

Country:	Australia
Technology:	Retail display cabinets
Sub Category:	Chilled and Frozen

Introduction

The first stage in the Mapping and Benchmarking process is the definition of the products, i.e. clearly setting the boundaries that define the products for use in data collection and analysis. Doing this ensures that comparison between the participating countries is done against a specific and consistent set of products.

The summary definition for this product is:

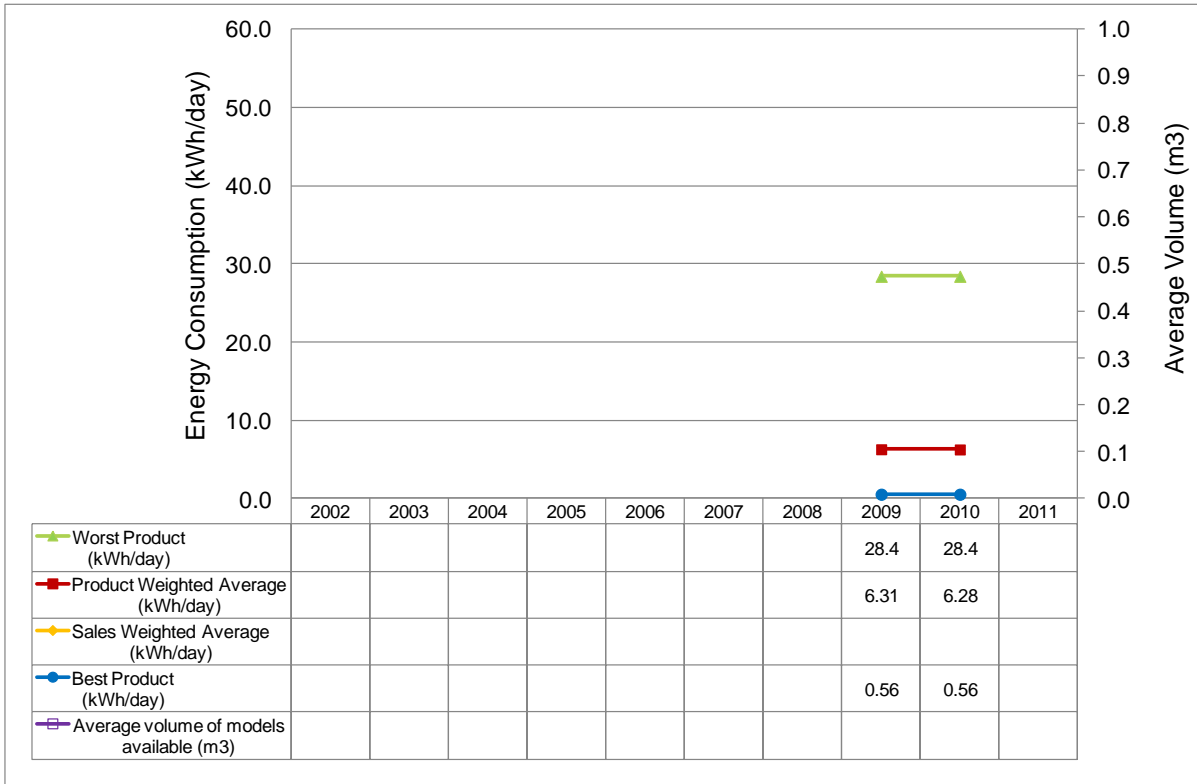
Definition & scope	Scope is limited to: <i>“Refrigerated integral retail display cabinets of types a) vertical chilled with glass door(s) as used for beverages and b) horizontal/semi-horizontal freezers as used for ice cream merchandising. Cabinets must enable customers to view the contents stored in the cabinet even when it is closed either through an opening in the cabinet, or through a transparent door or lid, and also enable customers to self-serve contents. ‘Integral’ means ‘plug in’ or self-contained, such that the cabinet incorporates a compressor and condensing unit within its housing.”</i>	
Intended purpose / content	Beverage display or similar uses, i.e. vertical chilled cabinets with glass door(s)	Ice cream display or similar, i.e. horizontal/semi vertical freezer cabinets
Temperature class (storage temperature)	Vertical cabinets with glass door for chilled storage at: a) -1 to +10°C (‘H1’ class, EU) b) 3.3°C ±1.1°C (USA/Canada) c) ‘As manufacturer stipulates’ (Australia) d) Others TBD	Horizontal and semi-horizontal ice cream cabinets for frozen storage at: a) -15 and below (‘L1’ class, EU) b) -21°C (USA, prior to 1Jan2010; Canada prior to 12Apr2012) c) -26.1°C (USA since 1Jan2010 and Canada since 12Apr2012) d) ‘As manufacturer stipulates’ (Australia) e) Others TBD
Cabinet orientation and doors / covers (not night covers)	Vertical chilled cabinet with: a) Single door full height b) Double doors full height c) Single under-counter d) Double under-counter	Horizontal frozen cabinet of: a) Small size (TDA and volume definition TBD) b) Standard size (TDA and volume definition TBD)

