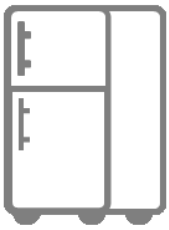


Country:	China
Technology:	Domestic Cold Appliances
Sub Category:	Freezers and Refrigerator/ Freezers Combinations

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.

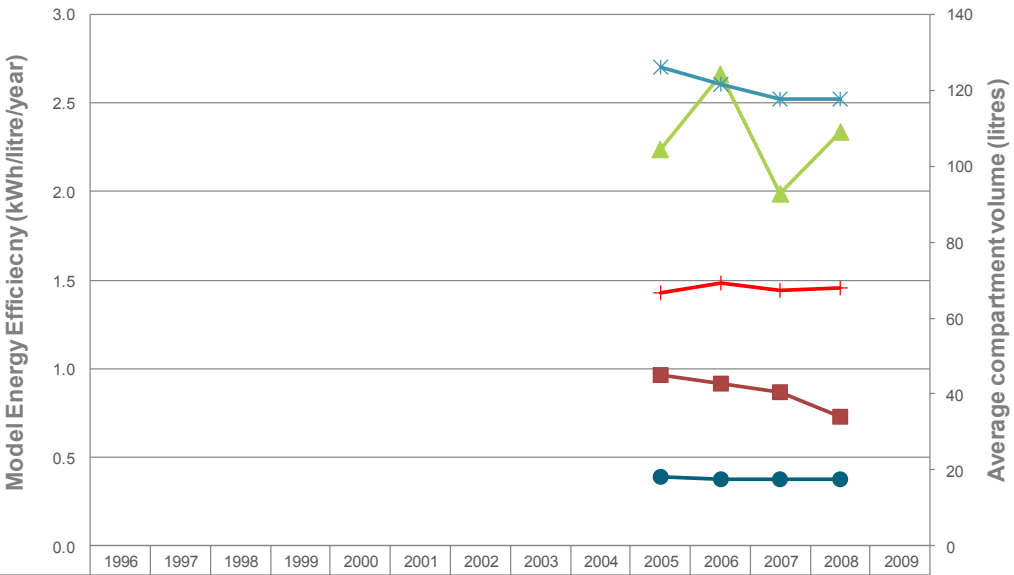
The summary definition for this product is:

Under Counter/ upright Refrigerators (Single Grouping – collect data only)	Refrigerator with freezer (ice) compartment (Single grouping – collect data only)	Side-by-Side and Freezer top/ Refrigerator bottom and Refrigerator top/ Freezer bottom (Collect data on proportion of each type of unit in the market)	Chest/Under Counter/Upright Freezer (Collect data on proportion of each type of unit in the market)
Where units are: • From all climate classes (but collect data on specific climate class that may be useful for later analysis) • Have freezer compartments with rated temperatures below -12 (all temperature ratings to refrigerator with freezer (ice) compartment) • Differentiated (if possible) between units with peripheral water coolers and ice makers			
Do not differentiate between • Defrost Cycles including Manual/Cyclical/Automatic (although collect data in case normalisation is required) • Controls mechanisms including manual, automatic and cyclical • Built in and stand-alone units (but where differentiated in market, collect data to enable normalisation) • Volume (but collect data on gross volumes as base metric) • Climate class (but collect data on climate class in case future analysis required, plus data on related local test conditions for climate classes)			

The detailed product definitions can be found at the Annex website:

