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Project acronym: REMODECE

Full title of the action: Residential monitoring to decrease energy use and carbon emissions in Europe

Intelligent Energy – Europe (IEE)
Type of action: Type 1; SAVE
Key action: VKA4.3

D9: Report with the results of the surveys based on questionnaires for all countries

Period covered: from July 2007 to January 2008

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End date of the project: 30 September 2008

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1 Introduction

Although significant improvements in energy efficiency have been achieved in home appliances and lighting, the electricity consumption in the average EU-25 household has been increasing by about 2% per year during the past 10 years, despite the numerous energy efficiency policies and programmes at EU and national level. In the period 1999-2004, the total electricity consumption in the residential sector in the EU-25 has grown by 10,8%, at almost the same rate as the economy (GDP) [Bertoldi and Atanasiu, 2006].

Some of the reasons for such increase in the residential sector electricity consumption are associated with a higher degree of basic comfort and level of amenities (particularly in the new EU member countries) and also with the widespread utilization of relatively new types of loads whose penetration and use has experienced a very significant growth in recent years. These loads include personal computers, laptops, printers/fax/multipurpose machines, game consoles/ play stations, large-screen home theatres/DVDs, HVAC auxiliary equipment, air conditioners, chargers (phones, power tools), etc. Households are becoming more and more dependent on electronic/electric devices and gadgets, with ubiquitous microcontrollers/digital controls being embedded into most apparatus, to improve the performance and the quality of the provided services. Unfortunately in many cases little or no attention is given to the energy consumption, particularly in the standby modes. According to IEA projections [IEA, 2003], 15% of the total appliance electricity consumption in Europe, by 2030, could be due to standby functionality. This also represents the largest potential saving as it is currently unregulated and efforts to introduce measures to reduce this wasteful consumption are only just beginning (last decade). According to the EuP Lot 6 [EuP, Lot 6], the business as usual standby consumption by 2020, based on the new stock model SC2-n, will be around 100TWh, and the recommended 2-tier implementation represented in SC5-n leads to at least a 55 % improvement against the business as usual in 2020, as it can be seen in Figure 1.

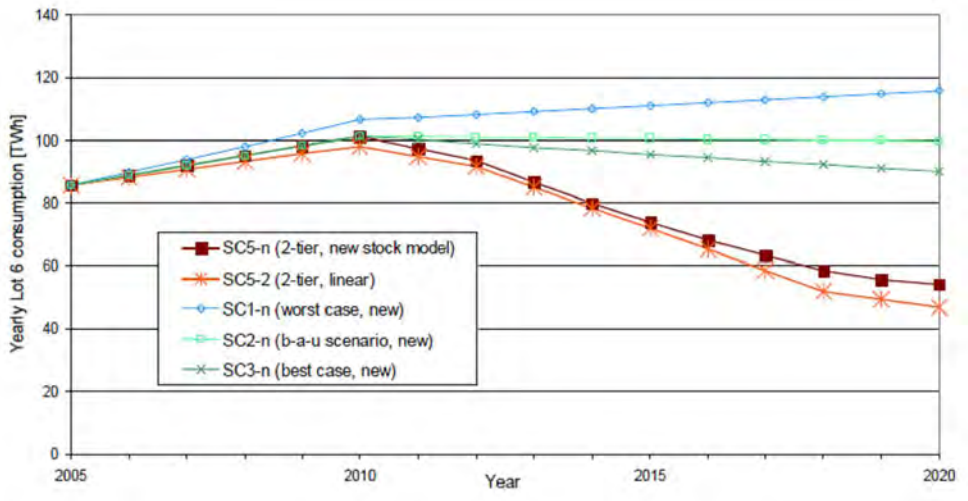


Figure 1: Energy consumption scenario based on new stock model [EuP-Lot6]

In summary, electricity consumption in the EU has been increasing because of many different factors, including:

- An increased degree of basic comfort and level of amenities due to an increase of the living standards (particularly in the new EU member countries).
- Increased penetration of traditional appliances (e.g. dishwashers, tumble driers, air conditioners, and personal computers) which still did not achieve the saturation level.
- Increased use of the equipments: more hours of TV watching (sometimes used as background activity to provide sound), more hours of use of personal computers (widespread use of internet, tele-working), more washing and use of hot water.
- Increased number of lamps per home.
- Introduction and widespread utilization of relatively new types of loads whose penetration and use has experienced a very significant growth in recent years, mainly consumer electronics and information and communication technologies (ICT) equipment (Set top boxes, DVD players and recorders, broadband equipment, cordless telephones, game consoles, etc.), many with stand by losses.
- Increased number of double or triple appliances, mainly TVs and refrigerators-freezers, as well as computers.
- Increased size of some appliances like refrigerators and TV screens.
- More single family houses and larger houses and apartments. This results in more lighting, more heating and cooling. Population is getting older, spend more time at home, and therefore demand higher indoor temperatures, as well as all day heating in winter and cooling, in summer.

Next picture shows the situation in terms of final electricity consumption in the participating countries for the previous years, in the household sector. As it can be seen, on average the electricity consumption has been increasing by about 2% per year in the household sectors [ODYSSEE, 2008].

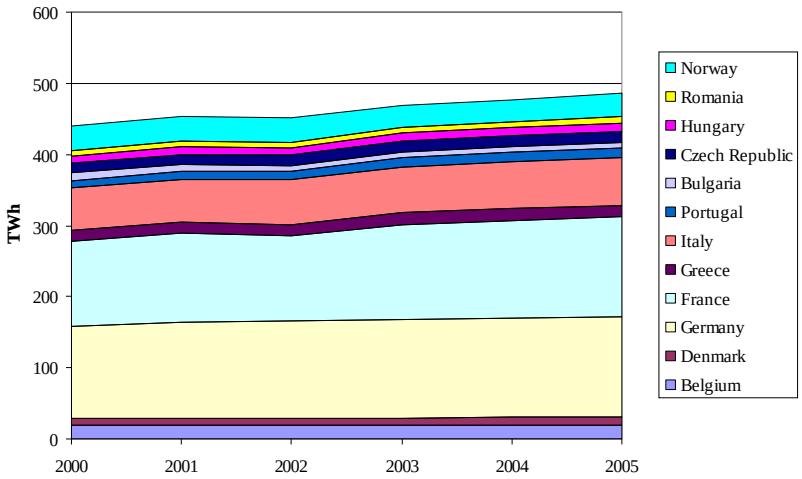


Figure 2: Final electricity consumption in the residential sector

Despite the large electricity consumption increase and the consequent impact in CO2 emissions, there is little reliable knowledge at European level where the electricity is used. In the scope of the REMODECE Project, whose main aim was to characterize the household's electricity consumption for different types of end-uses in 12 countries, geographically and economically representative, this report presents the results of the survey carried out in Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Greece, Hungary, Italy, Norway, Portugal and Romania. The objective of the survey herein presented was to obtain reliable, representative and internationally comparable energy related data. The survey was based on the collection of at least 500 questionnaires per country, on the equipment penetration, general characteristics (type, age, quality, etc.) of the electrical equipment being used, and on the user behaviour (pattern of use, criteria for equipment selection), as well as on the selection criteria when buying new appliances/equipments. The questionnaire used for carrying out the survey can be seen in Annex 1.

2 Description of the survey

The REMODECE team has developed a detailed questionnaire (Annex 1), to enable the characterisation of the end-use electricity consumption based on the survey campaign. The questionnaire addresses both quantitative and qualitative data, as the objective was to collect data on the type of appliances and lighting people have at home, and also to understand their behaviour concerning the electricity use in their houses and their choices when buying new equipment. Therefore, both technological aspects and behavioural aspects have been analysed in the survey.

In order to avoid a biased sample and to increase the rate of response, it was decided not to use an online questionnaire alone. Therefore a mix of techniques has been used to collect the questionnaires in the several countries, to make it more successfully and more representative. The extensive survey has been carried out throughout different regions, covering large cities and the country side, thus guaranteeing regional representativeness. In addition the extensive survey targeted different classes of the society, with different levels of graduation and living standards, living either in flats or in single family houses.

The questionnaire was originally developed in English and has been translated into the national languages of each partner's countries. It was released late in 2006 and has been collected during the year 2007. The target goal for each partner was to collect at least 500 questionnaires from a representative sample. The questionnaire typically takes less than 30 minutes to be completely filled in.

For the collection of the questionnaires the REMODECE project has used several methods, in particular: face to face interviews, telephone interviews, internet (web-based platform), direct email contacts (emailing lists) and mail. The response rate is difficult to calculate because an internet based questionnaire was used. However for the questionnaires delivered through mailing lists, the response rate reached around 90% and people who have been approached for the interview were quite receptive and very interested to collaborate. Structural criteria like household size and level of consumption have not been considered for the surveying campaign.

Some of the partners used existing consumer's panels, by subcontracting the service to market study companies.

2.1 Overview of the survey

Next Table shows the total number of questionnaires received in each country within each technique used. The aim was to collect as many questionnaires as possible with face to face

interviews, but it was not always possible to use this methodology and the partners had to use the internet web based platform and email because it is a less time consuming alternative.

Table 1: Distribution of survey methods in each country

	BE	BU	CZ	DE	DK	FR	GR	HU	IT	NO	PT	RO
N° distributed questionnaires	At web site 248	805	At web site	700	At web site		Web and email	700	80 in paper version	500		623
N° questionnaires received	548	509	500	545	500	530	425	504	500	487	542	623
Response rate	--	60%		78%	--	--		72%				100%
Telephone interviews						402						0
Face to face interviews	56	80			0	34	100	405	64		180	623
Online (internet web-based platform)	492	0	500		500		78	0	436	487	260	0
Email	0	95			0		151	0	0		102	0
Mail	0	329		545	0	28	96	0	0		0	0
Distributed at the beginning of the monitoring campaign						39		99				
Total	548	509	500	545	500	503	425	504	500	487	542	623

2.2 Problematic questions

Although the large majority of respondents gave sincere answers to the questionnaire, during the face to face interviews it was brought to our attention that some of the interviewed were influenced by the options presented, giving convenient answers that reward them as “energy consciousness” or “green image”.

As some questions were about the technical specifications of equipment, some residents did not know how to answer those questions. Another issue was the response rate of the questionnaire; due to its nature and size some people did not answer all the questions. The questions which dealt with technical details of appliances or specific consumptions had high percentages of invalid answers (respondents who did not know/not answered). This situation happened due to three main reasons:

- The primary reason is the age of the equipment: people with old equipment do not remember about its characteristics any longer, and it was possible to figure out that more than 50% of the stock of white appliances was more than five years old.

- Another situation is when respondents live in a rented household. In this case the owners have bought the equipment and the tenants do not have any information about the technical specifications of the equipment because they did not claim for the manuals when renting the house. This situation is itself an important barrier for increasing the market penetration of efficient technologies within households, because the person (tenant) who pays the electricity bill is not the same person (owner) who buys the equipment, whereas the initial price is the main decision factor for the owners (split incentives).

- The last reason deals with the degree of technical knowledge of respondents and how this may influence their understanding, with consequences in their practices and lifestyle.

Selection of participants

Due to the mix of techniques used for the collection of the questionnaires (email, online, face-to-face interviews), it can be said that the selection of participants for the survey was random. With the online questionnaire hosted on a website, it is not possible to predict and or to select the type of participants for the survey. It can be assumed that using this method, only people interested in energy subject and with technical background would be interested to fill in the questionnaire on voluntary basis. On the other hand, in the surveys using direct email contacts, mail and face to face interviews, all types of people have been contacted, no matter their background or interests. This guarantees that not only people interested in energy issues is addressed in the survey but also all the population.

Representativeness selection of households

As it was mentioned before, it can not be said that the survey sample was representative because the selection of respondents was random. Only in Germany and France the sample could be considered representative as they used an existing panel of consumers.

Analysing the results we could notice that in some countries the behavioural questions and the technical data from the appliances are largely deviated from the average, meaning there is not representativeness in the sample.

3 Survey Results

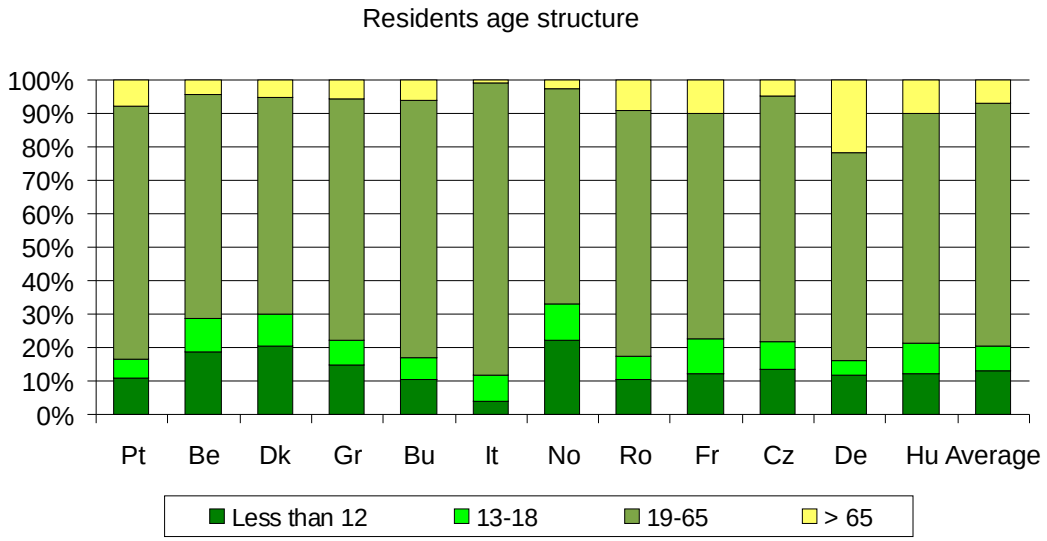
3.1 Households details

The questionnaire used in the survey was divided into several modules each one focusing in a particular subject. The first module gives insight about the household details, as the energy consumption is dependent on factors such as the number of persons living in the household, the age structure of inhabitants and the type and size of the house. This background information is an important factor to understand the variation in the household's energy consumption. However other factors play a key role such as purchasing capacity, lifestyle, social status, and technical knowledge.

3.1.1 Persons by age: how many persons live in the household in each age group?

The questionnaire inquired about the number of persons who lived in the household as well as the distribution in four different age ranges: less than 12, 13 to 18, 19 to 65 and older than 65. The vast majority of the inhabitants, about 73%, belong to the age range: 19 to 65 years old. Based on the survey results it can be concluded that the age structure is similar to all the countries, except in Germany, whose sample included more elderly households.

Total of residents	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Less than 12	177	338	231	174	164	69	166	191	34	194	140	153
13-18	93	176	108	89	101	144	79	130	28	120	51	114
19-65	1235	1209	731	858	1183	1556	482	1361	185	1056	732	858
> 65	126	78	61	67	97	19	19	169	28	71	254	127



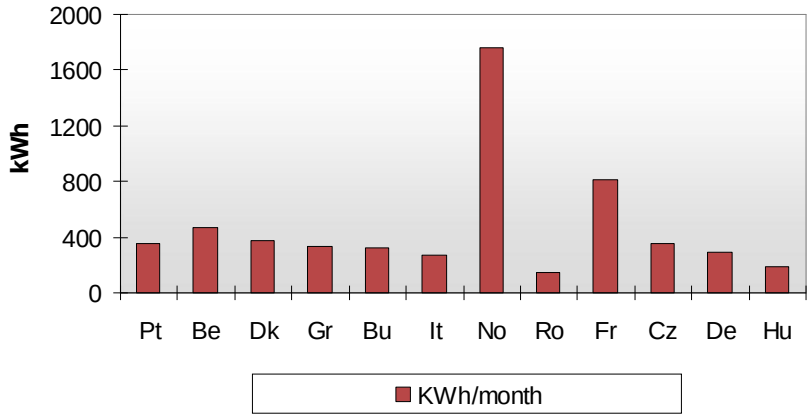
3.1.2 Average electricity consumption per month and household

When asked for indicating their monthly electricity consumption in Euros and in KWh, many respondents did not remember about the requested information. This was a troublesome question because it demanded to make a brain storm exercise for many households.

It was however possible to achieve the following values for the average monthly electricity consumption per household per country, both in KWh and in Euros:

Country	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
In euros/month	47,8	92,1	78,0	42,1	23,8	54,2	148,9	18,8	87,5	43,3	51,7	28,7
In KWh /month	354,9	466,8	373,0	334,7	321,65	270,0	1758,2	145,2	808,3	349,2	289,5	186,8

As expected Norway has by far the highest average electricity consumption per household followed by France. Both Norway and France have high penetration of electric space and water heating due to the low electricity rates. In France, for e.g., the electric heating consumption for a recent household is 41% of the total electric consumption. Germany presented quite low electricity consumption values per household per month, but this average value should be taken with care, because the German sample targeted a large percentage of old.

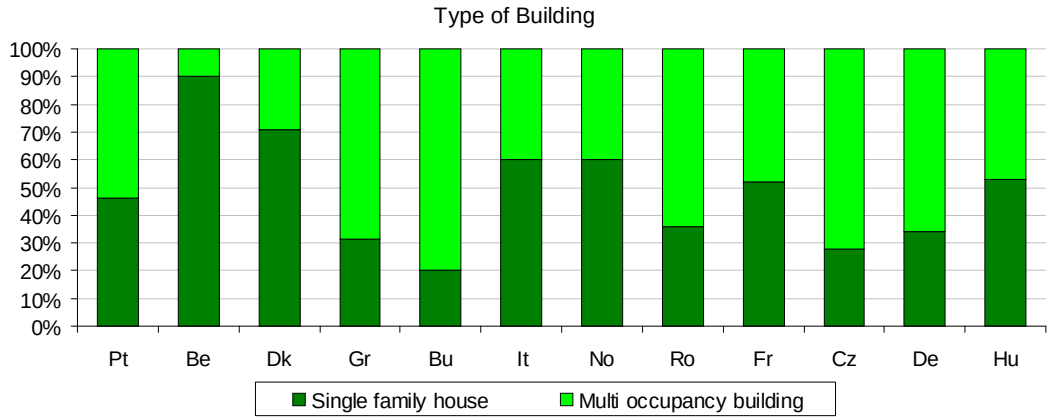


3.1.3 Type of building

Because the type of house is an important factor to determine the range of consumption within the household, the survey included the type of building in which the respondents live in. There is a

large variation in the type of houses in Europe, especially related to tradition. In Belgium for example, 90% of the respondents were living in single family houses. More than 50 % of the sample in DK, IT, NO, FR and HU were also living in single family houses, while in the remaining countries the largest share of the respondents live in multi occupancy buildings. In Bulgaria and Greece, the share of households living in single family houses is quite low, representing about 20% and 30%, respectively.

Building type	PT	BE	DK	GR	BU	IT	NO	RO	FR	CZ	DE	HU
Single family house	46	90	71	31	20	60	62	36	52	28	34	53
Multi occupancy building	54	10	29	69	80	40	40	64	48	72	66	47



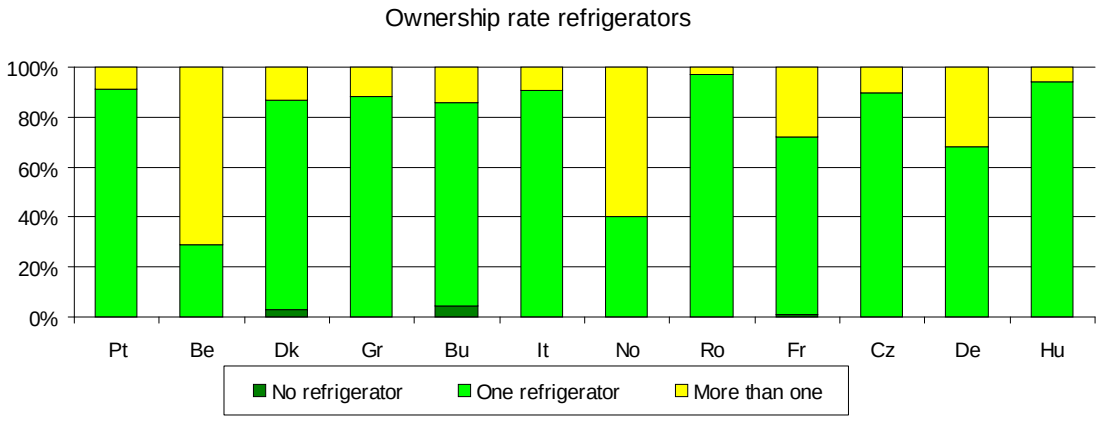
After the portrayal of the household details the survey then proceeded to more specific questions related to specific appliances groups. The next section is about the cold appliances in the household (refrigerators and freezers).

3.2 Cold appliances

3.2.1 Ownership rate: percentage of household sample

The ownership rate for refrigerators can be seen in the Table and picture below.