Other characteristics to be noted: Refrigerant type; Presence of lighting; Presence of circulation fan; Defrost type; Outer dimensions; Ambient test conditions class.

A full product definition is provided at the annex website¹.

¹ see <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=10>

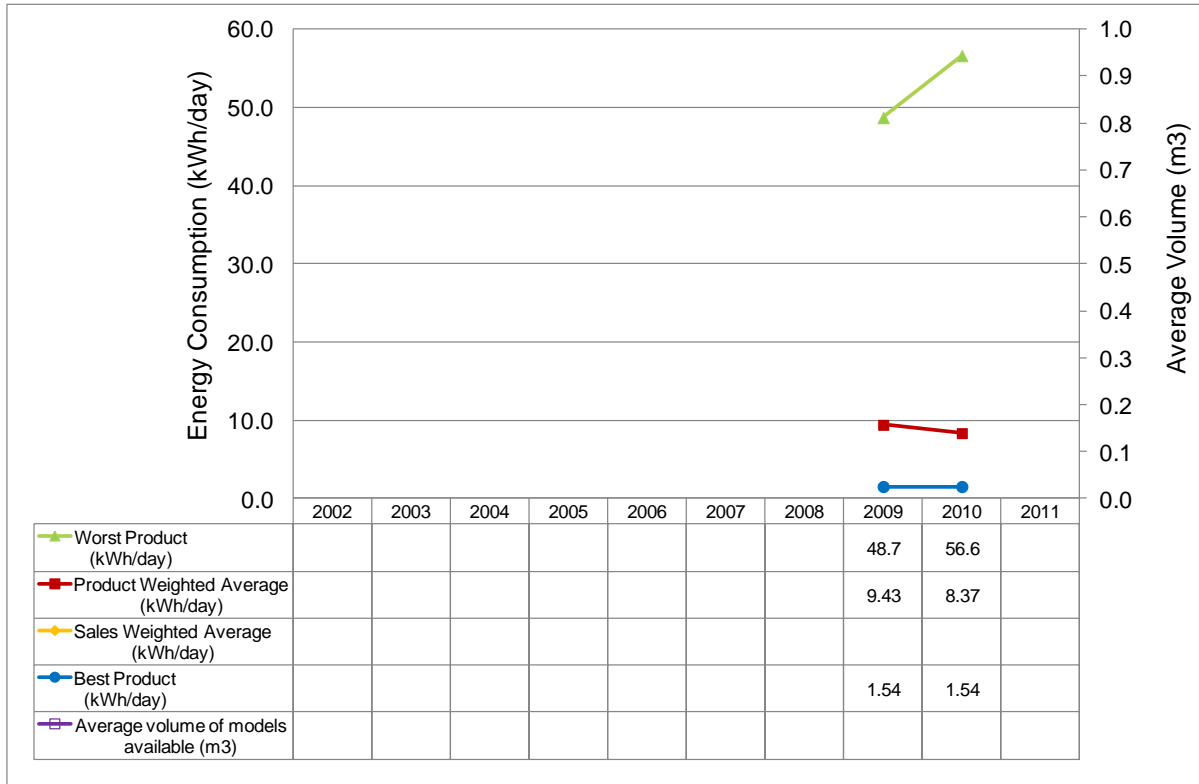
Energy consumption of new chilled retail display cabinets Australia



Key notes on Graph (see notes section 1)

- Products covered are self-contained (integral) vertical chilled cabinets with glass door(s). Volume is the refrigerated internal storage volume (no data available).
- Data were supplied by the federal government from the mandatory MEPS registration database. No sales data were available.
- Analysis is based on 447 cabinets in 2009 and 569 cabinets in 2010.
- The very wide range between highest and lowest consuming product is due to significant differences in the size of product: the highest consuming product has a total display area (TDA) of 2.2 m², the lowest of only 0.2 m² (no data on internal volume were available for comparison).

