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Final report

Energy Consumption Survey for Belgian households

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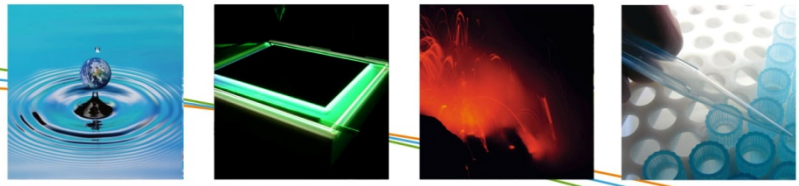

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1 INTRODUCTION

1.1 EUROSTAT GRANT

Eurostat launched in July 2009 a first action (with grant) to develop detailed statistics on energy consumption in the household sector (SECH project). The immediate cause was the Regulation on Energy Statistics (1099/2008) that stipulates that the European Commission and the Member States need to develop better energy statistics related to renewable energy and energy consumption. In particular it is necessary to carry out a review of the existing approaches at national level and implement data collections if needed. In consultation with the Member States, Eurostat decided to prioritize actions and to start with improving energy statistics in the households sector. Member States were stimulated to collect detailed data on the final energy consumption in households by using a direct survey (interview, CAPI[1], CATI[2], e-mail/web questionnaire) or to develop a model for estimating energy consumption in households (or to improve existing household modelling) or to combine both.

In July 2010 Eurostat launched a new action (again with grant) for Member States who had not been selected for the first one. Belgium took this opportunity to conduct Computer Assisted Personal Interviews (CAPI) on energy related parameters in households: the ECS-survey (Energy Consumption Survey). In the survey Belgium took into consideration the recommended coverage of data collection as proposed by Eurostat.

1.2 BELGIUM NATIONAL CONTEXT

Various constitutional reforms have made Belgium a federal State, as a result of which competences have been distributed among the Federal State and the 3 Regions (Flanders, Wallonia and Brussels-Capital) The rational use of energy, and the use of renewable energy sources, which are surveyed here for the households, fall both within the competences of the Regions.

Nevertheless, it is considered of primary importance to ensure availability of coherent and reliable statistics for the Belgian State as a whole, with possible disaggregation till regional level. This is why the follow up of this ECS survey and its results has been ensured by the CONCERE/ENOVER cell in charge of Energy Efficiency. CONCERE/ENOVER is a working party put in place by the Interministerial Conference for Economy and Energy in order to ensure consultation, coordination and coherence between the 3 Regions and the Federal State in the field of energy.

[1] CAPI = Computer assisted personal interviews
[2] CATI = Computer assisted telephone interviews

1.3 SPECIFIC AIMS OF THE ECS SURVEY

The first goal of the ECS-survey was to give better insights in the household energy consumption and dwelling characteristics (especially equipment level and insulation characteristics) at Belgian and regional level in order to improve the quality of energy balances at regional and federal level.

Another goal was to collect data useful for calculating indicators in the field of Demand Side Management (DSM) policies and measures in general and especially for the monitoring of different European Directives (ESD 2006/32, Renewable 2009/28, EPB 2002/91 + 2010/31).

Finally these indicators can also be helpful to propose more focused policies and measures in the household sector aiming at reducing its energy consumption and its GHG emissions.

This ECS survey complements already available data, like, for example, the last general official socio-economic survey (SES 2001 or census 2001) which took place in 2001. Flanders also conducts surveys, but at a smaller scale (n=1000), about energy use in the household sector every 2 years since 1998.

1.4 PREPARATION OF THE ANALYSIS REPORT

In this report Belgium presents a detailed description of the execution of the Belgian ECS survey and the analysis of its results.

Chapter 2 describes the process of preparing the survey and the execution of the survey itself.

In **Chapter 3**, the results are presented for Belgium as a whole, as well as for the three regions. More advanced analyses such as correlation analysis are also described in chapter 3.

In **Chapter 4** conclusions of the analyses presented in this report are discussed.

All questions and analyzed results could of course not be described in detail in this report. For each theme, the most relevant questions are listed, and the questions that are taken into account in this report are highlighted (in bold). All results and questions are available in the form of tables and graphs in excel datasets, that accompany this report. In Annex 7, a list shows the relationship between each question in the survey and the name of the dataset in which the results are analyzed.

2 DESCRIPTION OF THE PROCESS

2.1 PREPARATORY TASKS BEFORE STARTING THE SURVEY

2.1.1 SELECTING THE SAMPLE OF HOUSEHOLDS

The National register is used to make the sample. 1968 was the digital starting point of the National Register of natural persons in Belgium. The Register contains the personal identification data and addresses of all persons registered in the municipal registers and in all consular registers for Belgians abroad.

