

Commercial/Professional Cold

Best available technology of plug-in refrigerated cabinets, beverage coolers and ice cream freezers and the challenges of measuring and comparing energy efficiency

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Introduction

Eva Geilinger

Master Studies in Environmental Sciences at Swiss
Federal Institute of Technology (ETH) Zurich

Project manager for Topten International Services since
2009

Main expertise:

- Commercial/Professional Refrigerators
- Lighting

Daily work:

Research on best available technology,
Coordination of a rebate programme,
Luminaire testing and evaluation ... etc.

Introduction

Beverage Coolers



Plug-in
Refrigerated
Service Cabinets



Ice Cream Freezers

METZGEREI

MERVE

LEBENSMITTEL



Coca-Cola

Take Away Kebaphaus

Coca-Cola

KEBAPHAUS





KAS
Gutbürgerlich

KASSE
Gutbürgerlich

Stock & Energy Consumption

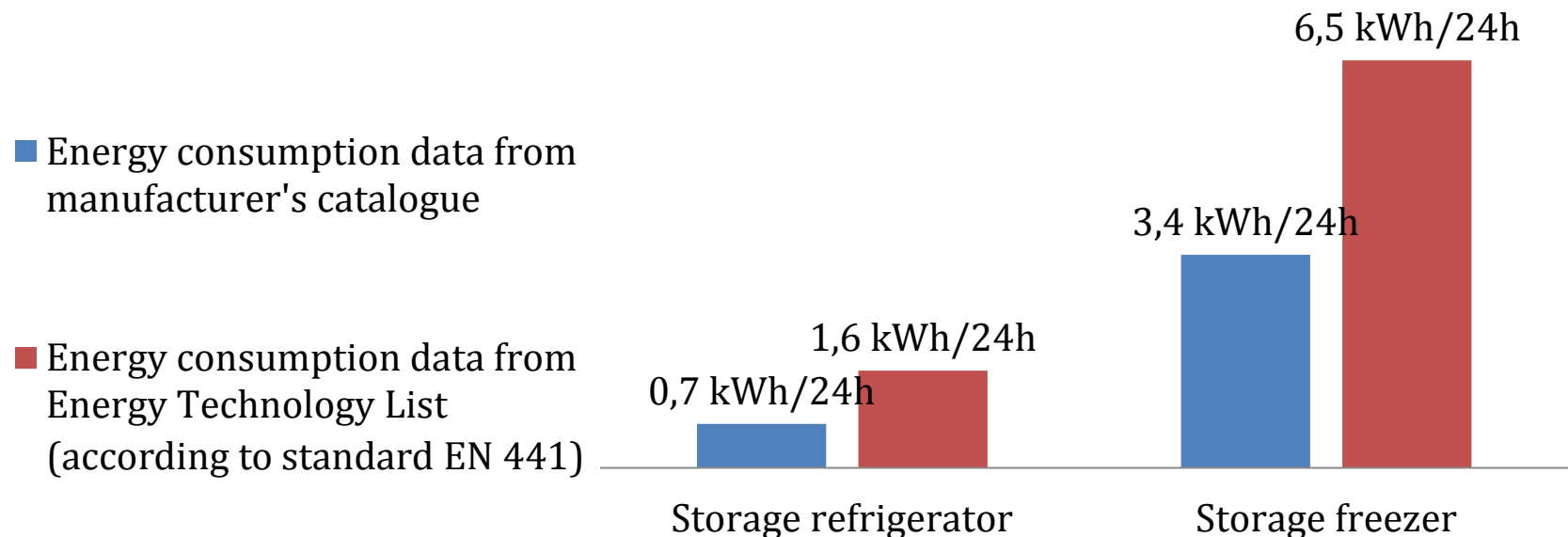
	Beverage coolers	Ice cream freezers	Refrigerated service cabinets	Household refrigerators	Household freezers
Stock in EU-27	6 million units	3 million units	3 million units	191 million units	84 million units
Energy consumption	16 TWh/year	4 TWh/year	7 TWh/year	82 TWh/year	40 TWh/year

Energy Efficiency Status Report 2012. European Commission, Joint Research Centre, Institute for Energy and Transport.