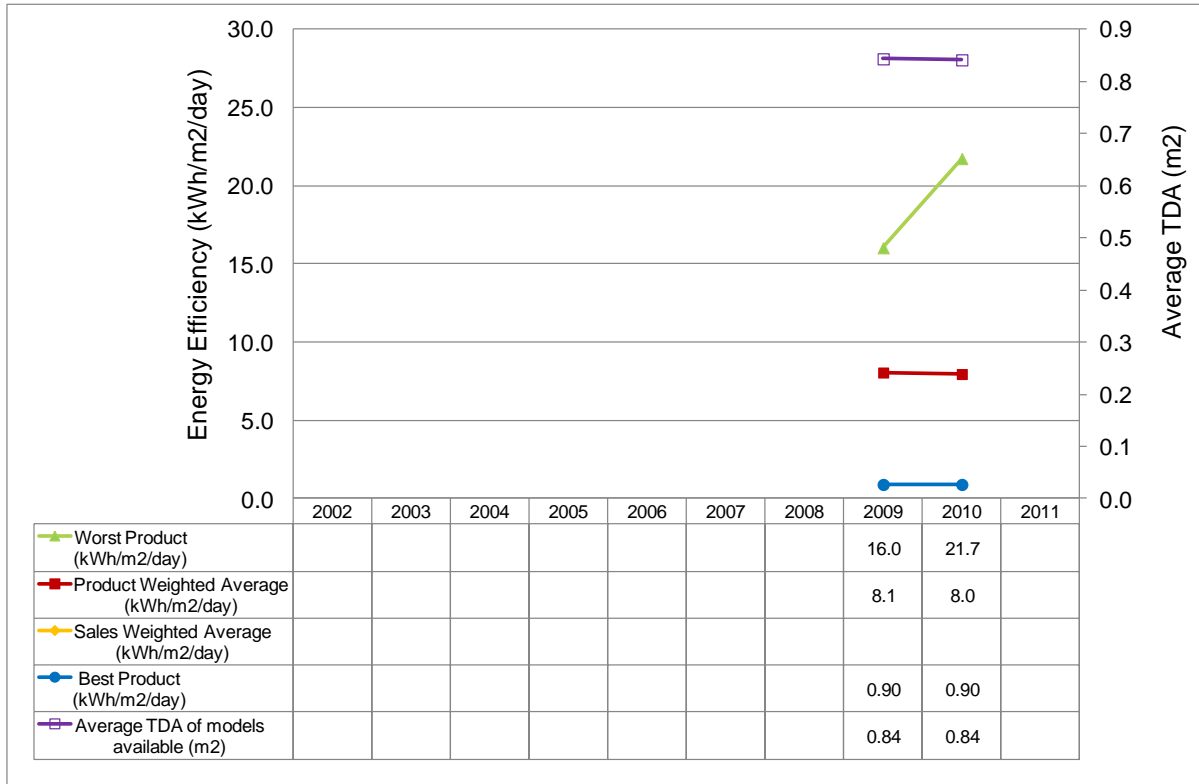
Energy consumption of new frozen retail display cabinets Australia



Key notes on Graph (see notes section 1)

- Products covered are self-contained (integral) horizontal frozen ice cream merchandiser cabinets. Volume is the refrigerated internal storage volume.
- Data were supplied by the federal government from the mandatory MEPS registration database. No sales data were available.
- Analysis is based on 178 cabinets in 2009 and 223 cabinets in 2010.
- The very wide range between highest and lowest consuming product is due to significant differences in the size of product: the highest consuming product has a total display area (TDA) of 2.1 m², the lowest of only 0.3 m² (no data on internal volume were available for comparison).