In order to select a sample that represents the total population in Belgium, one has to take into account that Belgium is divided into 3 regions: Flanders, Wallonia and the Brussels Capital Region. Belgium is also divided into 10 provinces; 5 provinces in Flanders and 5 provinces in Wallonia. For the purpose of the sampling, the Brussels-Capital Region will be treated here as an eleventh province even though the Region is normally directly subdivided into 19 municipalities and does not contain any province. The procedure for drawing the sample is as follows:

Step 1:
The size of the brute sample is determined on the base of an expected response rate of 50 % in the Walloon and Flemish region and 40 % in the Brussels Capital Region (based on expert judgment of the FPS DGSIE[3]). A net sample size of 3700 in total was aimed at in the ECS survey, with 1850 cases in Flanders, 1200 in the Walloon region and 650 in the Brussels Capital Region, proportional to the size of each region. A brute sample of 3700 Flemish, 2400 Walloon and 1625 Brussels cases (total: 7725) was drawn.

Step 2:
The size of sampling groups is set at 20 households for Flanders and Wallonia and 25 households for the Brussels Capital region. Each interviewer gets assigned one or more groups assigned to interview. 185 groups are selected in Flanders, 120 in Wallonia and 65 in the Brussels Capital Region (370 groups for the entire country). This choice implies some oversampling for the Brussels Capital Region.

Within the regions, a stratified sample is drawn, with province as stratification variable and proportional allocation to spread the groups (and therefore households) over the provinces. Proportional allocation is based on the size of provinces, measured as the number of private households. This means that the number of groups for, for example the province of Antwerp, is calculated as: the number of groups for Flanders (185) multiplied by the number of households in Antwerp (746.548) divided by the number of households In Flanders (2.633.794) = 52. Proportional allocation within Wallonia would result in 9 groups in Luxemburg, but the actual number is set to 10, implying slight over-sampling (relative to other Walloon provinces) for this relatively small province.

[3] FPS DGSIE = Federal Public Services DG Statistics and Economic Information

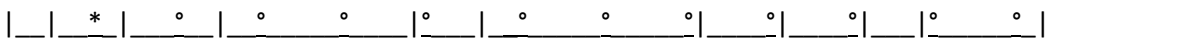
So, the selection chance, π_h[4], of a household within a province can be determined because the size of a group is known (20 households for Flanders and Wallonia and 25 for the Brussels Capital Region). The selection chance for a household in Flanders lies between 0,00139 and 0,00143 and for Wallonia between 0,00160 and 0,00163 (for the province of Luxemburg a somewhat higher value of 0,00183 is obtained because of abovementioned over-sampling). For the Brussels-Capital Region, that accounts for one province, the selection chance is 0,00306.

Step 3:
Within each province a sample of municipalities (on 13/02/2011) has to be drawn. Before doing this, all 9 German speaking municipalities are excluded (because of budget limits), collective households are excluded too. Selection of municipalities is done following a systematic probability, proportional to size (SYS-PPS); sampling scheme; size of municipality is measured as the number of private households (excluding households in some "special" statistical sectors).

The municipalities in each province are then sorted by: REFNIS (municipality code). All municipalities are represented as line segments on a line, as shown below; the lengths of the line segments are (proportional to) the sizes of the municipalities.

Systematic probability proportional to size sampling (within any province) works as follows: A step is calculated as the total number of private households (the total length of the line below), divided by the number of groups to be drawn; a start is generated as a random number between 0 and the step. This start is set out on the line (marked as *), and determines the first municipality being selected as the line segment that contains the start. Next, beginning from the start, more points are set out successively by moving a step each time to the right; these points are marked as °. For each ° appearing in a line segment, the corresponding municipality is selected once (and a group of households will be selected later). That makes that some municipalities are not selected at all, while other municipalities can be selected once or more times, later resulting in one or more groups.

See figure to explain:



- The length of the line segment | | representing a municipality is the size of (or number of private households in that municipality.
- The starting point * is defined at random between the left end of the line and step.
- The "distance" between * and the first °, and between any two successive °, is always the step (in a given province).
- Each ° and the * correspond to one group of households.

Step 4:
The final step is to select the households within the selected municipalities. The drawing here is done following a simple random sampling (SRS) scheme per selected municipality, taking into account the number of groups that are selected in that municipality. The household sampling frame is based on an extraction from the National Population Register from 07/05/2011 (date as close to the interviews as possible because of possible changes).

[4] π_h = number of groups in the province* number of households within a group / number of households within the province

German-speaking municipalities, households in some "special" statistical sectors, collective households, and households with reference persons above 85 years or less than 18 years were excluded.