→ Total energy consumption only 5 times higher, though 20 times more household refrigerators/freezers.

Market is not transparent

- No EU energy label, no minimum requirements, no product information requirements
- Catalogue values are not according to standard and cannot be compared between brands



EU Energy Label & Ecodesign planned

Storage refrigerators: DG ENTR Lot 1

Draft ecodesign and labelling regulations from June 2013, DG ENTR:

<http://www.topten.eu/uploads/File/CF-Ecodesign-Lot1-June2013.pdf>

<http://www.topten.eu/uploads/File/CF-Labelling-Lot1-June2013.pdf>

Impact Assessment study: http://www.taitconsulting.co.uk/Ecodesign_Consultation.html

Preparatory study: <http://www.ecofreezercom.org>

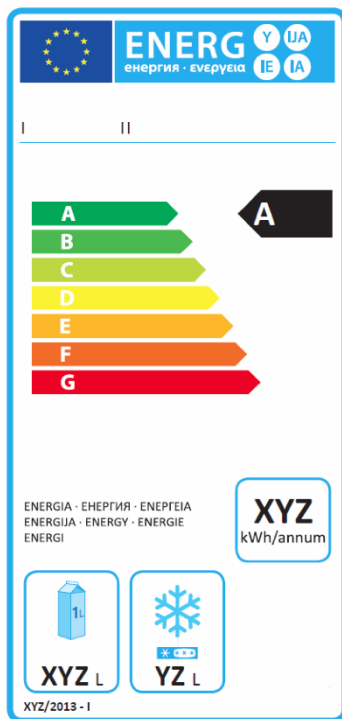
Display refrigerators: DG TREN Lot 12

Preparation of ecodesign regulations, assistance of the Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS):