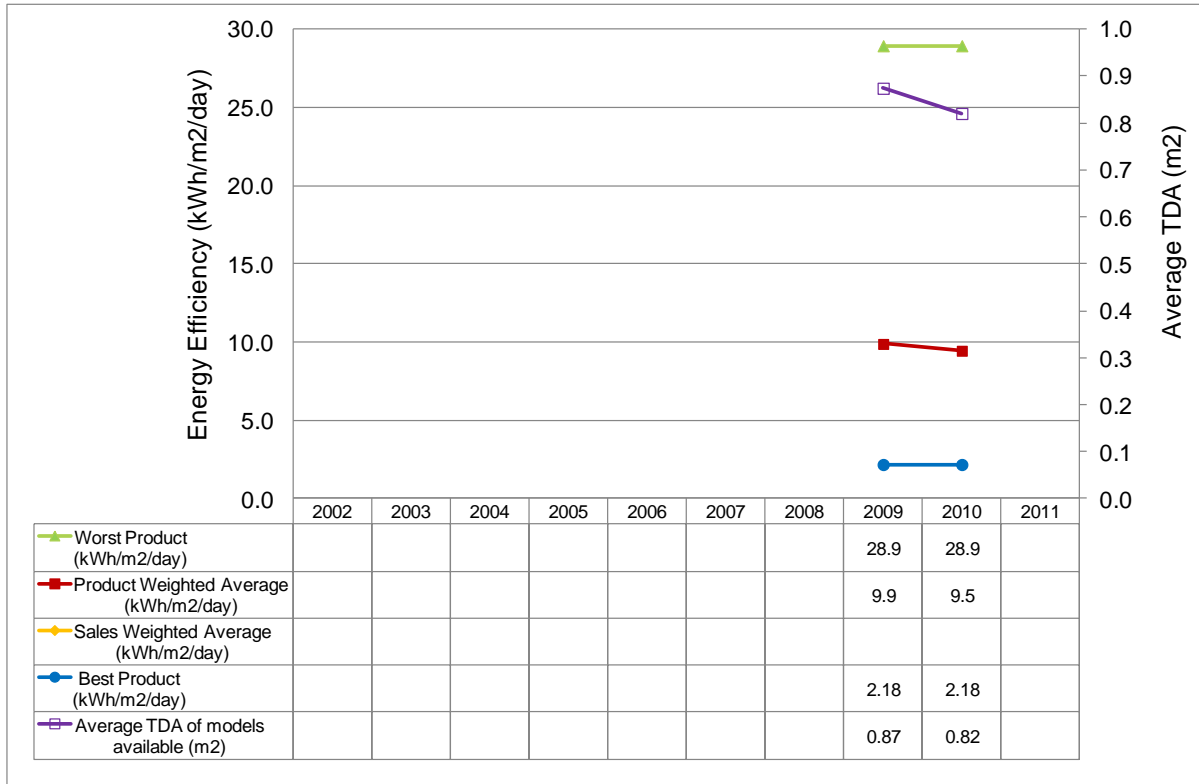
Energy efficiency of new chilled retail display cabinets Australia



Key notes on Graph (see notes section 1)

- Products covered are self-contained (integral) vertical chilled cabinets with glass door(s). TDA is the Total Display Area, the open or glazed viewable area for food products on display, in square metres.
- Data were supplied by the federal government from the mandatory MEPS registration database. No sales data were available.
- Analysis is based on 447 cabinets in 2009 and 569 cabinets in 2010.
- The very wide range between highest and lowest efficiency product is due to significant differences in the size of product: the highest efficiency product in 2010 has a TDA of 1.6 m², the lowest of only 0.2 m². The size of a cabinet inevitably influences efficiency due to significant differences in the ratio of surface area to internal volume, for which surface area is proportional to ambient heat ingress.