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

Energy Efficiency of New Fridge Freezers
China

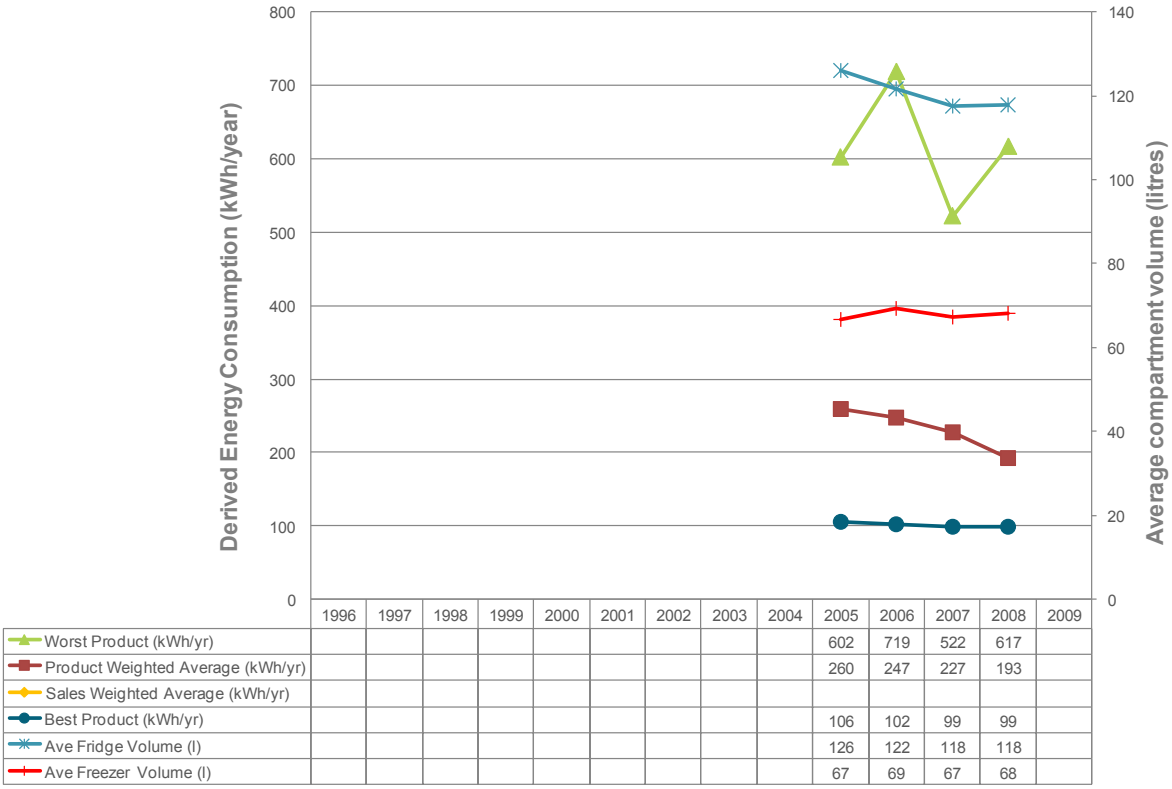


	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Worst product (kWh/lit./yr)										2.24	2.66	1.99	2.34	
Product Weighted Average (kWh/litre/year)										0.97	0.91	0.87	0.73	
Sales Weighted Average (kWh/litre/year)														
Best Product (kWh/lit./yr)										0.39	0.38	0.38	0.37	
Ave Fridge Volume (l)										126	122	118	118	
Ave Freezer Volume (l)										67	69	67	68	

Key notes on Graph (See notes section 1)

- Data provided directly by China National Institute of Standardization.

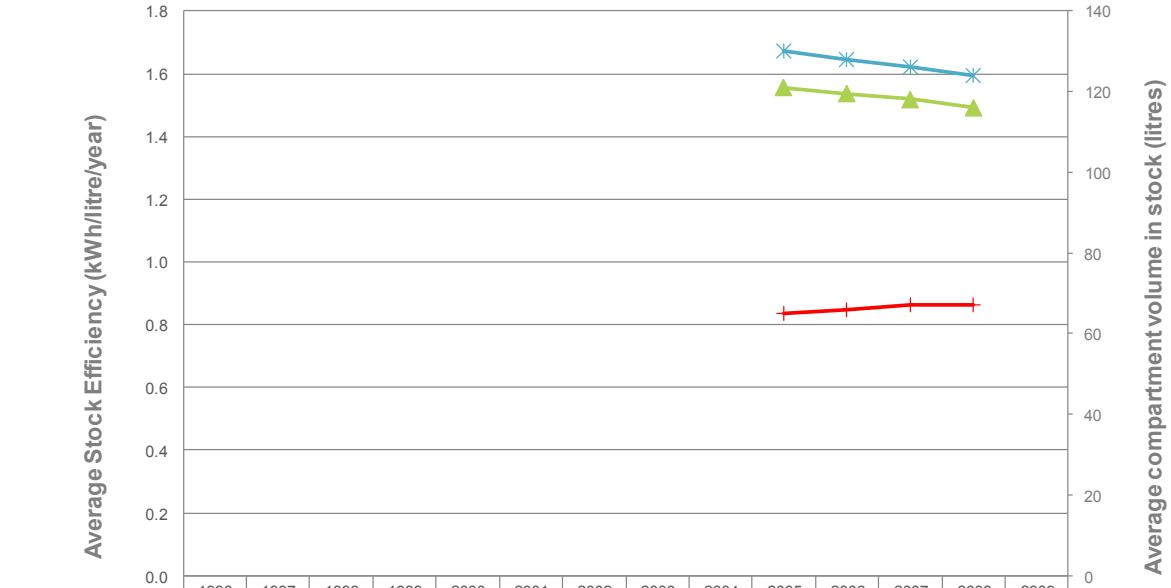
Energy Consumption of New Fridge Freezers China



Key notes on Graph (See notes section 2)

- Data provided directly by China National Institute of Standardization.