Project website: <http://susproc.jrc.ec.europa.eu/comrefrig/index.html>

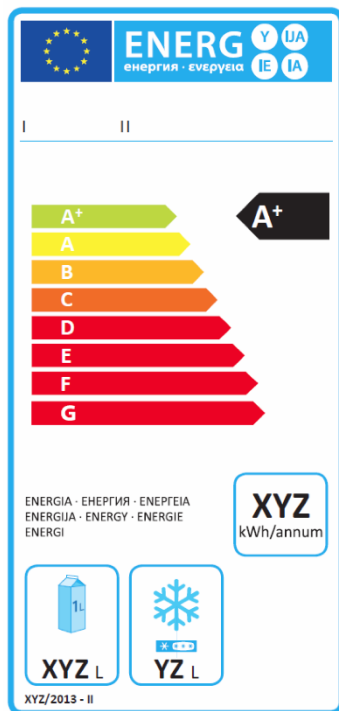
The Plan for Storage Refrigerators

Label & Ecodesign from July 2015



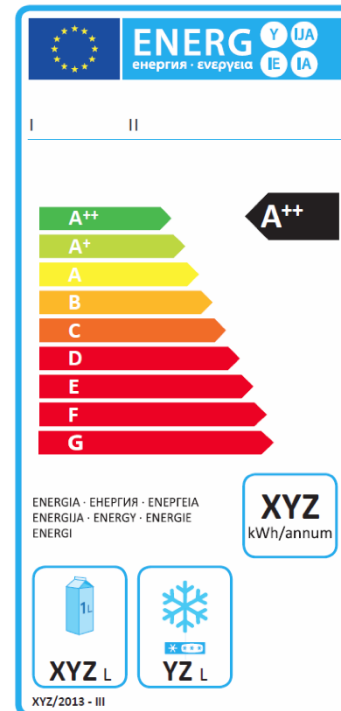
1st July 2015

Phase out worse than G



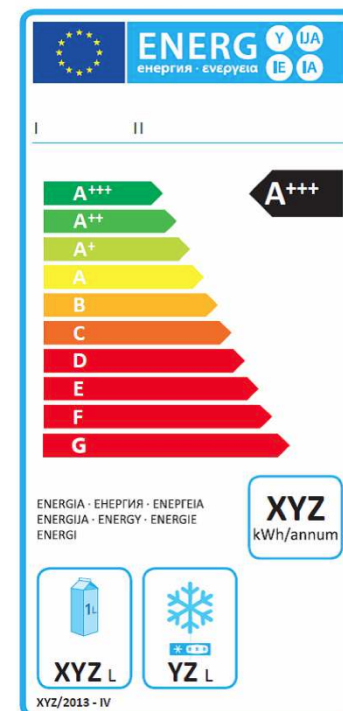
1st July 2016

Phase out G



1st July 2018

Phase out F



1st July 2019

Energy Technology List (ETL)

Enhanced Capital Allowance Scheme in UK,
managed by The Carbon Trust



<http://etl.decc.gov.uk/etl>

Product data base:
top 25% of the market

Since 2003, 1200 models
of over 40 brands

ETL - The Energy Technology Product List

https://etl.decc.gov.uk/etl/site/etl.html

Energy Technology List
ECA SCHEME

Quick search
Search by product or manufacturer • Full search

Home
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The Energy Technology Product List
Browse ETL
Eligibility Criteria
How to Claim
Resources
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Find ETL Products
This search facility allows you to search for:

Currently Listed products - In order to claim an ECA, a product from the list needs to be selected at the time of purchase.

Products which were previously listed but which have been removed since 1 April 2010. These products are still displayed on the ETPL but show a removal date as part of the listing.

Note that products which have been removed from the ETPL prior to 1 April 2010 are no longer included on the ETPL. You can [download a list of products removed prior to 1 April 2010](#).

Technology: Commercial Service Cabinets
Manufacturer: 1
Product Name:
Model Number:
Show: Currently listed products
Search

244 matching products

Export to CSV
Download

Product	Model	Subtechnology	VRF File	Manufacturer	Date added	Date removed
Foster EcoPro solid door (NEW)	EP1440H	Commercial Service Cabinets		Foster Refrigerator (UK) Ltd	01/09/2013	

The Danish Energy Saving Trust and Go'Energi



Best available technology lists for procurers
from 2005 - 2013

Ceced Italia

Italian Association of Home and Professional Appliances Manufacturer

only storage

Voluntary energy efficiency
classification of professional
cabinets and counters

<http://www.ceceditalia.it/>

Since 2012, so far 5
manufacturers participate

Data not publicly available



The screenshot shows the Ceced Italia website. The header includes the Ceced Italia logo and the text "Associazione Nazionale Produttori di Apparecchi Domestici e Professionali". Below the header is a navigation bar with links: Events, Ads, Media, Press releases, Contact us. The main content area is titled "ECE LABELLING" and features a graphic of an ECE Energy Label. The label is a vertical rectangle with a blue header, a yellow body, and a green footer. It displays the number "6" in a black box, a color-coded bar (yellow, orange, red, green), and the text "ENERGY LABEL". Below the label, there is a paragraph of text: "Manufacturers members of CECED Italia have agreed to anticipate the forthcoming EU Energy Labelling regulations by voluntarily setting up a system for the energy efficiency classification of professional cabinets and counters. Companies participating to the project have taken the engagement to label all their professional cabinets and counters, making available for their clients an objective evaluation of energy efficiency. This goes in the sense of improving energy efficiency and environmental impact of the appliances, in line with the Italian Plan for Energy Efficiency. To this aim CECED Italia has set up a voluntary evaluation and testing protocol based on EN ISO 23953-2, duly adapted to cover the specificities of professional cabinets and counters. The applicability of the Protocol has been verified by IMQ, well known and reputed third party body. The project focuses on professional cabinets (vertical) and counters (horizontal) which represent 70% of the market of".

topten.eu

Best Products of Europe

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Enter search ...



