

## **Cold appliances: recommendations for policy design**

July 2013

### **1. Summary**

Since July 2010 refrigerators and freezers that are less efficient than class A have been banned from the EU market. Starting in July 2012, the ecodesign regulation from 2009 will also ban class A refrigerators and freezers. The implementation will be completed in July 2014 (then also considering the tightened measurement tolerance), leaving A+, A++ and A+++ models on the market. The high number of highly efficient refrigerators and freezers on Topten shows that more ambitious efficiency requirements would be feasible.

Since December 2011 the new energy label for cold appliances with classes up to A+++ is mandatory. A+++ models consume 50% less electricity than A+ models. By June 2013 116 A+++ models on the European market – 75 refrigerators and 41 freezers – reach the efficiency requirements of the top class. The number of models reaching the A+++ class will keep increasing.

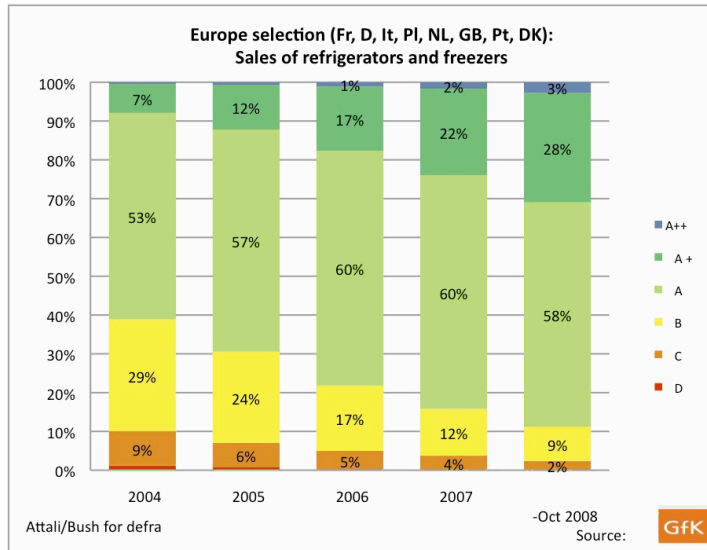
In 2014 the Ecodesign and Energy Labelling regulations for household refrigerators and freezers will be reviewed by the European Commission. There is the potential to reduce the energy consumption of cold appliances in Europe's households by the production of more than six nuclear power plants. Additional efficiency requirements should be introduced in the future, stricter than the ones already adopted – geared by the best products on the market. Switzerland for instance has implemented A++ as minimum efficiency requirement since January 2013. Furthermore an re-scaled energy label should be envisaged, where 'A' stands for the very best.

### **2. Best available and average technology**

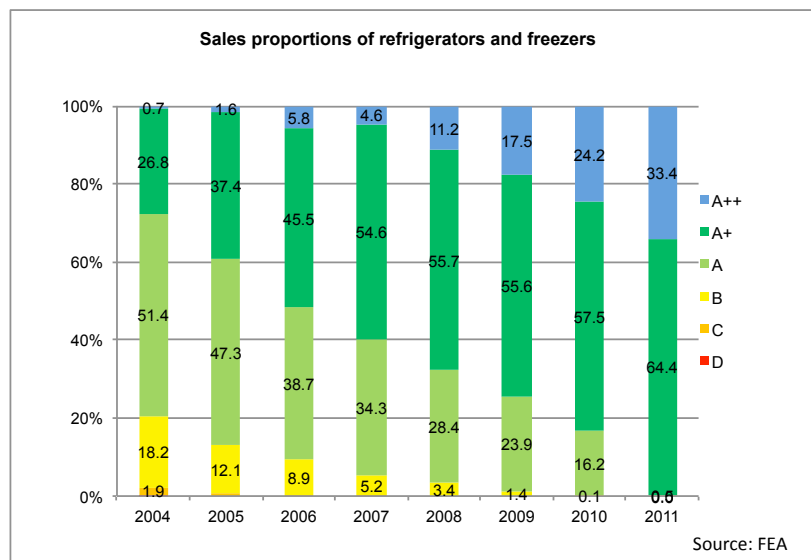
The most efficient refrigerators and freezers on the market are A+++ class appliances. They have appeared on the market since early 2011, when the new energy labeling regulation was put into force. The energy efficiency index (EEI) of the A+++ models is below the class limit  $EEI < 22\%$ , and they consume only 40% the energy of an A class appliance.