Energy Efficiency in the Installed Fridge Freezer Stock China

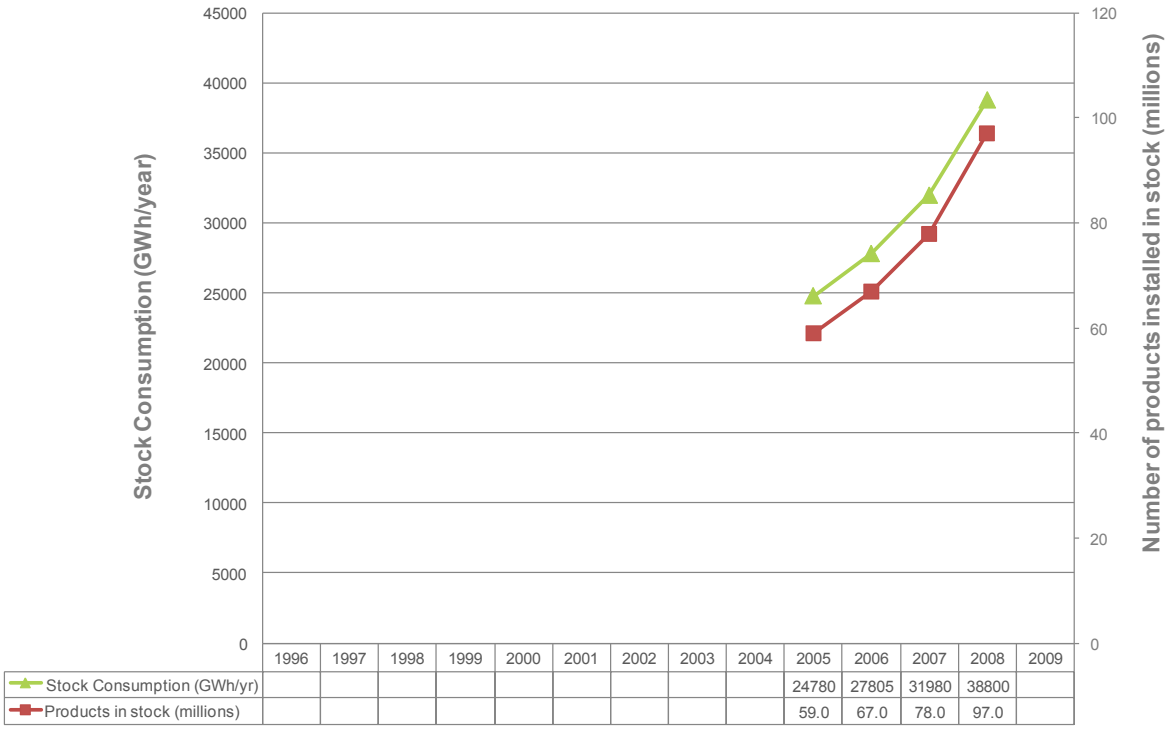


	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Stock Efficiency (kWh/l/yr)										1.56	1.54	1.52	1.49	
Ave. Stock Fridge Volume (l)										130	128	126	124	
Ave Stock Freezer Volume (l)										65	66	67	67	

Key notes on Graph (See notes section 3)

- Data provided directly by China National Institute of Standardization.

