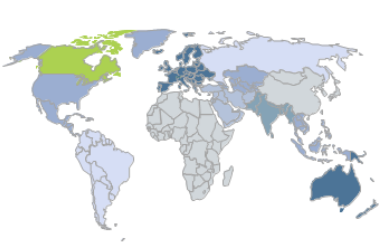
Mapping Document



Country:	Canada
Technology:	Domestic refrigerated appliances
Sub Category:	Refrigerators, refrigerator-freezers and freezers

Introduction

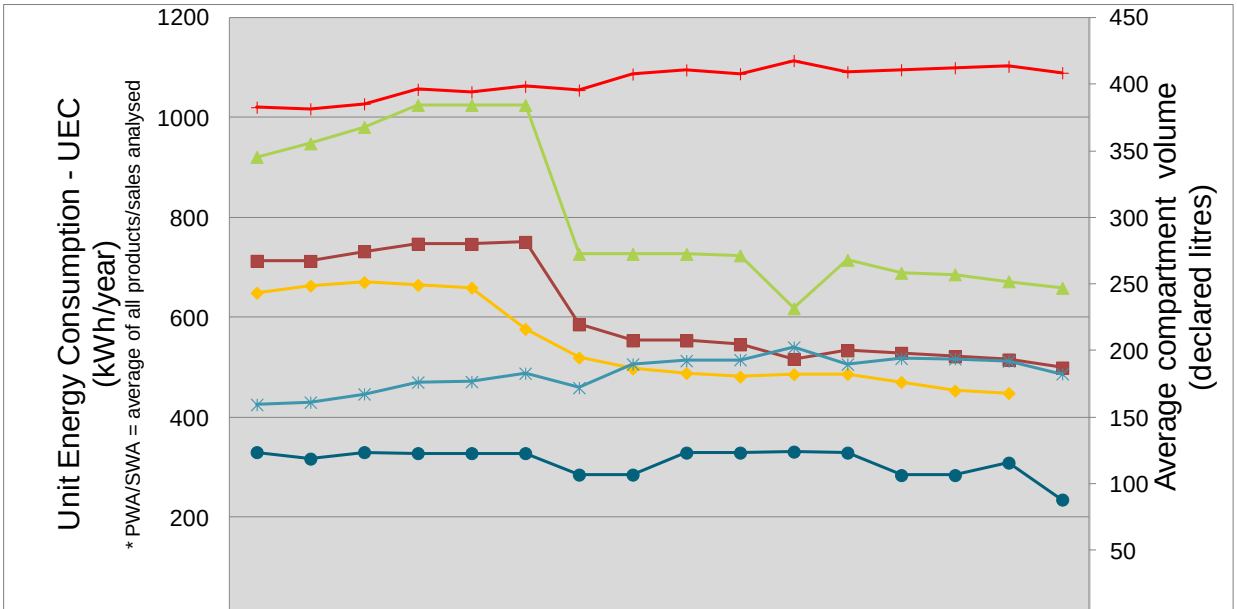
The first stage in the Mapping and Benchmarking process is the definition of the products, i.e. clearly setting the boundaries that define the products for use in data collection and analysis. This ensures that comparison between the participating countries is done against a specific and consistent set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

The summary definition for this product is:

M&B Category	Description
Refrigerator only and refrigerators with freezer compartments	The primary compartment is for fresh storage in the temperature range 5°C >= T> 0°C *and* • The unit has no freezer compartment, *or* • The unit has a freezer compartment of any temperature rating but a volume of less than 14 litres, *or* • The unit has a frozen food compartment of any volume that is rated as 0°C >= T > -15°C
Refrigerator/Freezer	The primary compartment for fresh storage in the temperature range 5°C >= T> 0°C *and* the primary frozen food compartment is greater than 14 litres and has a rated temperature T <= -15°C
Freezer only	A unit where *all* compartments have a temperature rating T <= -15°C

The detailed product definition can be found at the Annex website:
http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=13

Unit Energy Consumption of new refrigerator freezers in Canada



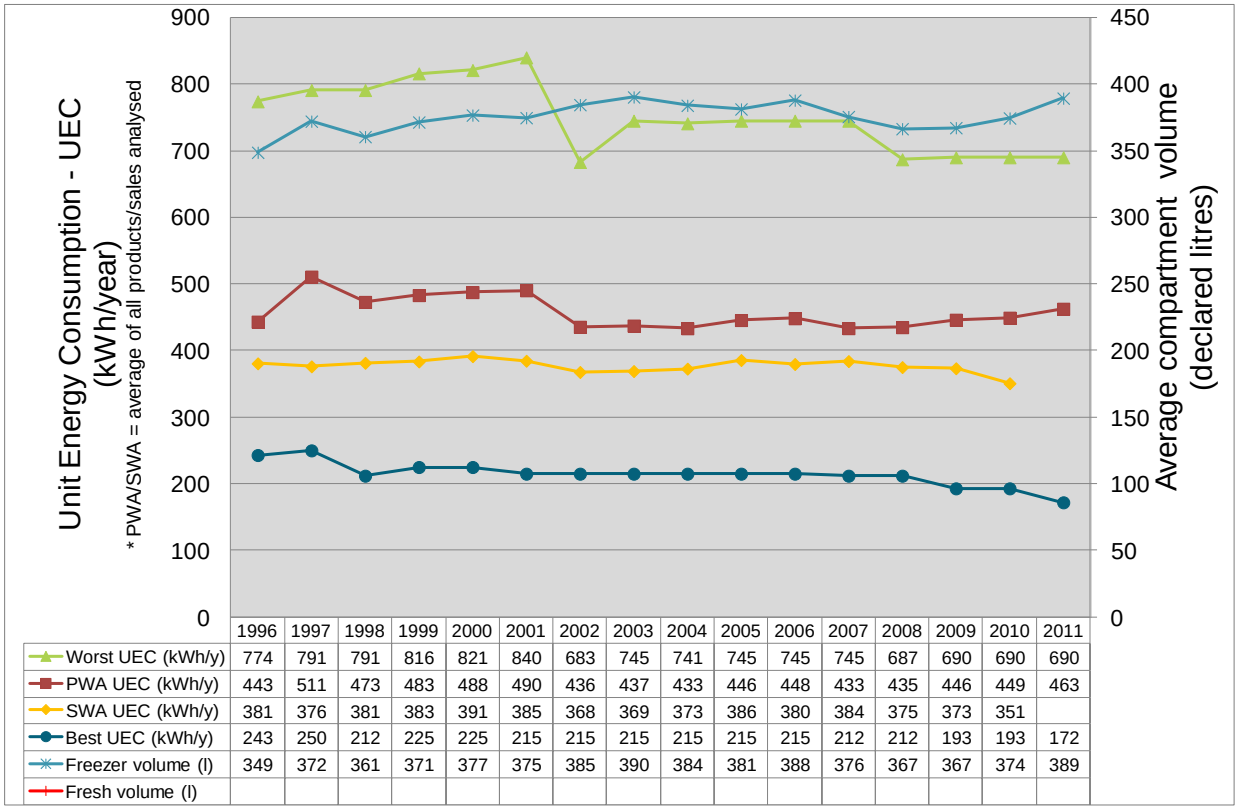
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst UEC (kWh/y)	921	948	981	1025	1025	1025	727	727	727	724	618	715	689	686	672	659
PWA UEC (kWh/y)	713	713	732	747	747	751	586	554	554	546	516	534	529	522	515	499
SWA UEC (kWh/y)	649	663	670	665	659	576	519	497	488	481	486	487	470	453	448	
Best UEC (kWh/y)	330	317	330	328	328	328	285	285	329	329	331	329	284	284	309	235
Freezer volume (l)	159	161	167	176	177	183	172	190	192	193	203	190	194	194	192	183
Fresh volume (l)	383	381	385	396	394	398	396	408	411	408	418	409	411	412	413	409