Ownership	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
No refrigerator	0	0	3	0	4	0	0	0	1	0	0	0
One refrigerator	99,6	29	84	88	81	91	40	97	71	90	68	94
More than one	9,35	71	13	12	14	9	60	3	28	10	32	6



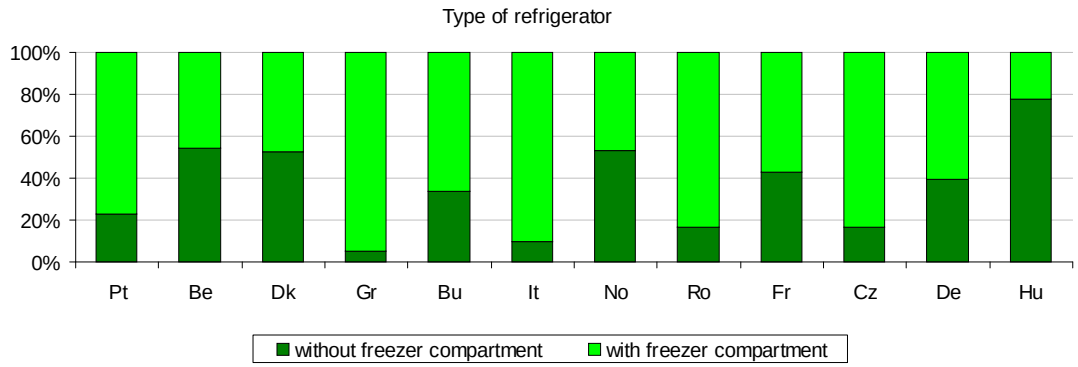
As it can be seen in the picture, in the survey the share of households without any refrigerator is very low, being Denmark, Bulgaria and France, the only countries where households without refrigerator were found, at the respective percentages: 3%, 4% and 1%.

As it was mentioned before the number of households with double or triple refrigerators has been increasing in recent years. The number of households with more than one refrigerator in Belgium, Norway, France and Germany is quite high, representing about 71%, 60%, 28% and 32% respectively. One reason for this high share is because people keep the old refrigerator running in the garage to cool beer and other drinks instead of disposing it in a proper manner by calling the local waste management facility and ask about disposal of "white goods.

3.2.2 Type of refrigerator

The questionnaire also inquires about the type of refrigerator, and the results were quite different for each country.

%	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Without freezer Compartment	23	65	55	5	33	10	53	18	43	17	40	78
With freezer Compartment	77	55	50	95	67	90	47	88	57	83	60	22



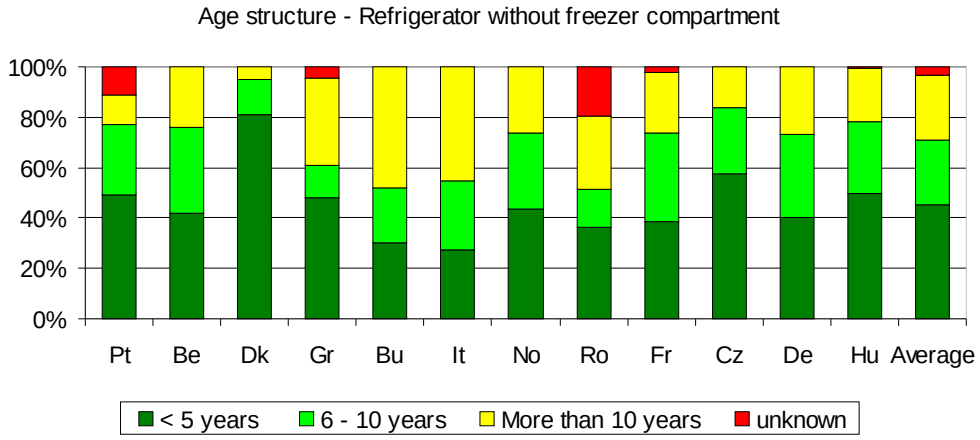
The share of refrigerators with freezer compartment is higher in the southern and most eastern countries (Pt, Gr, It, Bu, Ro, and Cz). The share of refrigerators without freezer compartment is higher in northern countries and Hungary (Be, Dk, No, Fr, De and Hu). Be, No, Fr and Ge also correspond to the countries with high percentage of households with more than one refrigerator.

3.2.3 Refrigerator without freezer compartment

3.2.3.1 Age

The details for each type of refrigerator were asked, the age structure is quite similar for all the countries, except for Denmark, where 81% of the equipment is under 5 years, in opposition to the remaining countries where the share ranges from 30% to 50%. It should be noticed the high percentage of equipment with more than 10 years present in Bulgaria (48%) and in Italy (45%).

Refrigerator Age	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
< 5 years	49	42	81	48	30	27	44	36	39	58	40	50
6-10 years	28	34	14	13	21	27	30	15	35	26	33	29
More than 10 years	11	24	5	35	48	45	26	29	24	16	27	21
Unknown	11	0	0	4	0	0	0	20	3	0	0	1

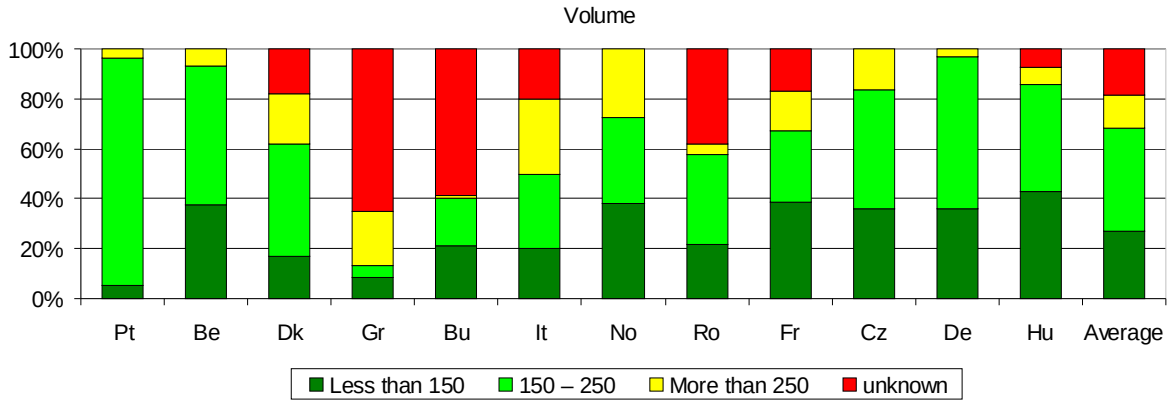


If the weighted average value for the 12 countries being analysed is considered, about 45% of the refrigerators without freezer compartment are less than 5 years old. In Denmark this value is quite high, about 80%, probably as a consequence of the Danish energy-saving policy, with several energy efficiency incentive programmes available that help households to change their old inefficient refrigerator by a new more efficient one (see Efficiency Class below where Denmark has by far the largest share of A++, A+ and A energy label appliances).

3.2.3.2 Volume

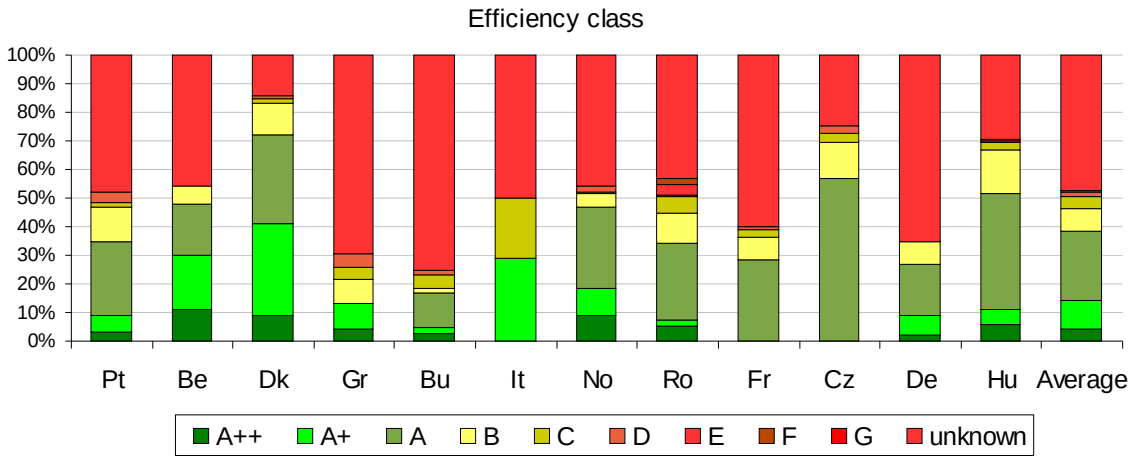
Concerning the volume of the equipment there were several countries with a high unknown share. This could be correlated with the age of the equipment, as people tend to forget the specific details of the appliances as the years progress. Denmark, Greece, Italy, Norway, France and Czech Republic have significant percentages of large refrigerators, with volume over 250L.

Volume in liters	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Less than 150	5	37	17	9	21	20	38	22	39	36	36	43
150 – 250	91	55	45	4	19	30	34	36	28	48	61	43
More than 250	4	7	20	22	1	30	28	5	16	16	3	7
unknown	0	0	18	65	59	20	0	38	17	0	0	7



3.2.3.3 Efficiency Class

Regarding the efficiency class for refrigerators without freezer it should be noted that most countries have a large percentage of unknown labelled equipment. The average value for EU-12 is about 55%.



It can be assumed that refrigerators in the *unknown* category are of the type below D class. The rational for this assumption is that if people do not know about the efficiency class of their refrigerator is because it is too old and therefore their efficiency class should be low, or they are not keen on the issue and therefore the decision criteria when buying one appliance was the price and not the efficiency class.

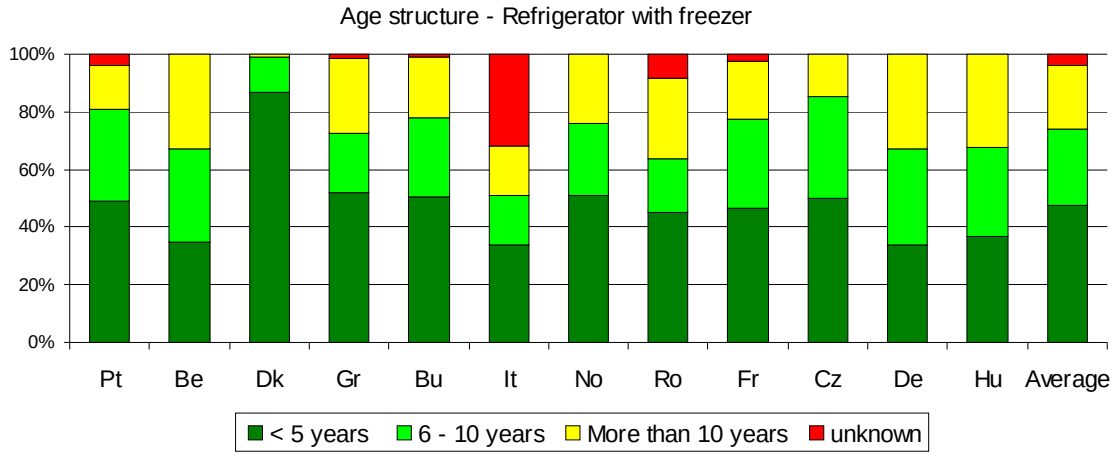
Except for Belgium, Denmark, Italy and Norway, the share of A++ and A+ appliances is still very low, representing on average about 4% and 10% respectively.

3.2.4 Refrigerator with freezer compartment

3.2.4.1 Age

The results for the refrigerators without freezer compartment are similar to the results of the refrigerators with freezer compartment.

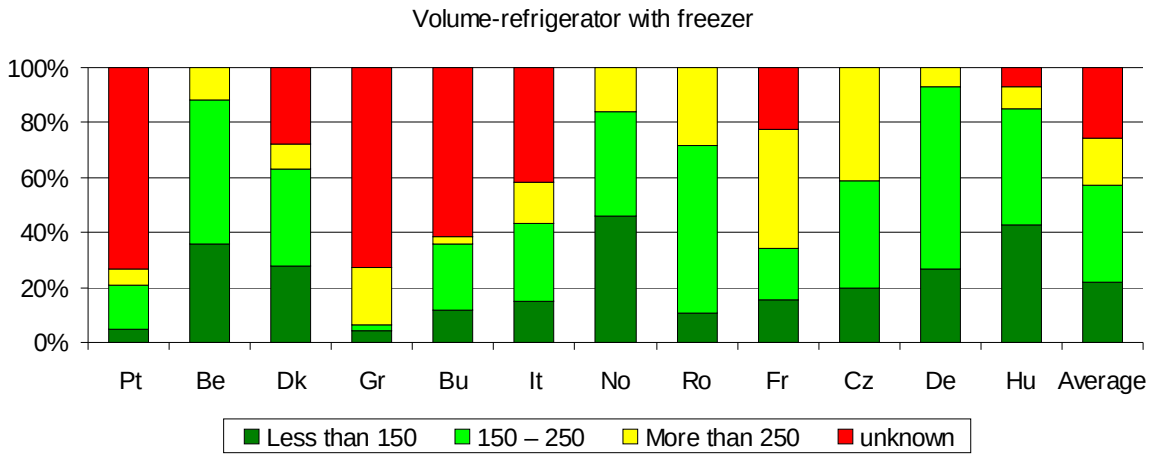
Refrigerator Age	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
< 5 years	49	35	87	52	50	34	51	45	47	50	34	37
6-10 years	32	32	12	20	28	17	25	19	31	35	33	31
More than 10 years	15	33	1	26	21	17	24	28	20	15	33	33
Unknown	4	0	0	2	1	32	0	8	3	0	0	0



If considering the weighted average value for the 12 countries being analysed, about 45% of the refrigerators with freezer compartment are less than 5 years old. In Denmark this value is quite high, about 90%, probably one consequence of the Danish energy-saving policy, with several energy efficiency incentive programmes available that help households to change their old inefficient refrigerator by a new more efficient one. Italy is the country with the largest share of Refrigerators with freezer with more than 10 years old (about 55%).

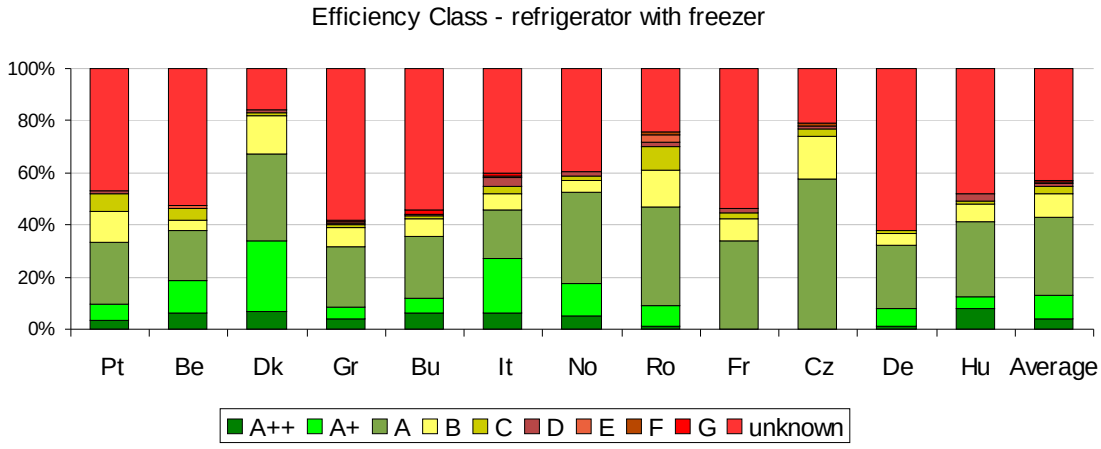
3.2.4.2 Volume refrigerator

Volume in liters	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Less than 150	5	36	28	4	12	15	46	11	15	20	27	43
150 – 250	16	53	35	2	24	29	38	61	19	39	66	42
More than 250	6	12	9	21	3	15	16	28	43	41	7	8
unknown	73	0	28	73	62	42	0	0	23	0	0	7



3.2.4.3 Efficiency class

Regarding the efficiency class for refrigerators with freezer it should be noted that most countries have a large percentage of unknown labelled equipment. The average value for EU-12 is about 43%.

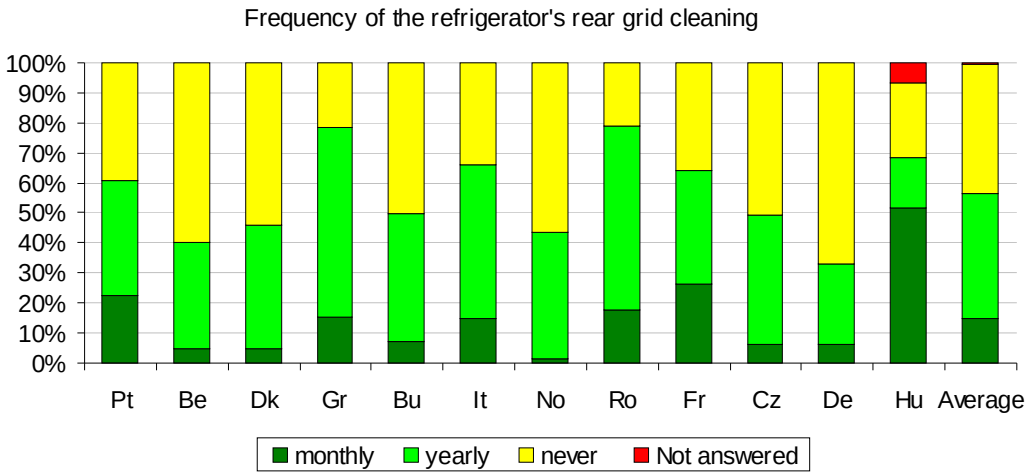


Denmark owns the largest share of refrigerators with less than 5 years old and at the same time the largest share of efficient appliances: the share of A, A+ and A++ in Denmark represent 65% of the park of refrigerators with freezer compartment. Unknown efficiency labelled refrigerators should be considered as efficiency class D or below. Taking into account that labelling of refrigerators is in place for more than 5 years, it would be expected that the percentage of people who do not know the efficiency class of their refrigerator would be smaller than 50%. This could be interpreted as a sign of malfunctioning of the labelling.

In Portugal, half of the households in the sample own fairly recent refrigerators (less than 5 years old), however there is only 9% share of A++ and A+ refrigerators. One reason could be the fact that there are no A++ appliances available in the market in Portugal.

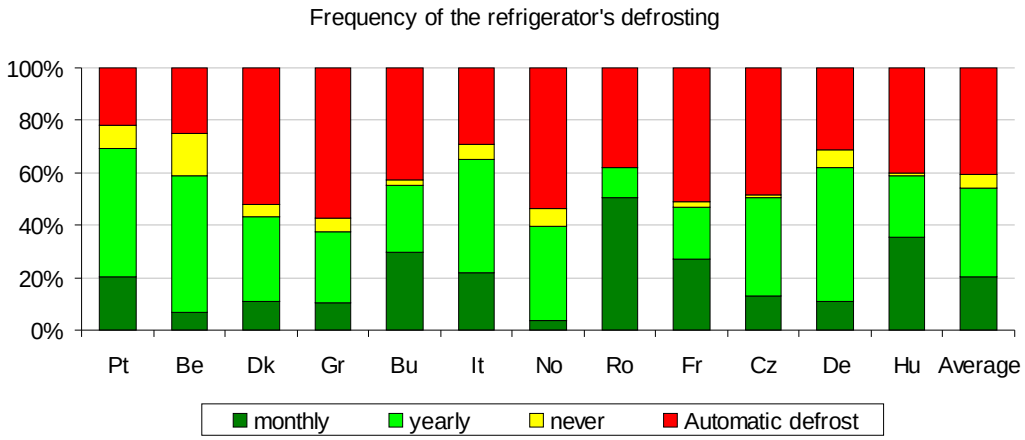
3.2.4.4 Frequency of the refrigerator's rear grid cleaning

The behaviour towards the use and cleaning of the refrigerators was also inquired. The respondents were asked to indicate the frequency of cleaning of the rear grid. Hungary has the best results as 52% answered that they do it on a monthly basis, the worst being Belgium where 60% admit that they never clean it.



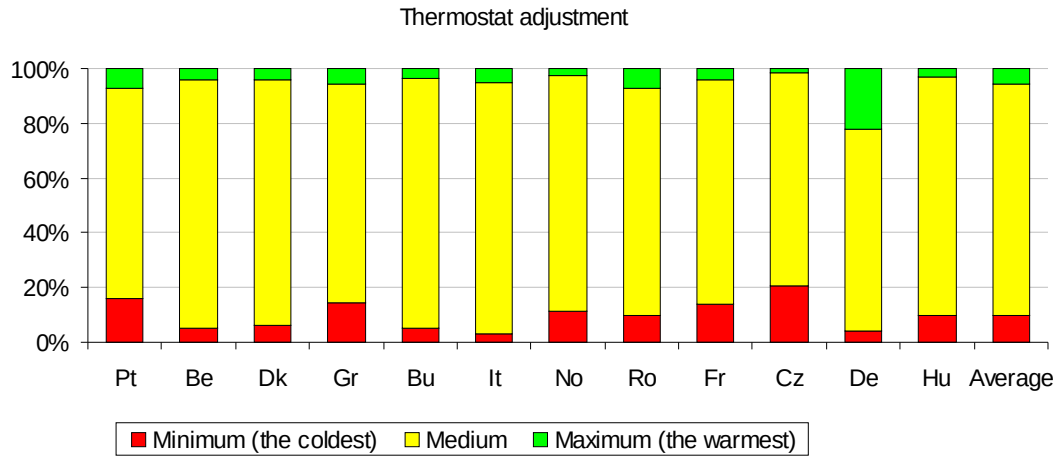
3.2.4.5 Frequency of the refrigerator's defrosting

The questionnaire also asked about the frequency of the refrigerator's defrosting. As there are several models with automatic defrost function, the results were better than the ones in the previous question. The worst behaviour takes place in Belgium, where 16% of the respondents admit they never do it, and the best takes place in Romania where everyone defrosts their refrigerators or has equipment with automatic defrost.