Energy Consumption in the Installed Fridge Freezer Stock China

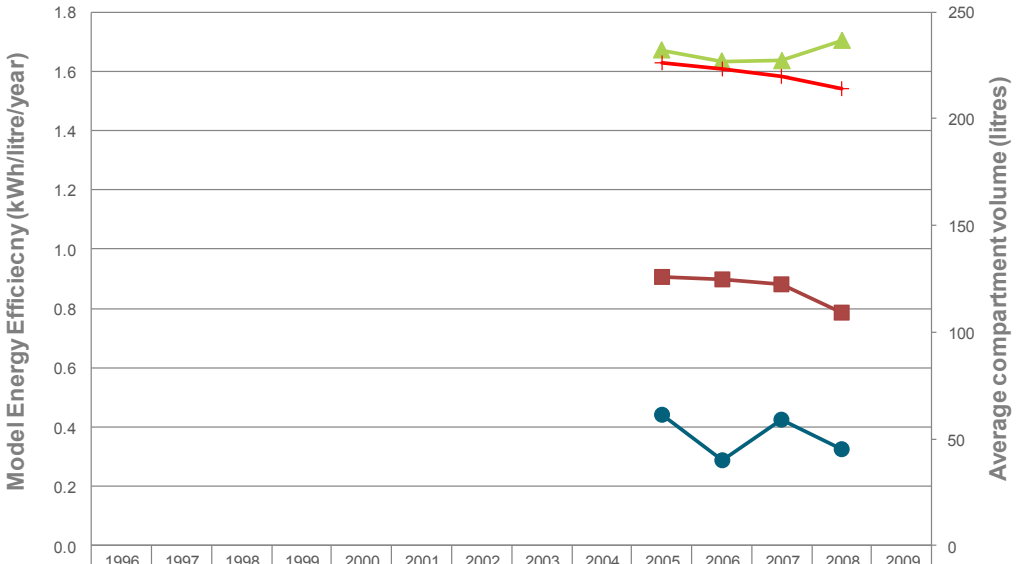


	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Stock Consumption (GWh/yr)										24780	27805	31980	38800	
Products in stock (millions)										59.0	67.0	78.0	97.0	

Key notes on Graph (See notes section 4)

- Data provided directly by China National Institute of Standardization.