Key notes on Graph (see notes section 1)

- Product and sales[1] weighted averages are from correlated data sets.
- No breakdown of volumes was available in the sales data set, therefore average volumes are product weighted.
- The 'Worst UEC' is the UEC of the product at the 'worst 5%' point of a ranked list of products in the dataset.

[1] Sales weighted averages calculated based on *shipment weighted* data

Unit Energy Consumption of new freezers in Canada



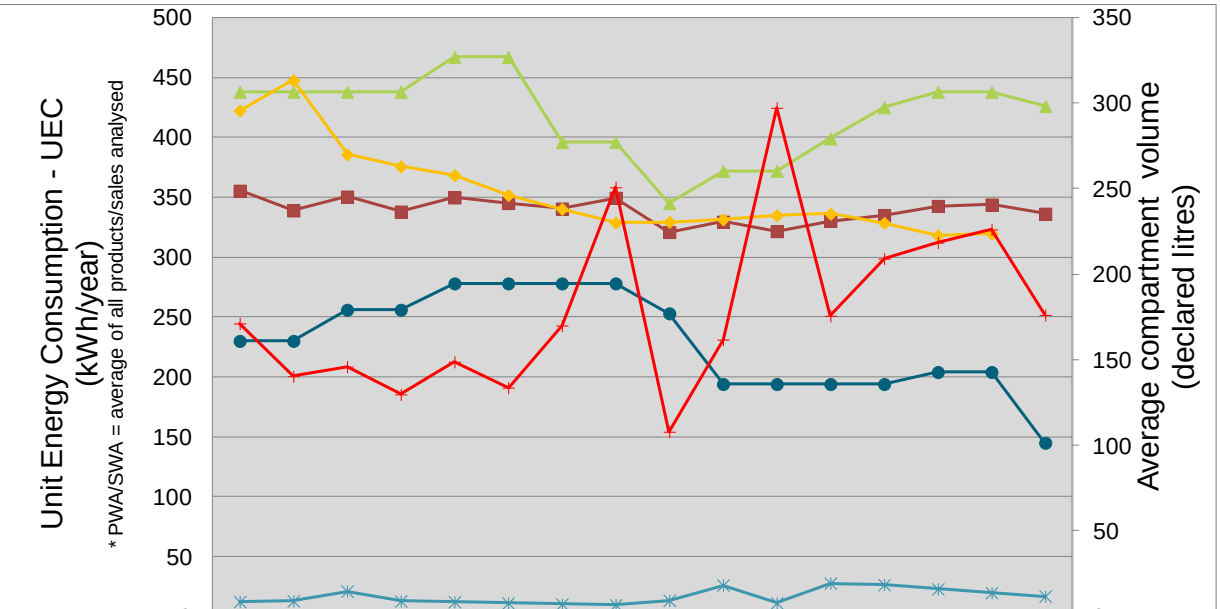
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst UEC (kWh/y)	774	791	791	816	821	840	683	745	741	745	745	745	687	690	690	690
PWA UEC (kWh/y)	443	511	473	483	488	490	436	437	433	446	448	433	435	446	449	463
SWA UEC (kWh/y)	381	376	381	383	391	385	368	369	373	386	380	384	375	373	351	
Best UEC (kWh/y)	243	250	212	225	225	215	215	215	215	215	215	212	212	193	193	172
Freezer volume (l)	349	372	361	371	377	375	385	390	384	381	388	376	367	367	374	389
Fresh volume (l)																

Key notes on Graph (see notes section 1)

- Product and sales[2] weighted averages are from correlated data sets.
- No breakdown of volumes was available in the sales data set, therefore average volumes are product weighted.
- The 'Worst UEC' is the UEC of the product at the 'worst 5%' point of a ranked list of products in the dataset.

[2] Sales weighted averages calculated based on *shipment weighted* data

Unit Energy Consumption of new refrigerators and refrigerators with freezer compartments in Canada



