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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Co-funded by the Intelligent Energy Europe Programme of the European Union
European Climate Foundation
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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
ALLE PIZZA
AB 9.90


KASSE

Stock & Energy Consumption

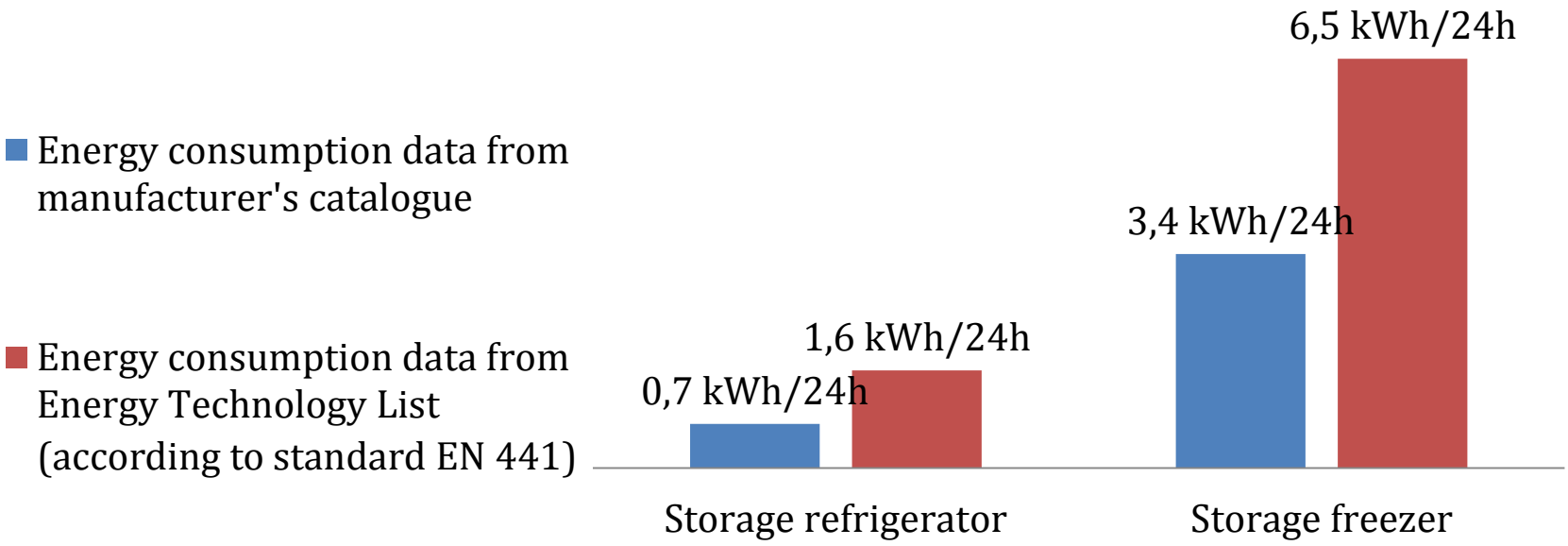
	Beverage coolers	Ice cream freezers	Refrigerated service cabinets	Household refrigerators	Household freezers
Stock in EU-27	6 million units	3 million units	3 million units	191 million units	84 million units
Energy consumption	16 TWh/year	4 TWh/year	7 TWh/year	82 TWh/year	40 TWh/year

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



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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):

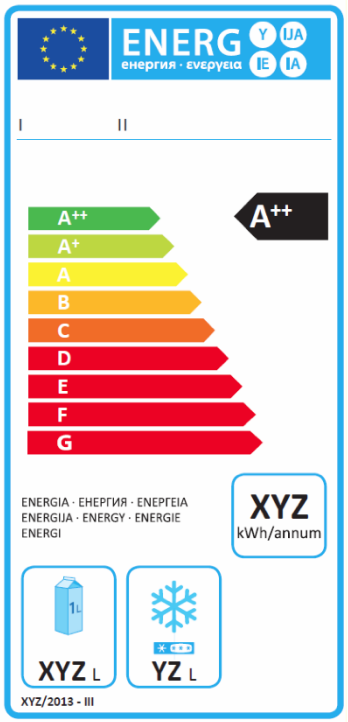
Project website: http://susproc.jrc.ec.europa.eu/comrefrig/index.html