Energy Efficiency of New Freezers
China

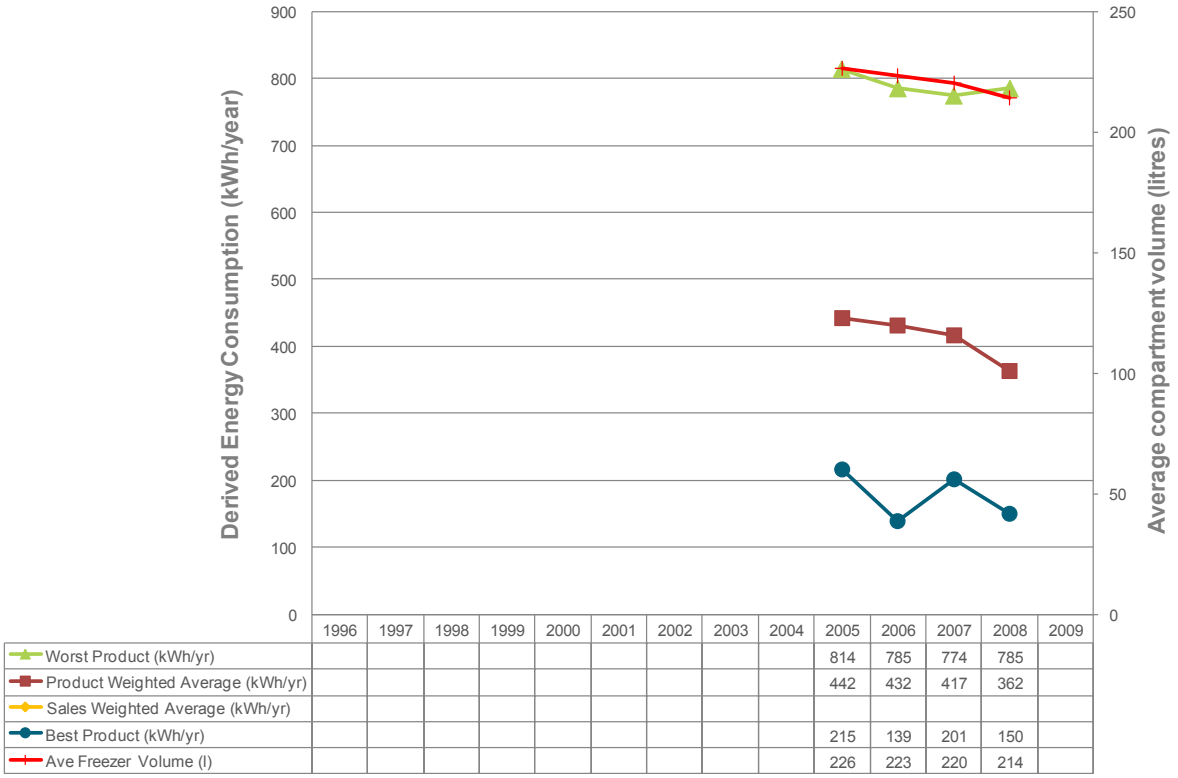


	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Worst product (kWh/lit./yr)										1.67	1.63	1.64	1.71	
Product Weighted Average (kWh/litre/year)										0.91	0.90	0.88	0.79	
Sales Weighted Average (kWh/litre/year)														
Best Product (kWh/lit./yr)										0.44	0.29	0.42	0.33	
Ave Freezer Volume (l)										226	223	220	214	

Key notes on Graph (See notes section 1)

- Data provided directly by China National Institute of Standardization.

Energy Consumption of New Freezers China

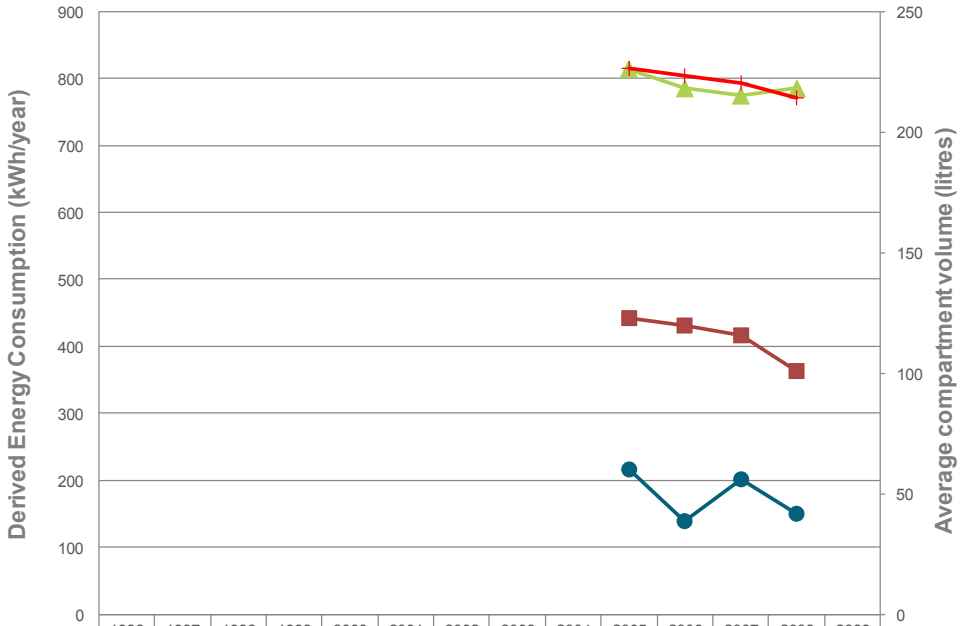


	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Worst Product (kWh/yr)										814	785	774	785	
Product Weighted Average (kWh/yr)										442	432	417	362	
Sales Weighted Average (kWh/yr)														
Best Product (kWh/yr)										215	139	201	150	
Ave Freezer Volume (l)										226	223	220	214	

Key notes on Graph (See notes section 2)

- Data provided directly by China National Institute of Standardization.

Energy Efficiency in the Installed Freezer Stock China



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Worst Product (kWh/yr)										814	785	774	785	
Product Weighted Average (kWh/yr)										442	432	417	362	
Sales Weighted Average (kWh/yr)														
Best Product (kWh/yr)										215	139	201	150	
Ave Freezer Volume (l)										226	223	220	214	

Key notes on Graph (See notes section 3)

- Data provided directly by China National Institute of Standardization.

Energy Consumption of the Installed Freezer Stock China

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Stock Consumption (GWh/yr)										4345	5403.5	6464.3	8208	
Products in stock (millions)										7.9	10.1	12.7	16.0	

Key notes on Graph (See notes section 4)

- Data provided directly by China National Institute of Standardization.