### 3. Market situation in Europe

#### Energy efficiency class sales



The introduction of the energy label in 1995 led to higher sales shares of efficient cold appliances. Sales data from 8 EU-countries (France, Germany, Italy, Poland, Great Britain, Portugal and Denmark) visualize this development from 2004 to 2008. In 2008 (sales data till October) the majority of consumers (58%) from the eight EU countries chose a class A cold appliance, and 28% of the sales of cold appliances were A+ models. Across these eight countries only 3% were A++ models so far. The A++ sales share however will have increased since 2008. In some countries A++ cold appliances already have high market shares: in Switzerland for instance, 33% of the consumers chose an A++ refrigerator or freezer in 2011. In Switzerland, A+ was implemented as MEPS in 2011, and since January 2013 only A++ and A+++ models are left on the market.

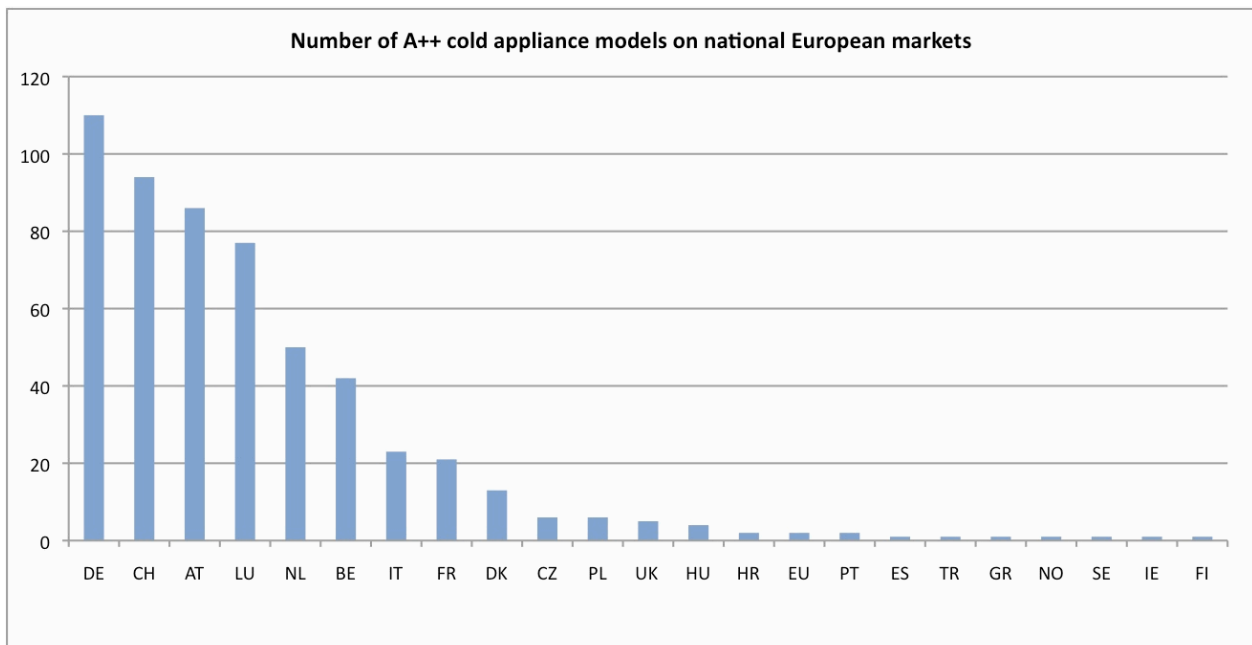


**A++ and A+++ cold appliances in Europe**

There are more than 260 million cold appliances installed in European households (Faberi, 2007), and over 18 million are sold each year. The example of Switzerland shows a growing A++ sales share: from 2004 to 2011, the share of A++ sales increased from 1% to 33% (data source: FEA, see graph above). A similar development is expected to occur in the EU, where the number of A++ models available on the market has more than quadruplicated from 2007 to 2011: while in 2007 115 different A++ cold appliance models were on the European market, this number increased to 486 by May 2011, including 17 A+++ models (topten.eu, May 2011). Since 2012 Topten.eu lists only A+++ products: in June 2013 there were 116 A+++ refrigerator (75) and freezer models (41) on the European market, of 16 different brands (Topten.eu, June 2013).

**Availability of A++ in different European countries**

The number of A++ cold appliance models available in different European countries differs vastly. The Topten market analysis from May 2009 covering 23 countries (including Switzerland), shows that in detail: availability ranged from 110 different A++-models in Germany to but one in countries such as Spain, Turkey, Greece and Ireland (see graph). A vast assortment of energy efficient refrigerating models is on the market, but not widely available yet.



Source: topten.info

#### 4. Energy consumption and saving potentials

##### Relevance



Photo: Tennessee Tech University