2.1.2 MAKING THE QUESTIONNAIRE / MAKING INSTRUCTIONS FOR INTERVIEWERS

Belgium made a detailed questionnaire, based on earlier experiences in energy surveys. In Flanders an energy behaviour survey is conducted on a regular basis (± every two years). To compose the present survey, the Flemish surveys were taken as a starting point and were completed with some extra questions related to energy consumption, dwelling characteristics, renewable energy, type of heating equipment, insulation, surfaces, type of sanitary hot water appliances, type of cooking equipment, type and number of all kind of electrical appliances, including their energy label (where applicable), type of lightning, … with special attention to the recommended coverage of data by Eurostat.

The questions in the present survey that were also used in the Flemish surveys were formulated (as much as possible) in the same way (and the same order). This way the Flemish surveys could serve as a possible source for validation (within the Flemish region).

The final questionnaire can be found in Annex 1 of this report.

There were several guidelines developed to help the interviewers to conduct the interviews in the best possible way. The guidebooks were printed out so the interviewers could take along the guide during interviews as back-up material.

Guidebook 1 (see Annex 2.1) presents all practical information for the interviewers like:

- the contact points for more information for interviewers and for respondents,
- the procedure that has to be followed
- the web pages for the survey,
- the global purpose of the ECS-survey, the use of the CAPI-tools,
- the legal and administrative information (e.g.: confidentiality),
- practical information on the fieldwork (timing, how to conduct the interview (behavior for interviewers)

Guidebook 2 (see Annex 2.2) presents all technical information on the survey content:

- how to fill in the contact sheet (see Annex 5 in French and Dutch)
- how to interpret every question of the survey (photos and text were added to help the interviewers (who are no energy experts) understand the meaning of the questions and to know the differences between the possible answers

Guidebook 3 (see Annex 2.3) presents all practical and technical information on the use of the computers, the installation of the ECS-program, the use of it and how to forward the data to the central database.

2.1.3 INSTRUCTING/TRAINING OF INTERVIEWERS (A & B)

Every interviewer was obliged to follow the training course specifically developed for the ECS-survey (3 hours + 1,5 hours for interviewers without CAPI experience). During the training the interviewers were given all information from the before mentioned guidebooks: from the technical background of the survey to the practical use of the computers and the program.

During 11 training days (between 14/06/2011 and 24/08/2011) 211 interviewers were trained (98 Dutch and 113 French-speaking).

2.1.4 THE CONTACT PROCEDURE

In order to introduce the selected households into the process, they received a letter wherein the goal of the survey was explained and the visit of the interviewer was announced.

The interviewers had to contact each selected household. They had to try at least 4 times to reach them.

Participating in the project is voluntary. After the interview, the participating households receive a letter to thank them and 2 lottery tickets.

2.2 FIELD TESTING OF THE QUESTIONNAIRE

There was no pre-survey. Instead, a "desk-check" was executed in which the filter (routing) was checked.

2.3 EXECUTING THE SURVEY

Between 4 July 2011 and 20 December 2011 the interviewers collected the data by interviewing the households. Interviewers were asked to log in the system weekly to forward all registered contact efforts. All the data were collected and included in a computer system-database.

During the period of executing interviews, the fieldwork was followed-up regularly (on the base of the weekly log-in of the interviewers). On a two-weekly basis (between 31 August 2011 and 28 November 2011) actions were defined and worked out. For example: encouraging interviewers to start; contacting interviewers when specific problems were observed that were important for all, contacting interviewers when the central system was not working.

2.3.1 OVERVIEW OF THE RESULTS OF THE FIELDWORK

The following table presents the results of the final response on the ECS-survey.

Table 2 presents the final response on the interviews. From the 7.197[5] selected addresses in the brute sample (3.500 in Flanders, 2.204 in Wallonia and 1.493 in the Brussels Capital Region) there were 3.396 interviews conducted (1.774 in Flanders, 1.020 in Wallonia and 602 in the Brussels Capital Region).

[5] The brute sample has been decreased from 7725 to 7197. A net sample of 3700 households, the goal, could not be reached, not with a brute sample of 7725 households neither with one of 7197.

