

BNC08: Assumptions underlying the energy projections for domestic cold appliances

Version 3.1

This Briefing Note and referenced information is a public consultation document and will be used to inform Government decisions. The information and analysis form part of the Evidence Base created by Defra's Market Transformation Programme.

1 Summary

This document provides information on the assumptions and evidence used for MTP energy-use modelling and in the Policy Brief for domestic refrigeration appliances – fridges, fridge-freezers and freezers. It includes information on implemented policies which have contributed to the availability of more efficient cold appliances. Further policy options or market activities (such as industry agreements) are explored in order to maintain a move to more efficient appliances.

Using the assumptions presented below it is calculated that, in the absence of any further policies, major domestic cold appliances are expected to account for 15.0 TWh of electricity in 2010. A policy package, which includes a revision of the EU energy label and a minimum standard to remove less efficient models from the market, is projected to provide some savings against this figure (0.1 TWh). If, however, consumers were solely to purchase current readily-available efficient models (energy label efficiency A++), this consumption could be reduced by 2 TWh in 2010 compared to the current scenario (assuming no future policy measures).

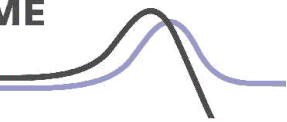
2 Background

This note sets out the information, rationales and assumptions made in the Market Transformation Programme Policy Brief for domestic cold appliances.

3 Assumptions for the Reference Case Scenario (Ref)

The Reference Case models underlying trends and technology development plus any extant policy measures. For more information about MTP Scenarios, see MTP Briefing Note BNXS02: Definition of Scenario Types Used in MTP Policy Briefs¹

¹ MTP Briefing Note BNXS02:
<http://www.mtprog.com/ApprovedBriefingNotes/BriefingNoteTemplate.aspx?intBriefingNoteID=181> .



3.1 Current market policy and activities

The following implemented market policies and activities are included in the reference modelling:

European Energy Label - [1 January 1995](#).²

Introduced the A to G energy efficiency classes for all major domestic cold appliances.

Maximum Consumption Directive - [3 September 1999](#).³

Only cold appliances of energy classes A, B and C are allowed to be sold (as new) on the European market, except for chest freezers where D and E class appliances are permitted. This SI has since been replaced by the The Ecodesign for Energy-Using Products Regulations 2007, but there have been no changes to the maximum consumption values allowed⁴.

Revision of Energy Label - [2004](#)⁵

The revision of the Energy Label saw the extension of the classes to include A+ (Energy Efficiency Index [EEI] 42 to 30) and A++ (EEI less than 30) from July 2004.

European Ecolabel⁶

The European Ecolabel is a voluntary endorsement scheme to demonstrate energy and resource efficiency. The revision agreed in February 2004 lifts the energy efficiency requirement to at least A+. No ecolabelled appliances are marketed in the UK.

Energy Efficiency Commitment (EEC)⁷

Energy Efficiency Commitment schemes subsidise the purchasing of more efficient cold appliances through retailer, manufacturer and energy supplier agreements.

Energy +

The [European scheme](#)⁸ aimed to encourage the production of the most energy efficient cold appliances and demonstrate the potential for improved levels of performance. It was run as a competition and winning products could promote their Energy Plus status.

Particular credit was given to products showing the greatest efficiency within different categories. It helped to demonstrate possibilities for the review of the Energy Label classes.

This initiative has now finished but, in 2004, the winning appliances used only around 27% of the energy used by an average European cold appliance of

² www.legislation.hmso.gov.uk/si/si1994/Uksi_19943076_en_1.htm.

³ www.opsi.gov.uk/si/si1997/19971941.htm.

⁴ www.opsi.gov.uk/si/si2007/uksi_20072037_en_1

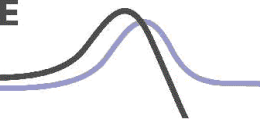
⁵ www.opsi.gov.uk/si/si2004/20041468.htm.

⁶ http://ec.europa.eu/environment/ecolabel/index_en.htm.

⁷ EEC is run by the Office of Gas and Electricity Markets:

<http://www.ofgem.gov.uk/Sustainability/Environmnt/EnergyEff/Pages/EnergyEff.aspx>

⁸ <http://www.energy-plus.org/>.



comparable size and type. A fridge freezer achieved an Energy Efficiency Index (EEI) of 19.8.

The minimum requirement for Energy + is an EEI of 0.42 (using the calculation in directive 94/2/EC).

Energy Saving Recommended (ESR)

[An Energy Saving Trust](#)⁹ scheme to highlight products that demonstrate best practice in terms of energy efficiency, thus allowing consumers to identify products more easily. The scheme is open to all manufacturers. Products meeting set criteria are able to display the ESR logo at point of sale and in promotional material.

The scheme aims to review the criteria as the efficiency of appliances improves to maintain 'best practice' recognition for recommended appliances.