The total number of household cold appliances in the European Union (EU-25) is an estimated 260 million, and according to GfK-data from 21 European countries more than 18 million refrigerators and freezers were sold in 2004 (Faberi, 2007). The energy demand during the use phase is responsible for more than 75% of all environmental impacts during a refrigerator's life cycle (Rüdenauer, Gensch, 2005). Of the total energy consumption of large appliances in households, refrigerators and freezers still have to be accounted for the larger share (40%) (Odyssee, 2007). The total energy consumption of the refrigerator and freezer stock in the EU-25 in 2005 is estimated at 106 billion kWh per year (Faberi, 2007) – the production of about 10 nuclear power plants.

##### Energy consumption

Energy consumption of household refrigerating appliances can differ vastly – depending on product category, but especially over different energy efficiency categories. While an average A+ class refrigerator consumes around 260 kWh a year, a comparable appliance of energy class A+++ consumes 50% less - only 130kWh/year. Over their life time of 15 years this results in a difference of more than 2000 kWh. The huge differences in energy consumption of the cold appliances on today's market (only classes A+ to A+++ permitted) are hardly perceptible to consumers.

	EEI
<b>A+++</b>	< 22%
<b>A++</b>	22% - 33%
<b>A+</b>	33% - 44%/42%
<b>A</b>	44%/42% - 55%
<b>B</b>	55% - 75%
<b>C</b>	75% - 95%
<b>D</b>	95% - 110%
<b>E</b>	110% - 125%
<b>F</b>	125% - 150%
<b>G</b>	> 150%

##### Saving potentials

Assuming the average energy efficiency label of the 18 million cold appliances newly installed each year today is an A, these new appliances approximately use 4.7 billion kWh a year. If only A+++ appliances were sold, energy consumption of these newly sold household refrigerators and freezers would be 50% lower: about 2.3 billion kWh per year. As soon as all older cold appliances in households were replaced by A+++-appliances (after about 15 years), their total energy consumption would be about 50% lower than today: each year 35 billion kWh could be saved, the production of about 4 nuclear power plants.

## 5. Political instruments and initiatives

Both the Ecodesign and the Energy Labelling regulations for household refrigerators and freezers will be reviewed in 2014.

### Minimum efficiency requirements

The Ecodesign requirements for cold appliances have been adopted in 2009. Since July 2010 only models corresponding to efficiency class A or better are allowed to be placed on the market in the EU. Class A will be banned in two steps between July 2012 and July 2014 (2012: EEI<44, 2014: EEI<42). From 2014 refrigerators and freezers need to reach class A+ or better to be placed on the market.