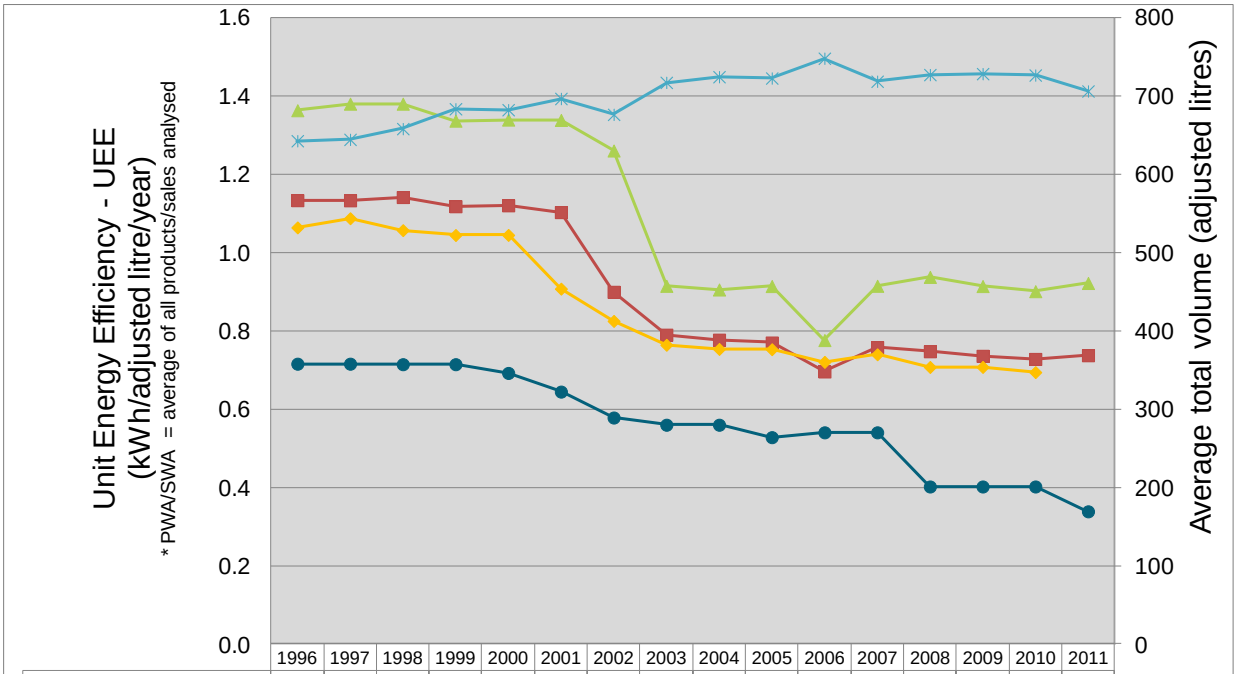
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst UEC (kWh/y)	438	438	438	438	467	467	396	396	345	372	372	399	425	438	438	426
PWA UEC (kWh/y)	355	339	351	338	350	345	341	350	321	330	322	330	335	343	344	336
SWA UEC (kWh/y)	422	448	386	376	368	352	340	329	329	331	335	336	329	318	320	
Best UEC (kWh/y)	230	230	256	256	278	278	278	278	253	194	194	194	194	204	204	145
Freezer volume (l)	9	9	15	9	9	8	7	7	9	18	8	19	19	16	14	12
Fresh volume (l)	171	140	146	130	149	134	170	251	108	162	297	176	209	218	226	176

Key notes on Graph (see notes section 1)

- The results shown are based on small datasets of products that represent a small proportion of the market. They are particularly sensitive to variations in the way data is reported during the period shown which has contributed to some wide fluctuations in the results.
- Product and sales[3] weighted averages are from correlated data sets.
- No breakdown of volumes was available in the sales data set, therefore average volumes are product weighted.
- The 'Worst UEC' is the UEC of the product at the 'worst 5%' point of a ranked list of products in the dataset.

[3] Sales weighted averages calculated based on *shipment weighted* data

Unit Energy Efficiency of new refrigerator freezers in Canada



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst UEE	1.36	1.38	1.38	1.34	1.34	1.34	1.26	0.91	0.91	0.91	0.78	0.91	0.94	0.91	0.90	0.92
PWA UEE	1.13	1.13	1.14	1.12	1.12	1.10	0.90	0.79	0.78	0.77	0.70	0.76	0.75	0.74	0.73	0.74
SWA UEE	1.06	1.09	1.06	1.04	1.04	0.91	0.82	0.76	0.75	0.75	0.72	0.74	0.71	0.71	0.69	
Best UEE	0.72	0.72	0.71	0.71	0.69	0.64	0.58	0.56	0.56	0.53	0.54	0.54	0.40	0.40	0.40	0.34
Total volume (adjusted l)	643	644	658	683	682	697	676	717	724	723	748	719	727	728	726	706

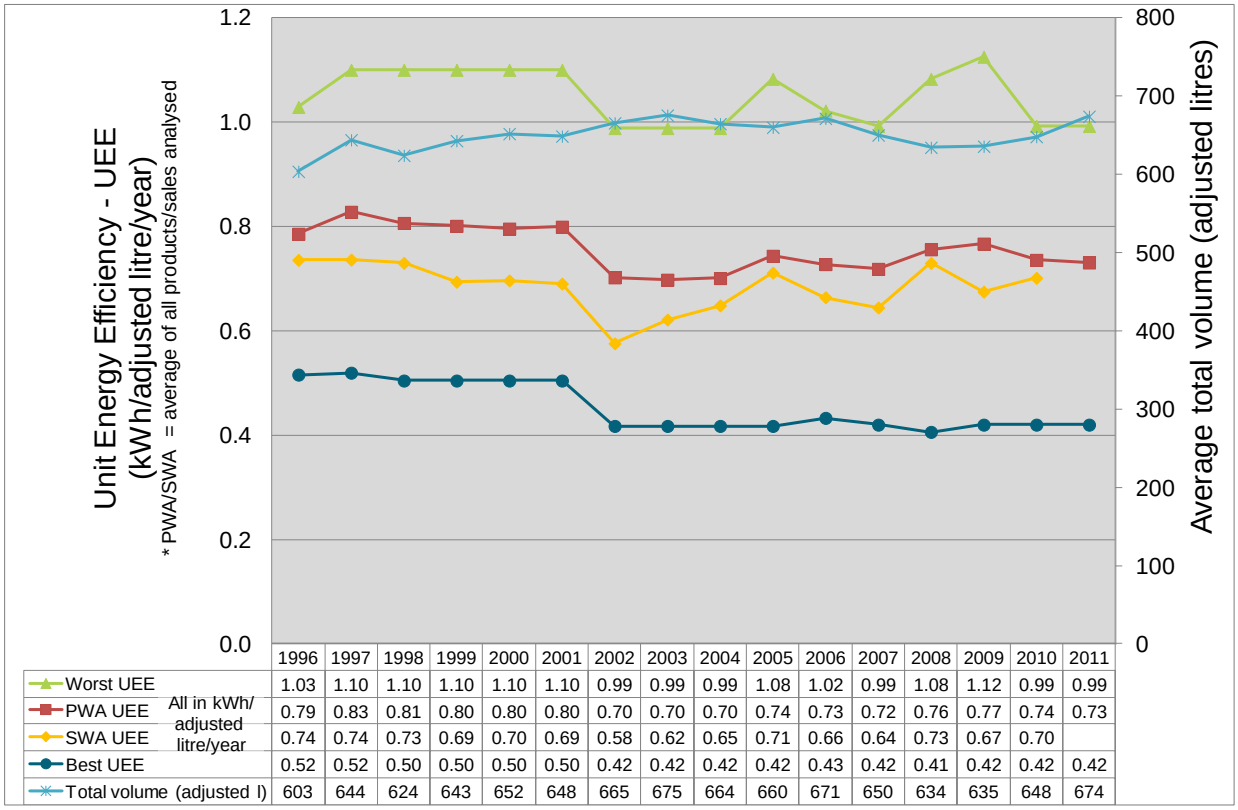
All in kWh/ adjusted litre/year

Key notes on Graph (see notes section 1)