Major Policy Interventions (See notes Section 5)

Major policy actions for cold appliances in China fall into 4 categories

- Mandatory Labelling: Mandatory Labelling of products in China began in 2005 with cold appliances and air-conditioners. The labelling system is a 1-5 unit. Originally wholly self certified, the requirements are gradually migrating to a requirement for all product claims to be supported by a test certificate from a certified laboratory, with both laboratory certification and granting of label authority based on the test report managed by the China National Institute of Standardisation (CNIS)

- Voluntary Certification (premium) Labelling: Known as the certification label, products are required to reach a minimum level of efficiency with third party checking of independent test lab reports and verification of production reliability through factory checks and requirements for quality system to be in place. Introduced for cold appliances in 1999 under the management of the China Standards Certification Centre (CSC, formerly CECP) with management transferred to the China Quality Certification Centre (CQC) in 2008.

- Minimum Energy Performance Standards: All Cold Appliances have been required to meet a minimum energy efficiency standard since 1999. This standard has been revised twice since this date (see notes section 1)

- Promotional Policies: Various promotional policies have been enacted within the last 10 years, particularly at the local level where electricity supply is a problem. Normally these promotional policies are subsidy based with government providing incentives for the purchase of more efficient appliances. In 2009, in response to the global economic crisis, central government instituted a number of stimulus measures. One such measure was the support of energy efficient appliances including cold appliances. The support offered was scaled, but provided subsidy for cold appliances carrying level 1 and 2 labels, with level 1 products receiving the highest subsidy (typically around $90/product).

Cultural Issues (See Notes Section 6)

Production and Penetration of Cold Appliances in China:

Year	Number of cold appliances used by every 100 families in towns and cities	Family number in towns and cities (calculated as three people in one family) (million)	Number of cold appliances used by every 100 families in rural areas	Number of cold appliances produced (million)
1990	42.33	99.9033	1.22	4.6306
1995	66.22		5.15	9.1854
1999	77.74			12.1000
2000	80.10	152.8133	12.31	12.7900
2005	90.72		20.10	29.8706
2006	91.75			35.3089
2007	95.03		26.12	43.9713

There are almost no refrigerator only units in China, combination units are the norm. Combinations are almost universally freezers on the bottom and refrigerator on the top.

The market is very style orientated and internationalised, with consumers increasing purchasing larger units with increased apparent functionality

Notes on data

Section 1: Notes on Product Efficiency

1.1 Test methodologies

1.1.1 Testing methodology history

Standards	Equivalent to	Date in Force
GB/T8059.1 – 1995	ISO 7371-1995	1996.8
GB/T8059.2 – 1995	ISO 8187-1991	1996.8
GB/T8059.3 – 1995	ISO 5155-1995	1996.8
GB/T8059.4 – 1993	ISO 8561	1994.5

Testing Temperatures (refrigerator/freezer combinations and freezers only)

Internal Refrigerator Temperature during Test: 5℃
Internal Freezer Temperature during Test: -18℃
External Temperature during Test: 25℃ (subtemperate zone, temperate zone, subtropical zone) or 32℃ (tropical zone)

1.1.2 MEPS levels and volume calculations (see also notes on section 5)

Current adjusted volume derivation (2009)

$$V_{adj} = \sum_{c=1}^{n} V_c \times F_c \times W_c \times CC$$

Where

V_c = measured volume of compartment

F_c = constant (1.4 for frost free, 1 for none frost free)

W_c = Compartment temperature adjustment (25-compartment temperature/20)

CC = Climate class constant (1.2 for tropical, 1.1 for sub-tropical, 1 for other) – included 2008 for 2009 implementation – therefore reported data ***excludes*** climate class correction)

Relevant standards for volume calculation and MEPs

Standards	Equivalent to	Date in force	Major changes to the former version
GB 12021.2—1999	/	2000.4	/
GB 12021.2—2003	/	2003.11	• revised the Correction Factor Fc of frost free compartment (clause 4.2); • revised the energy consumption limitation formular of all types of refrigerators(clause 4.3); • added the determination method for energy efficiency levels (clause 5); • added a to-be value for the energy consumption limitation, which will be implemented in 2007 (Appendix A)
GB 12021.2—2008	/	2009.5	• added correction factors for different climate types (clause 4.1); • revised the energy consumption limitation formular of the following types of refrigerator: (clause 4.3) • with a temperature-adjustable compartment of more than 15L and with the function of a chill compartment; • with a volume of no more than 100L; • with a volume of bigger than 400L and ice-making function of penetration type; • added the definition and calculation formular of basic energy consumption (clause 3.3, 4.2)

1.2 Product Efficiency Graphic

Data supplied by the China National Institute of Standardisation (CNIS) and based on all products registered to carry the energy label (see notes on policy).

