Business innovation in sustainable thermal systems

Building Model, Engineering and Energy
It’s like trying to play a game of Whack a Moll whilst carrying out on mass blood transfusions knowing major organ replacement is needed.
ASDA's Refrigeration Strategic Journey

Leak reduction was the focus. ASDA was the leader. The drive to F-Gas compliance will be a long journey. Taking the wrong route will be costly. Developed trials and evaluation of alternative solutions is critical.

F-Gas Alternatives 2007+

HFC alternatives were trialled and found to be insufficient, another option was needed.

CO2

Secondary

Cortons

Environmental Challenges - CGP

Water cooled engines

CGP - Energy

Life cycle

Safety

CO2

Mineral Oil

R440A

Best in class F-Gas
2010

R440A

F-Gas 2014

F-Gas 2006

F-Gas 2014

Technology change. HFO - HFOs were trialled against other alternatives and produced positive results, the trial was therefore extended.

Ongoing F-Gas Journey

HFO 2018+

2030

79% Reduction against 2022 targets of CO2 emmissions (F-Gas Driving)

2020 Ban on HFC's with GWP > 2500 - Existing fleets, ban on high GWP gases by 2020. Here fit required. ASDA anticipated this and started a replacement program in 2010.

2022 Systems with a greater capacity than 42 KWP will be restricted to GWP Cases of 50 and below. F-gas limits need for new systems by 2020.

Gen 2 Mistral:

Improved energy efficiency, safety, LCC (Life Cycle Cost), reduced gas charge and has an IRR (Internal Rate of Return) of 15%.

Jargon

CO2 is an industrial produce gas which is used as a refrigerant.

CGP - Global Warming Potential is a measure of how much energy the emissions of a given gas will trap over a given period, compared to a reference (134a). CO2, for example, has a GWP value of 1.

F-Gas - Those down on reduction or HFC gases by 75% CO2, a question set reduction versus 2009-2012.

HFO - Low Flammability rating. Next gen synthetic refrigerant.

Uptake in Mistral

Uptake in Az.

THE CHALLENGE

SAVE

2030

The implementation of Mistral was extended.

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Life Cycle cost impact of alternative tech

Based on 20 years - Model store

Glossary

A  Non-compliant tech post 2022
B  HFO – Mildly flammable (Model Option)
C  Mistral / HFO (Model)
D  Mistral / CO₂ option
E  CO₂ (Industry Driven Option)
F  Plug-in fridge tech option (air-cooled)
G  Plug-in fridge tech option (water-cooled)
H  Secondary Glycol

Why?

Innovation in cooling

Mistral ducted display

Removed data

Worlds first - HFO design standard

TCO benefit versus C02 estate wide
£600M
Circa 20% lower emissions
F-Gas focus
10 years of savings - get it right and save

Revenue
- £160m energy mitigated energy saving
  - Simple, reliable, safe, repeatable
  - Cost effective maintenance

Carbon
- 2.5TM Co2e mitigated carbon
- Refrigeration produces carbon in two ways measured as Total Equivalent Warming Impacts
  1. Carbon production energy 90%
  2. Carbon production leakage 10%

Capital
- £174m deferred asset investment
- Limiting the need to replace HFC tech
  - Trials to identify alternatives

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F-GAS
- Phase down reliance of HFC refrigerants
- Environmental regulation
  - 2020 – Existing kit
  - 2022 – New kit

ASDA
Save money. Live better.
Internet of Things – Building Performance – Systems Thinking

Data Environment
Performance
Energy
Heating
Cooling
Lux levels

Asset data (80%)
Repair/Replace
Roofs
Floors
Bakery
Refrigeration
HVAC
Lighting

UniModel
BIM - Building Information Modelling
Specification, Scoping, New & Existing space
Safe, Legal & trading

AIMS 2
ASDA Integrated Management System gen 2
Remote Building control/monitoring systems.
Input and output data
Safe, Legal & trading

Mercury
Asset data base LCC – End of Life
Informed decisions
Safe, Legal & trading
Overlaying Asda’s assets to DSM value streams

- Transitional fridge control
- Fridge defrost / trim control
- HVAC load shedding
- Central lighting control

- Store frequency response
- Depot frequency response

- Generator control
  - Reserve Services (STOR / CM)
  - Price Arbitrage (P4All)
  - Triad Avoidance
  - Scheduled Demand Response

- Battery storage

Typical response duration 1 – 2 hours