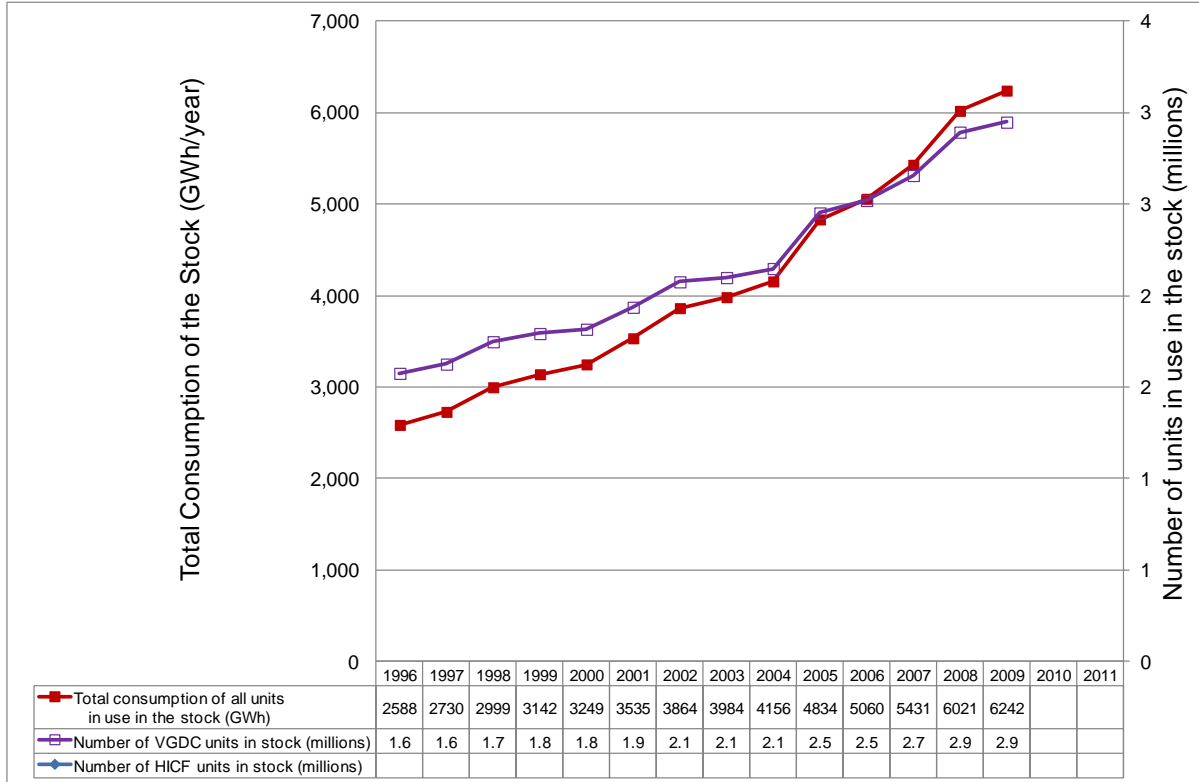
Energy efficiency of new frozen retail display cabinets Australia



Key notes on Graph (see notes section 1)

- Products covered are self-contained (integral) horizontal frozen ice cream merchandiser cabinets. TDA is the Total Display Area, the open or glazed viewable area for food products on display, in square metres.
- Data were supplied by the federal government from the mandatory MEPS registration database. No sales data were available.
- Analysis is based on 178 cabinets in 2009 and 223 cabinets in 2010.
- The very wide range between highest and lowest efficiency product is due to significant differences in the size of product: the highest efficiency product has a TDA of 3.4 m², the lowest of only 1 m². The size of a cabinet inevitably influences efficiency due to significant differences in the ratio of surface area to internal volume, for which surface area is proportional to ambient heat ingress.

Total energy consumption in the existing retail display cabinets stock - Australia



Key notes on Graph (See Notes Section 3)

- Data were only available on the stock of vertical glass door chilled cabinets.
- Data from Australian government research.

Major Policy Interventions (See notes Section 4)

MEPS

Refrigerated display cabinets manufactured in or imported into Australia and New Zealand must comply with Minimum Energy Performance (MEPS) requirements² which are set out in AS 1731.14-2003. The scope of commercial refrigeration MEPS includes both remote and self-contained refrigerated display cabinets primarily used in commercial applications for the storage of frozen and unfrozen food. The MEPS came into force in October 2004.

The Minimum Energy Performance Standards (MEPS) for commercial refrigeration are set out in AS 1731.14-2003 as total energy consumption per total display area (TEC/TDA) in kWh/day/square metre for various unit types. The test procedures for commercial refrigeration are the specified parts AS 1731.

