What can cold chain operators expect from suppliers/engineers in the years ahead?

Dr Rob Lamb CEng, FInstR, MCIBSE
Group Sales & Marketing Director
Star Refrigeration Ltd

STAR REFRIGERATION

In business to secure a better future

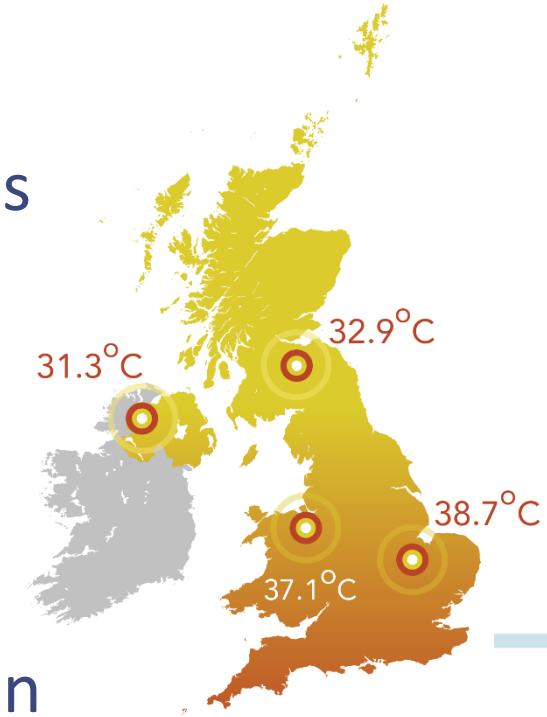
Intro To Star

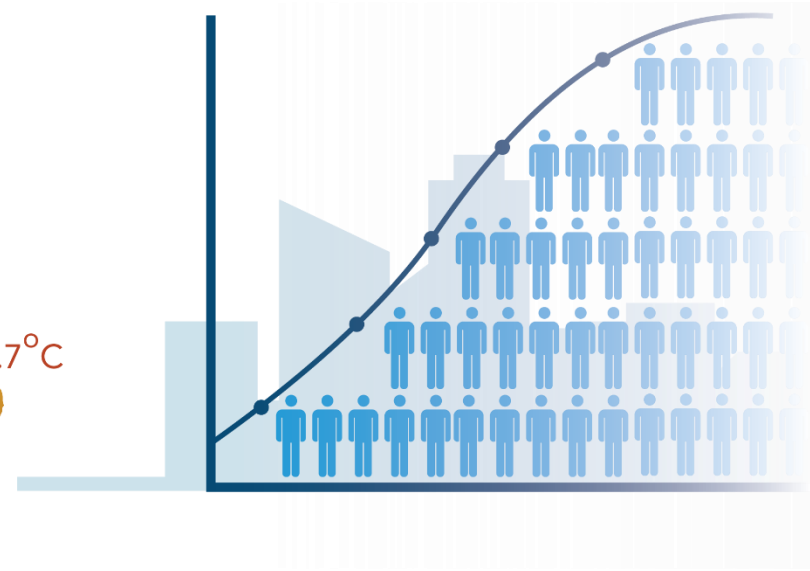
STAR REFRIGERATION

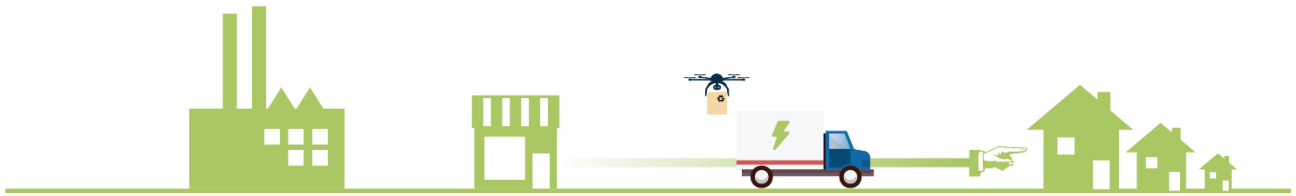
In business to secure a better future

Future Challenges Driving Innovation

- Global warming resulting in increasing ambient temperatures
- Energy – increasing costs and reduced availability
- Scarcity of resources (e.g. water, raw materials)
- Population growth and relocation
- Changing eating habits
- Changing logistics models and technology