### Energy label

The energy label informs consumers about the energy efficiency of cold appliances (and other household appliances), with the energy classes A+++ to G (initially A to G). The new classification scheme adds the A+++ class on top of the A classes. Additionally the A+ class limit is changed from EEI<42 to 44 in 2012 (because smaller measurement tolerances are introduced). In 2014 it will be re-changed to an EEI of 42. A two-step introduction of the corresponding minimum efficiency requirement is foreseen at the same time.

The new labeling scheme is mandatory since December 2011. Since July 2012 classes below A+ are no longer allowed on the market, but are still shown on the label.

	current EEI	new EEI
<b>A+++</b>	-	< 22
<b>A++</b>	< 30	22 - 33
<b>A+</b>	30 - 42	33 - 44/42
<b>A</b>	42-55	44/42 - 55
<b>B</b>	55-75	55 - 75
<b>C</b>	75 - 90	75 - 95
<b>D</b>	90 - 100	95 - 110
<b>E</b>	100 - 110	110 - 125
<b>F</b>	110 - 125	125 - 150
<b>G</b>	>125	> 150

'Old' and 'new' energy label classification scheme for cold appliances

## 6. Recommendations regarding policy design

The technical progress has led to much better performing refrigerating appliances in the recent past. The top class is populated with more than 110 models. A+++ refrigerators and freezers consume only half as much energy as A+ models. There is the potential to reduce the energy consumption of refrigerating appliances in Europe's households by the production of more than four nuclear power plants, if today's most energy efficient cold appliances are promoted seriously. New requirements regarding energy efficiency in household cold appliances should be guided by the best-performing existing models. As CECED has requested, energy efficiency rules have to be strictly enforced (CECED, 2007).

Energy label: rescaling in the long run

The energy efficiency label has had a positive effect on consumer's decision and has contributed to innovations leading to higher energy efficiency on the manufacturer's side. According to estimations by CECED (2002), the label has contributed about 16% to the 27% energy savings of household cold appliances between 1992 and 1999. After that technical innovations had led to better performance, the introduction of the new energy efficiency classes A+ and A++ in 2003 made the best models identifiable for consumers again, by now many A+++ models are on the market, while A has been removed from the market. 'A' however is still understood as the best class by consumers, and the added classes only have a limited impact. In the future the energy efficiency classes should be rescaled according to the initial A to G scheme, where D stands for the standard energy consumption (100%), while A is defined by the technical limits and thus stands for the very best. According to the Action plan for Energy Efficiency of the European Commission (2006), maximally 10-20% of the models should have an A-label status. A regular rescaling (e.g. every 5 years) to guarantee the effectiveness of the energy label is part of the priority action 1. The possibility to quickly compare an appliance model with the full market range at the first glance and an easily understandable rating however are key factors for the effect of a comparative label.



The energy label for cold appliances from 2010

### Minimum efficiency requirements

Energy efficiency standards keep improving thanks to technical innovations by manufacturers. Accordingly, energy efficiency limits should be continuously adapted to the changing state-of-the-art. In its Action plan for Energy Efficiency (2006), the European Commission formulates the need for dynamic energy efficiency standards: future efficiency requirements should be bindingly determined, based on expected technical improvements. This proceeding allows manufacturers to act in advance and be prepared for new requirements. It is therefore possible - and desirable - to set ambitious goals.

Efficiency requirements for cold appliances have been adopted in 2009 and entered into force in July 2010, when all cold appliances less efficient than class A were removed from the market. Since July 2012 only A+, A++ and A+++ refrigerators and freezers are left on the market. Further, more demanding requirements should be defined already now. Today's classes A++ and later A+++ should be announced to be required in the future, and a proceeding for adapting minimum requirements to the future technical development should be defined. An ambitious, binding schedule promotes continuous efforts in innovation and makes market development calculable for all stakeholders.

