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

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

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

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