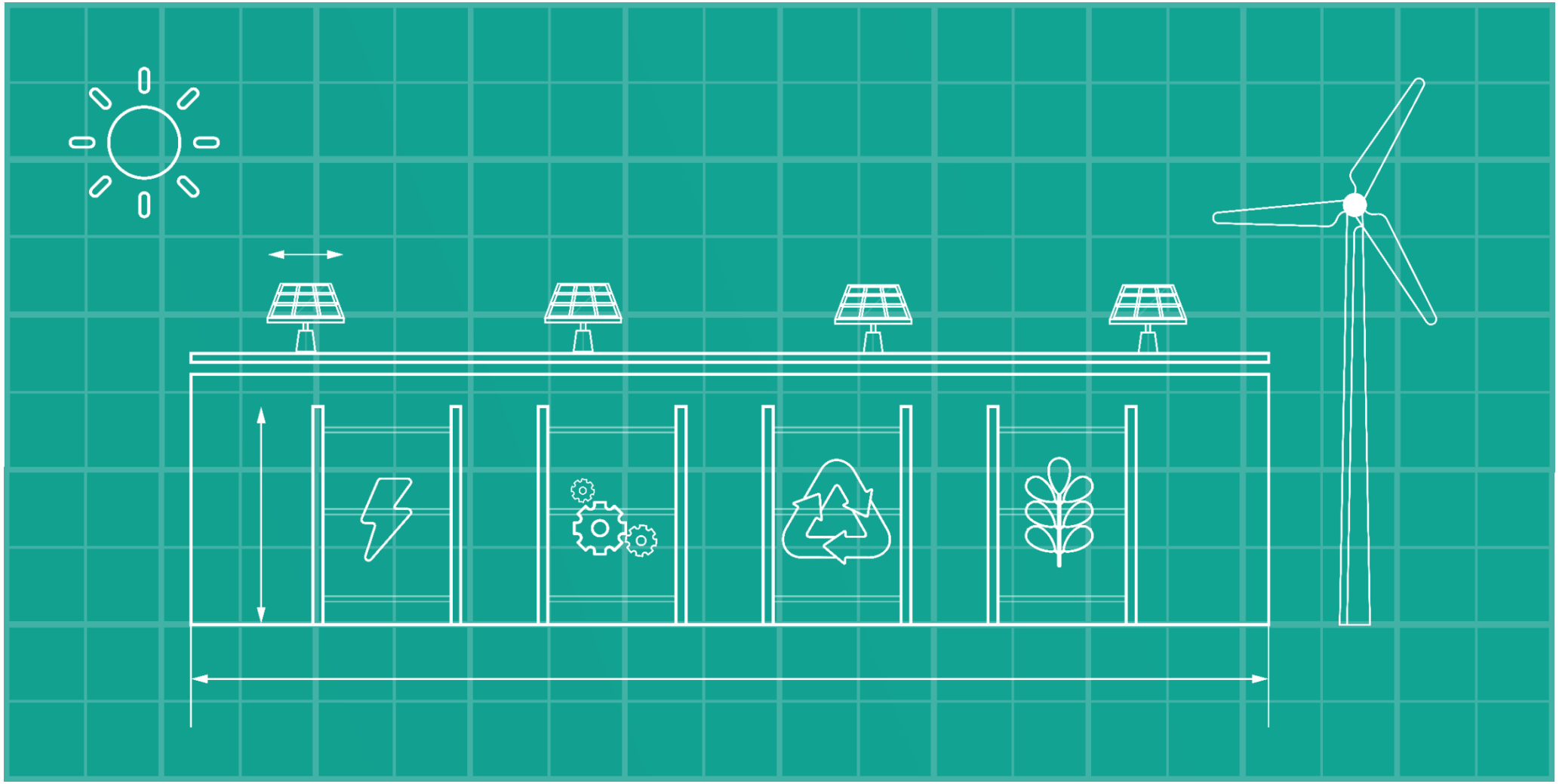




STAR REFRIGERATION

In business to secure a better future

What Can Cold Store Operators Expect From Engineers?