	Flemish Region		Walloon Region		Brussels capital Region		Belgium	
	N	%	N	%	N	%	N	%
TOTAL number of contacted households	**3.500**	**100,0**	**2.204**	**100,0**	**1.493**	**100,0**	**7.197**	**100,0**
Passed away	5	0,1	3	0,1	3	0,2	11	0,2
Moved	72	2,1	74	3,4	115	7,7	261	3,6
Language barrier	20	0,6	11	0,5	20	1,3	51	0,7
Illness, disabled	49	1,4	19	0,9	14	0,9	82	1,1
Vacation, business trip	21	0,6	12	0,5	20	1,3	53	0,7
Home, but not in the possibility to answer	31	0,9	31	1,4	12	0,8	74	1,0
Refusal by the respondent	796	22,7	426	19,3	254	17,0	1.476	20,5
Refusal by a representative of the respondent	111	3,1	52	2,4	36	2,4	199	2,8
Not home	308	8,9	265	12,0	200	13,4	773	10,8
Home, but no answering	16	0,5	25	1,1	11	0,7	52	0,7
Wrong or not existing address	33	0,9	48	2,2	62	4,2	143	2,0
Other	8	0,2	10	0,5	31	2,1	49	0,7
Not validated interview	13	0,4	10	0,5	5	0,3	28	0,4
No information available*	222	6,3	179	8,1	97	6,5	498	6,9
Interrupted interview	21	0,6	19	0,9	11	0,7	51	0,7
Conducted interview	**1.774**	**50,6**	**1.020**	**46,3**	**602**	**40,3**	**3.396**	**47,2**
Objective number of interviews	**1.850**		**1.200**		**650**		**3.700**	
% interviews of the objective		**95,9**		**85,0**		**92,6**		**91,8**

Table 1: Final response within the brute sample

**For 498 addresses no contact form was filled-in because of different reasons: address was never visited, address was visited by a interviewer who stopped working on the ECS-survey, address visited by a interviewer who didn't follow the administrative rules.*

From the 211 interviewers who followed the course, 36 (17%) stopped before finishing one group of addresses. 30 of them didn't even start with the ECS-survey.

Due to a strong decrease of the response and a big number of interviewers who stopped working on the ECS-survey, the objective number of 3.700 completed interviews was not reached. With 3.396 interviews, 91,8% from the objective number was reached. Because of this deficit, the maximum confidence interval will be somewhat higher than postulated (with a= 95%), but certainly for the Flemish Region and the Brussels Capital Region, the differences are small. In the Walloon Region the difference is +/- 0,24%.

Region	Number	Interval
Flemish Region	1.850	2,28%
	1.772	2,33%
Walloon Region	1.200	2,83%
	1.020	3,07%
Brussels Capital Region	650	3,84%
	602	3,99%
Belgium	3.700	1,61%
	3.396	1,68%

Table 2: Change in maximum confidence interval due to not reaching the objective of 3.700 interviews

The mean duration of the conducted interviews was 35 minutes. Due to a technical problem only 1.166 from the 3.396 interviews could be timed.

The mean item response is estimated on 99,1%. For 56,7% of the interviews all questions that applied to the respondents were also answered. 99,8% of the interviews had an item-non response lower than 10%. There are no interviews with an item-non response above 17% (excluding the interrupted interviews).
Some interviewee-profiles experienced more difficulties with answering the questions:

- The mean item-non response is 1,4% for tenants, while for owners it is 0,6%
- The mean item-non response is 1,2% for occupants of a multi-family dwelling, higher than for the occupants of a single family dwelling (0,7%)

The next table provides more information on the response rate of the questions about the use and consumption of specific energy sources.

	Use of the energy source [1]	Yearly energy consumption [2]	Yearly spend amount (€) [3]	Period of the electricity and natural gas bill [4]
Electricity	100%	63%	82%	83%
Natural gas	100%	77%	90%	90%
Fuel oil	100%	92%	90%	n/a
Coal	100%	97%	91%	n/a
Butane	100%	83%	87%	n/a
Propane	100%	91%	89%	n/a
woodlogs	100%	93%	91%	n/a
Wood pellets	100%	95%	92%	n/a
Wood waste	100%	77%	95%	n/a
Wood shaves	100%	100%	100%	n/a

Table 3: Response on Questions relating to the energy use

[1] *The related question was ' Do you use electricity in your dwelling?' (yes/no) (Question was asked for the whole list of energy sources).*

[2] *The related question was ' How much electricity have you consumed during the latest year?' (amount) (Question was asked for the whole list of energy sources for which the interviewee gave a 'Yes' to the first question).*

[3] *The related question was ' How much did you have to pay for this consumption of electricity?' (amount) (Question was asked for the whole list of energy sources for which the interviewee gave a 'Yes' to the first question).*

[4] *Only for consumers of electricity and natural gas the next question was asked: 'What was the invoicing period on last year's electricity/natural gas bill?'. (period)*

At the end of the fieldwork an evaluation form was sent to all households who participated to the survey. 50% of the respondents (1.715 of 3.434 (including the non-validated interviews)) sent the evaluation form back. There were no real shortcomings or fraud practices mentioned in the evaluation forms, except for 36 respondents who declared they were not interviewed face to face, but by phone.

2.4 STATISTICAL DATA HANDLING

2.4.1 UPGRADING THE DATASET

In every statistical survey a good close look at the data is needed. Mistakes, contradictions, extreme values, … have to be traced and possibly adjusted. Moreover, both the respondents and the interviewers are no energy experts. For example, the unit in which the energy use is expressed can be confusing.

