

# Retail refrigeration

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# WP 2.1 Retail chilling and freezing

- **WP2.1.1 – Technologies will be initially investigated and sifted**
- WP2.1.2 – In parallel with WP2.1 technologies will be investigated experimentally and a physical proof of concept and a prototype will be developed.
- WP2.1.3 – Non technical barriers preventing uptake of new technologies, such as customer reaction, implementation, cost-benefit models, end user (supermarket) incentives will be assessed.
- WP2.1.4 – The final part of this work package will involve a trial of the prototype in-store with ASDA

# Criteria

Quality of information	1-5
Barriers to staff/customers	L,M,H
Availability barriers	L,M,H
Limits to commercial maturity	L,M,H
Ease of use of installation	L,M,H
Technology independence	L,M,H
Maintainability	L,M,H
Legislative concerns	L,M,H
Energy savings	%
Scope of application	All, specific systems
Direct emissions	0%
Cost (payback)	£

# Retrofit - completed

- Refrigerants
- Floating head pressure
- LED lights
- EC Evaporator fan motors
- EC Condenser fans motors
- Suction pressure control
- Doors on cabinets
- Store dehumidification
- Anti-sweat heater controls
- Better cabinet loading
- Short air curtains
- Back panel flow
- Occupancy sensors and controls for cabinet lighting
- Strip curtains
- Night blinds
- Liquid pressure amplification
- Risers or weir plates
- Defrost controls
- Store lighting
- Radiant heat reflectors
- Store temperature control

# To be completed

- Cabinet temperature control
- Training
- Cleaning and maintenance
- Re-commissioning
- Covers
- Loading – duration and temperature

# Further work

- Refit – fitted to new stores
- Future technologies – long term options
  - Cabinet selection
    - Secondary systems
    - Water loop systems
    - CO2 refrigeration technology
      - Borehole condensing
      - Dynamic demand
      - Ground source
      - Pipe insulation/rifling/reduced pressure drops
      - Anti-fogging glass
      - Optimisation of cabinet air flow
      - Evaporative condensers
      - High-efficiency evaporators and condensers
      - Refrigeration system contamination
      - SLHE
    - Nanoparticles
    - Heat pipes and spot cooling
    - Anti-frost evaporators
  - Fans
    - Economisers
    - Electronic expansion valves
  - Reflective packaging
  - Insulation e.g. VIPs
  - Off-cycle losses
  - Cabinet location
    - Desuperheating/heat recovery
    - Variable speed drives (integral)
  - Internet shopping
  - Supermarket cold store
    - Vending cabinet concepts
    - Polygeneration
    - Adsorption
    - Absorption
    - Novel building fabric
    - High-efficiency compressors
    - Centralised air distribution
    - Store light (natural)
  - DONE

# Baseline store (Asda W-S-M) for model

	<b>TOTAL kW</b>	<b>% of store main</b>
<b>REFRIGERATION</b>	158.9	39.73%
<b>HVAC</b>	48.9	12.23%
<b>LIGHTING</b>	85.8	21.45%
<b>FOOD PREP</b>	63.2	15.80%
<b>SMALL LIGHTING &amp; POWER</b>	0.0	0.00%
		89.21%

- Currently working to identify missing 10% energy!
- Currently matching cabinets to refrigeration power
- Need detailed info on HVAC, lighting and food prep