Table of MEPS levels for the self-contained (integral) retail display cabinets in Australia² that are within the scope of this analysis. Thresholds are in kWh per 24 hours per square metre of total display area (TEC/TDA).

Type	M-package temperature classes (see AS1731.6 Clause 5)	
	M1	M2
Chilled temperature class:		
Vertical glass door chilled (VC4 type)	17.00	17.50
Frozen temperature class:	L1	L2
Horizontal open (wall site) frozen (HF3 type)	no value	no value
Horizontal open (island site) frozen (HF4 type)	26.50	26.50
Horizontal glass lid (wall site) frozen (HF5 type)	no value	no value
Horizontal glass lid (island site) frozen (HF6)	8.00	8.00

Tests for compliance are required to be conducted under climate Class 3 conditions, with lighting and anti-sweat heaters running for the duration of test period, unless controlled by a time-clock, smart sensor or similar automatic device.

Retail display cabinets are required by law to be registered for Minimum Energy Performance Standards (MEPS) in Australia. Registration applications must be made in a prescribed format and lodged with any of the regulators in Australia.

Note: AS1731 or MEPS does not apply to cabinets intended for use in catering and similar non-retail applications.

High efficiency standards

AS1731.14 also defines minimum efficiency levels for “High Efficiency” refrigerated display cabinets. Only products which meet the specified efficiency levels can apply this term to promotional or advertising materials.

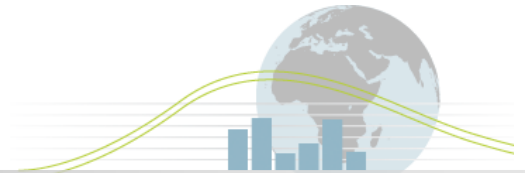
² See <http://www.energyrating.gov.au/products-themes/refrigeration/commercial-refrigeration/meps/>

Table of minimum efficiency levels if a cabinet is to be described as ‘high efficiency’ for the self-contained (integral) retail display cabinets in Australia² that are within the scope of this analysis. Thresholds are in kWh per 24 hours per square metre of total display area (TEC/TDA).

Type	M-package temperature classes (see AS1731.6 Clause 5)	
	M1	M2
Chilled temperature class:		
Vertical glass door chilled (VC4 type)	10.7	10.7
Frozen temperature class:	L1	L2
Horizontal open (wall site) frozen (HF3 type)	no value	no value
Horizontal open (island site) frozen (HF4 type)	19.5	19.5
Horizontal glass lid (wall site) frozen (HF5 type)	no value	no value
Horizontal glass lid (island site) frozen (HF6)	5.9	5.9

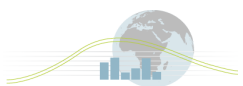
Australian ENERGY STAR

Suppliers can voluntarily use the US ENERGY STAR label in Australia through a reciprocal agreement with the US Government that has been in place since 2006.



Cultural Issues (See Notes Section 5)

- No information available.



Notes on data

Section 1: Notes on Product Consumption

1.1 Test methodologies, Performance Standards and Labelling Requirements

Australia has its own test methodology for refrigerated display cabinets which is AS1731 “Refrigerated display cabinets” (Australia and New Zealand). This is a comprehensive document providing test methodology and requirements for classification, installation and maintenance, user guides, minimum energy performance standards and more and was closely based on the previous European test methodology EN 441. Update of AS1731 is currently under consideration.

Tests for compliance are required to be conducted under climate Class 3 conditions, with lighting and anti-sweat heaters running for the duration of test period, unless controlled by a time-clock, smart sensor or similar automatic device.

MEPS are in force for integral (self-contained) and remote refrigerated display cabinets (see Major Policy Interventions section). There are no labelling requirements for refrigerated display cabinets.

1.2 Product Consumption Graphic

The chosen metric for consumption for both frozen and chilled cabinets is kWh per day.