In order to obtain a data set that can be further analyzed, the following actions were taken:

	Actions to obtain a dataset ready for analysis
Step 1	Removing not valid/interrupted/incomplete interviews
Step 2	Deleting redundant variables (for loop questions that were never asked)
Step 3	Conversion of all energy consumption data to one unit
Step 4	Detecting outliers
Step 5	Validation and harmonization of the responses on energy consumption
Step 6	Validation and harmonization of the responses on the main energy source for heating purposes
Step 7	Validation and correction of the responses on the surface questions

Step 1: Removing the interviews that were not valid, interrupted, incomplete,…
Not validated interviews are those who have extremely strange outputs, for example: all the same values on all questions, only a few questions were answered and the other question fields were empty. Interrupted interviews are those who were interrupted at an early stage in the interview, so the results were not useful.

Step 2: Deleting redundant variables (for loop questions that were not asked for).

Step 3: Conversion of all the consumption data to one unit
In the case of natural gas, the consumption is given in LHV[6] kWh. If some consumers have reported into kWh, the factor 0.905 was used to take into account that invoices are usually expressed in HHV[7]. If a consumer has reported in m³, consumption is converted into kWh LHV depending on the type of gas delivered (10,472 LHV kWh/m³ for high grade natural gas or 9,250 LHV kWh /m³ for low grade natural gas) based on a postal code list. These values are also used in the regional energy balances. For other fuels, the following conversion factors, densities and caloric values[8] are used:

- Oïl: 10.08 kWh/l
- Coal: 8.14 kWh/kg
- Propane: 6.44 kWh/l
- Butane bottle: 12.68 kWh/kg
- Wood log[9] : density 370 kg/m³ and 4.30 kWh/kg; calorific value 15,47 MJ/kg
- Wood pellet9: density 600 kg/m³ and 4.53 kWh/kg; calorific value 16,30 MJ/kg
- Wood waste9: density 370 kg/m³ and 4.44 kWh/kg; calorific value 16,00 MJ/kg

[6] lower heating value
[7] higher heating value
[8] Source: based on data used in the regional energy balances
[9] Source: VITO 2011/TEM/R/158 and Flemish energy balance

- Wood shavings9: density 347 kg/m³ and 4.39 kWh/kg; calorific value 15,80 MJ/kg
- Kerosene: 10.75 kWh/l

Step 4: Detecting outliers
The important variables in the field of energy consumption were screened: strange high and low values and some extreme ranges between minimum and maximum were observed. Hence, further analysis was needed to detect outliers. That is: an observation that appears to deviate markedly from other members of the sample in which it occurs. There is no rigid mathematical definition of what constitutes an outlier; determining whether or not an observation is an outlier is ultimately a subjective exercise. Hence, detecting outliers is not an easy job. However, removing these outlying observations is important because they can bias all statistical parameters.

For each scale and nominal variable, except for the questions that ask for specific energy use (V9, V16, V23, V30, V37, V44, V51, V58, V65, V72 see overview of questionnaire in Annex), we firstly analyzed the histogram and some descriptive statistics like mean, standard deviation, minimum and maximum. If the variable had some extreme high or low value(s), we took a closer look and tried to discover a mistake or other reasons in order to label the value as an outlier. The following table presents all the outliers and the reason why they are deleted.

Name of variable	value	ID	action
V117_C: What is the surface area of the basement/crawl space in m²?	620 m²	45305	We considered those values as very exceptional and therefore the ID's shall be treated both as outliers when making analyzes with the questions V117_C, V120, V126 and V132_C.
V120: What is the surface area of the storey on the ground floor in m²?	736 m²		
V126: What is the surface area of the first floor in m²?	736 m²		
V132_C: What is the surface area of this (equipped or not equipped) attic in m²?	667 m²		
V117_C: What is the surface area of the basement/crawl space in m²?	600 m²	47205	This very high value is in contrast with the answer of the household on question V120 "What is the surface area of the storey on the ground floor in m²?". The answer here is 300 m². The value shall be treated as outlier when making analyzes with the questions V117_C.
V78: How old in years is the oldest electric heating appliance? (separate direct heater besides the individual or collective central heating installation)	50 year	48806	We are arguing this as an extremely long lifetime for a (probably small) electric heating appliance. The value shall be treated as outlier when making analyzes with the question V78.
Q92: What is the cooling temperature in summer during the night °C?	60 °C	19 different ID's	Impossible value.

Table 4 List of outliers

Another approach is chosen for the questions about specific energy consumption and for metric, continuous variables. Here, on both sides of the distribution 2,5% is left out of the analysis.

Furthermore, the "lighting" variables also contain very high values. We have not referred to them as outliers. Some households have different types of lightings (LED, TL,…), others chose to invest in just one type.