3.2.4.6 Thermostat adjustment

Regarding the temperature settings, most respondents have the refrigerator in the medium setting, Czech Republic and Portugal have the biggest share of refrigerators working in the coldest settings (21% and 16%), Germany has the best behaviour with 22% in the warmest settings.



3.2.4.7 Location of the equipment: Near a heat source?

When asked about the location of the equipment the majority of the respondents state that it is not located near a heat source. France has the worst case with 37% of the appliances near a heat source.

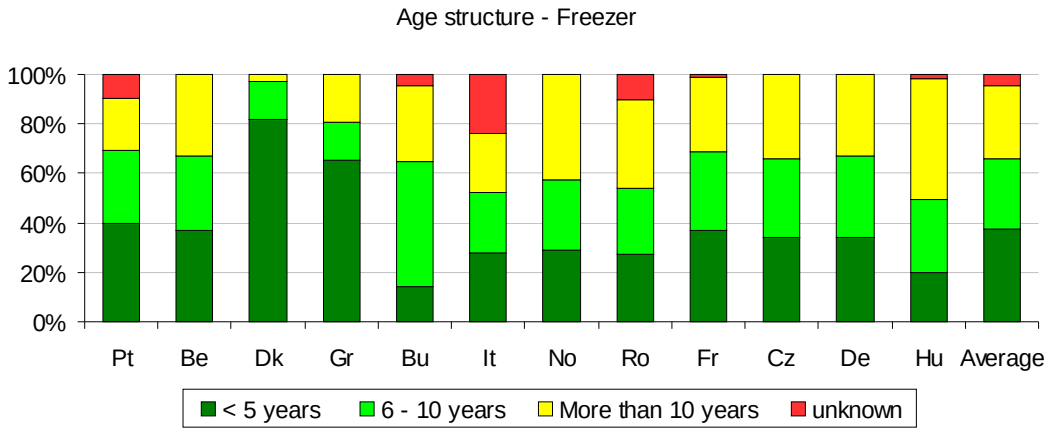
Location near a heat source	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	25	26	20	22	14	34	14	8	37	21	12	10
No	75	74	80	78	86	66	86	92	64	79	88	90

3.2.5 Freezer

3.2.5.1 Age Structure

Regarding freezers the countries reveal a diversified age structure. Denmark and Greece have high rates of freezers less than 5 years (82% and 65%, respectively), whereas Norway and Italy are the counterparts with 43% and 48% of the equipment with over 10 years. It can be assumed that equipment in the unknown category is over 10 years old.

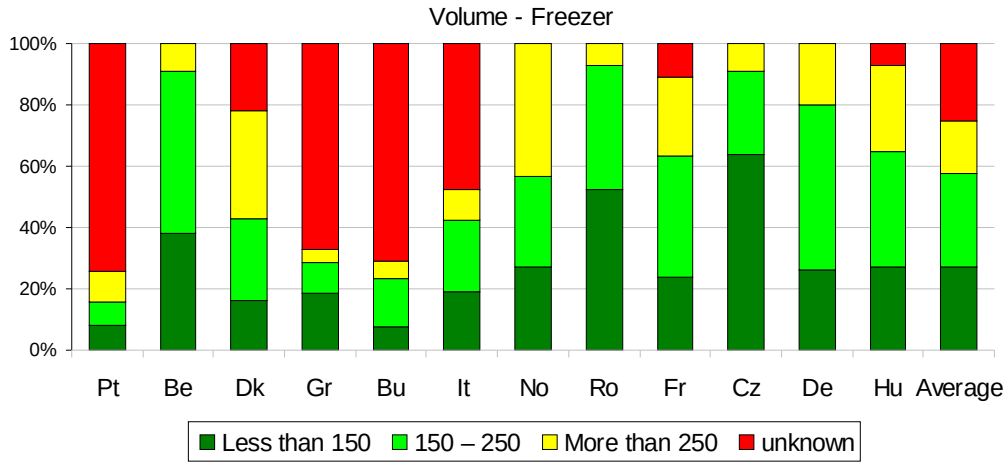
Freezer Age	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
< 5 years	40	37	82	65	14	28	29	27	37	34	34	20
6-10 years	30	30	15	15	51	24	28	27	32	32	33	30
More than 10 years	21	33	3	19	31	24	43	36	30	34	33	49
Unknown	10	0	0	0	5	24	0	10	1	0	0	2



3.2.5.2 Volume

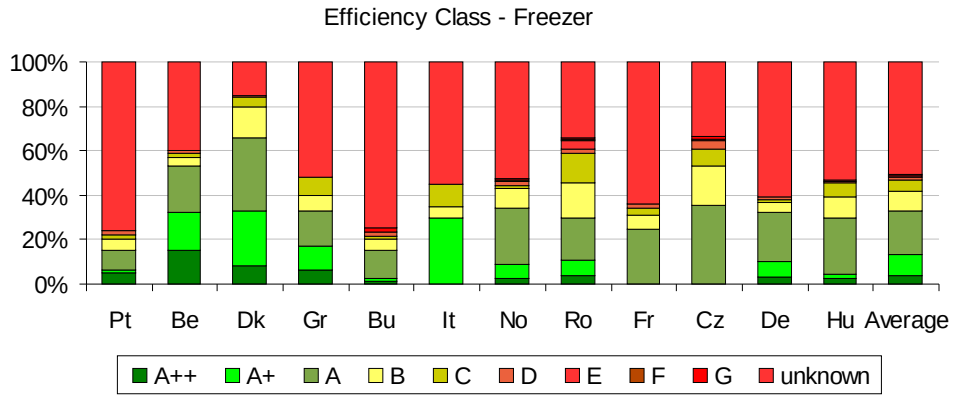
Concerning the volume of the equipment there were several countries with a high unknown share. Once again, this is correlated with the age of the equipment, as people tend to forget the specific details of the appliances as the years progress.

Volume in liters	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Less than 150	8	38	16	18	8	19	27	53	24	64	26	27
150 – 250	8	53	27	10	16	24	30	40	39	27	54	38
More than 250	10	9	35	4	6	10	43	7	26	9	20	28
unknown	74	0	22	67	71	48	0	0	11	0	0	7



3.2.5.3 Efficiency class

Regarding the disaggregation by efficiency level of freezers, the situation is similar to the refrigerators: there is a large percentage of unknown efficiency class categories. Like in the refrigerators, it can be assumed that freezers in *unknown* category are of the type below D class. The rational for this assumption is that if people don´t know about the efficiency class of their freezer is because it is too old and therefore the efficiency class for old appliances should be low. Another possible justification is that those households are not keen on the issue and therefore the buying decision criteria are the price and not the efficiency class.

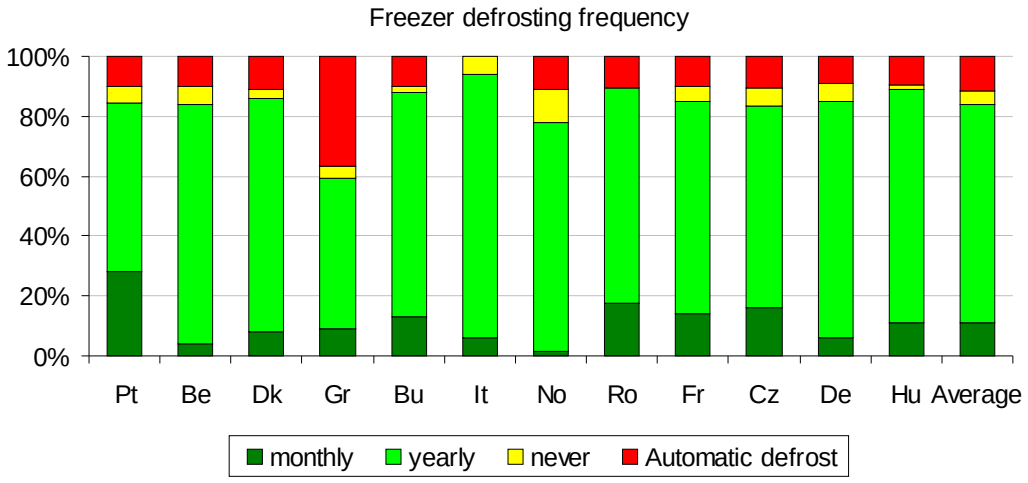


Like with refrigerators, Denmark owns the largest share of freezers with less than 5 years old and at the same time the largest share of higher efficient freezers. The share of A, A+ and A++ in Denmark represent 65% of the park of freezers. The average value for the countries of the study is 33%. Portugal and Bulgaria are in the worst situation, with A, A+ and A++ freezers sharing less than 20% of the park.

3.2.5.4 Defrosting

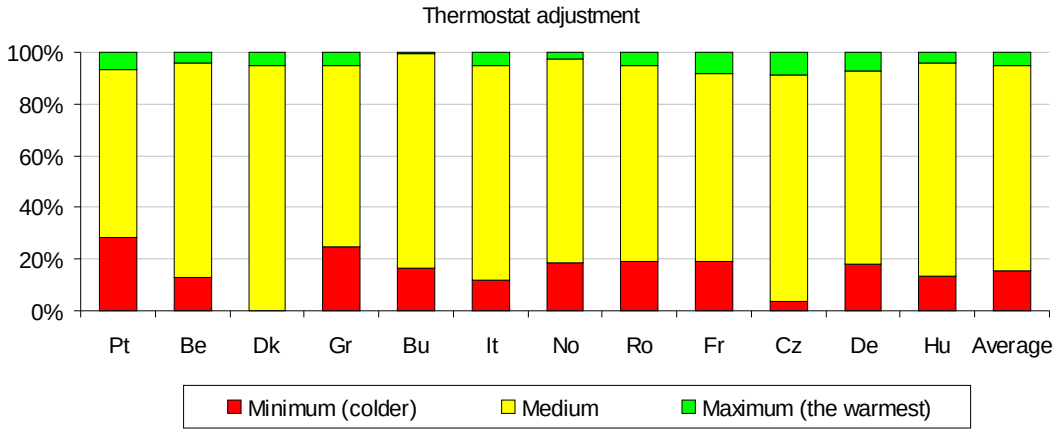
When asked about the frequency of defrosting their freezers, more than half said annually and less than 10% had never defrosted their freezers.

Overall there are not too many freezers with automatic defrost function. Greece has the largest share of equipment with automatic defrost function which is around 37%. Regarding behaviour, Portuguese households have the best behaviour in Europe since 28% of the sample defrosts their freezer every month.



3.2.5.5 Thermostat

Once again the thermostat setting that is the most used is the medium setting. However, when compared with the refrigerator's thermostat settings some countries like Germany and Italy display a larger share of equipment with the coldest setting.



3.2.5.6 Location of the equipment (near a heat source?)

Regarding the location of the freezers in all of the countries the majority states that they are not located near a heat source. In relation to freezers it seems that French households behave pretty well, contrary to how they behave with refrigerators.

Near heat source	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	25	0	4	9	11	26	5	10	3	12	2	5
No	75	100	96	91	89	74	95	90	97	88	98	95

3.2.6 Behavioural questions

Regarding more general questions about the freezer, targeting more user behaviour aspects, the results are shown in the next tables.

3.2.6.1 Put cooked food inside the equipment before it cools down

Comparing the results obtained by each country when asked if hot food was put inside the equipment before it cooled down, we notice that there are a few countries that surprisingly stand out:, Denmark (36%), Germany (23%) and Hungary (49%), that shown high percentages of positive answers while other countries shown an average of 11% of positive answers.

Hot food	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	13	11	36	11	13	13	12	10	6	8	23	49
No	87	89	64	89	87	87	88	90	94	92	77	51

3.2.6.2 Cover the dishes before placing it in the freezer

Covering the dishes before introducing them in the freezer is a widespread practice among all countries. Only Belgium and Czech Republic households show a significant percentage which do not cover the dishes before placing them in the freezer.

Cover dishes	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	93	75	93	96	82	97	93	96	87	71	96	96
No	7	25	7	4	18	3	7	4	13	29	4	4

3.2.6.3 Check the Energy label when purchasing a cold appliance

When asked if they check the energy label when purchasing a cold appliance, most of the respondents said yes. Surprisingly, in Norway about 44 % of the respondents said that they do not to check the energy label. In Denmark and in Germany, the energy label has a very important role when purchasing a cold appliance.

Role of Energy Label	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	80	85	96	73	70	94	56	90	76	86	95	91
No	20	15	4	27	30	6	44	10	24	14	5	9

Information campaigns are necessary to disseminate and promote a clear understanding of the labels, because well informed households will behave rationally and therefore will follow the recommendations, on the selection of energy efficient appliances.

3.3 Washing appliances

3.3.1 Washing machines

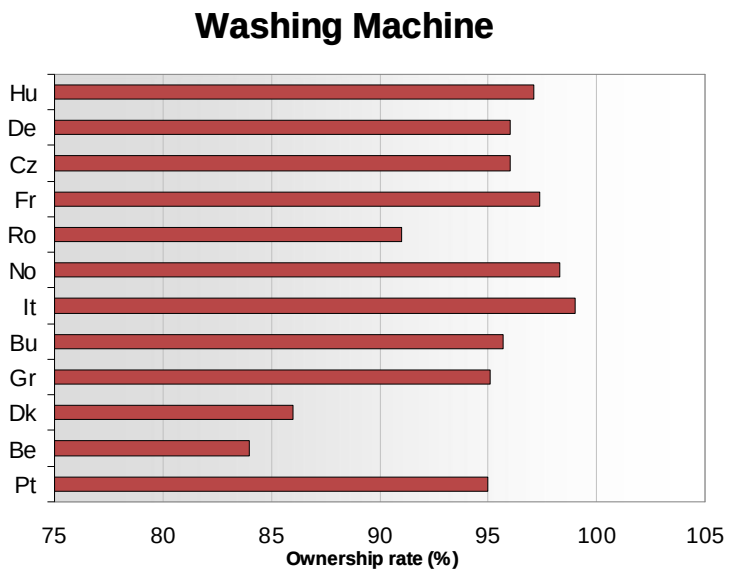
With the increasing household income and increasing living standards (especially in the Eastern European countries), washing machine sales had a significant growth in recent years. Therefore it was relevant to the study to detail the type and presence of this kind of appliances, as well as the behaviour aspects related to washing.

3.3.1.1 Ownership rate: percentage of households with washing machine

Nowadays washing machines are present in most households in EU countries, as it can be seen from the results of the survey. There are only two countries where the share of households with

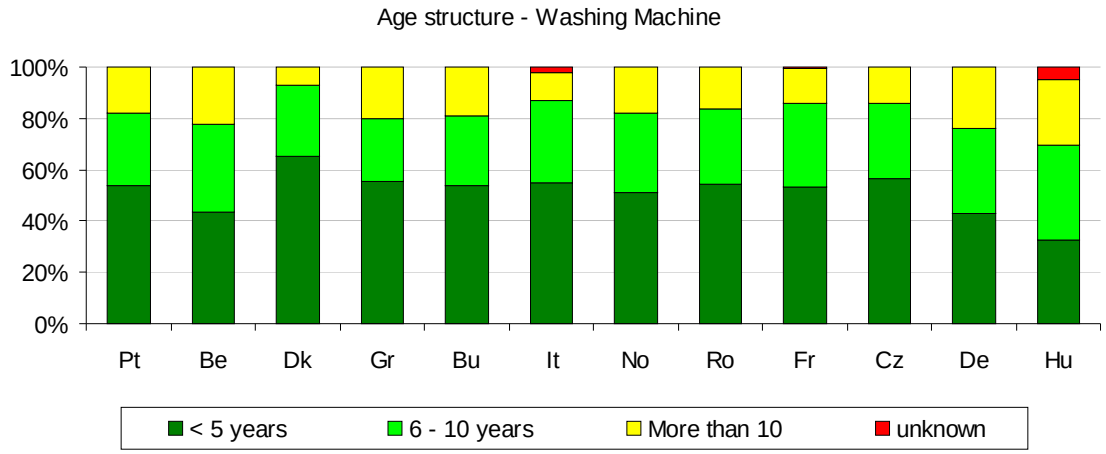
washing machine is under 90%: Belgium and Denmark, whose ownership rates are 84% and 86% respectively. These relative low percentages are due to the use of community washing machines for multi occupancy buildings or laundries, a practice that is not very usual in other countries.

Ownership rate	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Yes	95	84	86	95	96	99	98	91	97	96	96	97
No	5	16	14	5	4	1	2	9	3	4	4	3



3.3.1.2 Age structure of appliances

In most countries half of the washing machines are under 5 years, the exceptions are Belgium (43%), Germany (43%) and Hungary (33%) where washing machines under 5 years represent 43%, 43% and 33% respectively. In Denmark only about 6% of the washing machines are more than 10 years old. On average for the countries of the study 70% of the washing machines are up to 10 years old.



3.3.1.3 Capacity

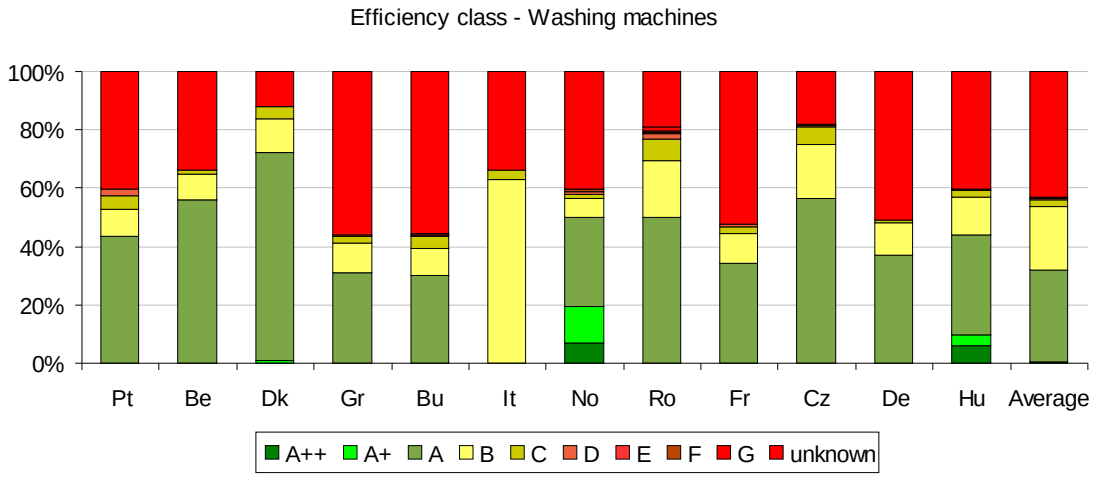
Regarding the machine capacity, since there are many different results, a trend can not be found.

%	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
More than 5 Kg	64	27	69	30	9	26	49	13	20	22	24	69
5 Kg or less	36	73	31	71	91	74	51	87	80	78	76	31

3.3.1.4 Efficiency Class

Since the share of new equipment is quite high, there are significant rates of A class efficiency machines. In 2007, A++ appliances were hardly present at the market, so the Norwegian and Hungarian households that have ticked A++ seem to be wrong. A+ appliance was very new in the market and therefore few own these. The percentages of A class machines are quite high for several countries, especially Denmark with 71%.

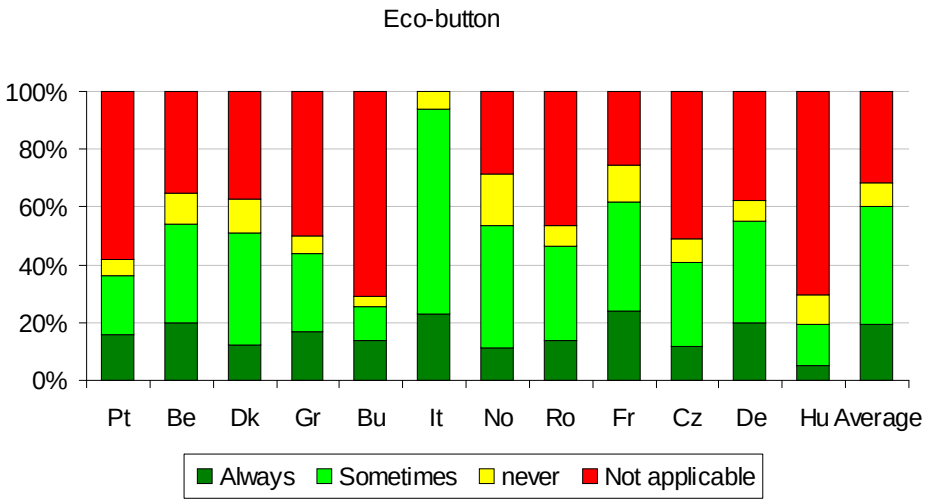
%	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
A++	0	0	0	0	0	0	7	0	0	0	0	6
A+	0	0	1	0	0	0	13	0	0	0	0	4
A	43	56	71	31	30	0	31	50	34	57	37	35
B	9	9	12	10	9	63	6	20	10	18	11	13
C	5	1	4	2	4	3	2	8	2	6	1	2
D	2	0	0	1	0	0	1	1	1	0	0	0
E	0	0	0	0	0	0	1	1	0	1	0	0
F	0	0	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	1	1	0	0	0	0
unknown	40	34	12	56	55	34	19	19	53	18	51	40



Considering that about 50% of households own a relatively new washing machine (less than 5 years) and taking into account that labelling of washing machines is in place for more than 5 years in all countries except Bulgaria (2006) and Czech Republic (2004), it would be expected that the percentage of people who do not know the efficiency class of their washing machine would be shorter than 40%. This could be interpreted as a sign of malfunctioning of the labelling.