- The average total volumes shown (adjusted litres) are calculated using the temperatures and methods defined in the local test methodology/regulations. The average unit energy efficiency (UEE) is then calculated using these total adjusted volumes.
- Product and sales[4] weighted averages are from correlated data sets.
- No breakdown of volumes was available in the sales data set, therefore average total volume is product weighted.
- Sales weighted UEE is calculated using product weighted average volumes by Canadian Category type.
- The 'Worst UEE' is the UEE of the product at the 'worst 5%' point of a ranked list of products in the dataset.

[4] Sales weighted averages calculated based on *shipment weighted* data

Unit Energy Efficiency of new freezers in Canada



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst UEE	1.03	1.10	1.10	1.10	1.10	1.10	0.99	0.99	0.99	1.08	1.02	0.99	1.08	1.12	0.99	0.99
PWA UEE	0.79	0.83	0.81	0.80	0.80	0.80	0.70	0.70	0.70	0.74	0.73	0.72	0.76	0.77	0.74	0.73
SWA UEE	0.74	0.74	0.73	0.69	0.70	0.69	0.58	0.62	0.65	0.71	0.66	0.64	0.73	0.67	0.70	
Best UEE	0.52	0.52	0.50	0.50	0.50	0.50	0.42	0.42	0.42	0.42	0.43	0.42	0.41	0.42	0.42	0.42
Total volume (adjusted l)	603	644	624	643	652	648	665	675	664	660	671	650	634	635	648	674

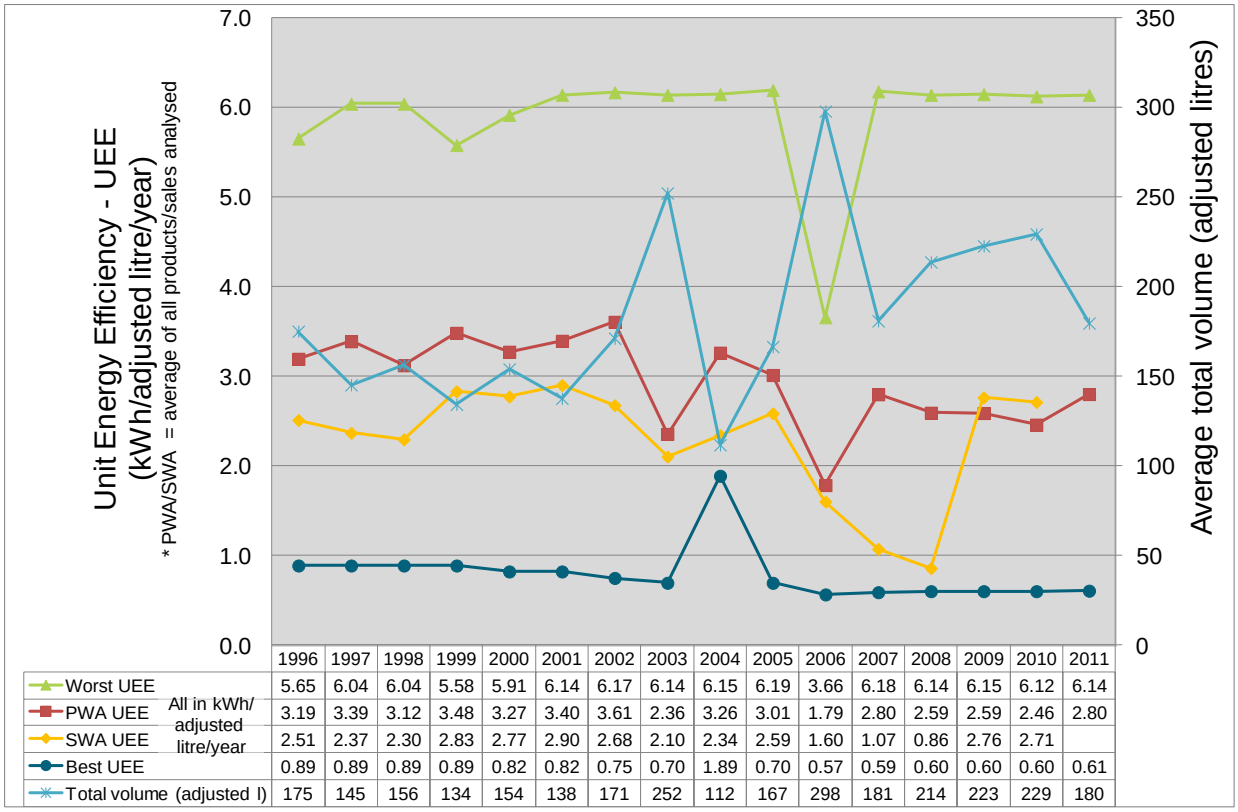
All in kWh/ adjusted litre/year

Key notes on Graph (see notes section 1)

- The average total volumes shown (adjusted litres) are calculated using the temperatures and methods defined in the local test methodology/regulations. The average unit energy efficiency (UEE) is then calculated using these total adjusted volumes.
- Product and sales[5] weighted averages are from correlated data sets.
- No breakdown of volumes was available in the sales data set, therefore average total volume is product weighted.
- Sales weighted UEE is calculated using product weighted average volumes by Canadian Category type.
- The 'Worst UEE' is the UEE of the product at the 'worst 5%' point of a ranked list of products in the dataset.