STAR REFRIGERATION

In business to secure a better future

Building For The Future On Solid Ground

STAR REFRIGERATION

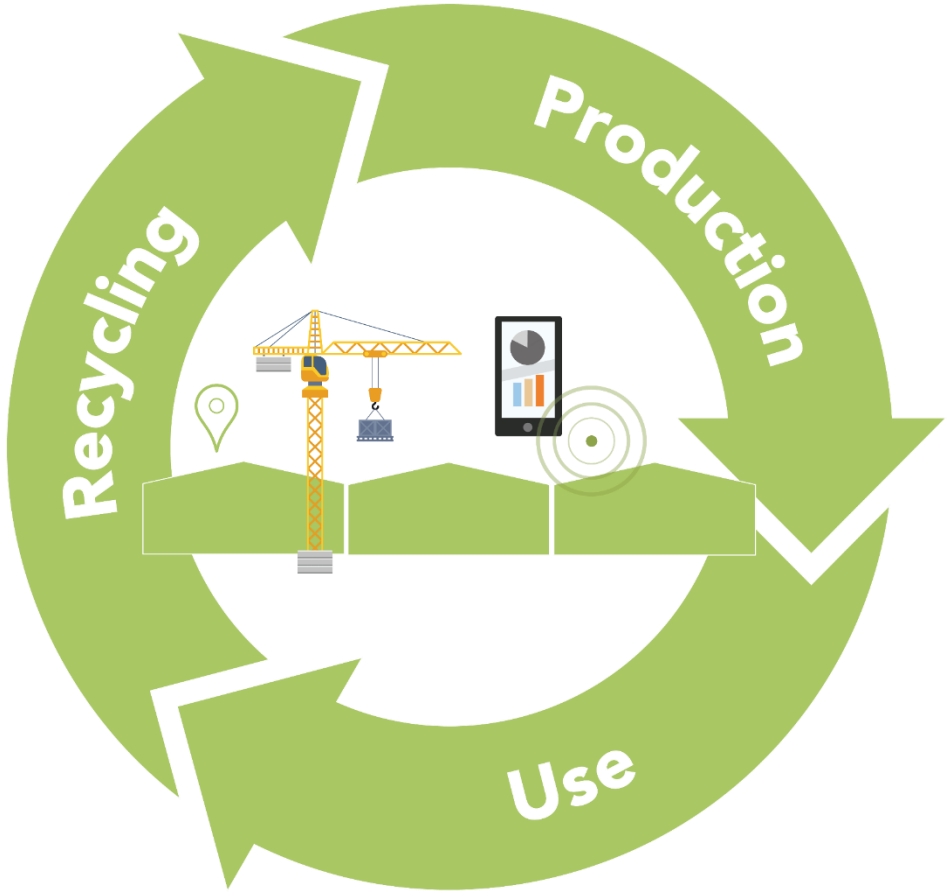
In business to secure a better future

A Focus On Building For The Future

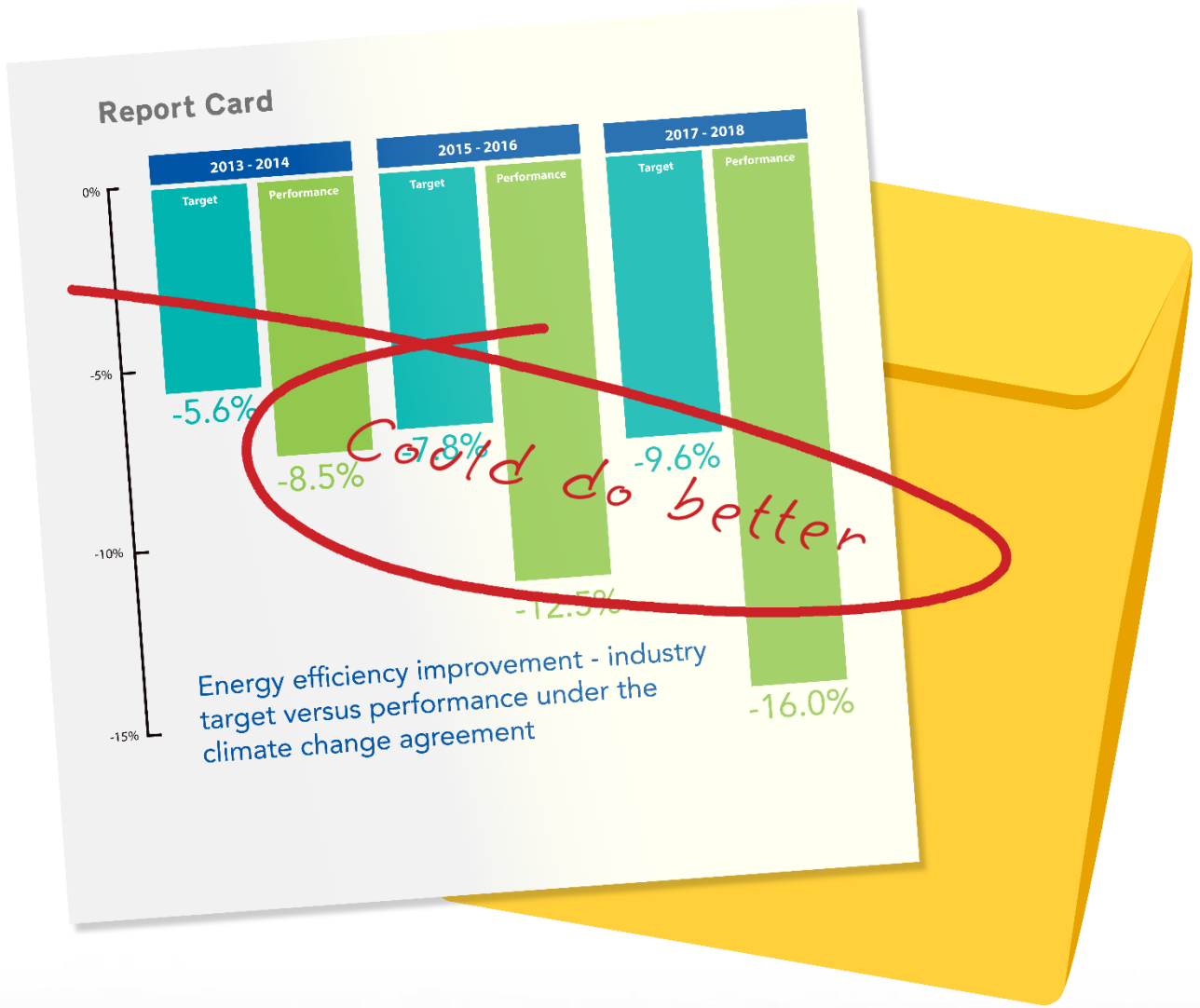
- Sustainable facilities:
  - Why?
    - Carbon emission targets
    - Increasing energy costs
    - Meet (and exceed) future benchmarking targets
    - Avoids expensive retrofit costs

A Focus On Building For The Future

- How?
  - Construction
    - Materials
    - Orientation/Location
  - Equipment selection
  - Operation
  - Energy Source
  - Data collection and analysis
  - Recycling
    - Materials
    - Energy



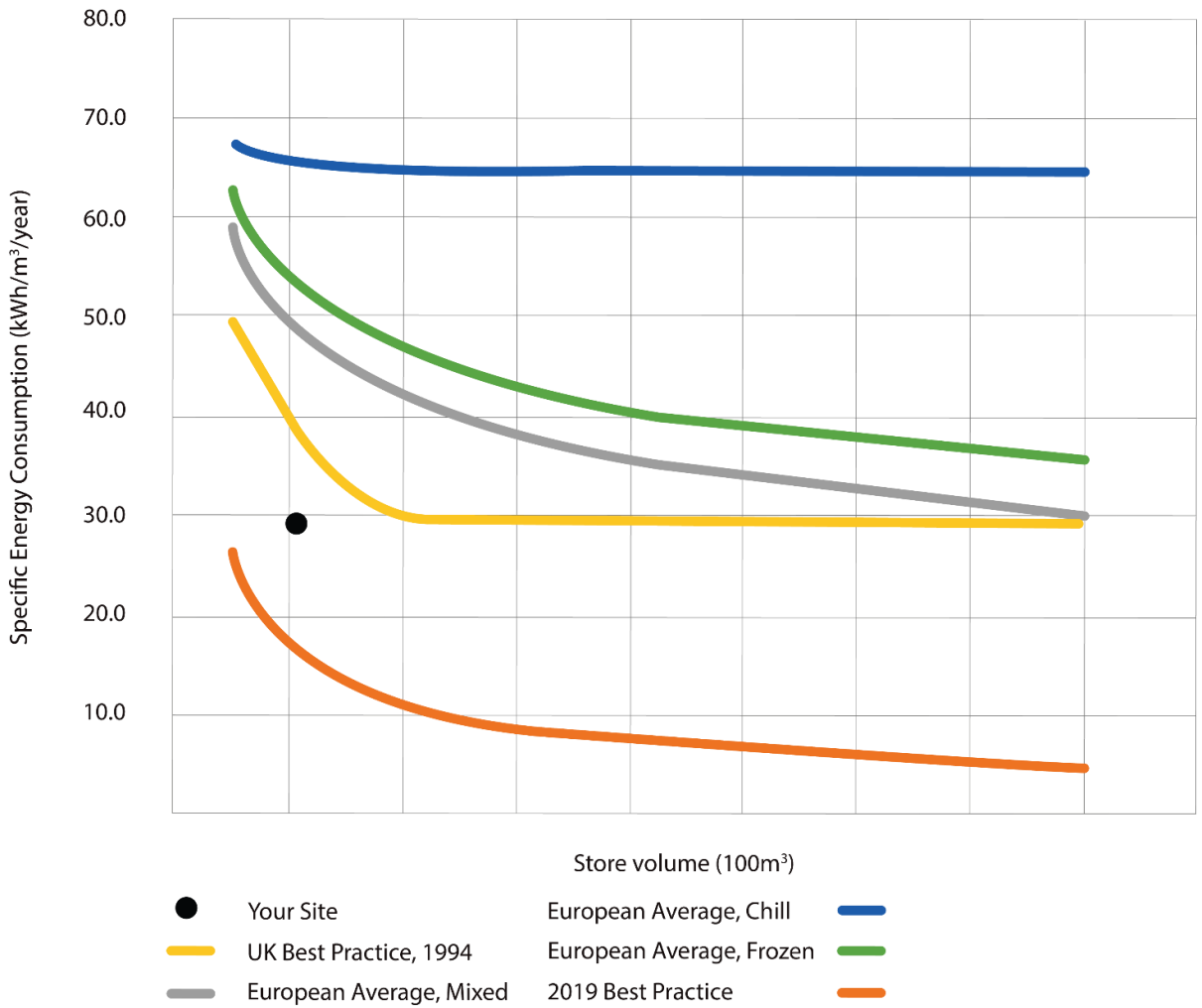
Energy Performance – A Good Start But Could Do Better