The last questions with doubtful values were: "How many baths (no showers) do you and your family take on average during the week in your dwelling?" and "How many showers do you and

your family take on average during the week in your dwelling?". There seems to be extreme values on both sides of the distributions. Because of this and because of the difficulty to define a decision framework, we decided not to reject the hypothesis that the variables are volatile.

Step 5: Validation and harmonization of the responses on energy consumption.
Specifically for energy consumption variables a different approach was used. For each presented energy source the yearly consumption is compared with the yearly devoted budget. Any strange observation was analyzed further to make sure the value is not a mistake. For example, we looked at factors/characteristics of the dwelling that can influence the energetic aspects, like the presence of a swimming pool, a very big surface area, the exercise of an independent business in the dwelling,… To be complete, we sum up the energy-use variables and the relating problems:

- Correction of prices: if the average price related to the bill and amount of consumption, is too different (more than 50% above or beneath) from standard values, research of erroneous data or investigation about a possible wrong unit encoding is done.

- Correction of consumption periods: the consumption of electricity and natural gas has been filled with start and end dates that do not correspond to a complete year, these consumptions have been recalculated to correspond to a calendar year making all electricity and natural gas consumption comparable.

  To do so, the profiles SLP (Synthetic Load Profiles) published by Synergrid[10] were used. There are three types of residential profiles: two for electricity (depending on whether the consumption ratio night/day is below or above 1.3) and one for natural gas. For electricity, assumptions (based on the presence of certain types of electrical appliances) have been made to select the appropriate profile.

  We assume that the household has a profile S22 if one of these statements is true; otherwise we assume that this is a S21 profile:

  - Main fuel to heat the dwelling is electricity (Q4=1);
  - Presence of a heat pump (Q11 <>7);
  - Hot water is produced from electricity (Q530x=9, 12 or 13).

- Standardization of electricity and natural gas bills: As consumption has been normalized to a calendar year, we need to normalize the bills too. If a correction has been made for consumption, we apply a rule of three with the basic data: average price per kWh * normalized kWh. If there is no consumption mentioned, we normalized the bill in the same way as consumption, based on the SLP profiles.

- Calculating an average price per class of consumption: Before calculating an average price for electricity and gas, some data have been excluded based on a logarithmic transformation[11] of the relation between kWh and price, with rejection of values outside a confidence interval of 95%. Then an average price per energy vector, per class of consumption and per region was calculated.

[10] http://www.synergrid.be/index.cfm?PageID=16896 (Home > Statistiques et données >Synthetic Load Profiles). Synergrid is the federation of the Belgian grid managers for electricity and natural gas)
[11] in order to take into account a decreasing price for large amount

With the classes of consumption in kWh and the average prices previously calculated, we could associate a class of invoice with each class of consumption. This will be useful to estimate consumption (kWh) on the basis of an invoice.

- Consumption calculation based on the invoice: For gas and electricity, we used the average prices per invoice class, as calculated above. For other fuels, the following average prices (for 2010) have been used:

  Oil: 0.6493 €/l
  Coal: 0.363 €/kg
  Propane: 0.65 €/l
  Butane bottle: 0.94 €/kg
  No correction for wood (logs, pellets, chips or waste). Wood for free is possible.
  No correction for kerosene.

Step 6: Validation and harmonization of the responses on the main energy source for heating purposes: Regarding the question "What energy do you use for heating?" we checked the consistency of the given responses. Sometimes we discovered contradictions, like households that report to heat with natural gas, but they only mention a consumption of fuel oil. In this case, we corrected the main energy source.

Step 7: Validation and correction of the responses on the surface questions (V116-V142 see overview of questionnaire in annex))

2.4.2 CONSTRUCTION OF THE WEIGHTS (CALWEI)

In order to improve estimation from the set of data that are gathered from responding households, we calculated appropriate weights for these responding households; in the dataset, they are stored as a variable called CalWei. One important goal of using weights for the analysis is to minimize systematic mistakes (e.g. bias) that are usually made, when conclusions are made for the whole population merely using a (small) respondent sample. That is, we try to make the respondent sample more representative by introducing weights. Another purpose of appropriate weighing is to reduce variance estimates for estimated totals, means, proportions, … In this text, we will focus on representativeness of the respondent sample, while higher precision will be considered implicitly fulfilled.

In the present section, we first discuss the non-response model and the calibration model underlying the calculation of weights. At the end of the present section, we shall explain how we use these weights for calculation of estimates, which are used for analyzing the results.

Earlier in the report, we described the determination of the selection probability, π_j, for any household *j* in the population. The sampling weight, d_j, for household *j* is then defined as the invers of the selection probability: $d_j = 1/\pi_j$. In the dataset, sampling weights are stored as a variable called SampWei.

