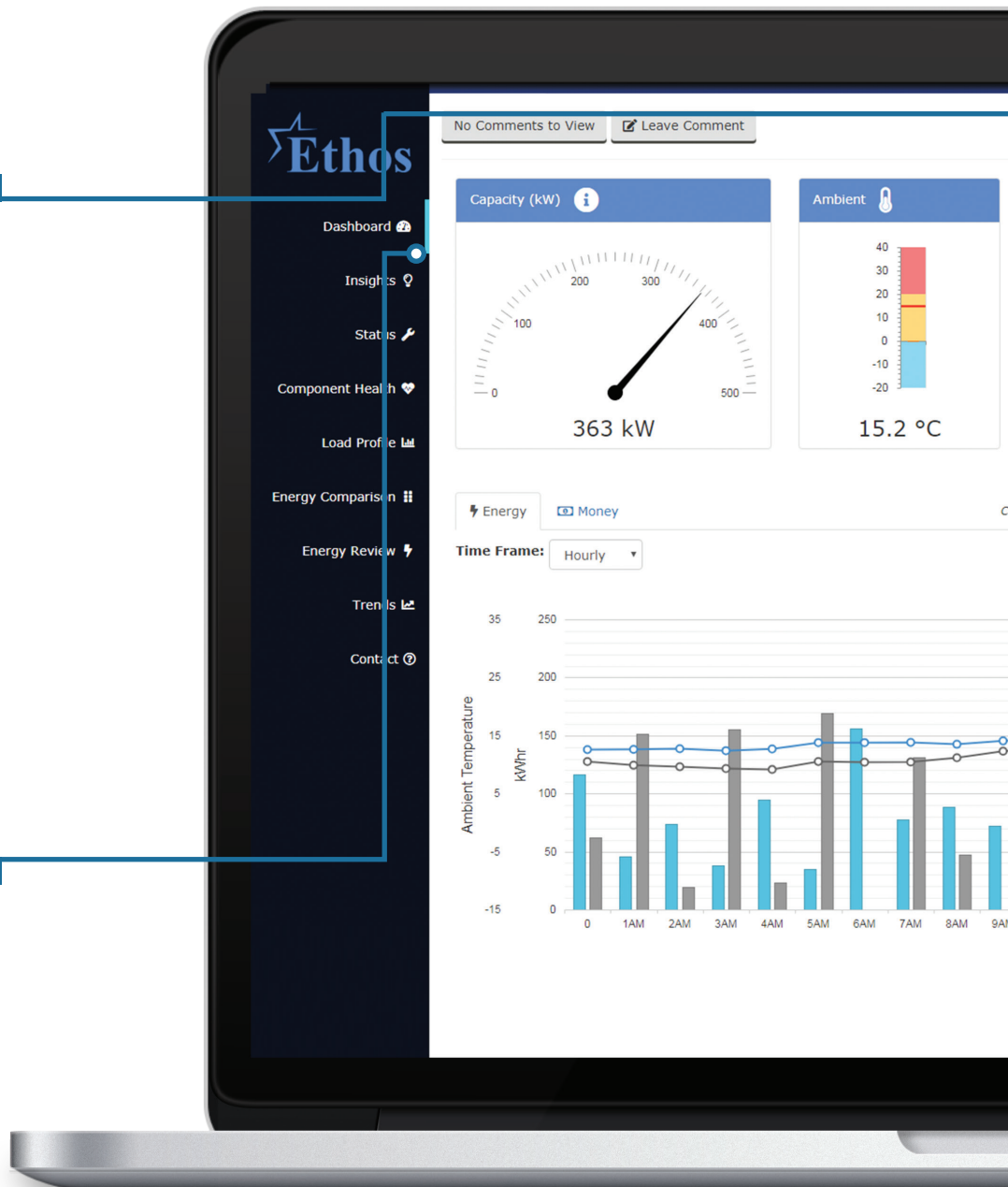
## Intuitive interface

Modules display information pop-ups that provide helpful advice

## Performance at a glance

The dashboard gives an overview of system vitals and makes it easy to gauge performance at a glance. Modules convey site data in a clear and concise manner.