STAR REFRIGERATION

In business to secure a better future

Energy Performance – Setting Ambitious New Benchmarks

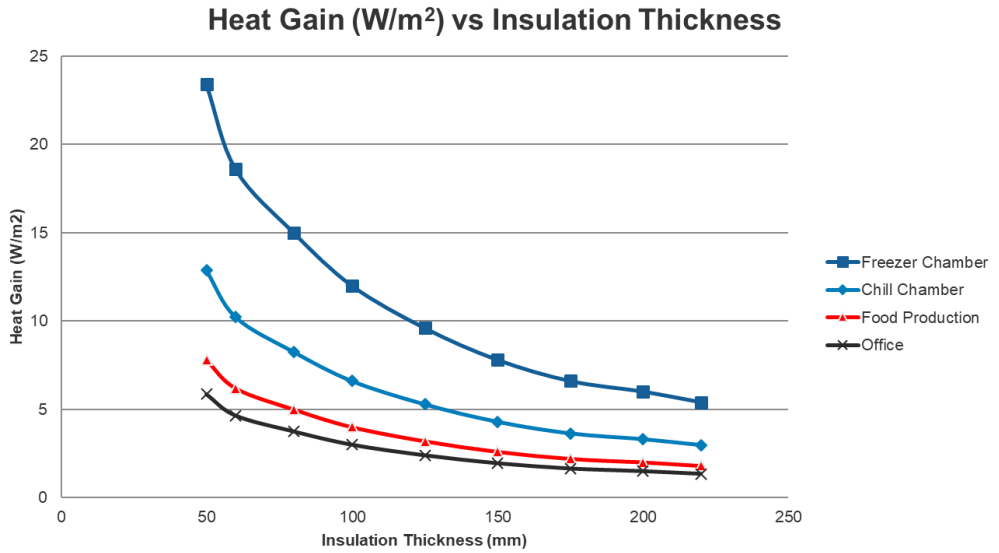


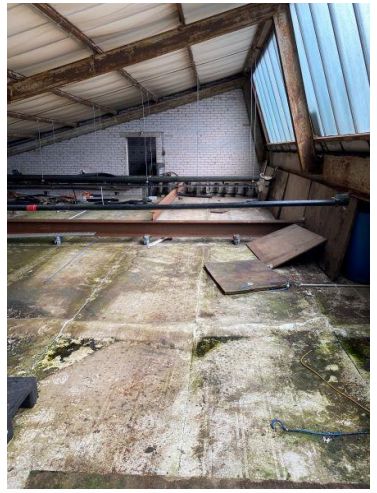
STAR REFRIGERATION

In business to secure a better future

Building Construction - Materials

- Use of sustainable materials
- Material selection for lower energy operation
  - Increased capital cost
  - Lower life cycle cost
- Ongoing building maintenance
  - Loading in roof voids
  - Delamination