In the absence of non-response, the sum $\sum_{j=1}^{n} d_j$, where *n* is the number of sampled households and the sum is over all sampled households, would be an unbiased estimate for the number *N* of households in the (target) population. Non-response, however, is a major cause for $\sum_{j=1}^{n} d_j$, where *n* is now the number of responding households and the sum is over the respondent sample only, being an under-estimate, i.e. negatively biased estimate, for *N*. Therefore, we can seek to adjust the sampling weights d_j for respondents *j* to calibrated weights w_j, such that (among other things) $\sum_{j=1}^{n} w_j$ is a better (e.g. approximately unbiased) estimate for *N*. Notice that from now on, *n* always denotes the number of respondents. This search for better weights is called calibration. The key idea of modern calibration methods is to calculate correction factors g_j, such that sampling weights d_j can be replaced with calibrated weights $g_j d_j = w_j$, and, among several other restrictions, the equation

$$\sum_{j=1}^{n} w_j = \sum_{j=1}^{n} g_j d_j = N \qquad (1)$$

is satisfied, i.e. estimated ($\sum_{j=1}^{n} w_j$) and known (*N*) number of households are exactly equal. In case of (severe) non-response, most correction factors g_j are usually larger than 1, whence the alternative terms “grossing-up” or “weighing up” for “calibration”. Notice that an obvious solution for equation (1) is simply: $g_j = N \Big/ \sum_{j=1}^{n} d_j$ for any respondent *j*, which does not depend on *j* and can be seen therefore as a global correction for non-response.

Calibration can be applied not only to adjust for global non-response (through equation (1)), but to reduce imbalances in the respondent sample due to the randomized selection procedure, to over-sampling for some subpopulations, and to differential non-response as well. Therefore, one tries to find g_j such that several other estimates $\sum_{j=1}^{n} w_j x_j = \sum_{j=1}^{n} g_j d_j x_j$, i.e. weighted totals of observed values x_j for some variable(s) *x*, are equal to the corresponding known population total(s) *X*. This requires the collection of background information (variables *x*) for each responding household, as well as corresponding totals (*X*) from other sources (registers, estimated totals from other surveys, …).

For each respondent, the following information has been collected (between parentheses, we indicate the final number of classes and describe the classes used when the variable is introduced as calibration variable and/or as (non-)response predictor):

- Region:region of residence (3 regions: BRU, VLA, WAL),
- Prov: province of residence (11 classes: Brussels Capital Region (BRU) is 1 “province”; 5 provinces in Flanders and Wallonia each),

- Urban: level of urbanization[12] for the municipality of the household's residence (1 to 3 classes: 3 in Wallonia (A, B, C), 2 in Flanders (A, B or C), 1 in Brussels Capital Region (A); A = dense, B = mixed, C = scattered),
- Sex: gender of the household's reference person (2),
- Age: age class of the household's reference person (3 classes: ≤29, 30-59, ≥60),
- HHsize: household size (3 classes: 1, 2, ≥3),
- Diploma: diploma for the household's reference person (4 classes: none or LO, LSO, HSO, HO or UO),
- Income: total household income (6 classes: ≤999€, 1000-1499€, 1500-1999€, 2000-2499€, 2500-2999€, ≥3000€),
- Owner: owner or tenant (2),
- Envir: environment of the dwelling (8 classes[13]),
- DwelType: dwelling type (8 classes[14]),
- DwelState: state (condition) of the dwelling (5 classes[15]),
- StateEnv: state of the dwelling, compared to the environment (5 classes[16]).

Population counts (i.e. counts of households, also referred to as population totals, since counts are totals for indicator variables[17]) are available from the National Population Register for each class of the following variables: Region, Prov, Urban, Sex, Age, HHsize, as well as for cells in crossings of any two or more of these variables. *Estimated* population counts (totals) are available from surveys for each class of the following variables: Diploma (from LFS 2011 T3), Income and Owner (from SILC 2010). Neither exact, nor estimated population counts are however available for variables Envir, DwelType, DwelState and StateEnv. This implies that variables Region, Prov, Urban, Sex, Age, HHsize, Diploma, Income and Owner can be used in a calibration model; variables Envir, DwelType, DwelState and StateEnv cannot. However, as we believed (and figured out) that the latter four variables are non-negligible predictors for response, effects of those variables have been taken into account for adjustment of the sampling weights through a response regression model, rather than through a calibration model.

Hence, before starting calibration, we have been looking for an appropriate (non-)response regression model, to obtain estimated response probabilities, which are used to adjust the sampling weights d_j, as explained hereafter.