Each system has its own corresponding dashboard. You can select the system you want to view at the 'Site Select' page.





## Equipment alerts

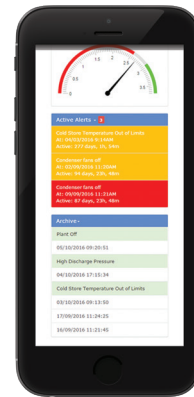
### Stay informed

Ethos sends you SMS or email alerts whenever irregular equipment behaviour is detected.

**Amber** denotes performance irregularity.

**Red** denotes equipment failure.

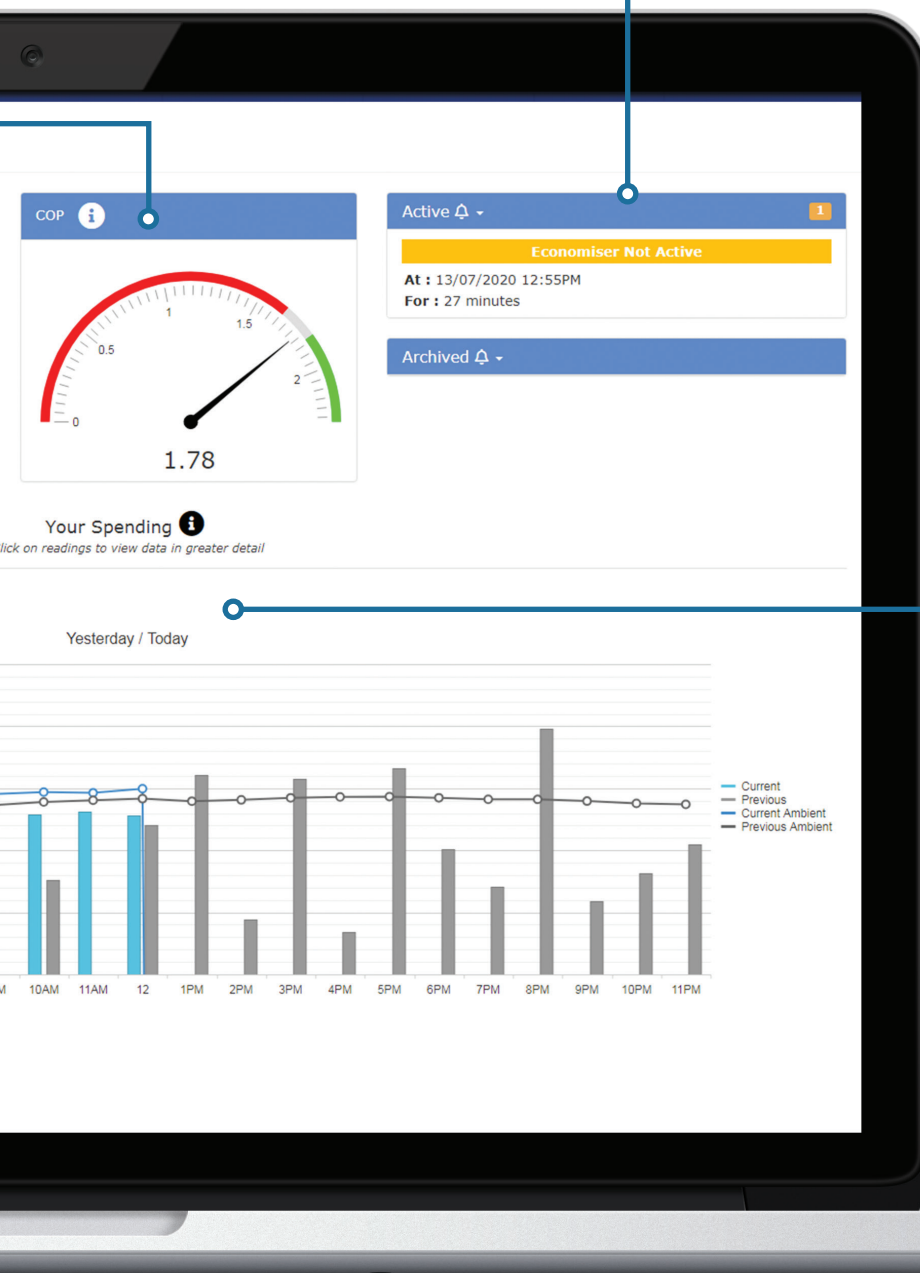
Resolved alerts are archived until the end of the month. You can review alerts in order to identify irregular patterns in equipment behaviour.