[5] Sales weighted averages calculated based on *shipment weighted* data

Unit Energy Efficiency of new refrigerators and refrigerators with freezer compartments in Canada



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst UEE	5.65	6.04	6.04	5.58	5.91	6.14	6.17	6.14	6.15	6.19	3.66	6.18	6.14	6.15	6.12	6.14
PWA UEE	3.19	3.39	3.12	3.48	3.27	3.40	3.61	2.36	3.26	3.01	1.79	2.80	2.59	2.59	2.46	2.80
SWA UEE	2.51	2.37	2.30	2.83	2.77	2.90	2.68	2.10	2.34	2.59	1.60	1.07	0.86	2.76	2.71	
Best UEE	0.89	0.89	0.89	0.89	0.82	0.82	0.75	0.70	1.89	0.70	0.57	0.59	0.60	0.60	0.60	0.61
Total volume (adjusted l)	175	145	156	134	154	138	171	252	112	167	298	181	214	223	229	180

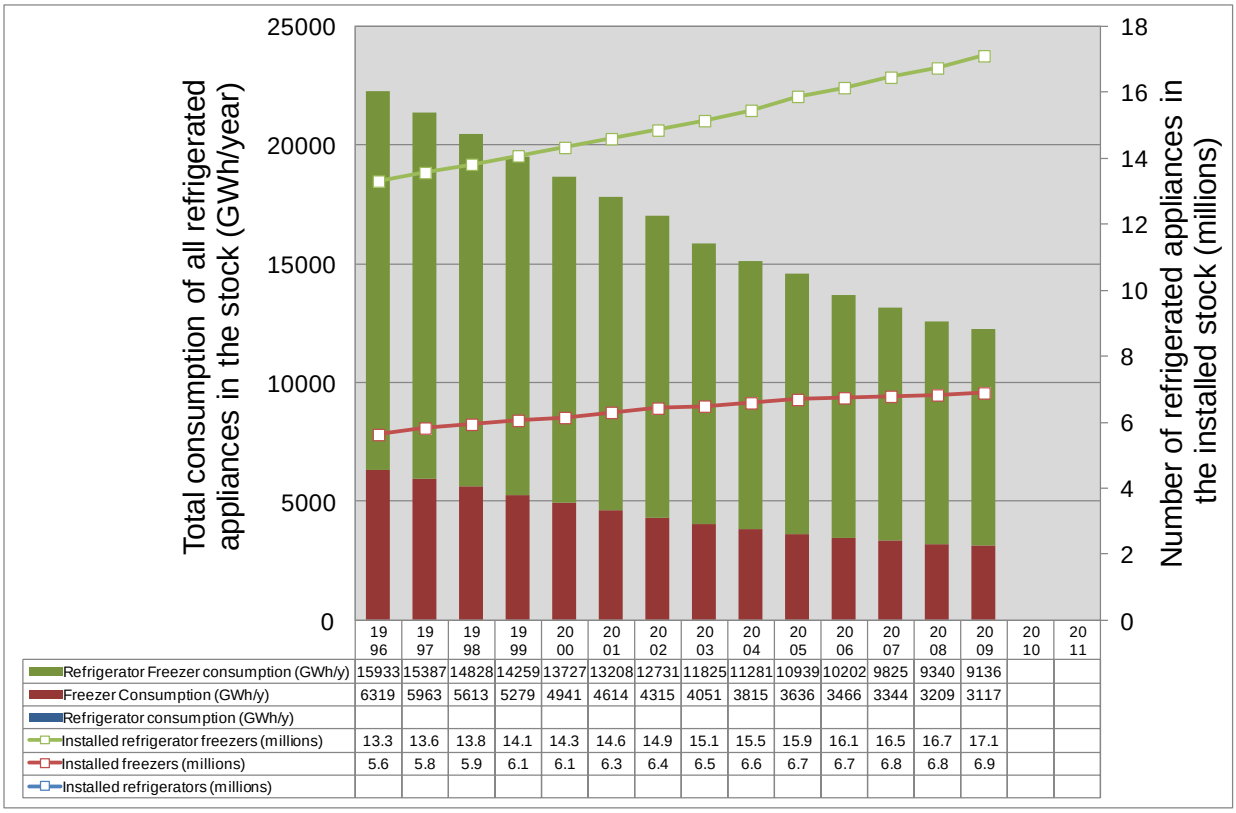
All in kWh/ adjusted litre/year

Key notes on Graph (see notes section 1)

- The results shown are based on small datasets of products that represent a small proportion of the market. They are particularly sensitive to variations in the way data is reported during the period shown which has contributed to some wide fluctuations in the results.
- The average total volumes shown (adjusted litres) are calculated using the temperatures and methods defined in the local test methodology/regulations. The average unit energy efficiency (UEE) is then calculated using these total adjusted volumes.
- Product and sales[6] weighted averages are from correlated data sets.
- No breakdown of volumes was available in the sales data set, therefore average total volume is product weighted.
- Sales weighted UEE is calculated using product weighted average volumes by Canadian Category type.
- The 'Worst UEE' is the UEE of the product at the 'worst 5%' point of a ranked list of products in the dataset.

[6] Sales weighted averages calculated based on *shipment weighted* data

Energy Consumption of the installed stock of refrigerated appliances in Canada



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Refrigerator Freezer consumption (GWh/y)	15933	15387	14828	14259	13727	13208	12731	11825	11281	10939	10202	9825	9340	9136		
Freezer Consumption (GWh/y)	6319	5963	5613	5279	4941	4614	4315	4051	3815	3636	3466	3344	3209	3117		
Refrigerator consumption (GWh/y)																
Installed refrigerator freezers (millions)	13.3	13.6	13.8	14.1	14.3	14.6	14.9	15.1	15.5	15.9	16.1	16.5	16.7	17.1		
Installed freezers (millions)	5.6	5.8	5.9	6.1	6.1	6.3	6.4	6.5	6.6	6.7	6.7	6.8	6.8	6.9		
Installed refrigerators (millions)																

Key notes on Graph (see notes section 2)

- The refrigerator freezer data shown includes refrigerators and refrigerators with freezer compartments as it was supplied in combination. Refrigerator freezers are the most common products in the stock accounting for nearly all (>95%) refrigerator products in use.

Major Policy Interventions (*see notes section 3)*

Canada has three primary federal policy interventions related to the energy efficiency of refrigerators, freezers and refrigerator-freezer combinations:

- Minimum Energy Performance Standards (MEPS): The Energy Efficiency Act, enacted in 1992, gives the Government of Canada the authority to make and enforce regulations on performance standards and labelling requirements for energy-using products that are imported into Canada or shipped across provincial and/or territorial borders for the purpose of sale or lease.