STAR REFRIGERATION

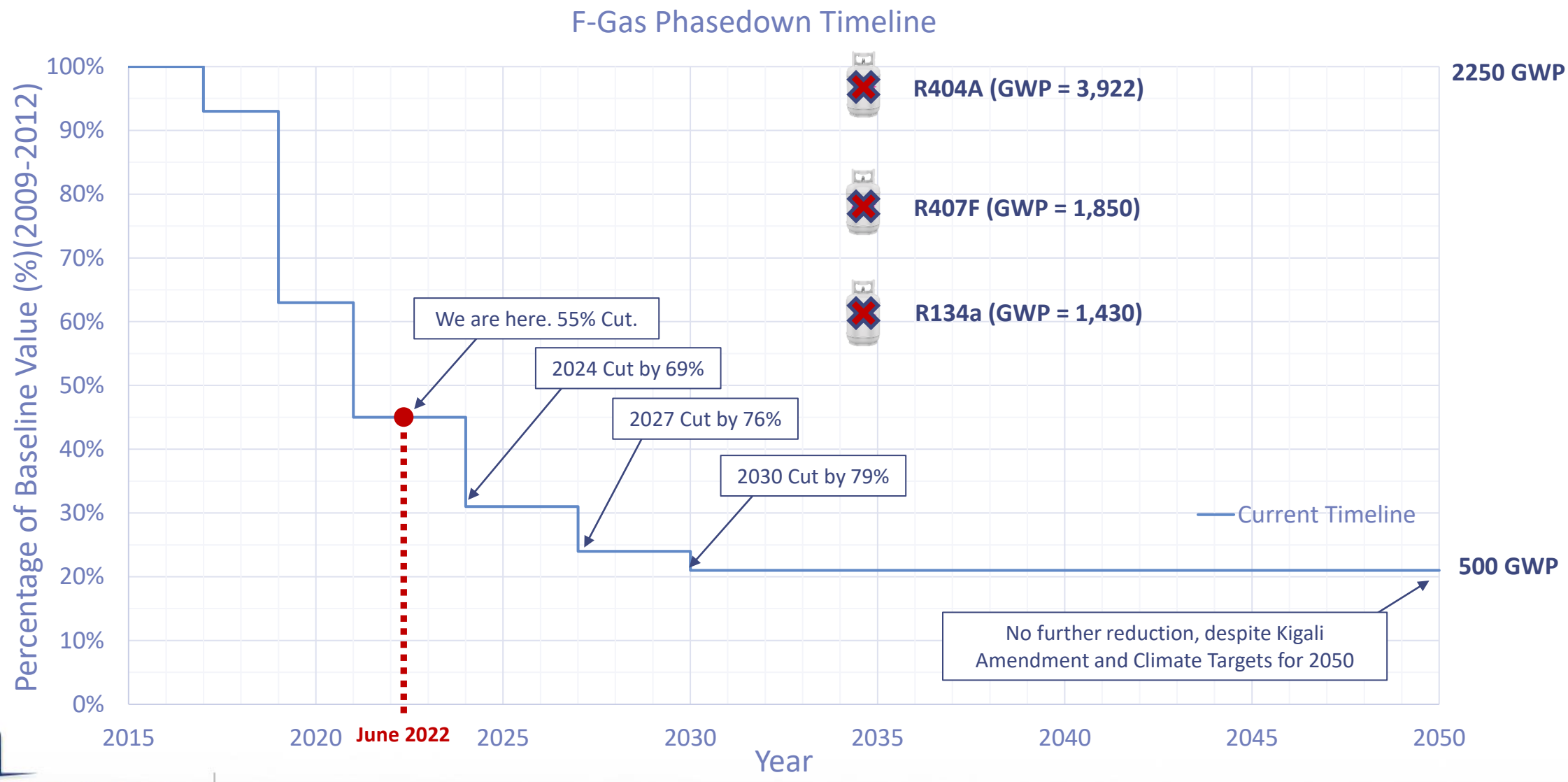
In business to secure a better future

Building Construction – Location and Orientation

- Changes to current design parameters
  - Higher ambient design conditions
  - Regional variations
  - Integration with local area

- Focus on building orientation
  - Maximise solar benefit for power generation
  - Minimise solar effect on refrigeration

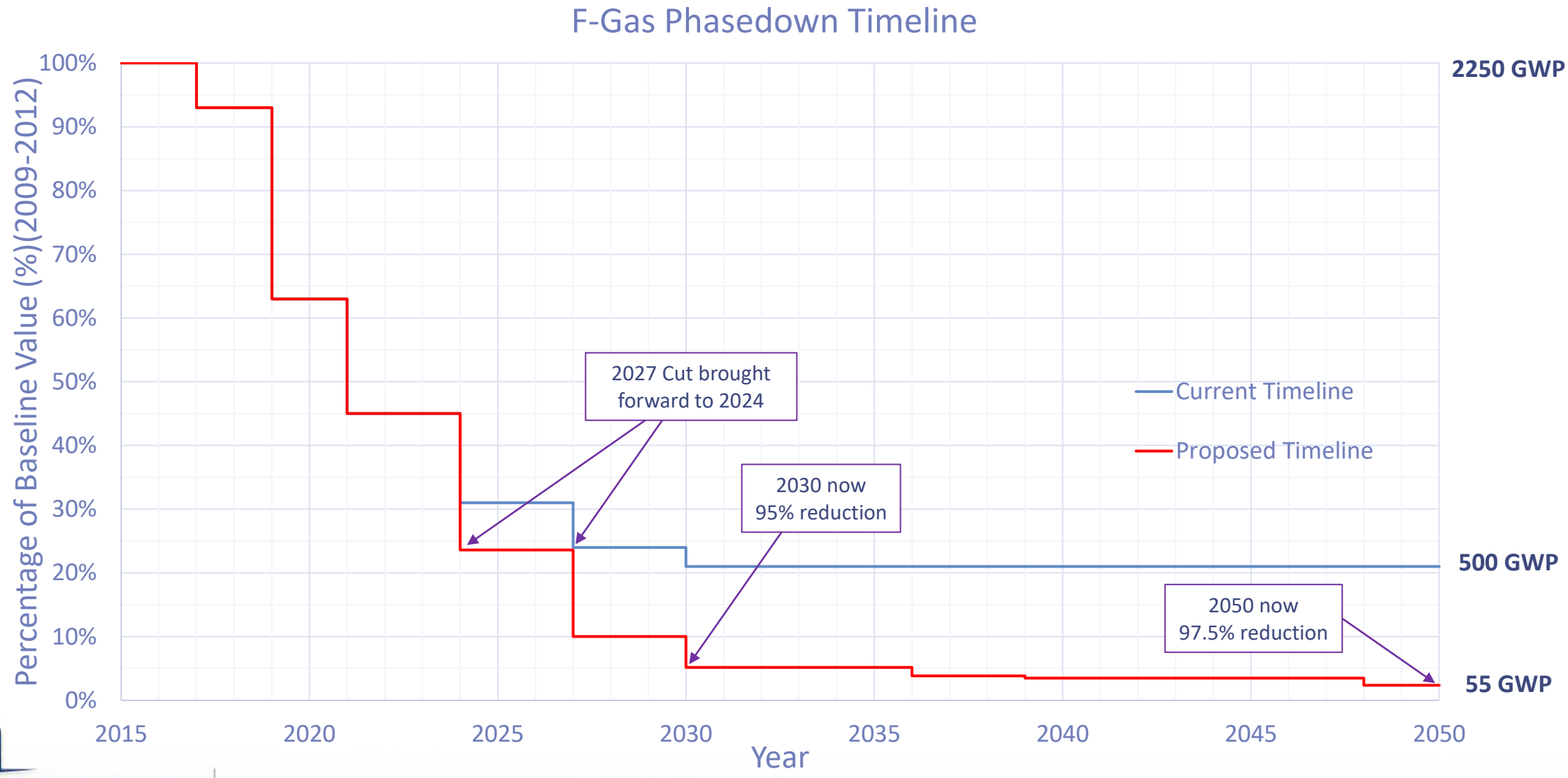
Refrigerant Selection – Current F-gas Phase Down Timeline