The Plan for Storage Refrigerators

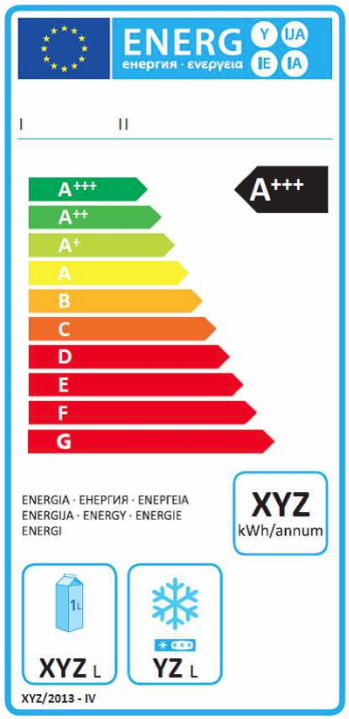
Label & Ecodesign from July 2015

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)

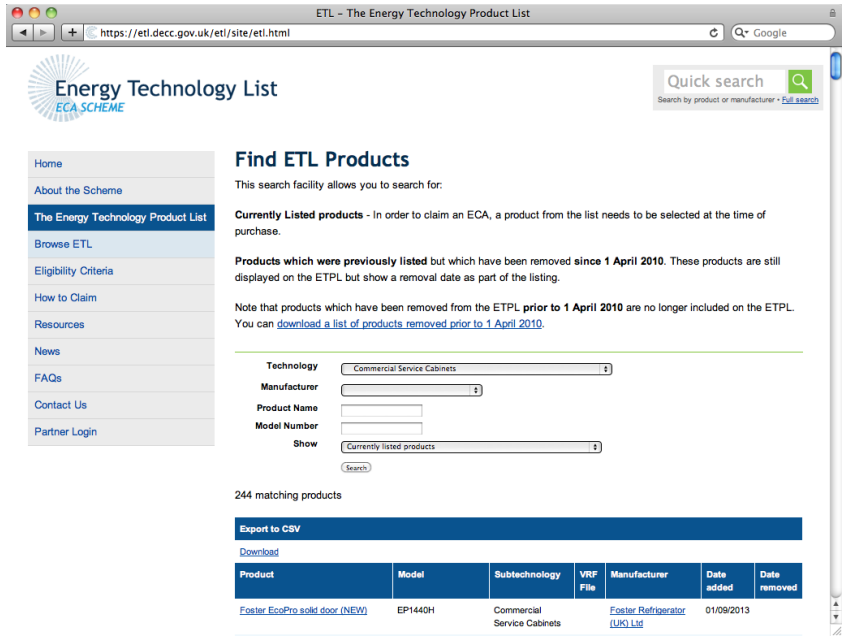
Enhanced Capital Allowance Scheme in UK, managed by The Carbon Trust

Qualified for Energy Technology List TM

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

Product data base:
top 25% of the market

Since 2003, 1200 models of over 40 brands



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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

Best of Europe – Best of Europe – topten.eu

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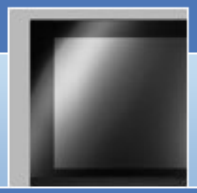


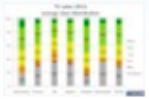
Cars | Household | Lighting | Office Equipment | Consumer Electronics | Building Components | Professional Refrigerators

- Glass-door Refrigerators
- Ice Cream Freezers
- Supermarket Freezers
- Storage Refrigerators under-counter
- Storage Refrigerators 1-door
- Storage Refrigerators 2-doors
- Storage Freezers under-counter
- Storage Freezers 1-door
- Storage Freezers 2-doors
- Storage Combined Refrigerator-Freezers
- Minibars