Cars



Household



Lighting

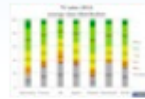
Office
EquipmentConsumer
ElectronicsBuilding
ComponentsProfessional
Refrigerators

Best products in your country

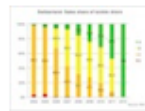


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|--|----------------------------|--|----------------------------|
| | Austria | | Lithuania |
| | Belgium | | Luxembourg |
| | Croatia | | Norway |
| | Czech Rep. | | Poland |
| | Finland | | Portugal |
| | France | | Romania |
| | Germany | | Spain |
| | Greece | | Sweden |

News



Topten publishes its [TV market monitoring 2007-2012](#), showing the developments leading to 39% class A / A+ sales in 2012. (July 2013)



Swiss appliance sales data 2004 - 2012 are published: 100% class A driers and 56% A+++ washing machines sales reflect a highly efficient market. (July 2013) » [more](#)



Topten Global Report 2012: how Topten supports market transformation towards better energy efficiency. (May 2013)



The Regulatory Committee has approved the **Ecodesign regulation for vacuum cleaners**, including a power cap (1600W / 900W). (March 2013) » [more](#)

Glass-door
Refrigerators

Ice Cream Freezers

Supermarket Freezers

Storage Refrigerators
under-counterStorage Refrigerators
1-doorStorage Refrigerators
2-doorsStorage Freezers
under-counterStorage Freezers 1-
doorStorage Freezers 2-
doorsStorage Combined
Refrigerator-Freezers

Minibars

product on the market.

Product Competition

BAT Beverage Coolers / Ice Cream Freezers

Brand	Liebherr	Inefficient model
Model	FKvsl 4112	1-door display refrigerator
Electricity costs (€ in 8 years)	1031	3570
Net volume (liters)	346	500
Storage temperature (°C)	0°C to +15°C	0°C to +15°C
Energy (kWh/year)	859	2'975
Refrigerant	R600a	R134a
Cooling	Recirculating air	Recirculating air
Ambient temperature (°C)	+16°C to +38°C	+16°C to +38°C
Dimensions W/D/H (mm)	600 x 610 x 1800	750 x 700 x 1700
Countries available	EU	EU



13/06/2013

Brand	AHT	AHT	Inefficient model
Model	Rio H 68 S R290	RIO H 100 S R290	Ice cream freezer
Electricity costs (€ in 8 years)	678	738	1972
Net volume (liters)	123	224	291
Storage temperature (°C)	-14°C to -23°C	-14°C to -23°C	-18°C to -23°C
Energy (kWh/year)	565	615	1'643
Refrigerant	R290	R290	R507
Cooling	Static	Static	Static
Ambient temperature (°C)	+16°C to +35°C	+16°C to +35°C	+16°C to +35°C
Dimensions W/D/H (mm)	680 x 650 x 880	1000 x 650 x 880	800 x 650 x 900
Countries available	EU	EU	EU