STAR REFRIGERATION

In business to secure a better future

Refrigerant Selection - Proposed Update to F-Gas Phase Down Timeline

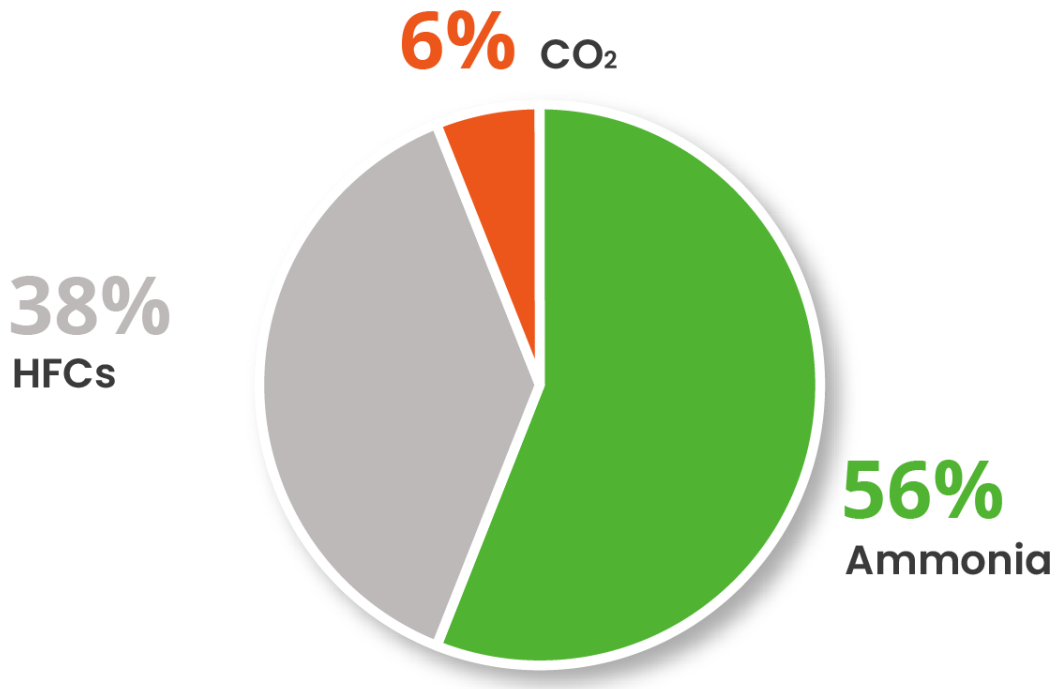


STAR REFRIGERATION

In business to secure a better future

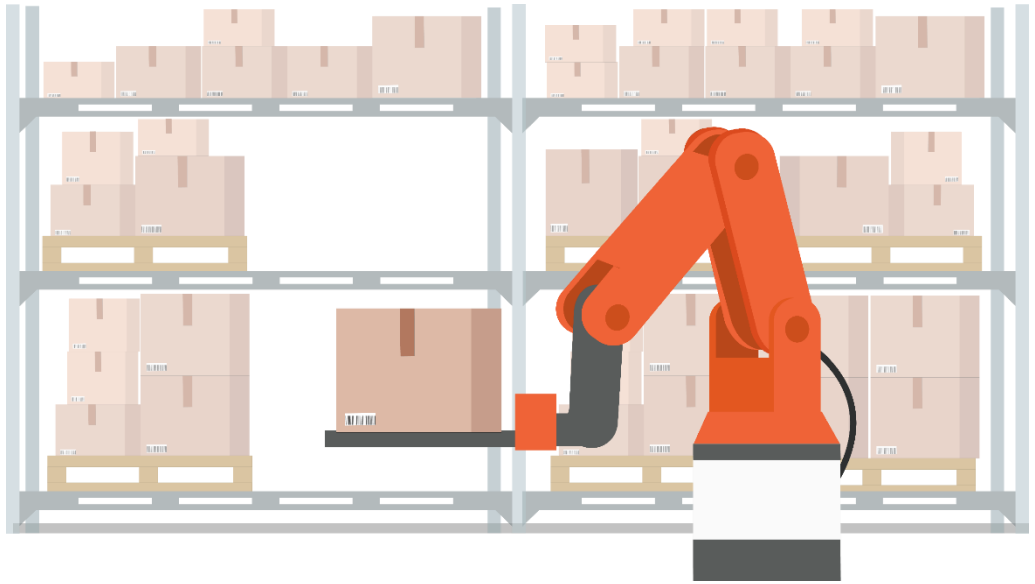
Refrigerant Selection - Building For The Future

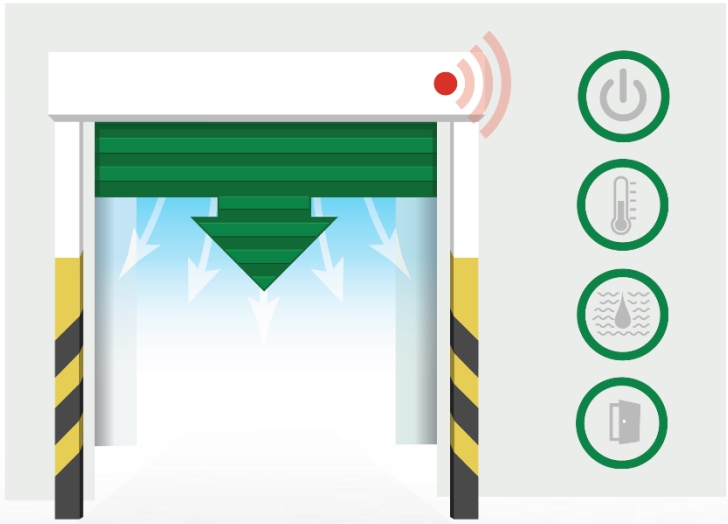
- HFCs still a large % of existing estate
- Many are for small systems
- Replacement ‘drop in’ fluids are possible but subject to phase out timeline
- Natural refrigerants are likely solution for the long term
- Growth in use of ammonia and CO_2 and other natural fluids for refits



Operation

- Greater use of automation
  - Better productivity
  - New staff skills needed
- Emphasis on reducing heat gain
  - Door design and control
  - Great use of airlocks
  - Dehumidification
  - Staff training and awareness
  - Product flow
  - Maintenance