3.3.1.5 In case of existence of ECO button, when is it used?

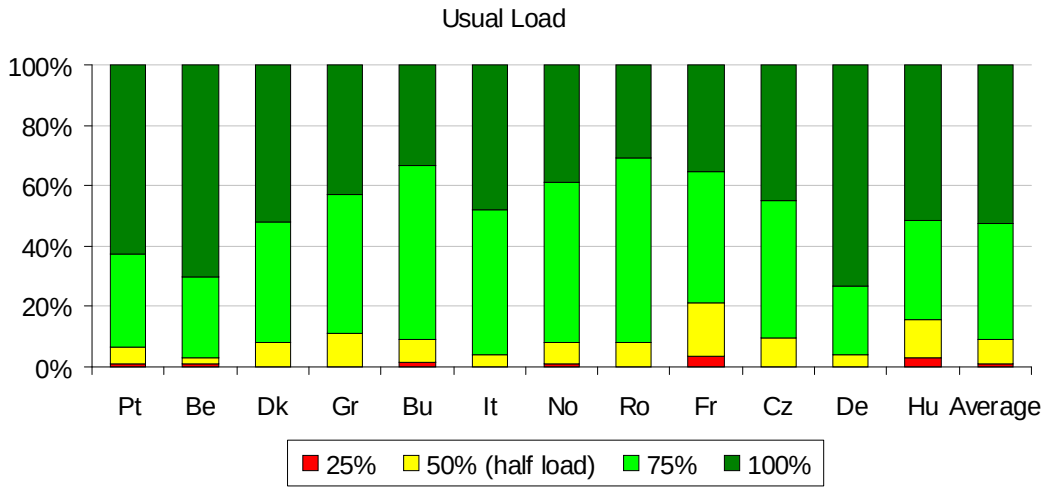
To further detail the type of equipment present in the households the respondents were asked about the use of ECO button. Although there is a relevant percentage of equipment that does not have the ECO button, the respondents that have appliances with it tend to not always use it.



Not applicable means this function is not available in the machines.

3.3.1.6 Usual loading of the machine

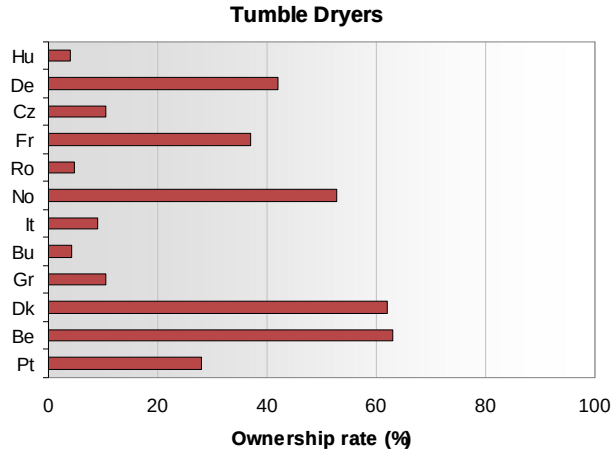
Regarding the loading of the machine there's an overall environmentally friendly behaviour as the vast majority of the respondents always use the machine at over 75% of it's capacity.



3.3.2 Tumble Dryer

3.3.2.1 Ownership rate: percentage of households with Tumble Dryer

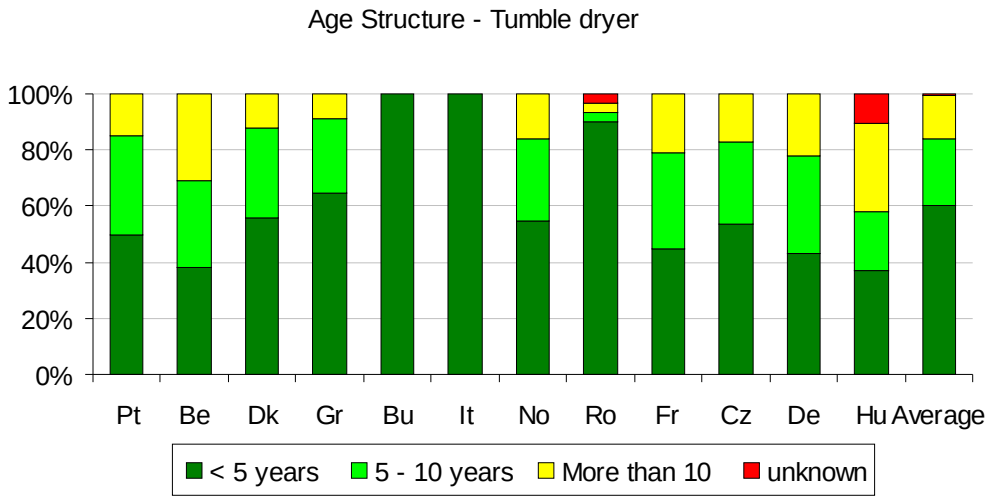
Concerning tumble dryers, the highest ownership rates are in Belgium, Denmark, Norway, Germany and France, with 63%, 62%, 53%, 42% and 37% respectively. On the other side in Bulgaria and Hungary only 4% of households have tumble dryers. The ownership of tumble dryers is especially related with the climate conditions but also with the purchasing power of the households. Tumble dryers are not considered an essential appliance.



In Portugal, although the weather is mild, the percentage of tumbles dryers is relatively high (28%) when compared with countries like Greece or Italy. They are mainly used by younger couples with little children.

3.3.2.2 Age structure of tumble dryers

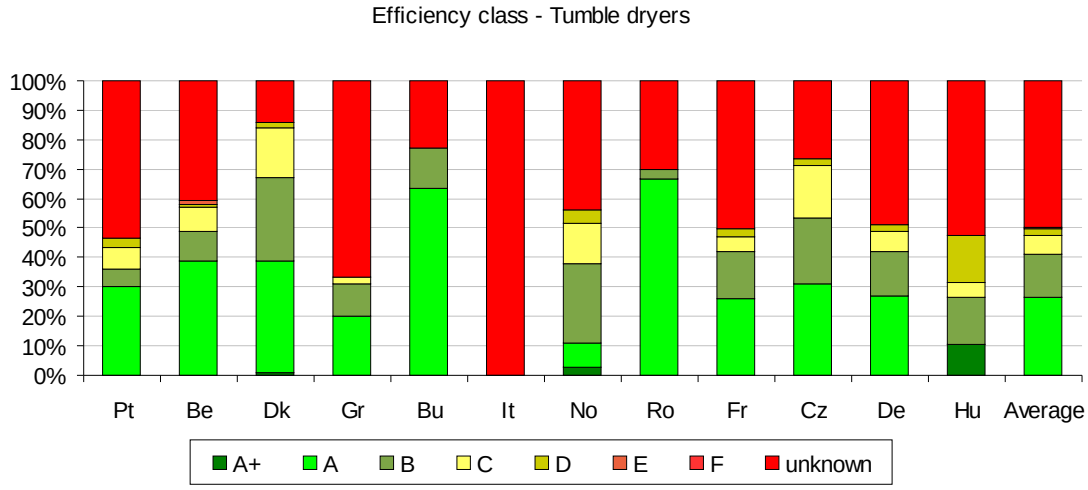
As for the age structure of tumble dryers, it varies from country to country. For instance in Bulgaria and in Italy all the equipment was under 5 years. In opposition in Hungary and Belgium only 37% and 38% of the equipments are under 5 years.



3.3.2.3 Efficiency Class

In 2007, A+ appliances were hardly introduced at the market, so the ticking of this class in three countries might be wrong.

On average, for the countries of the study, about 60% of the tumble dryers are less than 5 years old. However, it is surprising that about 50 % of the households do not know about the efficiency class of their dryers (as shown below), thus being an evidence of malfunctioning of labelling. Although the Italian results showed that the respondents have equipment less than 5 years, when asked about the efficiency class, surprisingly 100% of households do not know the class efficiency of their tumble dryers.



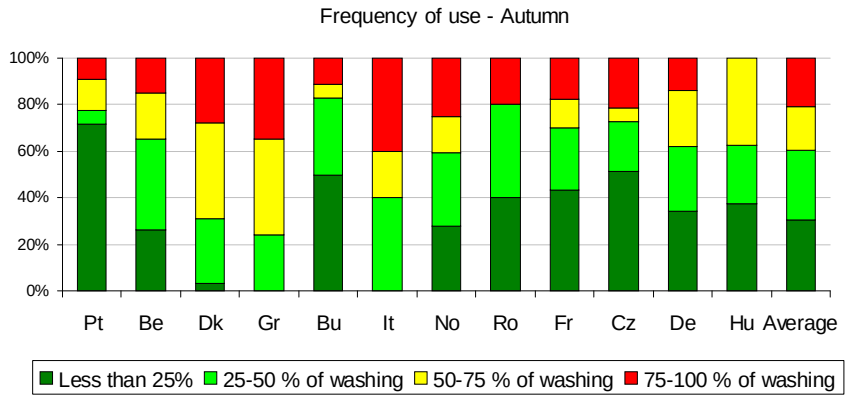
3.3.2.4 How does the cycle stop?

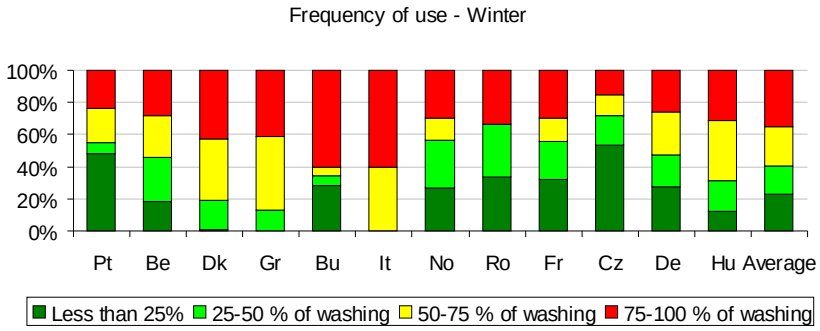
Besides the age and class efficiency of the equipment, another technical question that has been asked was on how the drying cycle stopped. In Italy all tumble dryers in the survey stop the cycle by timer, opposed to Norway where only 26% use this technology instead of a sensor to stop the machine as soon as the clothes are dry.

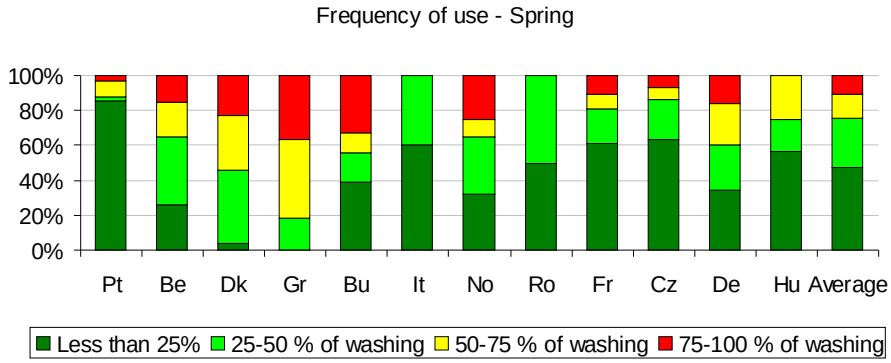
Stop Mechanism	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Timer	86	50	45	47	59	100	26	83	43	67	34	72
Automatically	14	50	55	53	41	0	74	17	57	33	66	28
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

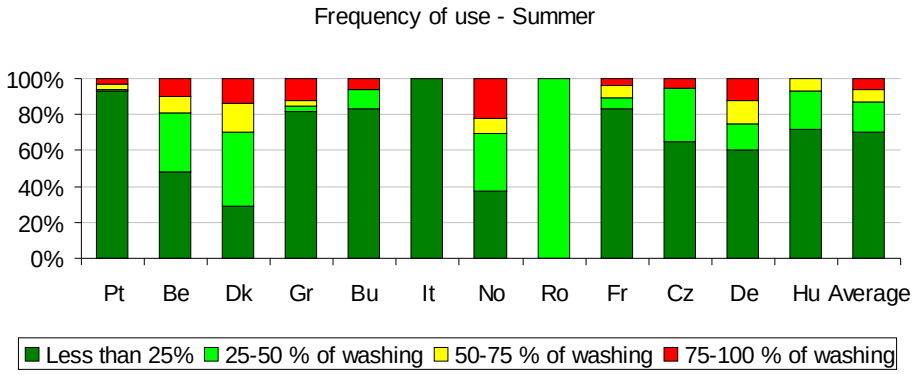
3.3.2.5 Frequency of use

It was also asked the frequency of use (in % of washing cycles) in each season to understand the behaviour in the household and to known the seasonality of use in each country.







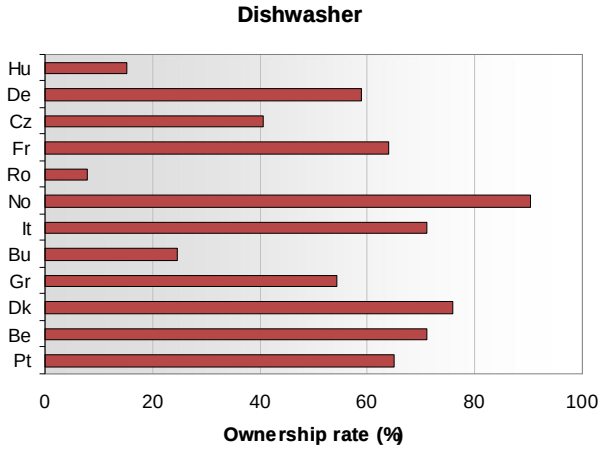


Surprisingly, in Greece the tumble dryer is widely used in Autumn, Winter and also in Spring, although it is a southern country. In Italy the tumble dryer is also widely used in Autumn and Winter but the survey was carried out in the north side of Italy with a continental climate. In Portugal, where climate conditions are similar to Italy and Greece, households behave pretty well as they tend to avoid the use of tumble dryer. Belgium, Denmark and Norway are the countries where the tumble dryer is more widely used in other seasons than Summer because the climate conditions are not so good for outdoor drying. In all countries the frequency of use is significantly reduced in Summer.

3.3.3 Dish Washer

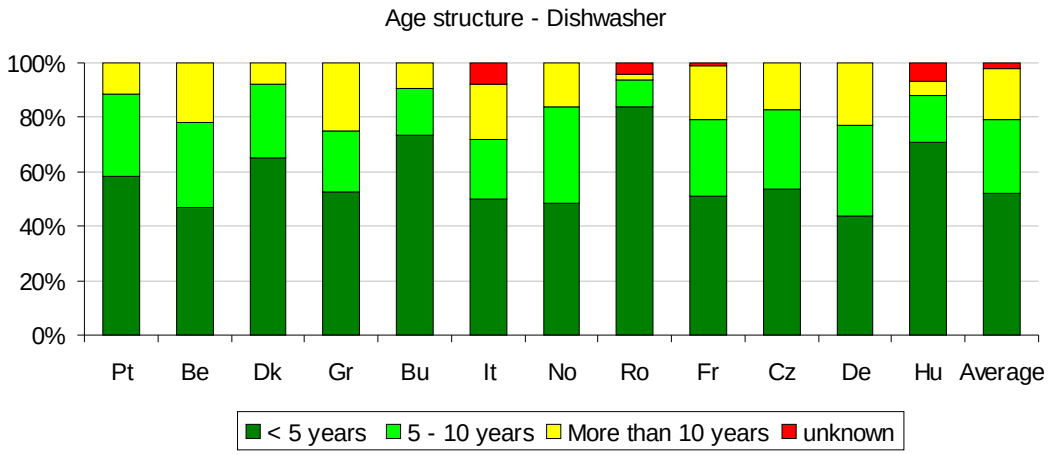
3.3.3.1 Ownership rate: percentage of households with dish washing machine

The ownership of dish washers has risen in the recent years and in our study it is present in the majority of countries and households. Norway has the biggest ownership rate with 90% and Romania has the smallest one with 8%. The ownership rate is lower in the Eastern European countries, especially Romania, Hungary and Bulgaria.



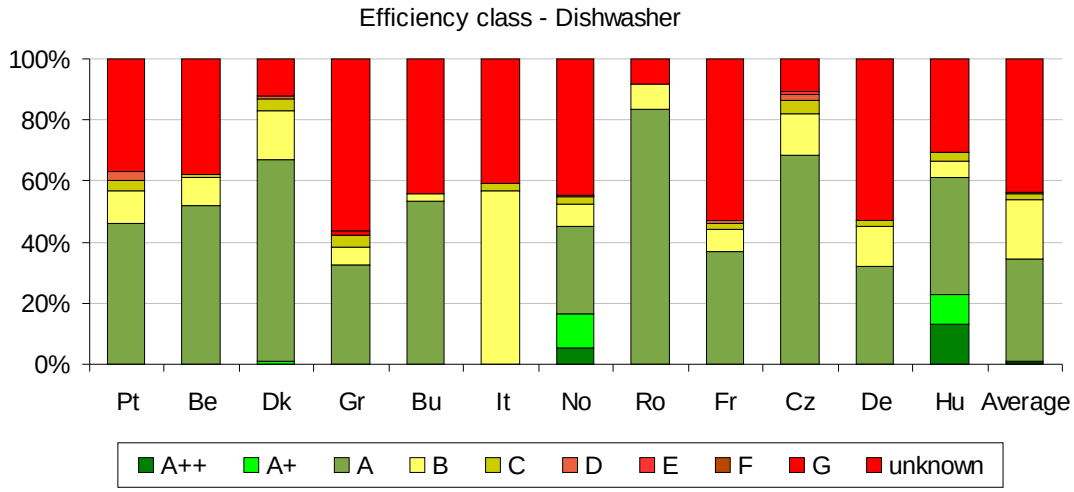
3.3.3.2 Age

As it was expected, the share of equipment under 5 years is quite high in Romania, Bulgaria and Hungary. Those countries share a high percentage of dishwashers in this age range, about 84%, 74% and 71% respectively. Another country with a high percentage of recent dishwashers is Denmark, with a share of 65%, while in the remaining countries this share is lower. One possible justification is the increasing purchase power of the eastern countries and on the opposite side, the energy efficiency incentives available in Denmark.



3.3.3.3 Efficiency Class

Since there are high shares of relatively new equipment (under 5 years old), there are relatively high rates for efficient appliances of the A class. In 2007, A+ and A++ appliances were hardly present at the market, so few households in few countries own them. The potential for improvements is thus considerable, assuming that the many dishwashers in the unknown category are of the type below D class.



3.3.3.4 Hot water feeding:

The only country where the practice of feeding the dishwasher with hot water is largely implemented is in Romania. However this practice should be disseminated, especially in those households who have solar panels installed.

Hot Water Feed	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	15	16	15	25	24	21	9	76	19	11	7	11
No	66	77	84	59	72	56	84	22	72	83	80	84
Unknown	19	7	1	16	4	23	7	2	9	7	13	5

3.3.3.5 Use of the ECO button

A large percentage of households do not have the eco button and a significant percentage that have this function, do not use it very often. This practice should be broadly disseminated because many households are not aware of the real advantages of the ECO button.

According to the survey, the best behaviour can be found in Romania, where 86% of the households always use the eco button.

Use of Eco Button	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Always	27	35	20	20	30	20	17	86	37	21	26	10
Sometimes	22	29	22	21	14	38	20	8	31	36	29	20
Never	6	17	47	8	10	9	36	0	12	10	9	14
Not applicable	44	19	11	50	47	33	27	6	20	33	36	56

Not applicable means this function is not available in the machines.

3.3.3.6 Temperature usually used to do washing

As the dishwasher electricity consumption is directly dependent on the water temperature of the washing, it is important to survey about the temperature usually used for dishwashing. Although in most countries there is a relevant percentage of "don't know" answers there's an overall tendency to use 50º C to do the washing.