**Links and References**

Links:

Energy Efficiency Measures by the European Commission:

[http://ec.europa.eu/energy/efficiency/index\\_en.htm](http://ec.europa.eu/energy/efficiency/index_en.htm)

Regulation on ecodesign requirements for household refrigerating appliances, July 2009:

[http://www.topten.info/uploads/File/Household\\_refrigerator\\_regulation\\_090723.pdf](http://www.topten.info/uploads/File/Household_refrigerator_regulation_090723.pdf)

COMMISSION DELEGATED REGULATION (EU) No 1060/2010 of 28 September 2010 with regard to energy labelling of household refrigerating appliances

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:314:0017:0046:EN:PDF>

DIRECTIVE 2010/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (recast)

[http://www.topten.info/uploads/File/Label%20Directive%20Recast%202010\\_30\\_EU.pdf](http://www.topten.info/uploads/File/Label%20Directive%20Recast%202010_30_EU.pdf)

Commission directive 2003/66/EC on energy labelling of household electric refrigerators, freezers and their combinations (old label):

[http://www.topten.info/uploads/File/Cold%20labelling\\_2003\\_66.pdf](http://www.topten.info/uploads/File/Cold%20labelling_2003_66.pdf)

Preparatory Study for Ecodesign requirements of domestic refrigerators and freezers:

<http://www.ecocold-domestic.org/>

European Union Eco-Label:

[http://ec.europa.eu/environment/ecolabel/index\\_en.htm](http://ec.europa.eu/environment/ecolabel/index_en.htm)

European Committee of Manufacturers of Domestic Equipment (CECED):

<http://www.CECED.org>

Energy Efficiency Indicators in Europe:

<http://www.odyssee-indicators.org/>

Promotion program for A++ cold appliances by ewz, EKZ and others (all in German):

[http://www.topten.ch/index.php?page=guenstiger\\_kuehlen](http://www.topten.ch/index.php?page=guenstiger_kuehlen)

[http://www.topten.ch/index.php?page=forderprogramm\\_ekz](http://www.topten.ch/index.php?page=forderprogramm_ekz)

[http://www.topten.ch/index.php?page=weitere\\_forderprogramme](http://www.topten.ch/index.php?page=weitere_forderprogramme)

Topten international group (TIG): [www.topten.info](http://www.topten.info)

Directives and Regulations of the EU:

Commission Directive 94/2/EC of 21 January 1994 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations

Directive 2010/30/EU on the indication by labelling and standard product information on the consumption of energy and other resources by energy-related products (recast)



Commission Directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations

COMMISSION DELEGATED REGULATION (EU) No 1060/2010 of 28 September 2010 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of household refrigerating appliances

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:314:0017:0046:EN:PDF>

DIRECTIVE 2010/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010

on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (recast)

Directive 96/57/EC of the European Parliament and of the Council of 3 September 1996 on energy efficiency requirements for household electric refrigerators, freezers and combinations thereof

Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC

Regulation (EC) No 1980/2000 of the European Parliament and of the Council of 17 July 2000 on a revised eco-label award scheme

#### References:

Action plan for Energy Efficiency, 2006: Realising the Potential. Communication from the Commission. COM(2006) 545 final, October 2006

CECED, 2002: Voluntary commitment on reducing energy consumption of household refrigerators, freezers and their combinations (2002 – 2010)

CECED, 2007: Top Executives Discontinue Voluntary Energy Efficiency Agreements for Large Appliances. Press release from 21 March 2007:

Green paper on energy efficiency, 2005: Doing more with less. COM (2005), 265 final of 22 June 2005.

Odyssee, 2007: Enerdata. Household energy consumption in the EU-15, MURE, January 2007 update

Stefano Faberi, 2007: Preparatory Studies for Eco-design Requirements of EuPs; LOT 13: Domestic Refrigerators and Freezers. Final report, Draft version.

Rüdenauer, Gensch, 2005: Environmental and economic evaluation of the accelerated replacement of domestic appliances. Case study refrigerators and freezers. Commissioned by CECED.