13/06/2013

BAT Storage Freezers

Brand	Gram	Gram	Gram	Electrolux Professional Ecostore Touch 727300	Gram	Snowflake	Liebherr	Gram	Gram	Liebherr	Gram	Inefficient model
Model	TWIN F 660 LSG	MIDI F 625 LSG	TWIN F 600 RSG		PLUS F 600 RSG	F 605 RG	GGPV 6590-40	PLUS F 660 RSG	MIDI F 425 RSG	GGPV 6570-40	EURO F 500 LSG	1-door storage freezer
Other models	TWIN F 660 CXG, TWIN F 660 RSG	MIDI F 625 CXG, MIDI F 625 RSG	TWIN F 600 CXG		PLUS F 600 CSG, PLUS F 600 CXG			PLUS F 660 LSG, PLUS F 660 CXG	MIDI F 425 CXG, MIDI F 425 LSG		EURO F 500 CXG, EURO F 500 RSG	
Electricity costs (€ in 8 years)	1997	2022	1960	2246	2000	2078	2276	2322	1866	2456	2018	4428
Net volume (liters)	473	449	422	513	423	429	492	475	312	492	346	450
Storage temperature (°C)	-25°C to -5°C	-25°C to -5°C	-25°C to -5°C	-22°C to -15°C	-25°C to -5°C	-22°C to -10°C	-35°C to -10°C	-25°C to -5°C	-25°C to -5°C	-35°C to -10°C	-25°C to -5°C	-25°C to -5°C
Energy class	B	B	B	B	B	B	B	B	B	B	B	E
Energy index	43.8	45.7	46.0	46.8	46.9	48.3	48.7	50.8	51.7	52.5	52.9	100.0
Energy (kWh/year)	1'664	1'685	1'633	1'871	1'667	1'731	1'896	1'935	1'555	2'047	1'681	3'690
Refrigerant	R290	R290	R290	R290	R290	R600a	R290	R290	R290	R290	R290	R404A
Cooling	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air	Recirculating air
Ambient temperature (°C)	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C	+16°C to +43°C
Dimensions W/D/H (mm)	815 x 756 x 2160	815 x 731 x 2000	815 x 756 x 2010	710 x 837 x 2050	695 x 876 x 2010	695 x 855 x 2000	700 x 830 x 2150	695 x 876 x 2160	600 x 731 x 2000	700 x 830 x 2150	600 x 806 x 2160	700 x 840 x 2060
Gastronorm L/W (mm)	650 x 530	650 x 530	650 x 530	530 x 650	530 x 650	530 x 650	530 x 650	530 x 650		530 x 650	400 x 600	
Countries available	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU
												

17/06/2013

Selection Criteria for Topten.eu

1. Refrigerant with global warming potential **GWP < 5**
(e.g. propane/R290, isobutane/R600a)
1. Maximum annual energy consumption* per liter
net volume








* Tested according to standard

Refrigerants

Refrigerant	Global warming potential (GWP) compared to CO2 over a 100-year time horizon
R-134a	GWP 1430
R-404A	GWP 3990
R-507	GWP 3920
Propane/R-290	GWP 3
Isobutane/R-600a	GWP 3
CO2/R-744	GWP 1

Climate friendly refrigerant means 1000 – 4000 times less effect on global warming than conventional refrigerants.

Recommendations for Policy Design

Product types		Top energy efficiency classes	Number of listed models
Refrigerators		A++, A+++	3
		B, A	33
		C, B	6
Freezers		A+	2
		B	24
		C, B	6
Refrigerator-Freezers		C	1