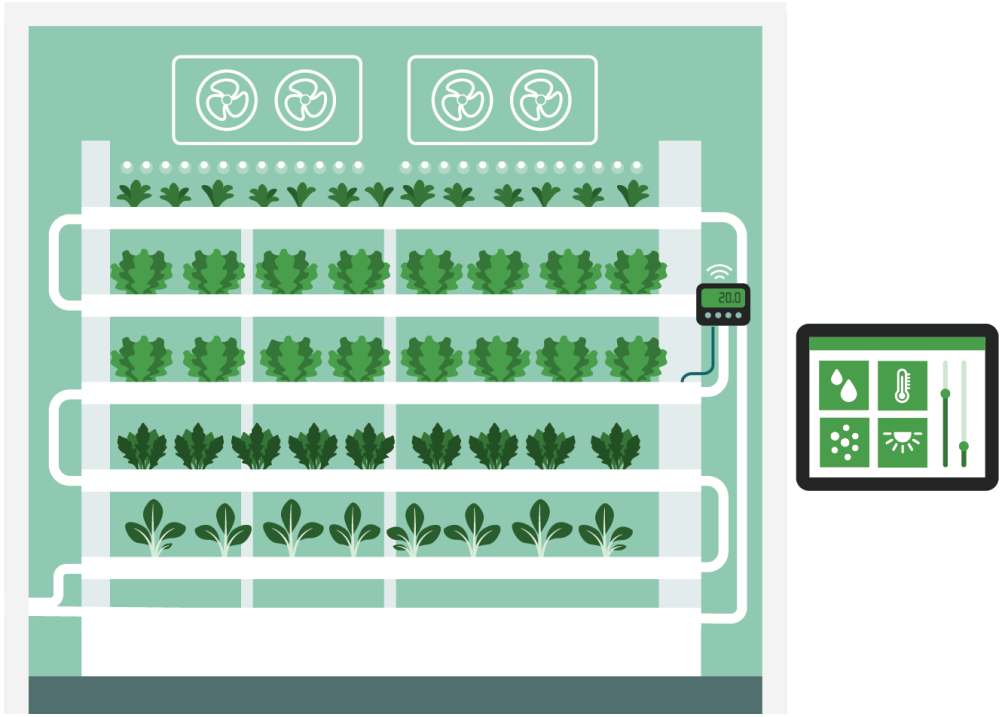


Operation - Flexibility

- Move towards flexible cooling solutions
  - Simple to install
  - Relocatable
  - Assets rather than sunken costs
  - Variable temperature (chill/frozen/blast)
- In rack cooling for blast freezing
  - Blast freeze at cold store temperatures
  - Improved energy and operational efficiency
  - Variable product type and sizes

Operation – Flexibility

- Vertical farming
  - Growing population
  - Move to plant based food
  - Shortage of land for traditional farming
  - Multiple times more product for the same floor area
  - Apply expertise in temperature control to a new application
  - Grow and store at the same time
  - Opportunity for post harvest cooling



Renewable Energy

- Carbon free power
- Increased on-site electrical demand
  - Automation
  - Vehicle charging
- Mix of on/off site renewable power
- On-site generation
  - Solar
  - Wind
  - Hydrogen