Data supplied was summary data only (as shown in data tables under graphics), **not** individual product data. It is reported the following information is the mechanism for calculation:

Derived Total Model Volume: As defined in 1.1.2 (actual adjustment factor varies slightly by product type, with freezers adjusted as follows: 1.63 for Refrigerator-Freezers, 1.44 for Refrigerator-Freezers of Type 1 and 11, and 1.73 for Freezers).

Derived Model Energy Consumption: based on total annual energy consumption under test conditions. This energy consumption is the Derived Model Energy Consumption.

Derived Model Energy Efficiency: Equals Derived Model Energy Consumption divided by Derived Total Model Volume

Model Weighted Energy Efficiency of New Models (used where no sales data is available): (Sum of Derived Model Energy Efficiency for all models sold in year) divided by (Number of Models sold in year) – not know in this case from available data set.

Section 2: Notes on Product Consumption

2.1 Test methodologies, Performance Standards and Labelling Requirements

As Section 1.1

2.2 Product Consumption Graphic

As Section 1.2

Section 3: Notes on Efficiency of Stock

Data supplied by the China National Institute of Standardisation (CNIS).

Section 4: Notes on Consumption of Stock

Data supplied by the China National Institute of Standardisation (CNIS).

Section 5: Notes on Policy Interventions

5.1 China Energy Label

Mandatory Labelling: Mandatory Labelling of products in China began in 2005 with cold appliances and air-conditioners. The labelling system is a 1-5 unit. Originally wholly self certified, the requirements are gradually migrating to a requirement for all product claims to be supported by a test certificate from a certified laboratory, with both laboratory certification and granting of label authority based on the test report managed by the China National Institute of Standardisation (CNIS)

5.2 China Energy Conservation Product Certification Label

Voluntary Certification (premium) Labelling: Known as the certification label, products are required to reach a minimum level of efficiency with third party checking of independent test lab reports and verification of production reliability through factory checks and requirements for quality system to be in place. Introduced for cold appliances in 1999 under the management of the China Standards Certification Centre (CSC, formerly CECP) with management transferred to the China Quality Certification Centre (CQC) in 2008.

5.3 Minimum Energy Performance Standards:

All Cold Appliances have been required to meet a minimum energy efficiency standard since 1999. This standard has been revised twice since this date (see notes section 1).

(The following information is drawn from data on the CLASP Website www.clasponline.org)

This standard specifies the maximum allowable values of energy consumption, evaluating values of energy conservation, energy efficiency grades, test method and inspection rules for household refrigerators.

It covers the household refrigerators driven by the electric compressor, including the refrigerators with a capacity larger than 500 litres. It does not apply to the refrigerators for special purpose such as the embedded refrigerators, the exhibition refrigerators with the transparent door or other refrigerators for special use.

MEPS requirements for refrigerators:

Daily electricity consumption limit is calculated according to the formula:

Emax = (M x Vadj + N)/ 365

in which:

Emax -- daily electricity consumption limit, kWh/24h

M, N -- coefficients, values listed in Table.

Vadj -- adjusted volume in liters

Table: Values of M and N in China's 1999 Refrigerator Efficiency Standard

category	M	N
refrigerators without a frozen food compartment	0.233	245
refrigerators with a 1-star frozen food compartment	0.643	191
refrigerators with a 2-star frozen food compartment	0.450	245
refrigerators with a 3-star frozen food compartment	0.657	235

refrigerator-freezers	0.777	303
chest frozen food storage appliances	0.558	200
chest freezers	0.597	216
upright frozen food storage appliances	0.624	223
upright freezers	0.519	315

Proposed date of standard adoption: 7/18/2008
Proposed date of entry into force: 1/18/2009

Section 6: Notes on Cultural Issues

Year	Number of cold appliances used by every 100 families in towns and cities	Family number in towns and cities (calculated as there are three people in one family) (million)	Number of cold appliances used by every 100 families in rural areas	Number of cold appliances produced (million)
1990	42.33	99.9033	1.22	4.6306
1995	66.22		5.15	9.1854
1999	77.74			12.1000
2000	80.10	152.8133	12.31	12.7900
2005	90.72		20.10	
2006	91.75			35.3089
2007	95.03		26.12	43.9713

Source: National Bureau of Statistics of China (www.stats.gov.cn)