## Mobile ready

The application is fully optimised for use with a mobile device.

This means you can check your plant as easily as you would check your weather app.



## Track spending

### Spending made simple

The 'Your Spending' charts makes it easy to see:

- How much energy is being spent
- How much money is being spent

(Spending can be viewed per year, month, day or hour)

Values of the current and previous period are displayed for comparison and to highlight where savings have been made.

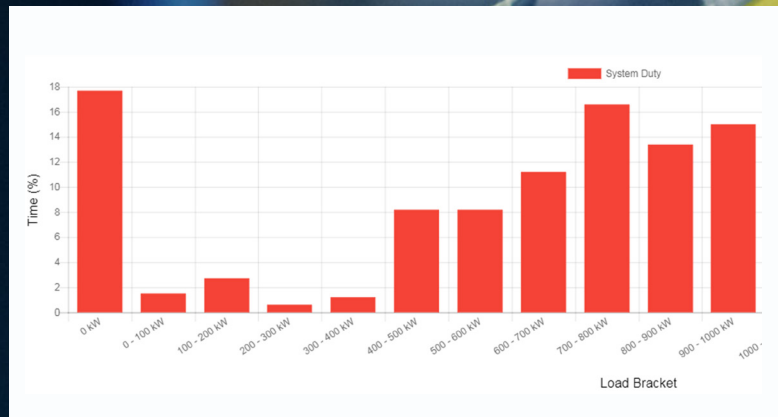


# More valuable features

Ethos is even more than performance optimisation.  
It also enhances customer operations with clever features on its online dashboard.

## Load profile

Ethos provides insights to inform businesses on strategic decision making through the load profile feature. This is useful when looking to expand capacity or throughput.



## Component health

This is a heatmap of component health which is Red, Amber, Green for a quick view of performance.



## Visibility

The Status page facilitates the monitoring of site equipment in real time. A simple overview of equipment status is available.





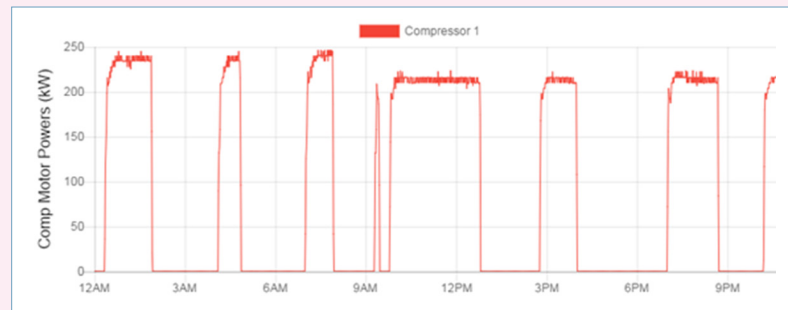
# Energy saving examples

Ethos has a proven track record of delivering up to 30% energy savings. It does this through identifying maintenance and control changes which require little to no monetary investment. Ethos provides continuous virtual access to the plant's operating parameters, plant energy usage, CO<sub>2</sub> emissions and COP, helping you identify inefficiencies and corrective actions.

## Scenario 1

A compressor where the Vi had been set wrongly at commissioning.