Water Temperature	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Unknown	39	20	14	33	24	29	29	82	27	14	11	9
50º	32	43	41	33	36	39	45	8	37	40	35	23
65º	18	29	37	26	22	32	14	8	21	35	44	39
Other	11	8	8	8	18	0	12	2	15	11	10	29

3.3.3.7 Rinse the dishes

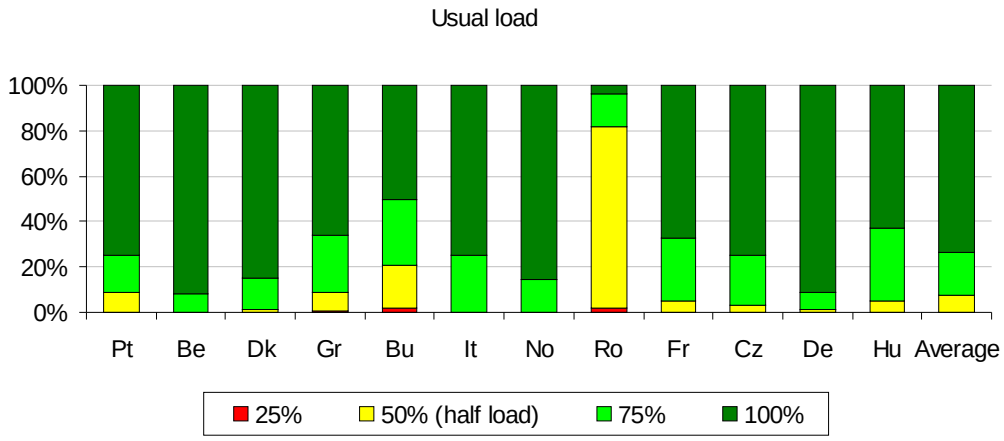
To rinse the dishes can be a water wasteful practice, but at the same time can save electricity, if by using this practice less intensive programmes are then used to do dishwashing. Rinsing should always be done with cold water, and with minimum water required for the purpose. The results show that rinsing the dishes is a very common practice all over the countries, with the exception of Belgium and Germany.

Rinsing the Dishes	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Yes	79	34	59	94	79	84	71	92	58	44	25	56
No	21	66	41	7	21	16	29	8	42	56	75	44

3.3.3.8 Usual filling of the appliance's capacity

Another household behaviour that can influence the electricity consumption is how the appliance if loaded. Use of the appliances below full load capacity should be avoided to reduce the electricity and water consumption.

The results obtained showed that Romania has the worst behaviour, with 80% of the households using the dishwasher at half the capacity, followed by Bulgaria with 19%. These two countries are also the only ones with households which use the appliance at 25% of its capacity (2%). In the remaining countries there is an overall environmentally friendly behaviour as the vast majority of the respondents always use the appliance at over 75% of its capacity.



3.3.4 Check the Energy label when purchasing equipment

When asked if the energy label was checked when purchasing equipment, a large percentage of respondents admit to check the energy label when purchasing new equipment. Surprisingly Norway shows the lowest percentage followed by Greece. Raising awareness on the Energy label is needed. There is still some work to be carried out towards raising the awareness on the Energy Label Scheme, involving not only end-users but also the retailers and shop assistants.

Role of Energy Label	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Yes	83	84	95	68	74	94	56	91	77	93	94	95
No	17	16	5	33	26	6	44	9	23	7	6	5

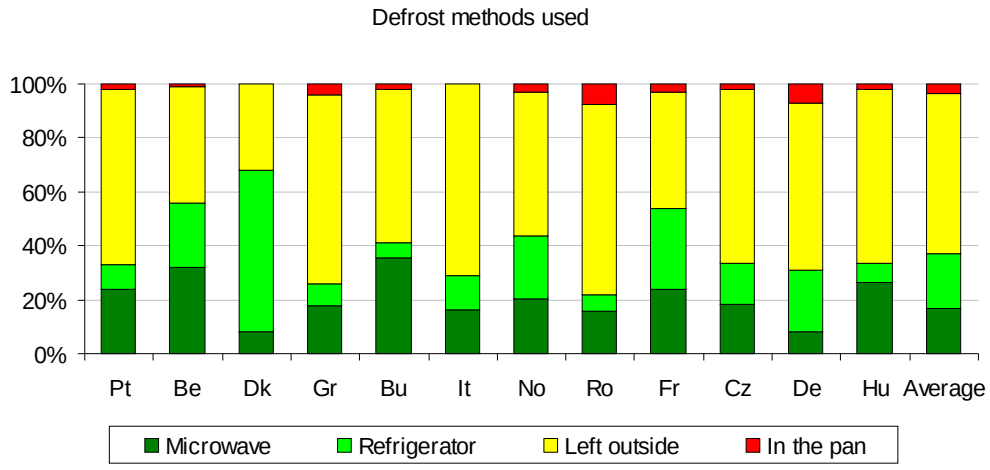
Looking at the results of the questions related to behaviour, it seems that households behave relatively well with dishwashing. However better practices related with water savings should be disseminated as households do not seem to be aware of the potential water savings.

3.4 Cooking Appliances

Regarding cooking appliances the focus of the survey was household behaviour related to defrost methods used, use of a lid while cooking and frequency of use of a pressure cooker.

3.4.1 Food defrosts method used

According to the survey, the country that has the best behaviour is Denmark where 60% of the respondents defrost their food in the refrigerator. Most people defrost food outside the refrigerator. Microwave defrosting is also a widely used method.



3.4.2 Use of a lid on the pan when cooking

The use of lids while cooking can have significant impact in the energy consumption for cooking. Develop the habit of "lids-on" cooking enable lower cooker settings.The best results are from Portugal, Belgium, Norway and Hungary. The worst behaviour is from Denmark where 42% never use lids and only 8% use them always.

Lid on the Pan	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Always	71	71	8	56	33	46	57	71	57	64	48	72
Sometimes	28	28	50	43	59	50	1	29	32	35	48	27
Never	1	0	42	1	8	4	43	0	11	1	4	1

3.4.3 Frequency of use of a pressure cooker

Although pressure cookers are a very efficient way to cook, it seems that its use is in remission. Most people when buying kitchen appliances do not consider buying a pressure cooker due to

perceived safety reasons. The survey results show that the pressure cooker, in most cases, is not widely used.

3.5 Office Appliances

The REMODECE survey also focused on major sources of standby losses, for instance office appliances and entertainment, which have been increasing fast and already represent a significant share in the final power demand.

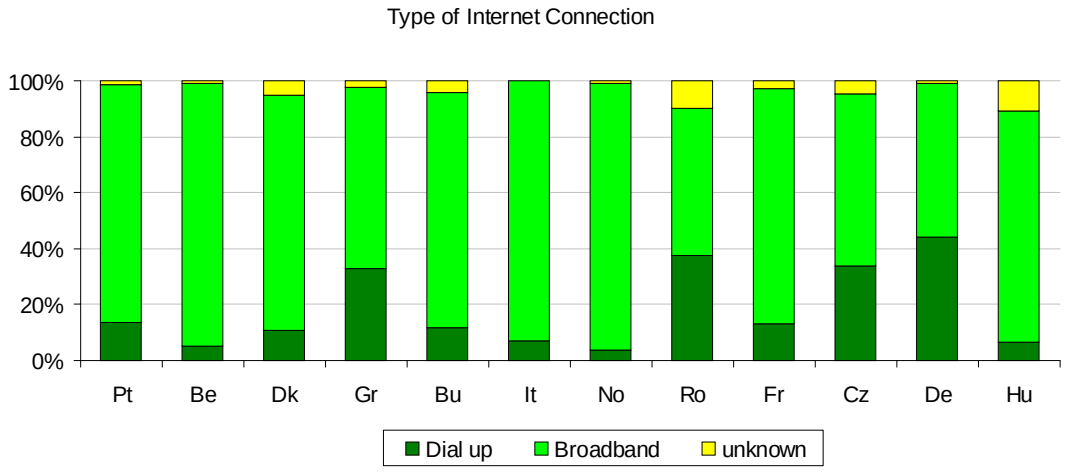
3.5.1 Penetration rate of internet

The first question of the survey regarding office appliances was if there was an internet connection. There is a very high internet penetration rate in Norway, Denmark and Belgium while Romania has the lowest penetration rate (47%).

Internet Connection	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Yes	73	92	97	79	63	87	97	47	82	79	57	51
No	27	8	3	21	37	13	3	53	18	21	43	49

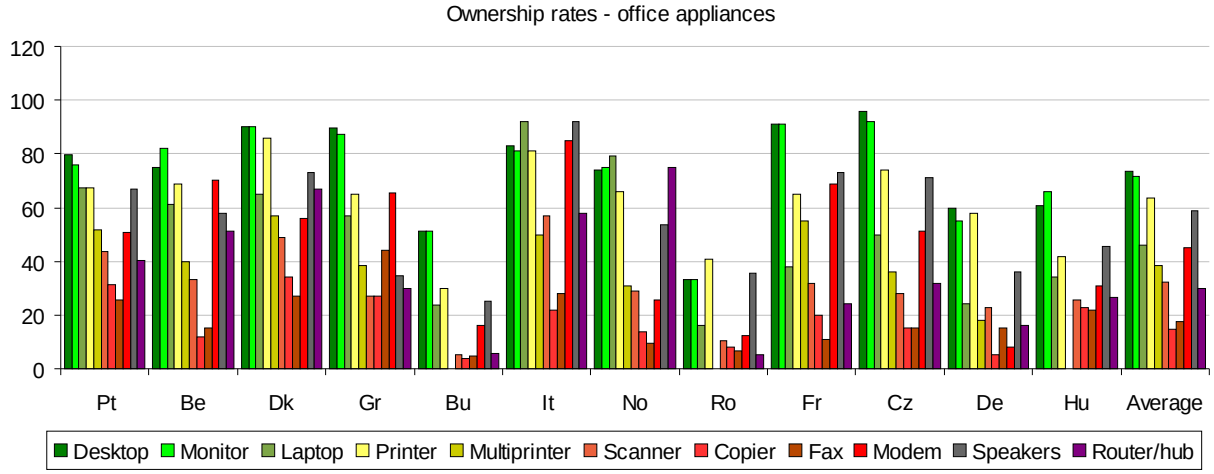
3.5.1.1 Type of Internet Connection:

The vast majority of the households with an internet connection have a broadband connection.



3.5.2 Ownership rate of office equipment

As it can be seen in the picture below, the ownership rate for desktops, laptops, monitors and printers is generally quite high. The reason for this high penetration rate together with the high penetration rate of internet is the high average education level of our sample, originating a somewhat deviated sample.

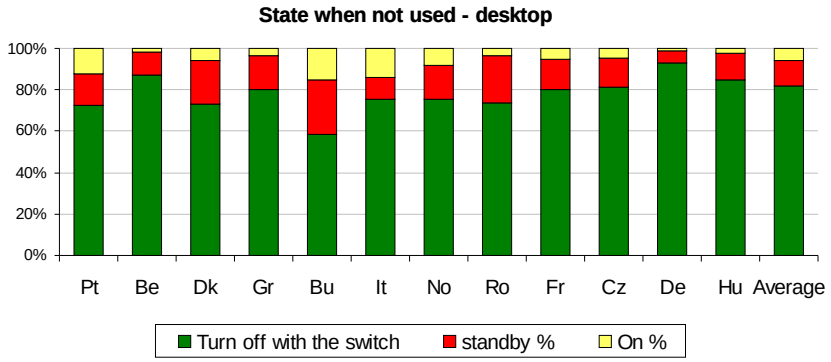


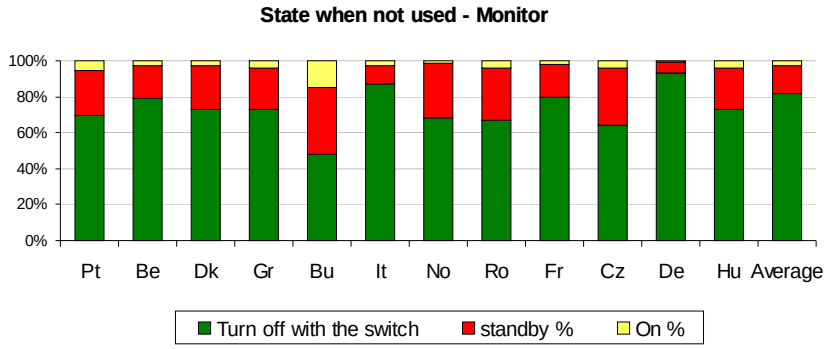
From the results obtained it was possible to estimate an ownership rate for the specific office appliances. Czech Republic has the highest rate for desktops (96%) and monitors (92%), Italy has the highest ownership rate for laptops (92%), scanners (57%), modems (85%) and speakers (92%), Denmark has the biggest rate for printers (86%), multiprinter (57%) and copier (34%), Greece has the highest rate of fax (44%) and Norway has the highest rate of Router/hub (75%). Bulgaria and Romania present the lowest penetration rates for office equipment. Surprisingly Germany presents ownership rates quite low, especially for laptop, scanner, copier, fax, modem and router.

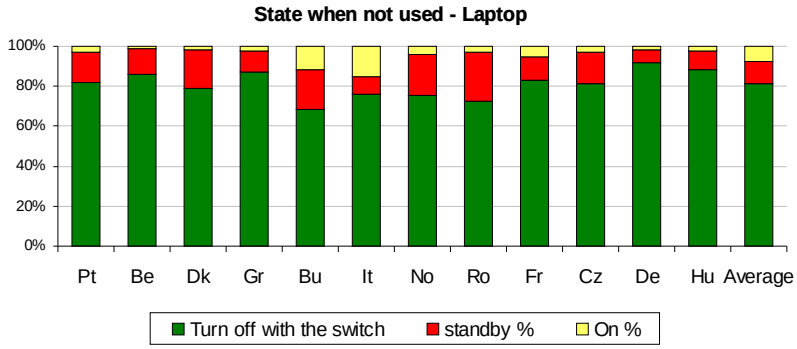
3.5.3 States when the device is not in use

When enquired about keeping the office equipment in the On-mode operation even when they are not using it, households seem to behave pretty well with computers and monitors, as the vast majority of respondents mentioned they do turn off the equipments. Only few percent of households admit they keep their computers on the stand-by mode and on the on-mode, when it is not being used. Households do not behave so well with fax machines, modems and routers/hubs, because they fear to loose the pre-definitions or having to re programme them if they turn them off.

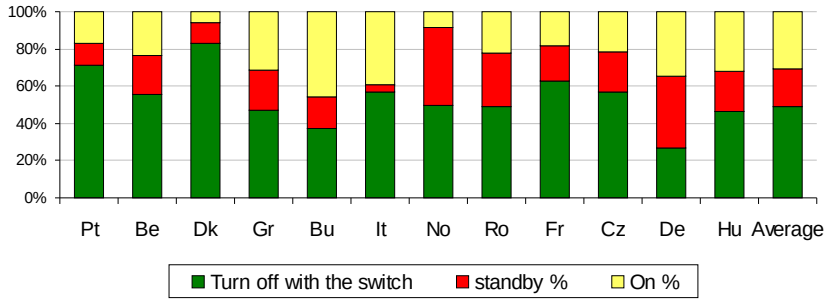
These results may be deviated as people tend to expose a greener behaviour than they actually perform, when faced with such questions related to behaviour.



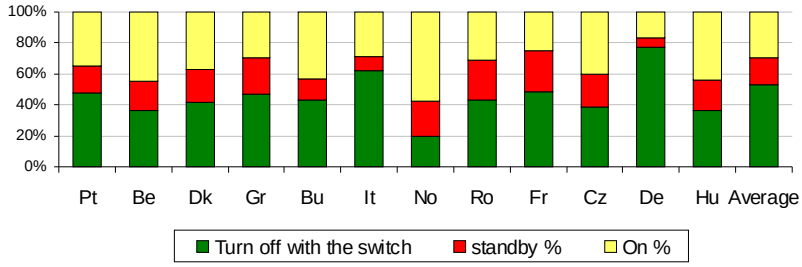




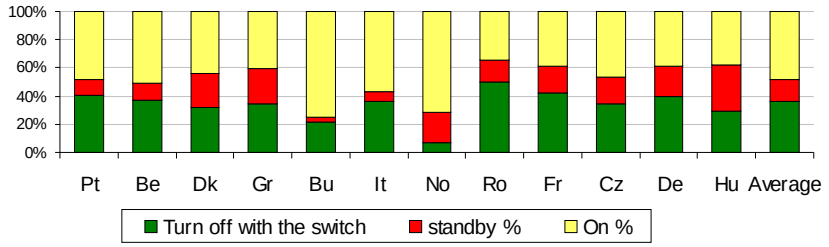
State when not used - Fax



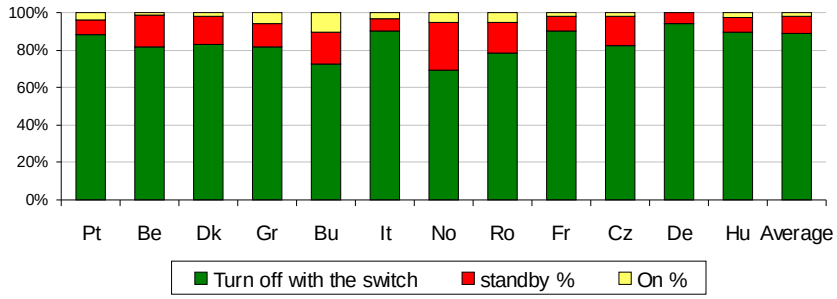
State when not used - Modem

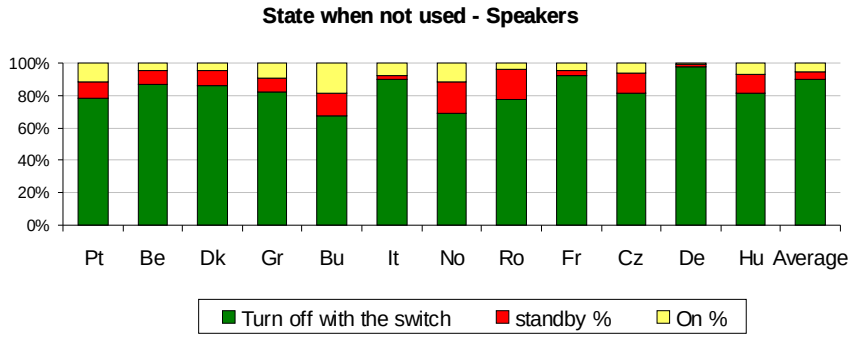


State when not used - Router/Hub



State when not used - Printer





Regarding desktops Germany presents us the best behaviour as 93% of the households admit to turn off the equipment when is not being used. The worst scenario is from Bulgaria where 15% leave the equipment on (although not using it) and 27% just keep it on standby mode.

Analysing the monitor's situation we can see that there are some similar results to the ones concerning desktops.

As the laptop ownership rate has been increasing in the last few years, this equipment has a new found relevance, and once again we can see that the best behaviour is from Germany with 92% turning the equipment off.

Regarding fax machines, the most environmental friendly behaviour is from Denmark, where 83% of the respondents turn off their fax with a switch.

As the penetration rate of internet is rising, the modem ownership will rise up accordingly. Behaviour wise we must point out that Germany has the best one with 77% of the respondents turning off with a switch, Norway has the worst with 58% of the respondents leaving it in the On mode.

As people tend to have more than one computer per household and set up home networks, the use of routers/hubs is increasing fast, and people tend to keep them on when they are not using them as the users might not be close to these central appliances, often connected as Home Access Gateway (phone, cable TV, WiFi).

Germany has the best behaviour regarding printers use with 94% of the respondents turning them off. Regarding multifunction printers, some countries did not consider this kind of equipment (Greece, Bulgaria, Romania, and Hungary). Analysing the results for the remaining countries we see that Italy has the best behaviour (94% turn off with the switch) and Norway presents the worst behaviour (25% leave the equipment on standby mode, 4% in on mode).

Scanners are a type of office equipment whose sales are fading away due to the widespread use of multifunction equipment; nevertheless as they are present in a significant number of households and therefore, it is important to know how people manage the standby consumption. As we can see, in Italy all the households with scanners turn them off when they are not in use.

Although it is not usual to find copiers in a household, it was possible however to conclude that the households with copiers have a fairly good behaviour. Hungary and Italy have the best behaviours, as all the households turn the equipments off when not in use.

Regarding speakers we see that there are high rates in every country of people who turn them off with the switch; Germany stands out with a 97%, and on the other hand we have Romania with the lowest level at 77%.

3.5.4 Behavioral questions

3.5.4.1 Why is the computer left on when it's not being used?

Since the behaviour of the user has a significant impact in the consumption of the equipment, some behavioural questions were made. The respondents were urged to state why the computer was left on when it was not being used. In some countries this was because they did not want to boot the PC: Belgium, Bulgaria, Italy, Norway and Romania. In Portugal, Denmark, Greece, France, Czech Republic, Germany and in Hungary is due to having some tasks running. Romania with 21% and Germany with 13% are the only countries which have a significant percentage of respondents who leave the computer on due to worries about the possibility of damaging it.

Reasons to Leave the Computer ON	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
No need to boot	40	54	47	22	56	83	67	42	44	17	28	26
Worries about damaging	3	4	5	1	5	0	4	21	3	7	13	7
Tasks running	57	42	48	77	39	17	29	37	52	77	59	67

3.5.4.2 Do you have the Power saving mode active in your Computer?

When asked about the power saving mode in the computer the vast majority has the save mode active on their computers/monitors, although the share of positive answers in each country is lower for the computers than for monitors, probably due to the fact that computers are left on with some tasks running which do not require the monitor to be on.