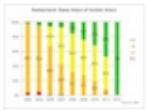
Best products in your country

Austria, Belgium, Croatia, Czech Rep., Finland, France, Germany, Lithuania, Luxemburg, Norway, Poland, Portugal, Romania, Spain

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

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	Gram	Snowflake	Liebherr	Gram	Gram	Liebherr	Gram	Inefficient model
Model	TWIN F 660 LSG	MIDI F 625 LSG	TWIN F 600 RSG	Ecostore Touch 727300	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

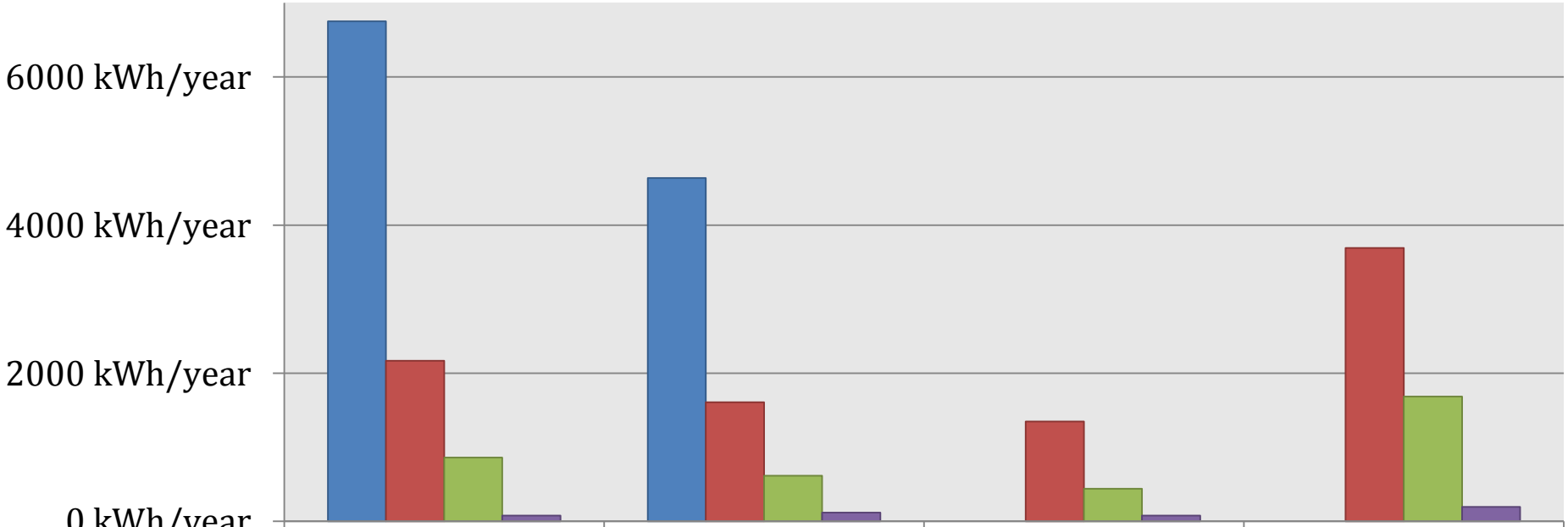
- No delay with product information requirements
- Label + product fiche that indicate whether a low-GWP refrigerant is used or not
- A label that directly compares energy consumption of open and closed display cabinets
- A label that creates incentive for improvement (meaning class A must be more ambitious 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



	Beverage cooler	Ice cream freezer	Storage refrigerator	Storage freezer
Open	6753 kWh/year	4636 kWh/year		
Typical closed	2168 kWh/year	1606 kWh/year	1348 kWh/year	3690 kWh/year
Best efficiency	859 kWh/year	615 kWh/year	439 kWh/year	1685 kWh/year
Domestic	75 kWh/year	117 kWh/year	75 kWh/year	193 kWh/year

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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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