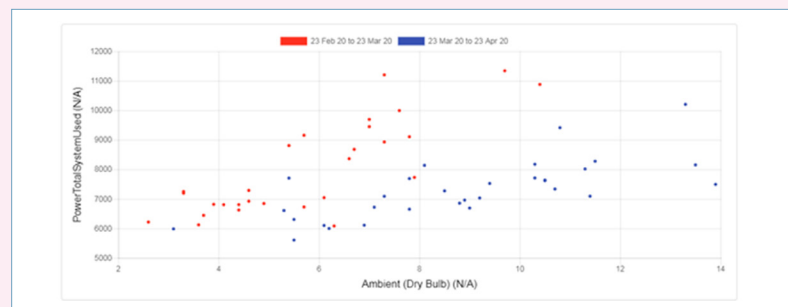
The error was identified some years later by Ethos and rectified. This single simple action reduced annual energy consumption by around £40,000.



## Scenario 2

High condensing temperature identified. Some control settings were changed.

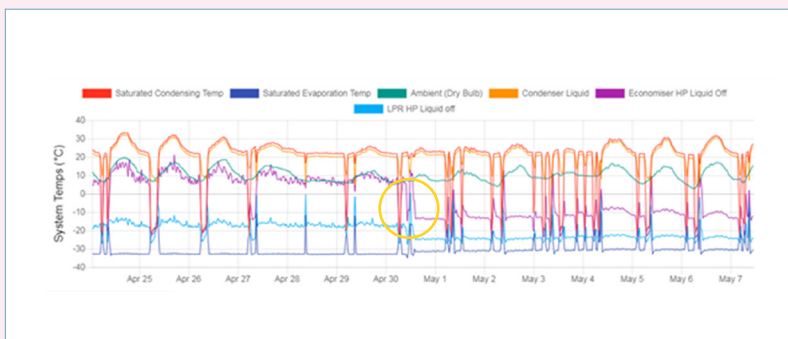
This is an example of site operators making changes to running conditions that had previously impacted adversely on energy performance.



Ethos identified the problem and settings were reverted to design conditions. Each dot represents the energy used on one day. Red dots are the week before the change and blue dots the week after. The graph takes account of the differing ambient conditions in March and April.

## Scenario 3

Economiser not working. Site was advised and engineer calibrated economiser valve actuator. The economiser was brought back to normal operation which increased efficiency by 12%, representing considerable financial savings.





# Case studies

## The Ice Co Storage & Logistics

Ethos performance optimisation remotely monitored and analysed data from the Ice Co Storage & Logistics refrigeration plant at Wakefield. The advice and insights provided by Ethos enabled the distribution centre to reduce its carbon emissions by 310 tonnes of CO<sub>2</sub> per year, and saved over £100,000 annually on energy bills.

Ethos proposed immediate changes to condenser fan sequencing, condenser fan control, low-stage compressor sequencing and system purging which required no capital investment, along with advising on corrective actions such as replacing an inefficient compressor.



**Customer:** The Ice Co  
**Location:** South Kirkby  
**Sector:** Temperature Controlled Storage

## Large UK retailer

Ethos helped a facilities management company slash £68,000 off their multinational retailer customer's annual energy bill at their distribution centre in the East of England.

Ethos delivered a set of low cost and quick to apply actions, including cleaning of all condensers, replacement of condensers float switches, repair of passing control valves, optimisation of adjustable Vi slides on the compressor and purging of air from the condenser - all resulting in annual savings of 680,000 kWh and 190 tonnes of CO<sub>2</sub>.



**Customer:** UK Retailer  
**Location:** East of England  
**Sector:** Temperature Controlled Storage





**“ Star Data Analytics have the knowledge and experience to identify exactly where savings can be made, and many of which are with minor unnoticeable changes in system operation. ”**

Joanne Webster, Compliance Manager - The Ice Co Storage & Logistics



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Star Refrigeration's network of offices across the UK provide services including maintenance, service, spares, new equipment/installations, retrofits and consultancy. We specialise in industrial refrigeration including temperature controlled storage & distribution, food production, beverage, process, pharmaceutical, petrochemical, leisure & ice, data centres and HVAC. Contact your local office for more details.

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