Power save active in monitor	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Yes	79	88	80	78	56	76	82	66	74	81	43	61
No	5	10	11	7	19	8	8	11	15	18	37	21
Unknown	16	1	9	16	24	17	10	23	11	2	20	17

Power save active in PC	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	60	81	64	74	56	70	63	59	41	60	36	48
No	20	13	21	11	16	11	20	15	37	33	41	33
Unknown	20	5	15	15	27	19	17	26	21	8	23	20

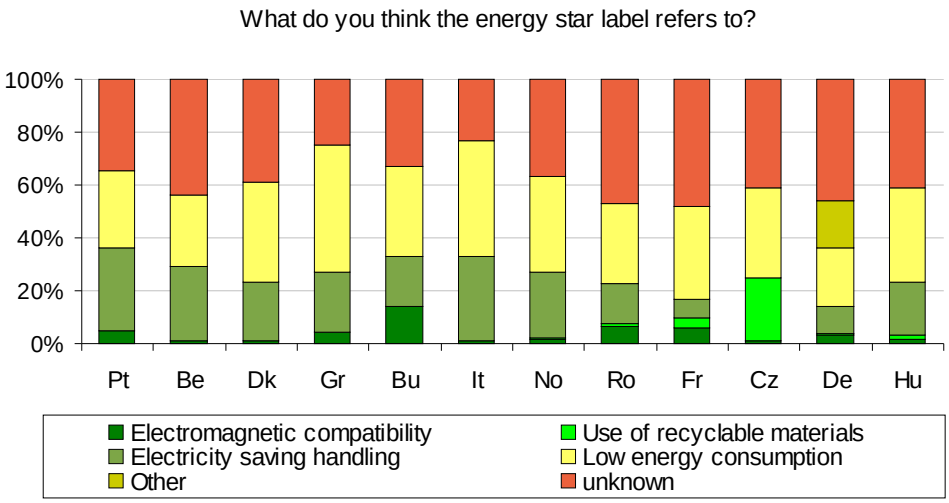
3.5.4.3 Knowledge: Do the activation of the screen saver save electricity?

There are still some misconceptions about the use of screen saver, as many countries have a high share of people who think that the activation of the screen saver does save energy. Italy (93%), Czech Republic (82%) and Bulgaria (81%) have the highest percentages of positive answers. Belgium (65%) has the biggest share of negative answers, while Germany with 42% and Hungary with 62%, have the biggest share of people who do not know.

Screen saver save electricity	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Yes	50	15	44	62	81	93	39	54	40	82	17	22
No	46	65	52	38	19	7	61	26	50	18	41	16
Unknown	4	19	4	0	0	0	0	20	10	0	42	62

3.5.4.4 Knowledge: What do you think the Energy Star label refers to?

Along with the knowledge about the screen saver, the knowledge about the Energy Star label was also inquired. The knowledge of the energy star labelling is generally poor.



3.5.4.5 When you buy an office appliance, do you choose one with Energy Star?

When asked about the importance of the energy star label when purchasing an office appliance, there is not a clear trend that stands out. Nevertheless we should point out that in Italy (57%), France (50%) and in Czech Republic (60%) a high percentage of people, 57%, 50% and 60% respectively, never choose equipment based on the energy star label.

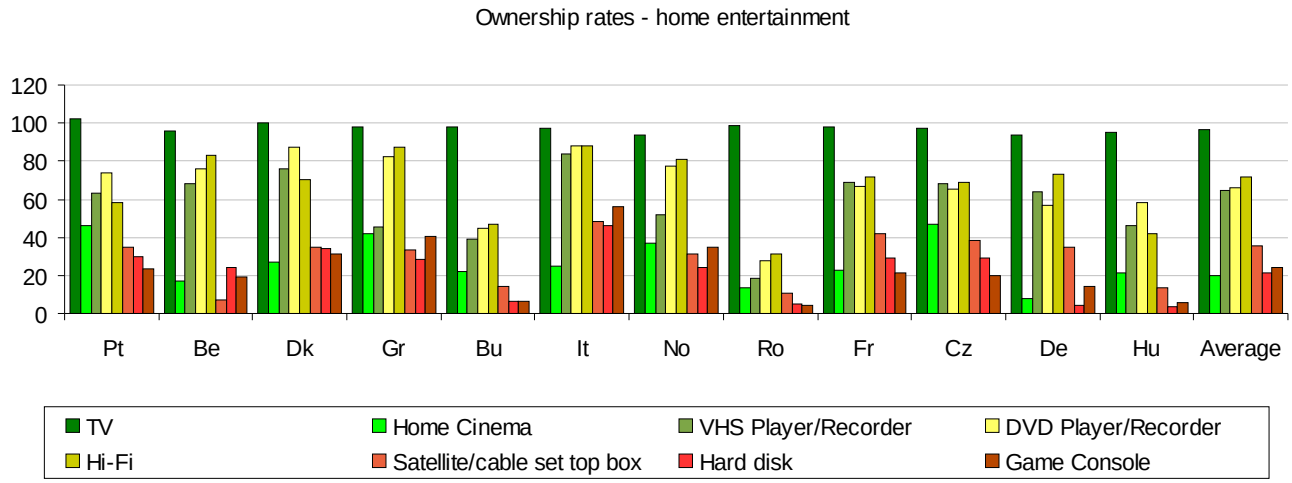
Energy Star as a decision factor	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu
Always	32	22	12	40	38	9	9	30	20	9	11	31
Sometimes	40	21	43	35	29	34	55	28	12	31	14	22
Never	28	12	37	25	33	57	37	33	50	60	28	19
Unknown	0	46	8	0	0	0	0	9	17	0	47	28

Although the majority of the sample has the power save mode active on their computer/monitor, 50% think that the screen saver saves electricity, which is a myth. In reality screen savers do not save any electricity. The knowledge about the energy star label is scarce among households, and it is not a buying factor for most cases.

3.6 Home entertainment

3.6.1 Ownership rate

From the results obtained it was possible to estimate an ownership rate for the different home entertainment appliances. All countries have TV ownership rate close to 100%. Czech Republic has the highest ownership rate for home cinema (47%), Italy has the highest ones for VHS recorder/player (84%), DVD recorder/player (88%), hi-fi (88%), satellite/cable set top box (48%), hard disk (46%) and Video game consoles (56%).

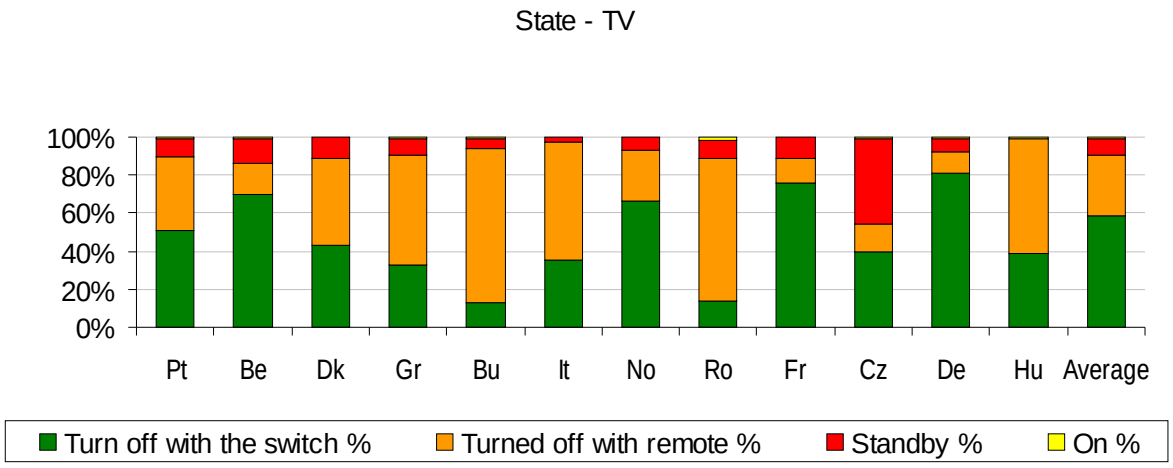


As the survey questionnaire did not ask about the number of appliances of each type in the household we got an average ownership rate of televisions of 96%. However, based on official statistics and based on the questionnaires from the monitoring campaigns, most of the households have several TVs and therefore the ownership rate should be higher.

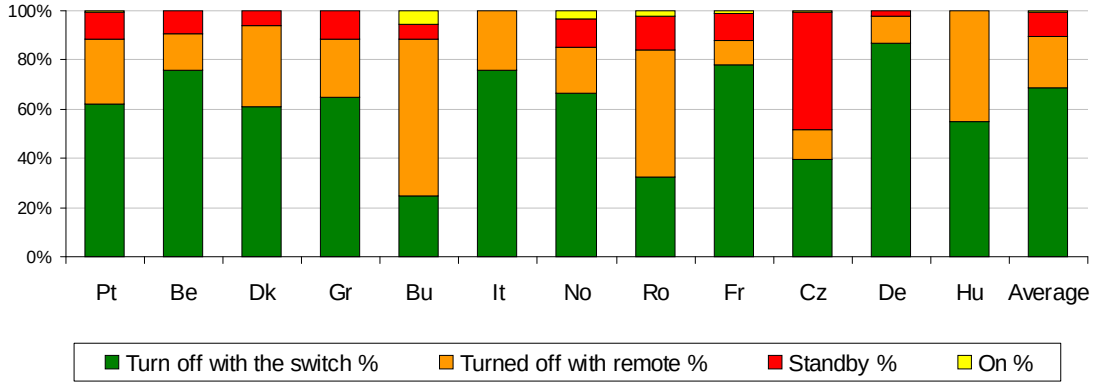
In the REMODECE survey, we only asked for 2nd/3rd appliances in the case of cooling appliances, but not for TVs and computers e.g. where this could also be important. For TVs, we have therefore used for further analysis, the ownership rate from another study, which is 1.4 TVs per household (this is also the assumption in the EuP study for TVs for all EU countries).

3.6.2 State when the device is not used

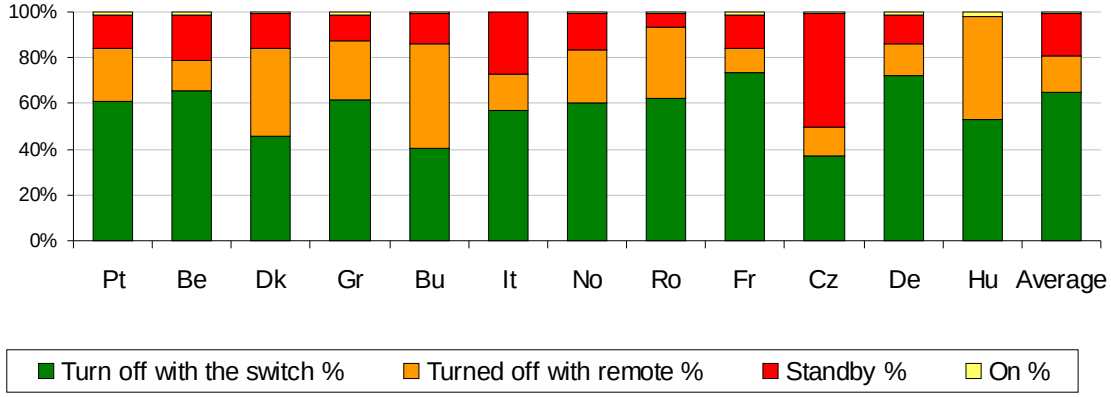
To understand the use of the appliances it was asked to the respondents how did they kept the appliance when not using it: turned off with an on/off switch, turned off with remote control, leave it on standby mode or just leave it on.

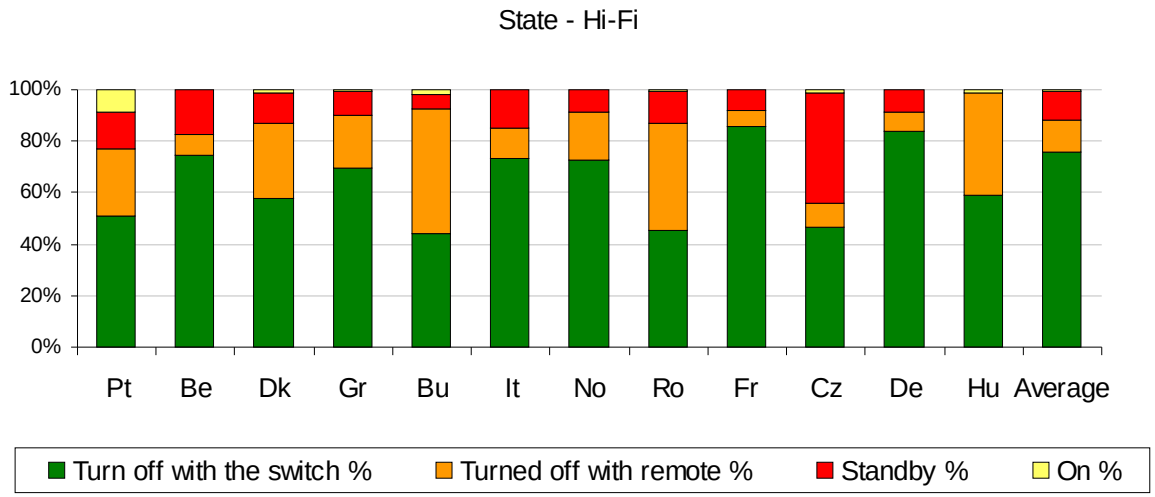


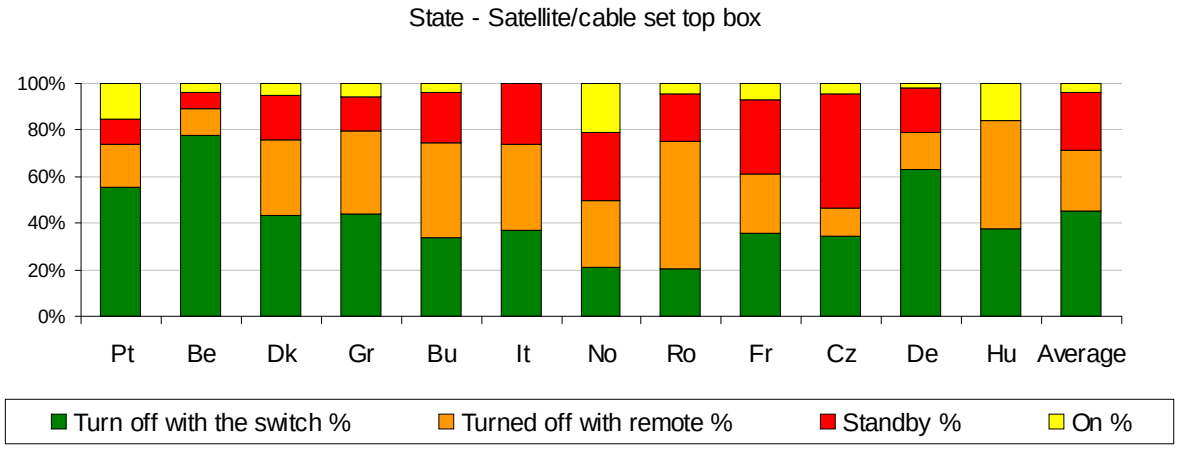
State - Home Cinema

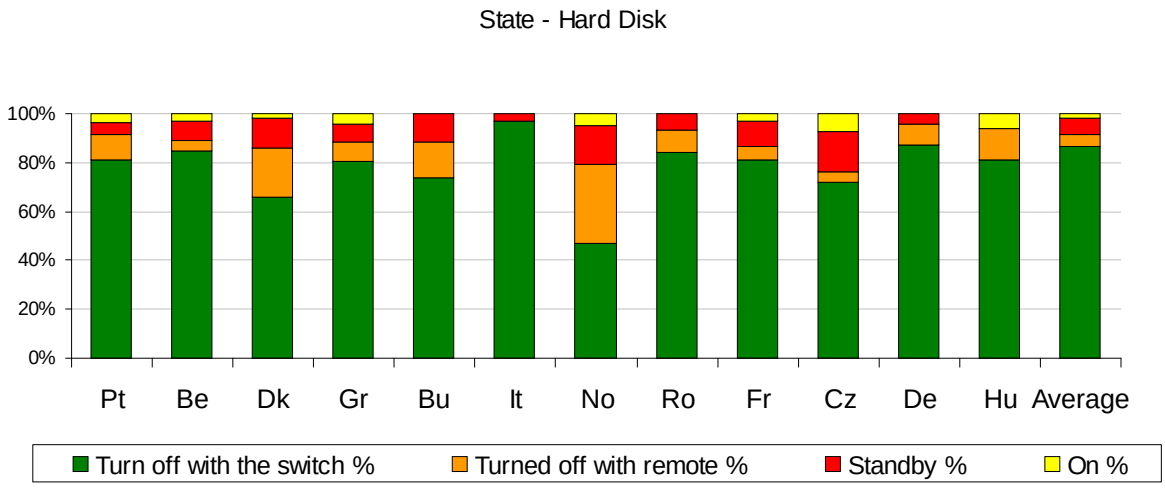


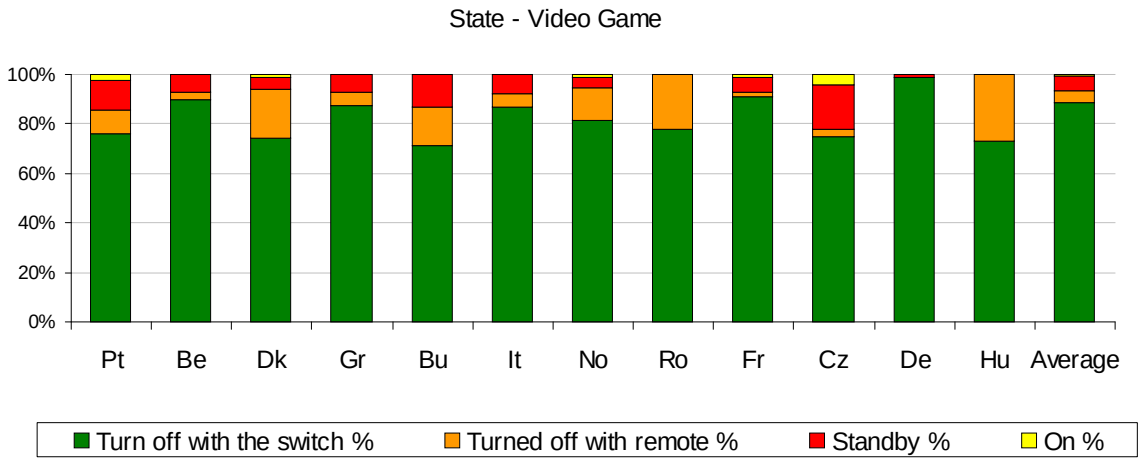
State - VHS Player/recorder




State - Hi-Fi
100%
80%
60%
40%
20%
0%
Pt
Be
Dk
Gr
Bu
It
No
Ro
Fr
Cz
De
Hu
Average
Turn off with the switch %
Turned off with remote %
Standby %
On %


State - Satellite/cable set top box
100%
80%
60%
40%
20%
0%
Pt
Be
Dk
Gr
Bu
It
No
Ro
Fr
Cz
De
Hu
Average
Turn off with the switch %
Turned off with remote %
Standby %
On %





Roughly 40% of the households do not turn off the television with the on-off button, keeping it on standby mode. Germany, France and Belgium present the best behaviour as 81%, 76% and 70% of the households, respectively, admit to turn off the equipment with the button.

For the home cinema once again Germany has the best behaviour with 87% of the households turning off with the button. The worst behaviour is from Bulgaria where only 25% turn off the equipment.

Although VHS Players/recorders are a type of equipment that in the future will vanish from our houses, nowadays it is still common in a considerable number of households. Regarding the use of this equipment, France has 73% of households who turn off with the button while in CZ only 37% of the households turn off the equipment.

As the market for DVD Players/recorders is evolving fast, by replacing the old VHS in the households, the type of use of these devices is very important. The results show that Germany has, once again, the best behaviour with 78% of the households turning it off with the button, and Bulgaria presents the worst behaviour, with only 39% of households turning it off with the button.

Hi-fi systems are present in a considerable number of households and it is a kind of equipment that has significant standby consumption. If we compare these results to the ones of the VHS and DVD Players/recorders it is noticeable that the respondents have a better behaviour towards this kind of equipment.

The satellite/cable set-top box is present in a small number of households in Belgium, Romania, Bulgaria and Hungary and is more common in the remaining countries. There is however a wide variation of behaviours: in Norway and Romania only 21% of households turn it off with the button, while in Belgium 78% do it.

Hard disks are a type of technology that is expected to have a growth in their sales in the future, as a possible replacement for DVD/VHS players/recorders (units combining hard disk with DVD Player/Recorder are also becoming popular, however it is the type of equipment that is present in fewer households according to our survey. In Italy we find the best behaviour (97% turn off with the button) and in Norway the worst (47%).