  MEPS for refrigerators and freezers were first introduced in February 1995 with the ratification of the Energy Efficiency Regulations. Since then a number of amendments have been made to the MEPS for refrigerators, freezers, refrigerator-freezer combinations and other variations on these products (i.e. wine chillers). Three amendments in particular (Amendments 5, 9 and 10, passed in 2001, 2006 and 2008, respectively) have introduced either a new product or greater stringency on existing regulations with respect to the refrigerator/freezer category. Proposals for Amendment 12 (2010/2011) include more stringent MEPS for refrigeration equipment.

  Generally, MEPS serve in transforming the Canadian marketplace by way of eliminating products with poor energy efficiency performance, while fostering a commitment to improving efficiency for energy-using equipment.

- Mandatory Labelling: Since its inception in 1978, the EnerGuide label has given Canadians the opportunity to compare the energy consumption of major electrical household appliances, including refrigerators and freezers. With the introduction of the Energy Efficiency Regulations (1995), placement of the EnerGuide label on major electrical household appliances and room/window air conditioners became mandatory. In addition to providing the average annual energy consumption of an appliance, the EnerGuide label also includes a scale showing how the given appliance compares with other similar products in terms of annual energy consumption.

- Voluntary Labelling: In 2001, Canada officially introduced ENERGY STAR, the international symbol for energy efficiency. Refrigerators and freezers that exceed the regulated performance standards by 20% (or 10% for standard-sized freezers) are eligible for the ENERGY STAR label. ENERGY STAR has also been integrated with the EnerGuide label to further enable consumers to identify the best-performing products.

- Conformity Assessment: Various monitoring actives are utilized achieving a high level of compliance: self-monitoring by manufacturers and dealers; monitoring by regulatory authorities including NRCan designated inspectors, provincial partners, and Canada Customs and Border Services (CBSA); market surveys, product testing and electronic monitoring of energy efficiency reports and imports; third-party

verification mark issued by independent certification organizations accredited by the Standards Council of Canada; and finally with complaints and tips from dealers, manufacturers and consumers. Compliant products are listed on NRCan's website and in product directories for consumers, utilities, dealers, and the public. The data is monitored electronically to detect non-compliant products.

In addition to these major policy interventions, federal, provincial and territorial governments have also introduced programs to encourage the purchase and use of energy efficient equipment, including grants, and rebate and incentives programs.

Cultural Issues (*see notes section 4)*

Refrigerator/Freezer

- The average annual energy consumption of a refrigerator/freezer in 2010 was 425 kWh, during the 1990s it was 956 kWh, and 1300 kWh during the 1980s;
- In 2006, nearly 89% of new refrigerator/freezer models used less than 30 kWh/ ft^3 per year – a significant improvement from 1990, when 60% of refrigerators on the market used 60 – 69.9 kWh/ft^3 per year, and all models used more than 30 kWh/ ft^3 per year;
- Since 1990, top-mounted freezer types have gradually declined in popularity, having dominated roughly 85% of the marketplace in 1990 to representing just under 55% of the market in 2008. Preference for bottom-mounted freezers has grown significantly during the same time period, from less than 1% of market stock in 1990 to nearly 35% in 2008. Distribution of side-by-side models has had a relatively flat growth rate, representing just under 11% of market stock;
- Canadians continue to prefer refrigerator/freezer models sized between 16.5 ft^3 and 19.4 ft^3 (40%), or between 19.5 ft^3 and 22.4 ft^3 (20%). These preferences have not changed significantly since 2000. There has been noticeable growth in the distribution and sales of compact refrigerators (under 6.5 ft^3), which currently represent 15% of market stock;
- Canadian households with two or more refrigerators has increased from 24% in 2002 to nearly 27% in 2007;
- The average useful life of a refrigerator/freezer in Canada is 18 years;
- In 2011, the market share of ENERGY STAR refrigerators exceeded 68%.

Freezers

- During the 1980s the average annual energy consumption of a freezer was 960 kWh; by 1990 it had dropped to 714 kWh. From 1996 to present, due to marginal revisions of energy efficiency regulations and ENERGY STAR for freezers, the average annual consumption of a freezer in Canada has been around 390 kWh (365 kWh in 2010).
- In 2006, 40% of new freezer models used between 30 to 39.9 kWh/ft^3 per year, while nearly 35% of the freezer market used between 20 to 29.9 kWh/ft^3 per year. This is a dramatic improvement from 1990 when all freezers used more than 50 kWh/ ft^3 per year, the majority of which used between 70 to 79.9 kWh/ ft^3 per year;
- Chest freezers remain dominant in the market, having grown slightly in popularity from 65% in 1990 to 70% in 2008. Upright freezers represent 30% of market share;

The average useful life of a freezer in Canada is 19 years.

Section 1. Unit Energy Consumption and Unit Energy Efficiency Graphics

Important Note: Currently consultations are ongoing regarding the revision of Canadian test procedures and regulations to harmonise with the recently enacted revised USA regulations for refrigerated appliances which will be effective from 2014.

However, at the time of preparation, the test methodologies detailed below are still in force.

1.1 Test methodologies, Performance Standards and Labelling Requirements

Test Standards in use by program:

- MEPS and EnerGuide (a mandatory labeling program): CSA/C300-08
- ENERGY STAR (a voluntary program): 10 CFR 430, Subpart B, Appendices A1 and B1

Specific information:

External Test Temperature: The energy test procedure simulates typical room conditions (approximately 21.1ºC) with door openings, by testing at 32.2ºC without door openings.

Internal Test Temperature: Varies but typically units tested at

(a) all-refrigerator fresh food compartment temperature: 3.3 °C (38°F);

(b) basic refrigerator-freezer compartment temperature: –9.4 °C (15°F) in the freezer compartment or 7.2 °C (45°F) in the fresh food compartment, whichever yields the higher energy consumption; and

(c) refrigerator-freezer compartment temperature: –15.0 °C (5°F) in the freezer compartment or 7.2 °C (45°F) in the fresh food compartment, whichever yields the higher energy consumption.

(d)Testing shall be performed at –17.8 °C (0°F), the standardized reference temperature for a freezer.

The freezer volume adjustment for freezers in refrigerator / Freezers is 1.63 to calculate total volume for all years. The freezer volume adjustment for basic refrigerators is 1.44 (these would be a subset of type1 and type 11). The freezer volume adjustment for all freezers is 1.73.