Current criteria for cold appliances: A+ (from 1st July 2004).

Industry commitment

As part of the discussions regarding the revision of the energy label (2004), CECED (the European association of domestic appliance manufacturers) tabled a voluntary agreement package¹⁰.

The commitment is connected to the introduction of the new label and requires a limitation of production and importing of appliances with an efficiency index of 75. There is also a fleet average target (EEI 55). This is the average energy consumption of a manufacturer's range of appliances.

The voluntary agreement is confirmed and adopted, the first target was to eliminate appliances in energy class C or worse (except for chest freezers) by the end of 2004.

3.2 Reference case modelling

The projections are based on several interdependent considerations:

Household numbers

The number of households is assumed to rise from 24,355,000 in 1999 to 28,467,000 in 2020¹¹.

Percentage ownership

Information from market research organisations is used for recording and estimating how many households own particular types of appliances. Ownership levels based on data from GfK¹² are given in Table 1.

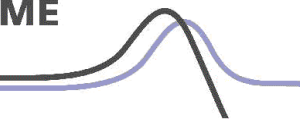
⁹ Energy Saving Trust: <http://www.est.org.uk/>.

¹⁰ "Voluntary commitment of reducing energy consumption of household refrigerators, freezers and their combinations (2002-2010)" 31st October 2002.

<http://www.ceced.eu/ICECED/easnet.dll/ExecReq/Redirection?eas:oldfilename=/community/files/296/phpXLy1ow/UICCOLD2002.pdf>

¹¹ Market Transformation Programme Briefing Note BNXS25 – UK Household and Population Figures 1970-2020. <http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNotelD=325>

¹² <http://www.gfk.com>.



Mintel ownership data is significantly different from GfK data. A Mintel report¹³ using (BMRB TGI survey) data in 2003 suggested ownership to be around 62% in 2001 and 64% in 2003 for fridges and, for fridge-freezers, ownership levels increased slightly from around 46% in 2001 to 48% in 2003. The differences could be due to the definitions of appliance used in collecting the data. GfK has historically been assumed to provide a realistic picture.

Table 1. Percentage ownership of refrigeration appliances

Year	% household ownership			
	Fridge-freezer	Chest freezer	Upright freezer	Fridge
2000	63.4	17.4	26.2	43.0
2001	64.0	17.2	26.8	43.0
2002	64.4	17.1	27.3	43.0
2003	64.7	16.9	27.8	43.0
2004	64.9	16.7	28.3	43.0
2005	65.0	16.5	28.7	43.0
2006	65.1	16.3	29.1	43.0
2007	65.1	16.2	29.4	43.0
2008	65.0	16.0	29.8	43.0
2009	65.0	15.8	30.0	43.0
2010	65.0	15.6	30.3	43.0
2011	65.0	15.4	30.5	43.0
2012	65.0	15.3	30.7	43.0
2013	65.0	15.2	30.8	43.0
2014	65.0	15.1	30.9	43.0
2015	65.0	15.0	31.0	43.0
2016	65.0	15.0	31.0	43.0
2017	65.0	15.0	31.0	43.0
2018	65.0	15.0	31.0	43.0
2019	65.0	15.0	31.0	43.0
2020	65.0	15.0	31.0	43.0

Lifespan

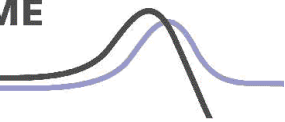
Using historic sales data (GfK) and ownership data the average lifespan of an appliance can be estimated. The lifespan has been estimated using the model, since reliable empirical evidence is not available. Sales data is used to help check on the level of replacement sales, and also provide an estimate of the waste stream.

From this, the following lifetime is assumed for the different types of cold appliances.

Table 2. Assumed lifespan for refrigeration appliance

	Chest freezer	Upright freezer	Fridge	Fridge-freezer
Lifetime (years)	16.7	15.5	12.8	17.5

¹³ Mintel Fridges and Freezers, Market Intelligence, September 2003.



Sales

Market data from GfK is used as the basis for considering the make up of the market, including branded and exclusive sales for freestanding and built in models. The percentage of sales according to the different energy efficiency classes is projected forward from 2006 (where actual sales are known). A gradual move to more efficient appliances is assumed based on current policy measures.

Efficiency of models available and sold

From the energy label information collected with the sales data, the average sales weighted energy consumption, for each type of appliance and for each energy efficiency class is calculated. This information provides the annual unit energy consumption for the base year of 1999 and subsequent years in the modelling (therefore any changes in the average size of the appliances which would affect average consumption are not taken into account). No distinction is currently made for frost-free appliances; they are included in the sales weighted average.

Table 3. Average annual consumption figures (kWh) used in MTP energy use modelling 2007

Specification	Chest freezer		Upright freezer		Fridge		Fridge-freezer	
	Ref	Pol/EBP	Ref	Pol/EBP	Ref	Pol	Ref	Pol/EBP
A++ (double plus)	175	109	175	123	91	96	206	223
A+ (plus)	231	153	219	172	138	135	270	312
A	200	200	225	225	177	177	408	408

Where a detail about the consumption for different energy label classes is unavailable, market average or calculated averages are used.

