EXPERTGROUP

(ABN: 79 413 183 502)
16 Exon Street,
Brighton, Vic 3186
Ph: (03) 9592-9111
Fax: (03) 9592-1846

18 May 2011

Att: John Maslin
Advanced Refrigeration Technology Pty Ltd
25A Latcham Drive
Caloundra West
Queensland 4551

Subject: Benefits of refrigeration doors and lids

Dear John,

The total supermarket industry consumes the best part of 4% of all electricity sent out in Australia and around 2,000 GWh of electricity per annum on medium temperature refrigeration equipment without doors and lids.

While it is almost standard practice throughout the developed world to have night-blinds fitted to new open refrigerated display cabinets there is now a trend in leading sustainable economies to go the extra step and fit all-day glass doors and lids on new and existing equipment.

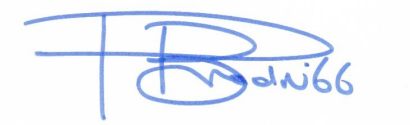
Overseas and local research shows significant energy savings ranging from 25% to 70% can be achieved by using all-day transparent doors and lids. The level of saving depends on the circumstances including the efficiency of the existing display cabinet, number of door openings per hour, existing night-blinds in use and store conditions. The penetration of doors and lids on medium temperature refrigeration in Australian supermarkets is very low, in the order of 10% and is often restricted to milk and beverages. The penetration of night-blinds in use across the Australian fleet of supermarkets is growing and is currently estimated to be around 30%. The attached assessment assumed an average efficiency improvement of 40% from fitting doors and lids, and deducted a 15% efficiency improvement for the existing base of night-blinds in use.

Fitting doors and lids to the existing supermarket fleet outside normal capital refurbishment cycles is an expensive exercise, however this assessment assumes a gradual phase in from 2011 to 2020 to allow for industry adjustment within normal capital refurbishment cycles typically between 7 and 15 years.

The total benefit from fitting doors and lids to medium temperature refrigeration equipment in supermarkets is estimated to be around 600 GWh per annum. Assuming a 'business as usual' energy growth rate of 2% per annum incorporating the natural rate of improvement, the projected cumulative energy and greenhouse gas savings between 2011 and 2030 are estimated to be 11,000 GWh and 8.8 Mt $CO_2$-e.

The attached analysis provides an independent assessment of the benefits to the Australian economy and environment from fitting doors and lids to the existing fleet of medium temperature refrigeration equipment in supermarkets. Energy saving opportunities existing with open display cases in other food retail outlets including convenience stores, automotive fuel retailing, takeaway stores and fruit/vegetable/meat retailing. Should you require further clarification or references please do not hesitate to contact the writer.

Yours truly,



Peter Brodribb [*B.Eng/Mech, MBA]*
Managing Director

## Electricity consumption and carbon savings: 2011 to 2030

Prepared by: Peter Brodribb
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**Supermarket stock**

| Brand | Nominal Qty | Penetration night-blinds in use | Trading floor (m2) Large ≥ 2,750 | Medium ≥1,500 & < 2,750 | Small < 1,500 & ≥400 | Extra small < 400 |
|---|---|---|---|---|---|---|
| Coles-Bi Lo | 770 | 50% | 308 | 385 | 77 | 0 |
| Woolworths-Safeway | 780 | 50% | 312 | 390 | 78 | 0 |
| Aldi | 260 | 90% | 0 | 0 | 260 | 0 |
| Franklins | 80 | 35% | 1 | 24 | 55 | 0 |
| IGA branded independent | 1,066 | 10% | 0 | 107 | 959 | 0 |
| IGA-Ritchie's co-branded | 125 | 10% | 0 | 13 | 113 | 0 |
| IGA-Drakes co-branded | 114 | 10% | 0 | 11 | 103 | 0 |
| IGA-Cornett's co-branded | 45 | 10% | 0 | 5 | 41 | 0 |
| AUR-Foodland | 710 | 5% | 0 | 0 | 400 | 310 |
| Total | 3,950 | | 621 | 934 | 2085 | 310 |