1.2 Product Classifications

(Source: CSA/C300-08)

Group	Description
Type 1	Refrigerators and refrigerator-freezers with manual defrost
Type 2	Refrigerator-freezers—partial automatic defrost
Type 3	Refrigerator-freezers—automatic defrost with top-mounted freezer without through-the-door ice service and all-refrigerator—automatic defrost
Type 4	Refrigerator-freezers—automatic defrost with side-mounted freezer without through-the-door ice service
Type 5	Refrigerator-freezers—automatic defrost with bottom-mounted freezer without through-the-door ice service
Type 5A	*Refrigerator-freezers—automatic defrost with bottom-mounted freezer with ice making capability but without through-the-door ice service*
Type 6	Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service
Type 7	Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service
Type 8	Upright freezers with manual defrost
Type 9	Upright freezers with automatic defrost
Type 10	Chest freezers and all other freezers except compact freezers
Type 10A	Chest freezer with automatic defrost
Type 11	Compact refrigerators and refrigerator-freezers with manual defrost
Type 12	Compact refrigerator-freezer—partial automatic defrost
Type 13	Compact refrigerator-freezers—automatic defrost with top-mounted freezer and compact all-refrigerator—automatic defrost
Type 14	Compact refrigerator-freezers—automatic defrost with side-mounted freezer
Type 15	Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer
Type 16	Compact upright freezers with manual defrost
Type 17	Compact upright freezers with automatic defrost
Type 18	Compact chest freezers
Type 19	Wine chillers with manual defrost
Type 20	Wine chiller with auto defrost

1.3 Data sources and limitations

Sources:

1. Energy Consumption of Major Household Appliances Shipped in Canada, Trends for 1990-2006, Natural Resources Canada, December 2008

2. Major Appliance Industry Trends and Forecast, Canadian Appliance Manufacturers Association, 2008, 2009 and 2012

3. Energy Use Data Handbook tables 1990-2006, Natural Resources Canada, http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tableshandbook2/res_00_16_e_3.cfm?attr=0 on

4. Energy Use Data Handbook tables 1990-2007, Natural Resources Canada (publication in process at the time of benchmarking study)

The number of models and sales analysed by product category are presented in the tables below.

Refrigerator freezers:

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Products in dataset	1702	1317	1392	2554	2483	1987	1930	2159	2475	2813	1304	2740	3834	3647	3694	3479
Products analysed	1702	1317	1287	2554	2483	1987	1930	2159	2475	2813	1304	2740	3834	3647	3693	3479
% products included	100%	100%	92%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Freezers:

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Products in dataset	333	275	369	331	343	436	313	376	408	371	360	406	417	0	510	541
Products analysed	333	275	369	331	343	436	309	376	408	371	360	395	417	0	496	535
% products included	100%	100%	100%	100%	100%	100%	99%	100%	100%	100%	100%	97%	100%	0%	97%	99%

Refrigerators and refrigerators with freezer compartments:

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Products in dataset	47	65	104	65	71	80	107	99	86	246	95	283	358	339	387	431
Products analysed	47	65	98	65	71	80	102	98	86	246	95	283	358	339	377	414
% products included	100%	100%	94%	100%	100%	100%	95%	99%	100%	100%	100%	100%	100%	100%	97%	96%

Sales weighted data is in fact based on shipment weighted data provided in the form of average UEC and percentage market share by Canadian product type[7]. The following information on total shipments gives an indication of the number of shipments included in the analysis:

[7] details can found in the actions and assumptions document - see section 1.4.1

Based on CAMA 2012 report Major Appliance Industry Trends and Facts

Unit shipment - Full size refrigerators[8]						
2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
923,000	960,000	1,049,000	1,062,000	1,018,000	1,036,000	983,000

Unit shipment - freezers						
2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
325,000	325,000	325,000	315,000	310,000	406,000	393,000

1.4 Data manipulations and specific limitations

1.4.1 Overview of the mapping and benchmarking process

There are essentially 4 stages to the mapping and benchmarking process for domestic refrigerated appliances as detailed below:

Stage:	Description
1. Data Cleaning and Pre-processing	• Removal of duplicate entries • Pre-processing to align all terminology and reported test values to be consistent between countries • Assigning of local, mapping and benchmarking and EU categories • Etc
2. Production of mapping outputs	• Production of mapping outputs based on local test methodologies
3. Normalisation of test data	• Calculation of adjusted volumes • Assignment Unit Energy Consumption to individual compartments • Normalisation for test temperature differentials
4. Production of Benchmarking outputs	• Post processing of benchmarking results • Production of benchmarking report

The details of this process are described in three supporting documents that accompany this mapping report:

1. The **product definition** describes the exact characteristics of the product being analysed; the energy metrics that will be calculated; the technological, usage and other characteristics that will be considered; and any other policy or cultural information that will be collected
2. The **summary of approach** provides an overview of the mapping and benchmarking process for analyzing domestic refrigerated appliances for all countries and regions.
3. The **actions and assumptions** report details the specific steps that were necessary to allow the data submitted from a specific country or region to be included in the

[8] includes all refrigerator and refrigerator freezer types.

mapping and benchmarking process as described in the product definition and summary of approach.

All these documents can be found at the annex website:

http://mappingandbenchmarking.iea-4e.org/matrix

by clicking on the "X" in the matrix table that aligns with *Canada* and *Domestic refrigerated appliances 2012*.

1.4.2 Specific cautions for this data

Please refer to the actions and assumptions document described in Section 1.4.1.

Section 2. Energy Consumption of the installed stock of refrigerated appliances graphic

2.1 Data sources and limitations

Sources:

Unit Energy Consumption (UEC) in stock: Based on "Energy Consumption of major Household Appliances Shipped in Canada; Summary report Trends for 1990-2009.

Number of appliances (by type): Natural Resources Canada, Comprehensive Energy Use Database Tables, Table 37: Appliance Stock by Appliance Type and Energy Source[9].

Calculation methodology:

Stock consumption is the product of UEC and number of appliances by type.

[9] http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tablestrends2/res_ca_37_e_4.cfm?attr=0

Section 3. Major Policy Interventions

Important Note: Currently consultations are ongoing regarding the revision of Canadian test procedures and regulations to harmonise with the recently enacted revised USA regulations for refrigerated appliances which will be effective from 2014. However, at the time of preparation, the minimum performance and labelling requirements detailed below are still in force.