Recommendations for Policy Design

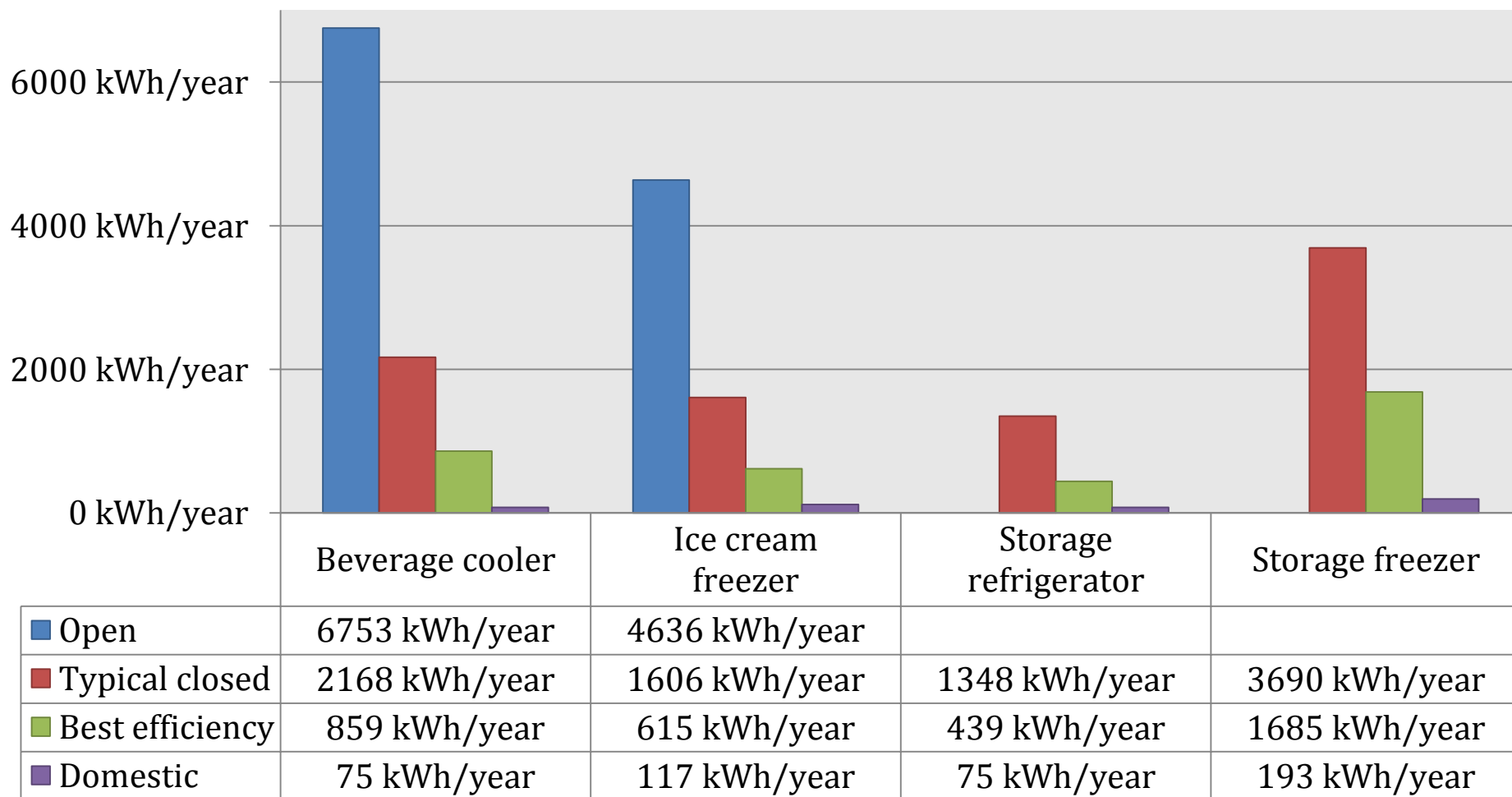
- No delay with product information requirements
- Label + product fiche that indicate whether a low-GWP refrigerant is used or not
- A label that directly compares energy consumption of open and closed display cabinets
- A label that creates incentive for improvement (meaning class A must be more ambitious than best available technology today)
- Minimum requirements strict enough to bring energy savings (meaning phase out poorly performing products)

Product Comparison

OPEN	TYPICAL CLOSED	BEST EFFICIENCY	DOMESTIC
 324 L	 350 L	 346 L	 346 L
 151 L	 183 L	 224 L	 200 L
	 450 L	 449 L	 346/409 L

Product Comparison

Annual energy consumption in kWh



Efficiency Potentials

- Typical vs. Best: use 2 – 3 times more energy
(54 – 67%)
- Open vs. Best: use 8 times more energy
(87%)
- Domestic vs. Best: use 5 – 10 times less energy

* Energy savings

Technology: 6 Energy Saving Measures

1. **Efficiency of compressors** closer to domestic refrigerator compressors. In addition variable speed compressors.
2. **More efficient fans** (reduced power = less heat inside).
3. **Better insulating** glass doors, thicker walls.
4. **Better heat exchangers** performances
5. **LED lighting** (reduced power = less heat inside).
6. **Energy Management Systems EMS** (i.e. higher temperatures during stand-by mode).

iCool research project: typical glass door cooler from 3.9 kWh/day to 0.9 kWh/day → **Energy savings of 77%**

Thank you for your attention

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