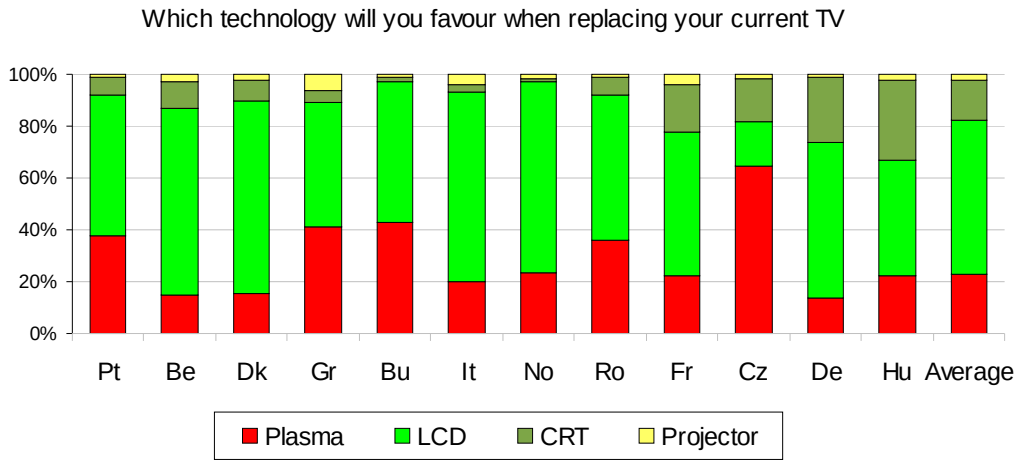
Video game consoles are a steady growing market and the respondents tend to turn off this equipment with the button.

Generally speaking, Denmark and Eastern European countries (except CZ) present the worst behaviour in what concerns leaving the entertainment equipment on the stand-by mode, instead of turning it off with the button. Belgium and Germany are the countries presenting the best behaviour when it comes to turn off the devices with the switch when they are not being used.

3.6.3 Behavioural questions

3.6.3.1 When replacing your TV, what type of technology will you prefer?

As CRT televisions are fading away from the households the survey investigated about the type of TV technology that the respondents are considering to buy to replace their current equipment. The results show that people tend to prefer LCD technology over the others, except in Czech Republic where plasma TVs are preferred by 65% of the respondents. It is expected that LCD will be the dominating technology in the near future. Plasma TVs continue to captivate users being the preference type of TV for around 40% of households. Households have difficulty to distinguish Plasma from LCD screens. From an energy saving perspective, it is important to inform about that Plasma TV's are much more energy consuming than LCD TV's. New display technology (Organic LEDs – OLEDs) emerging into the market can save 40% compared to LCDs.



3.6.3.2 Do you leave chargers on (phone, batteries, …) without being used?

Regarding the use of chargers, some people do not know that letting the charger plugged in consumes electricity even if it is not being used. Nevertheless the majority never leaves chargers on without being used.

Charger ON when not being used	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Always	10	19	9	12	9	3	11	8	20	11	4	11
Sometimes	34	0	30	33	39	43	55	26	15	30	19	2056
Never	56	81	61	56	52	54	35	66	62	60	77	68

3.6.3.3 Use of multiple sockets with a switch to disconnect all appliances from the mains:

In order to prevent standby consumption from several electronic appliances, multiple sockets with a switch to disconnect all appliances from the grid are available in all countries. However their use is not widespread among households. Italy presents the biggest number of households using a multiple socket with a switch (70%), but, on average, about 50% of the respondents do not use the multiple sockets with a switch to disconnect all appliances from the mains, avoiding standby consumption.

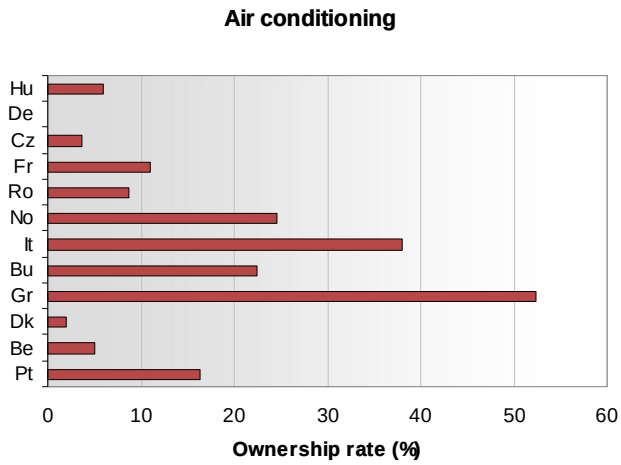
Use of multiple sockets with switch	**Pt**	**Be**	**Dk**	**Gr**	**Bu**	**It**	**No**	**Ro**	**Fr**	**Cz**	**De**	**Hu**
Yes	68	48	51	61	39	70	37	31	57	51	64	54
No	32	52	49	39	61	30	63	69	43	49	36	46

In spite of the campaigns about the rational use of electricity, there are about 40% of the respondents who do not know there are appliances which still use electricity after switching off (with off button).

3.7 Air conditioning/comfort cooling

3.7.1 Penetration rate of air conditioning:

Because of increasing global temperatures and increasing standard of living, the penetration of air conditioning is increasing fast. On other hand the European market is being invaded by very low efficiency units from China, which can not be sold in the Chinese market because of strict legislation but can be sold in Europe. To overcome this situation, air conditioning needs urgent attention from policy makers. Next picture shows the ownership rates of air conditioning in each country. Germany did not survey air conditioning ownership since the share of air conditioning in private households is rather small up to now.



Air conditioning is mainly used in the Southern European countries, being Greece the country with the highest penetration rate followed by Italy. Surprisingly, Norway is the third country in the ranking, followed by Bulgaria.

3.7.1.1 How many m2 of the households have air conditioning?

Following results are related to the households who have air conditioning installed.

Cooled area in houses	m^2 (average)	%of total area in the house (average)
PT	20	15
BE	52	20
DK	57	45
GR	60	47
BU		
IT	89	47
NO	110	66
RO	29	48
FR	71	52
CZ	68	58
DE		
HU	42	62

There is no data available for Bulgarian households.

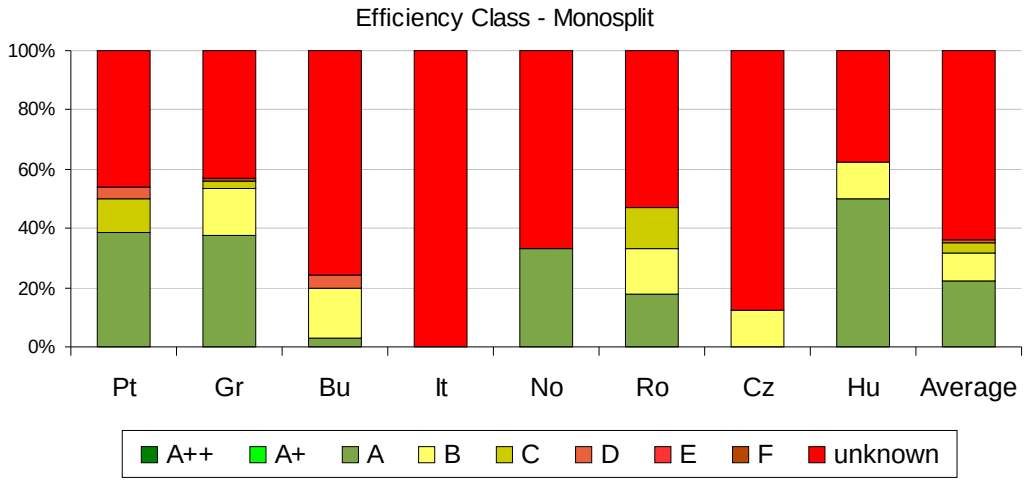
3.7.2 Type of the air conditioning in the sample

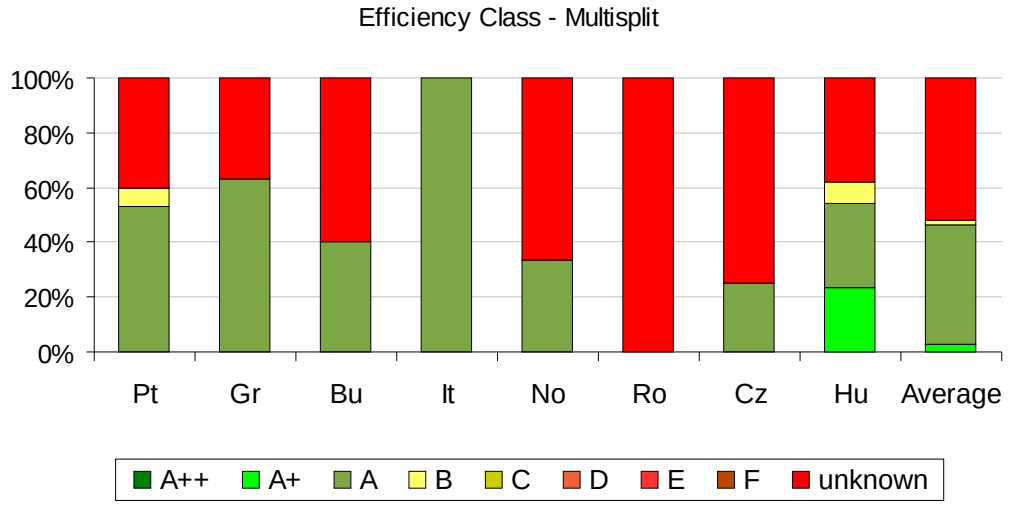
The main type of air conditioning used is different from country to country. However it can be seen that some types of equipment are present in smaller percentages (centralized air conditioning, mobile air conditioning and evaporative coolers) and others are found more often (mono split and multi split in Southern countries and heat pump in Northern countries).

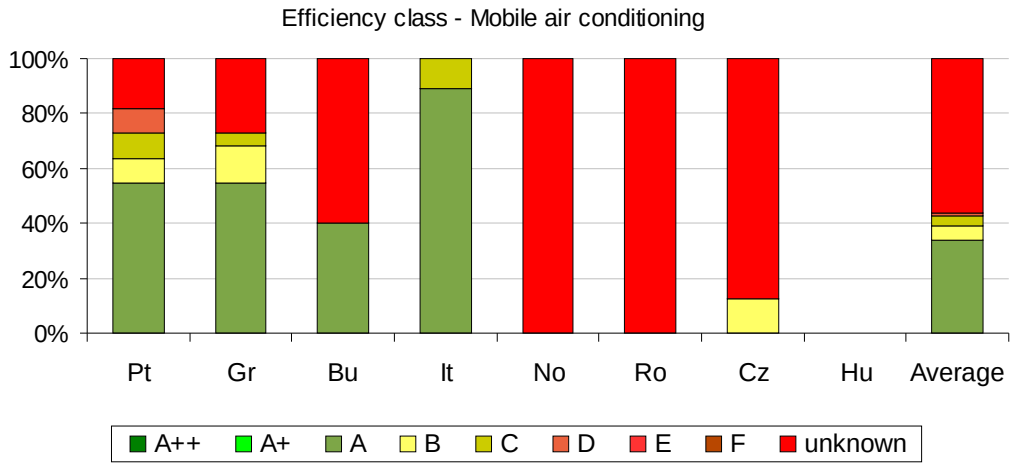
Type of air conditioning unit	Pt	Dk	Gr	Bu	It	No	Ro	Fr	Cz	Hu
Centralized air conditioning (multi occupancy buildings)	11	20	12	1	7	5	13	6	0	4
Heat Pump (geothermal)	13	40	5	6	18	36	6	15	28	4
Monosplit (Air-to-Air)	28	0	68	61	14	5	43	25	13	29
Multisplit ((Air-to-Air)	16	0	6	9	27	2	4	20	28	46
Mobile air conditioner	6	10	7	2	7	1	4	12	6	4
Evaporative cooler	16	10	1	0	9	0	2	9	2	7
Fan	9	0	7	1	18	51	0	12	23	4
Other/unknown	0	20	1	20	0	2	2	0	0	4

3.7.3 Efficiency class of the air conditioning

As the sample for air conditioning appliances is small, the obtained results may not be very representative.


Efficiency Class - Monosplit
100%
80%
60%
40%
20%
0%
Pt
Gr
Bu
It
No
Ro
Cz
Hu
Average
A++
A+
A
B
C
D
E
F
unknown


Efficiency Class - Multisplit
100%
80%
60%
40%
20%
0%
Pt
Gr
Bu
It
No
Ro
Cz
Hu
Average
A++
A+
A
B
C
D
E
F
unknown


Efficiency class - Mobile air conditioning
100%
80%
60%
40%
20%
0%
Pt
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No
Ro
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Average
A++
A+
A
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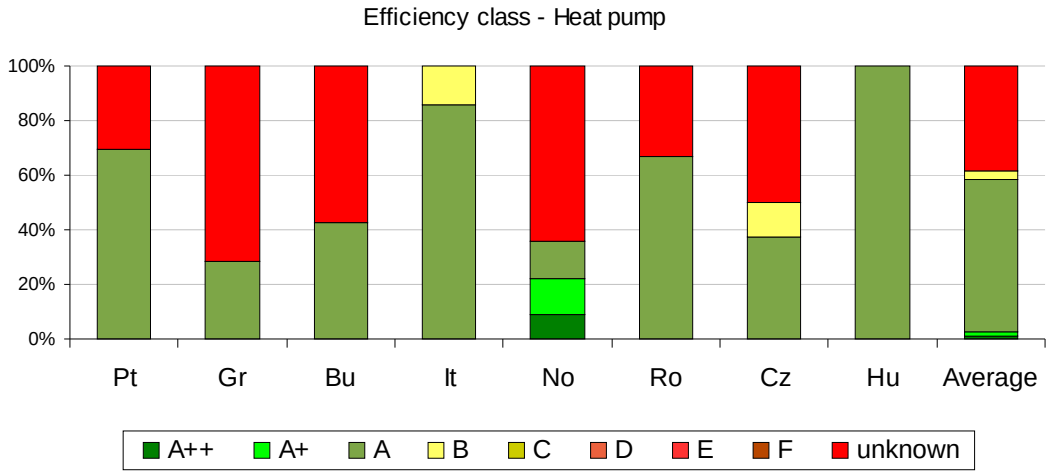


Germany, Belgium and Denmark did not present the data on the efficiency class of air conditioning units. It can be said that the average efficiency of air conditioners in the EU is poor.

3.7.4 Behaviour: outside doors and windows closed

When asked about keeping the outside doors and windows closed while using the air conditioning, a large percentage of households admit to close the windows and doors. However in Norway and Bulgaria people admit not to care if the windows and doors are open. Only 16% of the households keep their windows and doors closed while heating/cooling the house.

Doors and windows closed when using A/C	**YES**
PT	83
BE	94
DK	80
GR	82
BU	16
IT	96
NO	16
RO	20
FR	41
CZ	91
DE	-
HU	26

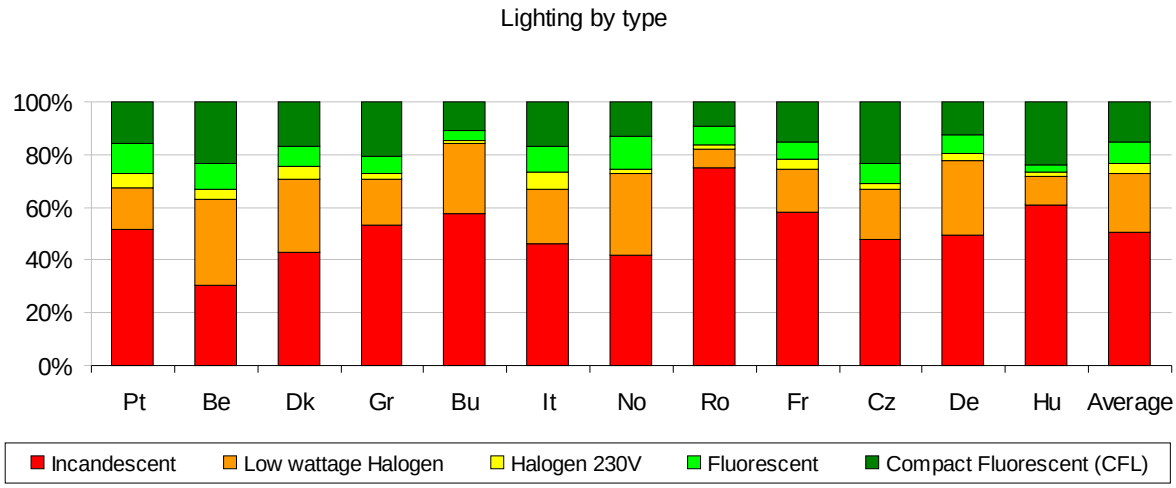
3.8 Lighting

3.8.1 Average number of lamps of each type

Although lighting represents a moderate share in the total household electricity consumption (about 18%) there is a significant savings potential available. Besides it is easy to obtain significant electricity savings.

The number of lamps of each type per country is presented below:

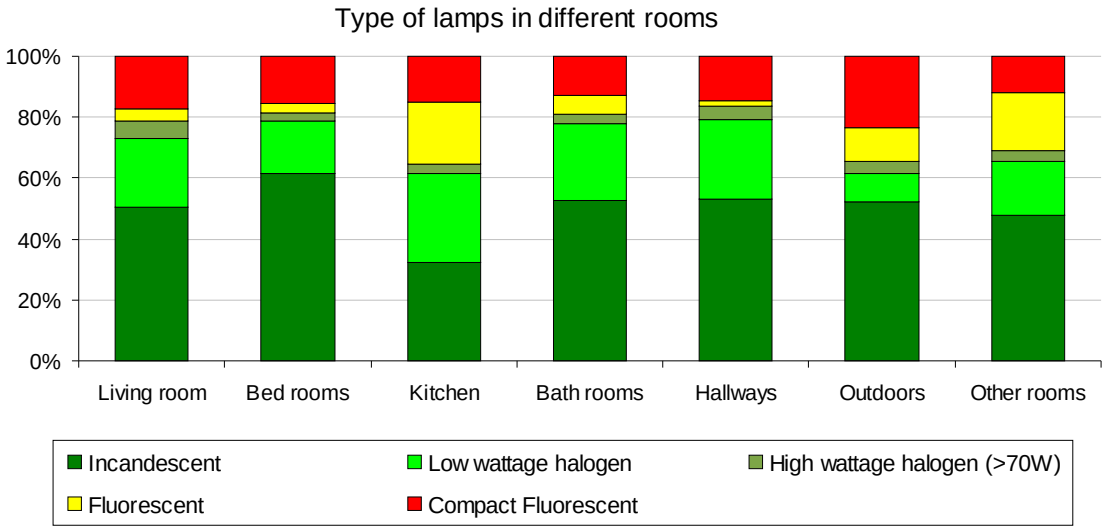
total of lamps by type	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu	Average
Incandescent	13	9	14	10	9	15	14	8	14	12	13	8	13
Low wattage Halogen	4	10	9	3	4	7	11	1	4	5	7	2	6
Halogen 230V	1	1	2	1	0	2	0,5	0	1	0	1	0	1
Fluorescent	3	3	3	1	1	3	4,2	1	2	2	2	0	2
Compact Fluorescent (CFL)	4	7	6	4	2	6	4,5	1	4	6	3	3	4
Total	26	31	33	20	16	33	34	11	24	25	25	14	26



The total average number of lamps per household is 26. On average there are 4 compact fluorescent lamps per household. The largest share is incandescent lighting representing about 50% of the total number of lights installed.

Low wattage halogen lamps are the second most used lamps. This may be explained by the fact that this type of lighting is used in false ceilings with a high number of light points. Fluorescent tubular and compact fluorescent lamps have small percentages (only in Belgium these two combined are more than 30% of the total lighting lamps, but other countries are very close to that value).

The disaggregation of lighting per type of lamp for the 12 European countries can be seen in the following picture.

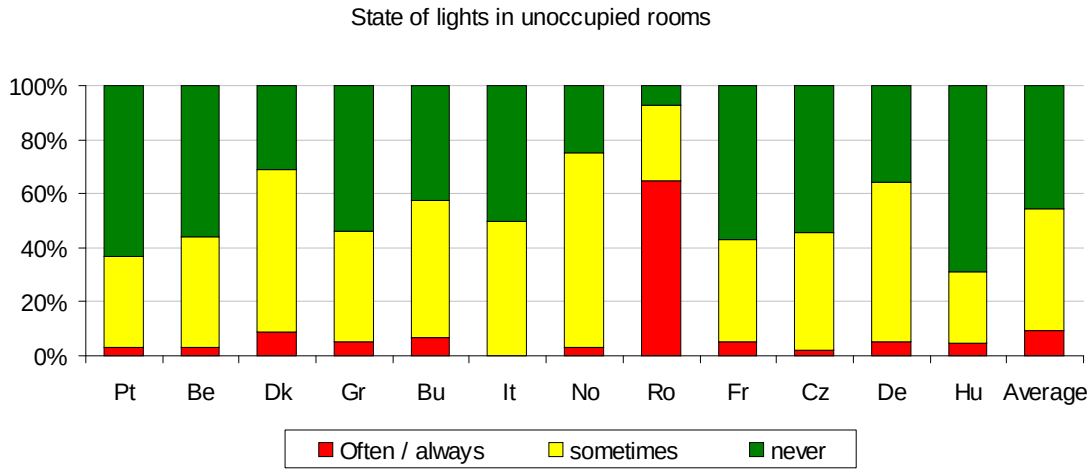


Incandescent and halogen lamps are by far the most widely used lamps. The share of compact fluorescent lamps although increasing fast is still less than halogen.