Minimum Standards – The program covers refrigerators or refrigerators-freezers with a cabinet designed for the refrigerated storage of food at temperatures above 32° F., and having a source of refrigeration requiring single phase, alternating current electric energy input only. An electric refrigerator may include a compartment for the freezing and storage of food at temperatures below 32° F., but does not provide a separate low temperature compartment designed for the freezing and storage of food at temperatures below 8° F. An "all-refrigerator" is an electric refrigerator which does not include a compartment for the freezing and long time storage of food at temperatures below 32° F (0.0° C). An "all-refrigerator" may include a compartment of 0.50 cubic capacity (14.2 liters) or less for the freezing and storage of ice. NRCan recently introduced MEPS for wine coolers which are defined as a type of refrigerator.

Types and minimum standards in Canada:

Refrigerators **Product class**	**Type**	**Maximum annual energy consumption (kWh/year)** **July 1, 2001 *December 31, 2005**
Refrigerators and refrigerator-freezers with semi-automatic or manual defrost	1	0.31 AV + 248.4
Refrigerator-freezers with partial automatic defrost	2	0.31 AV + 248.4
Refrigerator-freezers with automatic defrost with top-mounted freezer and without through-the-door ice service, and all-refrigerators with automatic defrost	3	0.35 AV + 276
Refrigerator-freezers with automatic defrost with side-mounted freezer and without through-the-door ice service	4	0.17 AV + 507.5
Refrigerator-freezers with automatic defrost with bottom-mounted freezer and without through-the-door ice service	5	0.16 AV + 459
Refrigerator-freezers with automatic defrost and bottom-mounted freezer with through-the-door ice service	5A*	0.18 AV + 539
Refrigerator-freezers with automatic defrost with top-mounted freezer and with through-the-door ice service	6	0.36 AV + 356
Refrigerator-freezers with automatic defrost with side-mounted freezer and with through-the-door ice service	7	0.36 AV + 406

Refrigerators **Product class**	**Type**	**Maximum annual energy consumption (kWh/year)**
Compact models: refrigerated volume < 219.5 L (7.75 ft3) and an overall height < 91.4 cm (36 in)		***July 1, 2001(onward)***
Compact refrigerators and refrigerator-freezers with semi-automatic and manual defrost	11	0.38 AV + 299
Compact refrigerator-freezers with partial automatic defrost	12	0.25 AV + 398
Compact refrigerator-freezers with automatic defrost with top-mounted freezer and compact all-refrigerators with automatic defrost	13	0.38 AV + 355
Compact refrigerator-freezers with automatic defrost with side-mounted freezer	14	0.27 AV + 501
Compact refrigerator-freezers with automatic defrost with bottom-mounted freezer	15	0.46 AV + 367
Wine chillers		***January 1, 2008 (onward)***
Wine chillers with manual defrost	19	0.48 AV + 267
Wine chillers with automatic defrost	20	0.61 AV + 344

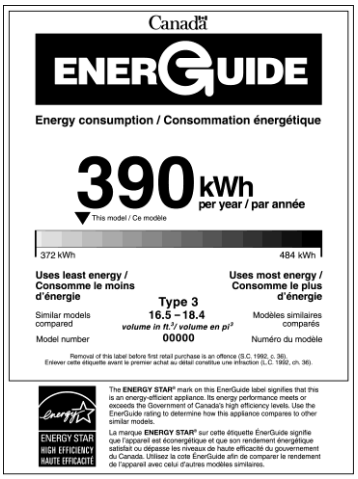
Notes:
*AV is the adjusted volume in litres [Note: total or adjusted volume ➔ AV=$V_{fresh\ food}$ + ($V_{freezers}$*AF)]*

Freezers	**Type**	**Maximum Annual Energy Consumption July 1, 2001 (kWh/year)** ***December 31, 2005**
Upright freezers with manual defrost	8	0.27 AV + 258.3
Upright freezers with automatic defrost	9	0.44 AV + 326.1
Chest freezers and all other freezers	10	0.35 AV + 143.7
Chest freezers with an automatic defrost system	10A*	0.52 AV + 211.5
Compact models: refrigerated volume < 219.5 L (7.75 ft3) and an overall height < 91.4 cm (36 in)		**(kWh/year)**
Compact upright freezers with manual defrost	16	0.35 AV + 250.8
Compact upright freezers with automatic defrost	17	0.40 AV + 391.0
Compact chest and all other compact freezers	18	0.37 AV + 152.0

Mandatory Labelling: EnerGuide

The EnerGuide label on refrigerators indicates how much electricity in kilowatt-hours (kWh) a particular model uses in one year.

The EnerGuide label also incorporates the ENERGY STAR Mark for qualified products.



This model / Ce modèle .

Voluntary Labelling: Energy Star

To qualify for ENERGY STAR, models must use 20% (standard and compact freezers and refrigerators, refrigerator-freezers) and 10% (standard freezers) less energy respectively than the current MEPS level or minimum federal standards for a refrigerator, refrigerator-freezers and freezers of that size and configuration.

Energy Star sales penetration figures:

Energy Star refrigerator penetration (*Total Refrigerators '000s*)									
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Total refrigerators	*1015*	*1028*	*1099*	*1159*	*1239*	*1242*	*1172*	*1182*	*1114*
Energy Star	*376*	*411*	*385*	*406*	*533*	*658*	*680*	*780*	*760*
Percentage:	*37*	*40*	*35*	*35*	*43*	*53*	*58*	*66*	*68*

Figures drawn from "The Canadian Appliance Manufacturers Association (CAMA): 2012Major Appliance Industry Trends & Facts"
http://www.electrofed.com/councils/CAMA/Industry_Trends/index.html.

Section 4. Cultural Issues

Sources:

1. *Energy Consumption of Major Household Appliances Shipped in Canada, Trends for 1990-2006*, Natural Resources Canada, December 2008
2. *Major Appliance Industry Trends and Forecast*, Canadian Appliance Manufacturers Association, 2008
3. *Major Appliance Industry Trends and Facts*, Canadian Appliance Manufacturers Association, 2009
4. *Major Appliance Industry Trends and Facts*, Canadian Appliance Manufacturers Association, 2012
5. *Data source for housing numbers and stock data:*
http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tableshandbook2/res_00_15_e_3.cfm?attr=0

6. *Related information is also available at:*
http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/sheu03/publication_en_022_1.cfm?attr=0

7. *Other cultural data supplied directly by Natural Resources Canada.*