STAR REFRIGERATION

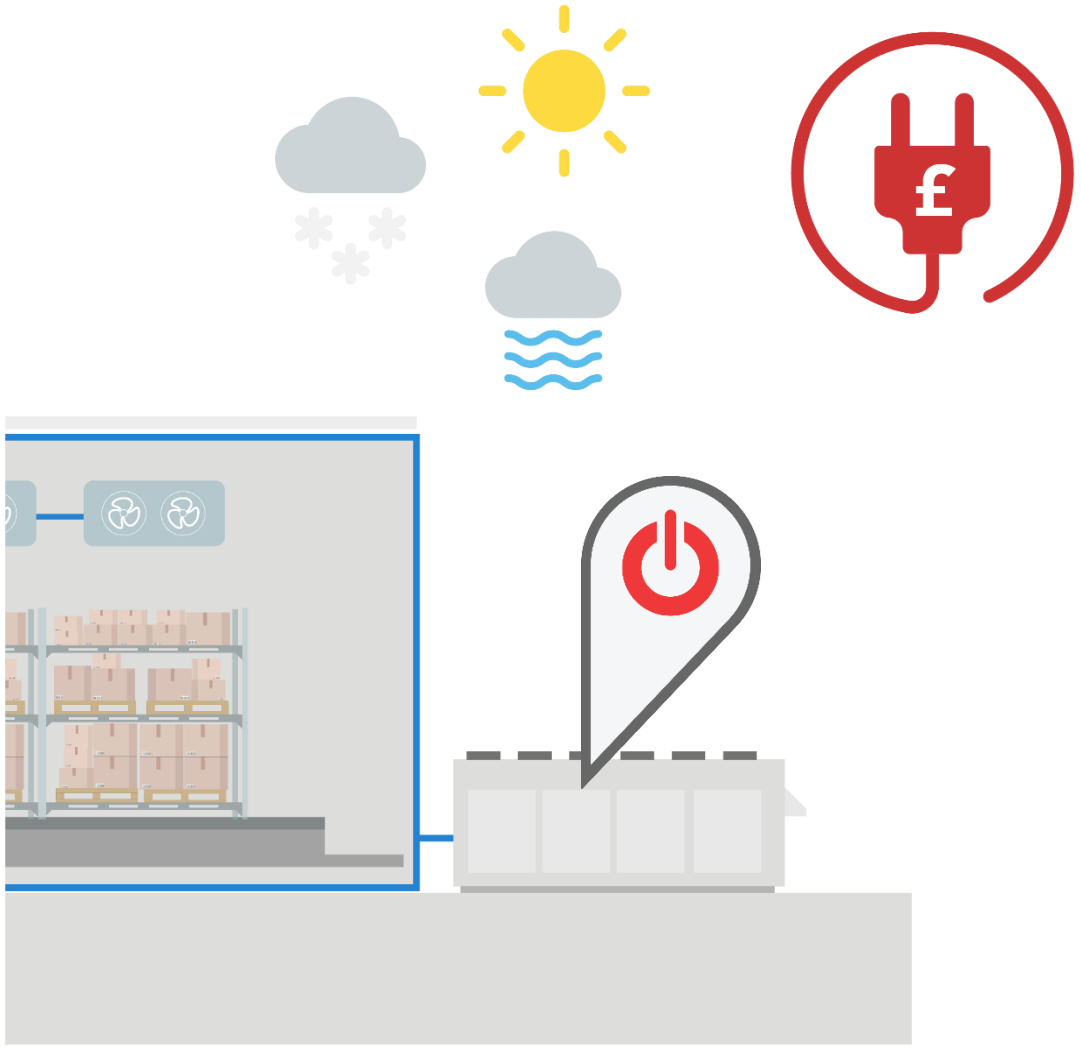
In business to secure a better future

Technology – Real Time Performance Monitoring

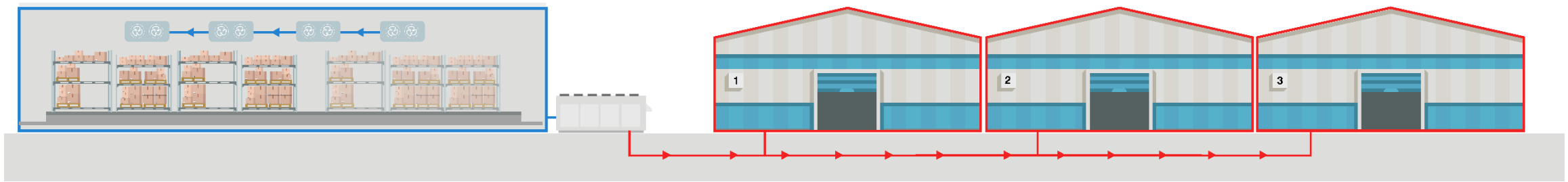
- Better use of data
  - Real time performance monitoring
  - Compare actual vs ideal
  - Identify and make improvements quickly
  - Predict annual performance in real time
  - Benchmarking
    - kWhr/m^3
    - kWhr/pallet

Technology

- Integration
  - Load shedding/forced running based on demand/pricing
  - Cooling based on ambient temperature and/or throughput predictions



Technology – Capturing Waste



STAR REFRIGERATION

In business to secure a better future

Technology – Capturing Waste

- Distribution parks linking heating and cooling users
- Linking to heat networks
- Transform waste into revenue
- Prepare now:
  - Explore what is needed for new installations
  - Run pipework to site boundary
  - Install connection for future recovery/heat pump

STAR REFRIGERATION

In business to secure a better future

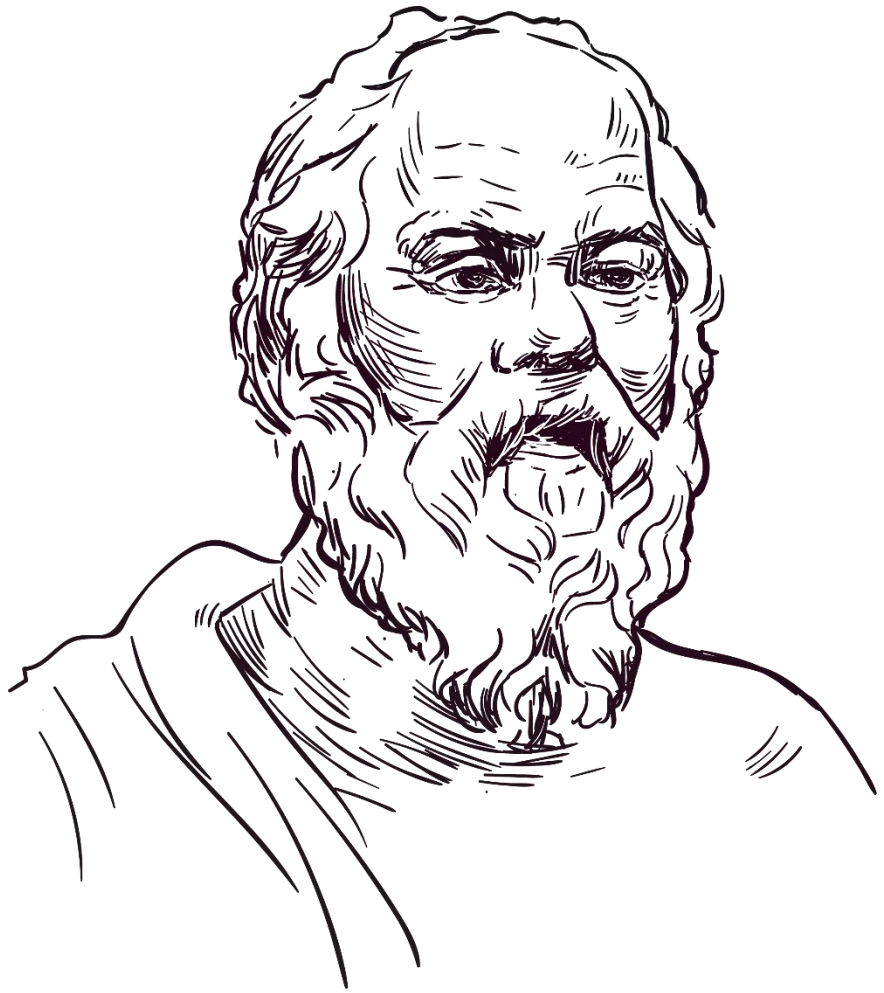
Summary

- We need to plan for a sustainable future
- There will be a focus on
  - Longevity
  - Efficiency
  - Use of data to optimise in real time
  - Recycling
  - Training
- Engineers and operators working together to deliver solutions

Change

"The secret of change is to focus all of your energy not on fighting the old, but on building the new"

- Socrates



Thanks for listening

Dr Robert Lamb

rlamb@star-ref.co.uk

www.star-ref.co.uk

STAR REFRIGERATION

In business to secure a better future