**Top down: Electricity consumption (GWh p.a.)**

| Brand | Storewide | Medium temp | Net saving |
|---|---|---|---|
| Coles-Bi Lo | 2,007 | 696 | 203 |
| Woolworths-Safeway | 2,033 | 705 | 206 |
| Aldi | 183 | 63 | 15 |
| Franklins | 98 | 34 | 11 |
| IGA branded independent | 923 | 320 | 111 |
| IGA-Ritchie's co-branded | 108 | 37 | 13 |
| IGA-Drakes co-branded | 99 | 34 | 12 |
| IGA-Cornett's co-branded | 39 | 13 | 5 |
| AUR-Foodland | 397 | 138 | 49 |
| Total | 5,887 | 2,040 | **624** |
| | | 35% | 31% |

**Bottom up: (GWh p.a.)**

| Store size | MT kWr | Electricity consumption |
|---|---|---|
| Large | 300 | 585 |
| Medium | 250 | 733 |
| Small | 90 | 589 |
| Extra small | 50 | 49 |
| Total MT | | 1,956 |
| Net savings | | **614** |
| Operating hour/day | | 16 |
| Operating days p.a. | | 365 |
| Compressor COP | | 3.1 |
| System losses | | 40% |
| System COP | | 1.86 |

| Year | BAU GWh p.a. | Savings % | Savings GWh p.a. | Savings kt $CO_2$-e | Year | Emission factor |
|---|---|---|---|---|---|---|
| 2011 | 2,039.8 | 0% | 0.0 | 0.0 | 2011 | 0.96 |
| 2012 | 2,080.6 | 3.3% | 69.3 | 65.7 | 2012 | 0.95 |
| 2013 | 2,122.2 | 6.7% | 141.3 | 131.8 | 2013 | 0.93 |
| 2014 | 2,164.7 | 10.0% | 216.3 | 198.2 | 2014 | 0.92 |
| 2015 | 2,208.0 | 13.3% | 294.1 | 264.9 | 2015 | 0.90 |
| 2016 | 2,252.1 | 16.7% | 375.0 | 331.0 | 2016 | 0.88 |
| 2017 | 2,297.2 | 20.0% | 459.0 | 396.9 | 2017 | 0.86 |
| 2018 | 2,343.1 | 23.3% | 546.2 | 462.6 | 2018 | 0.85 |
| 2019 | 2,390.0 | 26.6% | 636.7 | 527.9 | 2019 | 0.83 |
| 2020 | 2,437.8 | 30% | 731.3 | 593.2 | 2020 | 0.81 |
| 2021 | 2,486.5 | 30% | 746.0 | 592.5 | 2021 | 0.79 |
| 2022 | 2,536.3 | 30% | 760.9 | 591.6 | 2022 | 0.78 |
| 2023 | 2,587.0 | 30% | 776.1 | 590.3 | 2023 | 0.76 |
| 2024 | 2,638.7 | 30% | 791.6 | 588.8 | 2024 | 0.74 |
| 2025 | 2,691.5 | 30% | 807.5 | 587.0 | 2025 | 0.73 |
| 2026 | 2,745.3 | 30% | 823.6 | 587.8 | 2026 | 0.71 |
| 2027 | 2,800.3 | 30% | 840.1 | 585.7 | 2027 | 0.70 |
| 2028 | 2,856.3 | 30% | 856.9 | 583.3 | 2028 | 0.68 |
| 2029 | 2,913.4 | 30% | 874.0 | 580.5 | 2029 | 0.66 |
| 2030 | 2,971.7 | 30% | 891.5 | 577.4 | 2030 | 0.65 |
| Cumulative savings | | | **11,637** | **8,837** | | |

**Assumptions:**

| | |
|---|---|
| Night-blinds efficiency benefit | 15% |
| Industry weighted av. Night-blinds in use | 31% |
| Doors efficiency benefit | 40% |
| % storewide electricity for refrig. | 55% |
| % refrig. medium temp | 70% |
| % med temp closed | 10% |

Storewide electricity intensity

| Size | Av. trading floor ($m^2$) | kWh/$m^2$ p.a |
|---|---|---|
| Large | 3,800 | 900 |
| Medium | 2,500 | 935 |
| Small | 650 | 1,080 |
| Extra small | 300 | 1,250 |

BAU growth rate (incl. natural rate of imp) 2.0%
Assume gradual phase in of doors from 2011 to 2020 to allow for industry adjustment

**References:**

In From the Cold: Strategies to increase the energy efficiency of non-domestic refrigeration in Aust and NZ, 2011
Projected electricity fuel cycle emission factors from Equipment Energy Efficiency (E3) Committee