3.8.2 Behavioural questions

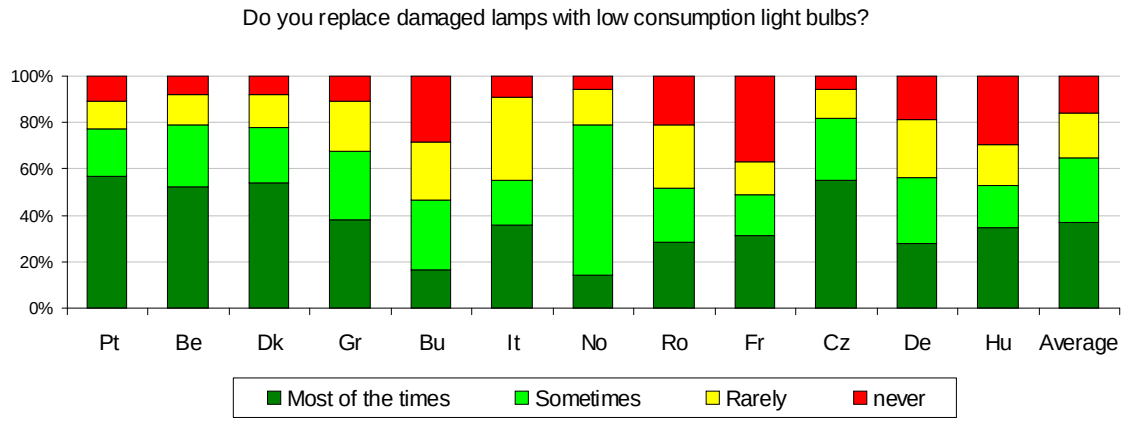
3.8.2.1 Do you leave the lights on in unoccupied rooms?

Except for Romania, where 65% of the respondents leave the lights always on in unoccupied rooms, most of the answers show us that generally there is a concern in turning off the lights in rooms that are unoccupied.



3.8.2.2 Do you replace damaged lamps with low consumption light bulbs?

The survey inquired about the replacement of damaged lamps with low consumption ones. If in some countries it is done most of the times (Portugal, Belgium, Denmark and Czech Republic) in others the distribution is more balanced (Greece, Bulgaria, Italy, Romania, Germany and Hungary).



3.8.2.3 Why low consumption light bulbs are not used?

The high price is appointed as the main reason for not having adopted CFLs in Portugal, Bulgaria, Romania, France, Czech Republic and Hungary. A significant percentage of the households in all countries consider their lighting quality being the second most important constraint influencing the purchase of CFLs. There was also mention to the problems of fitting CFLs to the existing armatures.

CFLs	Pt	Be	Dk	Gr	Bu	It	No	Ro	Fr	Cz	De	Hu

constraints												
Price	57	7	19	20	45	10	18	58	40	31	20	47
Lighting quality	18	21	26	25	32	21	23	15	28	22	15	10
Size	6	19	27	19	7	28	19	11	10	24	26	13
Appearance	4	1	12	15	7	3	17	10	18	11	22	19
Lifespan	3	15	16	15	4	0	9	6	5	8	4	5
Other	12	37	0	6	5	38	14	1	0	5	13	7

3.8.2.4 Habits changed due to low consumption light bulbs?

Some respondents admit to burn lights longer if they are using efficient light bulbs because the lamps have lower consumptions. The largest share of respondents however mentioned that they did not change their habits due to low consumption light bulbs.

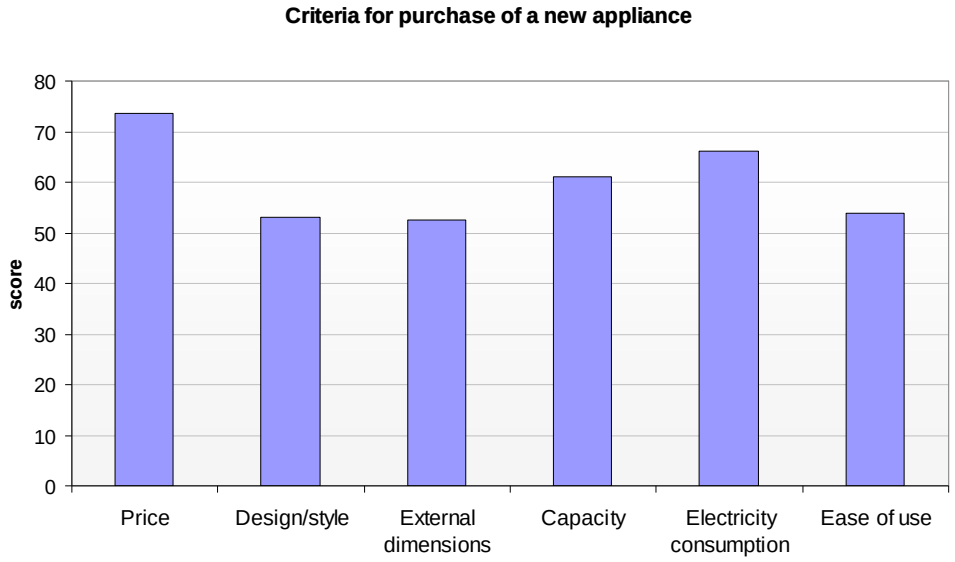
Increase of usage time with CFLs	**Yes, burn them longer**	**No, no change**
PT	21	79
BE	5	95
DK	25	75
GR	15	85
BU	30	70
IT	10	90
NO	13	87
RO	28	72
FR	12	88
CZ	30	70
DE	15	85
HU	5	95

3.9 General Points

3.9.1 Criteria for the purchase of a new domestic appliance

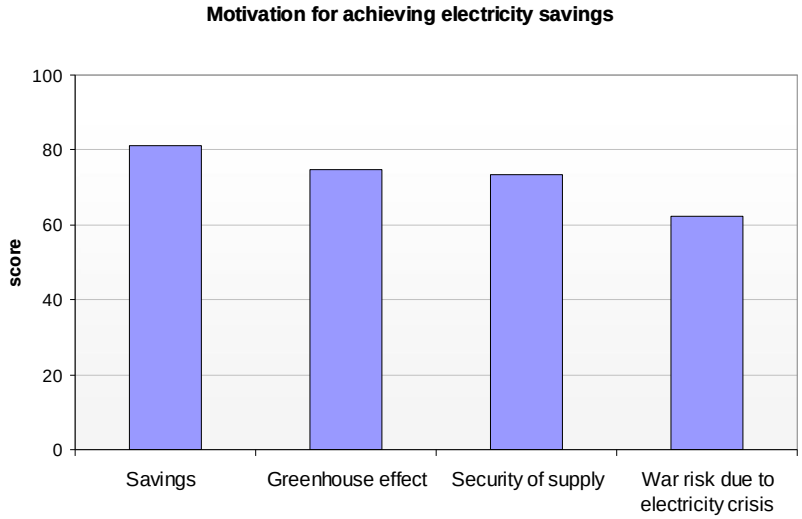
In addition to the specific questions related to specific appliances, some questions related to energy efficiency in general were part of the questionnaire.

The two most important criteria are the price and the electricity consumption followed by the ease of use. The design/style and external dimensions are mentioned as the less important.



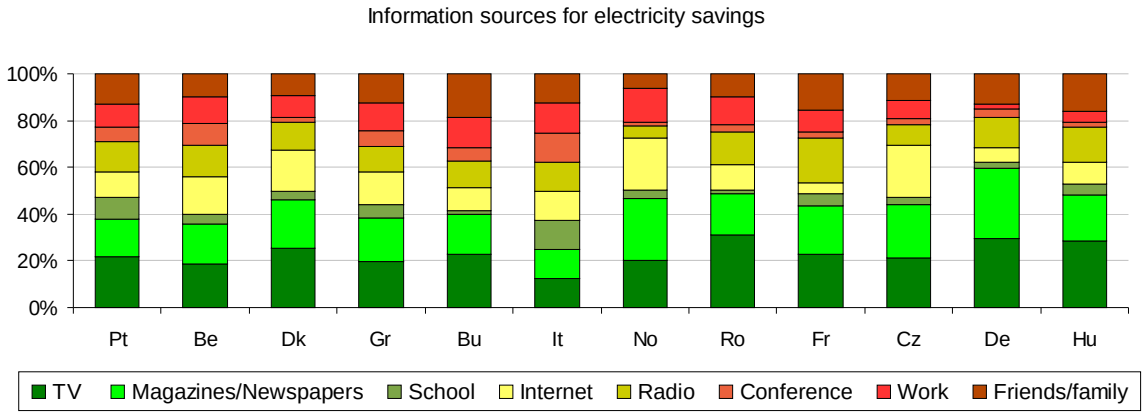
3.9.2 Criteria for saving electricity

When asked why it was important to save electricity, the majority of the respondents stated that their criteria are to obtain economical savings, followed by security of supply and greenhouse effect. War risk due to electricity crisis is the less important concern.



3.9.3 Information sources of electricity savings

As expected TV and written media (such as magazines and newspapers) are together the best media to spread information about electricity savings in the residential sector. Therefore, comprehensive information campaigns are very important to increase the household's awareness in the selection and operation of energy efficient appliances.



4 Conclusion

The survey can be considered a success because the response rate was high as well as the percentage of valid answers.

Analysing the questions addressing behaviour, the results indicate that there is an overall good, energy-conscious behaviour. Anyhow, we believe that when faced with behavioural questions, people feel obligated to answer politically correct and real behaviour might be somewhat different than what we find in the survey.

The efficiency label is generally mentioned as having an important role in the purchase decision; however the percentage of A++, A+ and even A appliances is still far beyond the desirable levels. There is plenty of room for increasing the penetration of efficient appliances in the households.

In relation to office equipment, the knowledge on the Energy Star label is poor and this criterion is not used much in the purchase decision. Office equipment left on in standby mode seems not to be a large problem according to the survey, but it is important to keep in mind that although the efforts to have a representative sample, the sample resulted deviated and the share of respondents with interest in energy is high.

In the field of household lighting, the survey shows that the share of compact fluorescent lamps in households is still very low. The answers also show that there are some doubts about the usage and fittings of the energy saving lamps.

One important conclusion from this survey is that a larger sample (of about 2000 -3000 questionnaires per country) would be desirable to make a more representative characterisation.

There are a few questions where there are some doubts if the answers represent faithfully the truth or if there was some misunderstandings from the respondents side. This mainly refers to the questions on the state when office equipment and home entertainment equipment is not used. It turns out, based on the survey results, that the number of appliances which are turned off with the button is very high. Our perception however, based on the interviews carried out face to face, is that when people are asked about how they behave, their natural tendency is, of course, to say they behave well, or to choose the best option among the choices. Therefore answers to questions related to human behaviour should be handled with care, and we are convinced that the good results obtained are somewhat deviating from reality. This possible difference can be seen when comparing the results of the questionnaires with the results of the monitoring campaigns. Particularly in new European Countries people seem to behave pretty well in what it concerns the use of equipment in stand by power.

This suspicion also applies to the stock of A+ and A class energy efficient appliances. Hungary and Czech Republic seem to have a high share of A++, A+ and A class appliances when compared to Germany or Belgium, for example. However the potential savings calculated based on the monitoring campaigns shows higher potentials in those countries.

As it can be seen in the charts below, there are several types of behaviour in the use of the equipment. The state when not used of one appliance may vary from country to country.

Regarding lighting, there is a high potential for energy savings, as there is generally, among all countries, a high percentage of inefficient bulbs installed. In particular incandescent lamps are more used in bedrooms and living rooms and halogen lamps usually used in corridors and living rooms. Fluorescent lamps are more used in kitchens. CFL lamps market penetration is increasing but the replacement of both incandescent and halogen with CFLs and LEDs needs to be accelerated.

More surveys should be done in order to obtain more representative values and to understand the changes through time.

5 Bibliography

[EuP, Lot 6]: “Task 8 Scenario, Policy, Impact and Sensitivity Analysis”, EuP Preparatory Study Lot 6 Standby and Off-mode Losses, Fraunhofer, October 2007.

http://www.ecostandby.org/

D9 Country Reports with the survey results of each participating country.

6 Annex 1 – Questionnaire

Residential Monitoring to Decrease Energy Use and Carbon Emissions in Europe

Household code:	Date: . . / . . /	**Interviewer:**	Page 1 of 4

Module A: Household details

A1 Location and contact details

Post code	
Phone number[1]	

[1]required if you would like an evaluation of your electricity consumption

A2 How many persons live in the household in the following age groups?

Age 12 and less	
Age from 13 to 18	
Age from 19 to 65	
Age more than 65	

A3 What is the highest education level in the household? (tick the relevant choice, one box only)

No degree or certificate	
High school or equivalent	
Trade/Vocational certificate or equivalent	
University degree or equivalent	

A4 What was your electricity consumption invoiced by your electricity company last year?

In euros	
In kWh (if known)	

A5 What type of building do you live in?

Single family house Multi-occupancy building

A6 Do you use electric space heating?

Yes No

A7 Do you use electric water heating?

Yes No

Module B: Cold appliances

B1 Do you have one or several refrigerators without a freezer compartment?

Yes No

If yes, please specify the age, the volume and the energy class (A++, A+, A, B, C, D, E, F, G) if known:

Refrigerator	Age			Volume (liters)	Energy class
	Less than 5 years	From 6 to 10 years	More than 10 years		
1					
2					
3					

B2 Do you have one or several refrigerators with a freezer compartment?

Yes No

If yes, please specify the age, the volume and the energy class (A++, A+, A, B, C, D, E, F, G) if known:

Refrigerator	Age			Vol.fridge (liters)	Vol.freezer (liters)	Energy class
	Less than 5 years	From 6 to 10 year	More than 10 years			
1						
2						
3						

B3 How often do you clean the grid at the rear of the refrigerator ?

Every month Every year Never

B4 How often do you defrost your refrigerator ?

Every month Every year Never Refrigerator has automatic defrost function

B5 How do you adjust the thermostat of your refrigerator?

Minimum (the coldest) Middle position Maximum (the warmest)

B6 Is (one of) your refrigerator(s) located against a cooking appliance (cooker, oven, hobs…)?

Yes No

B7 Do you have one or several freezers?

Yes No (à go to question B10)

If yes, please specify the age, the volume and the energy class (A++, A+, A, B, C, D, E, F, G) if known:

Freezer	Age			Volume (liters)	Energy class
	Less than 5 years	From 6 to 10 years	More than 10 years		
1					
2					
3					

B8 How often do you defrost your freezer ?

Every month Every year Never freezer has automatic defrost function

B9 How do you adjust the thermostat of your freezer?

Minimum (the coldest) Middle position Maximum (the warmest)

B10 Is your freezer located against a cooking appliance (cooker, oven, hobs…)?

Yes No

B11 Do you put cooked food into your refrigerator/freezer before it has cooled?

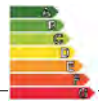
Yes No

B12 Do you systematically cover the dishes before introducing them in the refrigerator ?

Yes No

B13 Do you check the energy label when purchasing a refrigerator or freezer?

Yes No



Module C: Washing appliances

C1 Have you got a washing machine?

Yes No (à go to question C6)

If yes, please specify the age, the capacity and the energy class (A, B, C, D, E, F, G) if known:

Age			Capacity		Energy class
Less than 5 years	From 6 to 10 years	More than 10 years	5 kg or less	More than 5 kg	

C2 Do you usually load your washing machine to

25% 50% 75% 100%

C3 Do you pack clothes when loading the washing machine?

Yes No

C4 If known, indicate the spin speed you usually use for:

Cotton : turn/min
Synthetic : turn/min
Sensitive linen (wool…): turn/min

C5 Do you usually use the ECO button (if there is one on your machine)?

Always Sometimes Never Not applicable

C6 Have you got a tumble dryer?

Yes No (à go to question C9)

If yes, please specify the age and the energy class (A, B, C, D, E, F, G) if known:

Age			Energy class
Less than 5 years	From 6 to 10 years	More than 10 years	

C7 How does the drying cycle stop?

With a timer (set by the user) Automatically (sensor)

C8 How frequently do you use your tumble dryer

(in % of wash-for example 50% if you use it 1 wash out of 2)

Winter	Autumn	Summer	Spring

C9 Have you got a dish washer?

Yes No (à go to question C15)

If yes, please specify the age and the energy class (A, B, C, D, E, F, G) if known:

Age			Energy class
Less than 5 years	From 6 to 10 years	More than 10 years	

C10 Is your dish washer fed with hot water?

Yes No Don't know

C11 Do you usually use the ECO button (if there is one on your machine)?

Always Sometimes Never Not applicable

C12 At which temperature is your dish washer usually set to?

Don't know 50°C 65°C Other :

C13 Do you rinse the dishes before putting them in the dish washer ?

Yes No

C14 How do you load the dish washer most of the time?

25% 50% 75% 100%

C15 Do you check the energy label when purchasing a washing appliance?

Yes No

Module D: Cooking appliances

D1 How do you defrost your food most of the time? (only one answer)

Micro-wave Refrigerator Left outside to defrost In the pan

D2 Do you usually put a lid on the pan when you cook?

Always Sometimes Never

D3 How much of your cooking do you make with a pressure cooker?

0% 10% 25% 50% 90%

Module E: Office appliances

E1 Do you have an internet connection?

Yes No

If yes, please specify the type of connection:

Dial up phone line (analogue, ISDN)
Broadband or LAN (wireless, cable)
Don't know

E2 When you are not using the following equipment, do you usually
(tick the boxes only if you own the appliance)

Device	Turn it off	Leave it on standby	Leave it on
Desktop			
Monitor			
Laptop			
Printer			
Multifunction printer (printer/scanner/copier)			
Scanner			
Copier			
Fax			
Modem			
Speakers			
Router/hub			
Other :			

E3 When you leave your computer on without using it, what is the reason ?

No need to boot it at each use Worried about damaging it Tasks running (download, backup, etc)

E4 Are the electricity saving handler active on your monitor? (placing inactive monitor into a low power sleep mode)

Yes No Don't know

E5 Are the electricity saving handler active on your desktop? (placing inactive computer into a low power sleep mode)

Yes No Don't know

E6 In your opinion does the activation of the screen saver save electricity?

Yes No

E7 What do you think the Energy Star label refers to?

Electromagnetic compatibility Electricity saving handling
Use of recyclable material Low energy consumption Don't know

E8 When you buy an office appliance (computer, printer…) do you choose one with the energy star label?

Always Sometimes Never

Module F: Home entertainment

F1 When you are not using the following equipment, do you usually (tick only if you own the appliance)

Device	Turn it off with the on/off button	Turn it off with the remote control	Leave it on standby	Leave it on
TV				
Home cinema				
VHS recorder/player				
DVD recorder/player				
Hi-Fi				
Satellite/cable set top box				
Hard disc				
Video game				
Other :				

F2 What will you choose to replace your existing TV?

Plasma Flat screen(LCD) Cathode ray screen Projector

F3 Do you know that some appliances use electricity even when they are turned off with the ON/OFF button but not unplugged?

Yes No

F4 Do you usually leave chargers (phone, batteries…) plugged in without using them?

Always Often Sometimes Never

F5 Do you use multiple sockets with a switch to disconnect all appliances from the mains?

Yes No

Module G: Air conditioning/Comfort cooling

G1 Do you use an air conditioning system?

Yes No (à go to question H1)

G2 What is the floor area of your place of residence which is air conditioned ? ☐ **m²**

G3Which part of the dwelling does it represent? ☐ **%**

G4 Specify the type of air conditioning and its energy class in known (A, B, C, D, E, F, G, "don't know"):

Air conditioning appliance	Number	Energy class 1
Centralized air conditioner (multi occupancy buildings)		
Heat pump		
Monosplit		
Multisplit		
Mobile air conditioner		
Humidifier		
Fan		
Other		

G5 Do you leave some outside doors or windows of the air conditioned room open while the air conditioning is on?

Yes No

G6 What temperature do you set your air-conditioning to? ☐ **°C**

G7 What do you consider as the inside comfort temperature in summer? ☐ **°C**

Module H: Lighting

H1 Specify the number of light bulbs of each type and the room in which they are used

Type	Living room	Bed rooms	Kitchen	Bath rooms	Hallways	Outdoors	Other rooms
Incandescent 							
Low wattage halogen 							
High wattage halogen (>70W) 							
Fluorescent 							
Compact Fluorescent 							

H2 Do you leave the light on in unoccupied room?

Often Sometimes Never

H3 Do you buy low consumption light bulbs (Compact Fluorescent or Fluorescent lamps) when you replace a bulb?

Most of the time Sometimes Rarely Never

H4 If you never or rarely use them, why? (tick all the boxes which apply)

Price Lighting quality Size Appearance lifespan Other : ….

H5 Have you changed your lighting habits with the lamps you have replaced by low consumption bulbs?

Yes, I let them burn longer No, I haven't changed anything

Module I: General points

I1 Rank the following criteria from 1 to 7 according to their importance when you purchase a new domestic appliance
(1: more important, 7: not important)

Price	
Design/style	
External dimensions	
Capacity	
Electricity consumption	
Ease of use	
Other (specify:)	

I2 Why do you think it is necessary to save electricity ?
(1: more important, 5: not important)

Financial savings	
Depletion of energy supplies	
Greenhouse effect/Global warming	
War risk due to electricity crisis	
Other (specify:)	

I3 Have you heard about electricity savings from any of the following sources?

TV Radio
Magazine/Newspaper Conference
School Work
Internet Friends/family
Other : ……..