Data sources and data cleaning

Data were provided by the federal government from the mandatory MEPS registration database. The data sets covered 2009 and 2010 and included products both inside and outside of the scope of this analysis: the original data sets included 1,290 (2009) and 1,550 (2010) products. The databases were filtered to only include products meeting the scope of analysis. In some cases where descriptive data were incomplete, assumptions were made as to whether a product was in or out of scope. The following product types were deleted from the data sets:

- Remote cabinets (i.e. only integral (self-contained) cabinets are within scope)
- Products with opaque doors and drawer units
- Refrigerated (chilled) products without doors
- Combination refrigerator/freezer units
- All freezer units higher than 1m (cannot be horizontal units)³
- All upright/vertical freezer units.

³ This filter criterion is imperfect as it allows through vertical frozen cabinets less than 1m high. For example some under counter frozen units could end up in the analysed data set with horizontal ice cream merchandisers. The number of misplaced cabinets is not expected to significantly distort the results.

The procedure followed with data for other countries for this product has been to carry forward products into the successive years after first registration in order to have data sets that better represent products available on the market (as opposed to the more limited set of products which were registered in that year). However, since data for this country were only available for 2 years, this was not done for this analysis as it would have unduly distorted the pattern of results.

No sales data were available for any products and so data are only product-weighted.

Table of final number of products analysed in each year (excluding products deemed out of scope and with partial or dubious data).

	Frozen horizontal (ice cream) cabinets	Chilled vertical glass door cabinets
2008	-	-
2009	178	447
2010	223	569
2011	-	-
All years	401	1,016

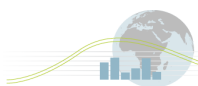
Normalisation of data for mapping

The data sets provided contained products tested to AS1731, EN 441 and EN 23953. Use of these different test methodologies meant differences in door opening regime during test. The data also covered several ambient temperature classes and storage temperature classes. This meant that the data had to be adjusted (normalised) in order to make performance of cabinets internally comparable for the aspects listed below.

Some of the normalisation process is summarised below, but for details on the normalisation adjustments for mapping and benchmarking see the separate document *'Product Normalisation Methodology: Integral Refrigerated Retail Display Cabinets'*.

The following aspects required adjustment (normalisation) for mapping analysis:

- 1) Door openings: the door opening regime of ISO23953 was adopted as the basis for comparison. Hence, products tested to (or assumed to have been tested to) EN 441 had their energy consumption/efficiency figures reduced by 3.9% to compensate for the slightly longer period of test with the door open (derived from empirical data).
- 2) Storage temperature during test: The Australian data included a range of different storage temperatures. Chilled cabinet data were normalised to an assumed storage temperature of 5.5°C (which is the typical average temperature achieved with the EU temperature classes H1 and H2); frozen cabinets were normalised to a storage temperature of -26°C (which is the average temperature under EU temperature class L1).
- 3) Ambient temperature and humidity during test: The Australian data included a range of different ambient test conditions, called temperature classes. Temperature class 3



was adopted as the basis for comparison, and all cabinets tested in classes 2, 3 and 4 had their data adjusted. Any cabinets tested at classes significantly different to the target temperatures for the products in scope (classes 0, 1, 5, 6, 7, 8) were rejected (i.e. they were assumed not to be of the required type and no evidence was available to make the adjustment).

No other factors were subject to normalisation.

Note that the lighting regime stipulated in AS1731 is 24 hours, the same as ASHRAE 72 and the standard adopted for comparison in this analysis. Products noted as being tested to EN441 would normally have had their performance adjusted to compensate as EN441 requires 12 hour lighting on and 12 hours off. However, on advice from the Australian technical specialist it was assumed that the performance data had already been adjusted to simulate 24 hour lighting (or alternatively had been tested in that way originally) and so no adjustment for lighting was carried out. In addition, no data were available on lighting features of the products.

Section 2: Notes on Product Efficiency

2.1 Test methodologies, Performance Standards and Labelling Requirements

Test methodologies, standards and labelling apply to efficiency exactly as for product consumption above.

2.2 Product Efficiency Graphic

The Australian data set contained only total display area (TDA) data for cabinets and so TEC/TDA (kWh per day/m²) was adopted as the metric for efficiency.

The data sets used for efficiency analysis were exactly the same as for product consumption above.

Section 3: Notes on Consumption of Stock

No further information available.

Section 4: Notes on Policy Interventions

No further information available.

Section 5: Notes on Cultural Issues

No further information available.