The energy consumption modelling is calculated from the declared kWh per 24 hours given on energy labels. It does not make use of any data from actual use or take account of measurement tolerances, however limited testing involving metering of appliances in homes suggests that these figures are appropriate.

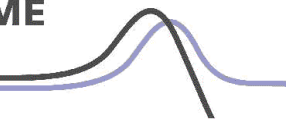
4 Assumptions for Earliest Best Practice scenario (EBP)

This projection is constructed from a Reference scenario and assumes that all consumers are purchasing the best available appliance from 2006. The best available is assumed to be A++ for fridges, fridge-freezers, upright freezers, and chest freezers.

Specifications according the A++ level of performance are not readily available, so figures have been calculated based on a proportionate reduction of the consumption for A class products.

5 Assumptions for Policy scenario (Pol)

The Policy scenario is based on the Reference scenario and incorporates proposed or potential policy measures or market influences.



The DECADE report 'Transforming the UK Cold Market 1997'¹⁴ presented various scenarios to achieve Earliest Best Practice (referred to as Economic and Technical Potential). Most of the policy measures suggested (eg revalorisation of the energy label and minimum standards) have not been introduced within the recommended timescales.

The following alternative actions and targets are included in the Pol scenario. Compared to the Reference scenario the activities included in the Pol scenario produce a faster move to increased sales of efficient models.

Revised Energy Label and minimum standard

The Policy scenario is dependent upon improvements in product efficiency, which will require a revision and extension of the label in 2008. It would be expected that such a measure would include the removal of current B class appliances through a minimum standard introduced by the Eco-Design Directive for Energy Using Products either as a regulation or voluntary agreement. By 2010 it is assumed that 100% of sales of cold appliances have an energy efficiency equal to or better than the current class A, and by 2015 100% of sales of cold appliances are equivalent to or better than the current A+ class.

Using current common product design and technology, it will be difficult to achieve significantly greater energy efficiency but it must be assumed that, given the incentive of a revised label and a minimum standard, improvements will be made more mainstream.

The above option is assumed to present the greatest market transformation, as it is difficult to consider the impact of those below.

Energy efficiency commitment (EEC)

The level of performance criteria used for ESR were used to calculate savings and a requirement to obtain the subsidies available through the EEC scheme. The ESR criteria have been uplifted and so are no longer in line with the requirements of EEC. The requirements of the revised EEC scheme (EEC2) for cold appliances are now less attractive, so the effectiveness of this policy measure is currently unpredictable.

Early replacement

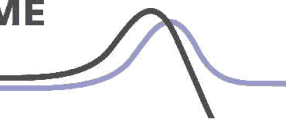
It has been suggested by industry representatives that early replacement of old appliances is encouraged¹⁵.

Economic incentives

There is a difference in price between the most efficient models and the market average. This could be addressed through economic incentives to consumers, such as rebates, as has successfully happened in other EU countries.

¹⁴ DECADE Transforming the UK Cold Market 1997, Energy and Environment Programme, Environmental Change Unit, University of Oxford.

¹⁵ CECED 2006 Energy-Efficiency A Shortcut To Kyoto Targets: The Vision Of European Home Appliance Manufacturers
http://www.cec.org/IFEDE//easnet.dll/GetDoc?APPL=1&DAT_IM=20429D&DWNLD=White Paper_Energy efficiency_Feb 2006_Final.pdf



6 Issues

Energy consumption is based on energy label claims and doesn't take account of any adjustments for tolerances that may be made by manufacturers.

Conflicting information from different sources necessitates further investigation to confirm appropriate levels of ownership for the different types of appliances.

The introduction of wine coolers and small fridges for beer storage is not considered in the modelling - the extent of use, and therefore energy use, is not yet quantified. Further information can be found in MTP Briefing Note reference BNC15 Small, non-traditional refrigerated appliances on the UK market¹⁶.

Related MTP information

- BNC07 Cold Appliance Energy Label Revision
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=82>
- BNC11 Domestic Refrigerator Standard vs Real-use Energy Consumption
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=310>
- BNC14 UK Market for A+ and A++ Refrigeration Products
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=402>
- BNC15 Small, non-traditional refrigerated appliances on the UK market
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=420>

Changes from version 3.0

Updated to reflect changes in modelling made for the Consultation on sustainable products - improving the efficiency of energy using products 2007.

Consultation and further information

Stakeholders are encouraged to review this document and provide suggestions that may improve the quality of information provided, email info@mtprog.com quoting the document reference, or call the MTP enquiry line on +44 (0) 845 600 8951.

For further information on related issues visit www.mtprog.com

¹⁶ BNC15 Small, non-traditional refrigerated appliances on the UK market
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=420>