In order to model and estimate response, we have applied logistic regression, with dependent variable Resp (1 for respondent, 0 for non-respondent), and with potential predictors based on the

[12] Source: http://economie.fgov.be/nl/statistieken/cijfers/leefmilieu/geo/typologie_gmeenten/

[13] Classes for Envir:
1=Een landelijke of bosrijke omgeving met hoogstens enkele huizen of andere gebouwen in het blikveld
2=Een niet al te grote dorpskom met gemengd uiterlijk, een verkaveling met overwegend villa's in een groen kader
3=Een woongebied met overwegend eengezinswoningen met voortuinen
4=Een verstedelijkt woongebied met dichte bebouwing van overwegend eengezinswoningen zonder voortuinen
5=Een verstedelijkt woongebied met dichte bebouwing van overwegend meergezinswoningen of appartementen
6=Een verstedelijkt gebied met meer winkels en/of horeca dan woningen
7=Een verstedelijkt gebied met meer kantoren, groothandels, bedrijven of andere gebouwen dan woningen
8=Anders (specificeer)

[14] Classes for DwelType:
1=Eengezinswoning : open bebouwing of vrijstaande woning; **2**=Eengezinswoning : halfopen bebouwing; **3**=Eengezinswoning : gesloten bebouwing of rijwoning; **4**=Gebouw met maximum 4 appartementen of studio's; **5**=Gebouw met 5 of meer appartementen of studio's; **6**=Kamerwoning; **7**=Rust- en verzorgingstehuis, serviceflats; **8**=Andere (specificeer)

[15] Classes for DwelState:
1=Zeer goede staat; **2**=Goede staat ; **3**=Geen goede maar ook geen slechte staat; **4**=Slechte staat; **5**=Zeer slechte staat

[16] Classes for StateEnv:
1=Veel betere staat; **2**=Betere staat; **3**=Ongeveer dezelfde staat; **4**=Slechtere staat; **5**=Veel slechtere staat

[17] Indicator variable: a variable assuming only values 0 and 1.

above mentioned variables Region, Prov, Urban, Sex, Age, Envir, DwelType, DwelState and StateEnv. All those variables are available for respondents, as well as for non-respondents; HHsize, Diploma, Income and Owner are only available for respondents, and are therefore excluded as potential response predictors.

Since logistic regression has been used only for obtaining appropriate initial correction factors for the sampling weights, but not for analyzing the response mechanism in detail, not too much effort has been spent in finding an "optimal" response regression model (i.e. a best-fitting model, possibly a model incorporating interaction effects of predictors, …). Some exploration turned out into choosing for logistic regression models with the following linear structures for the three Regions:

- Region = BRU : Age + StateEnv + Envir;
- Region = VLA : DwelType + DwelState + Sex + Urban + StateEnv + Prov + Age;
- Region = WAL : DwelState + DwelType + StateEnv + Envir.

The presence of '+' signs in the formal expressions for the linear structures of the logistic regression models, and the absence of '*' signs, indicates that only main effects have been retained. The order of the variables in the linear structures corresponds to their importance in the model.

Using these regression models, a response probability p_j has been calculated (predicted, estimated) for each sampled household *j*. Those predictions p_j for responding households *j* (*j* = 1, …, *n*) are then used to adjust the sampling weights, as follows: $d'_j = d_j / p_j$. This leads to an improved estimate $\sum_{j=1}^{n} d'_j = \sum_{j=1}^{n} d_j / p_j$ for the number of households *N*. Moreover, since various background variables have been included in the regression models to calculate the p_j, bias caused by differential non-response will be reduced as well.

Next, the non-response adjusted weights d'_j for responding households *j* = 1, …, *n* are further adjusted by calibration. The linear component of the finally applied calibration model can be expressed as follows:

Region * [Prov + Urban + Diploma + Income + Owner + (Age * Sex) + (HHsize * Sex)]

The notation "Region * […]" indicates that Region is a special calibration variable, i.e. that a calibration model is implicitly applied separately within each region, and that, consequently, a constraint like (1), wherein d_j is replaced with d'_j, is satisfied within each region. In other words, the subsample of respondents in each region is calibrated to the number of households in that region. Consistency between population and respondent samples is thus improved at regional level (and therefore also at the level of the entire Belgian household population). For convenience, we can also say that the d'_j are calibrated to the absolute distribution of households across regions.

Similarly, the expression between square brackets implies that the d'_j are also calibrated to the absolute marginal distributions of households across provinces, Urban classes, Diploma classes, Income classes, Owner classes, Age classes, gender and HHsize classes. And finally, the d'_j are also calibrated to the absolute joint distributions of households by Age and Sex, and by HHsize and Sex. Formally, a set of equations

$$\sum_{j=1}^{n^*} w_j = \sum_{j=1}^{n^*} g_j d'_j = N^* \qquad (2)$$

is satisfied, where the asterisk * indicates that the summations are restricted to the n^* responding households in any of the classes of any of the calibration variables Prov, Urban, Diploma, Income, Owner, Age, Sex or HHsize, or in any of the cells in the crossing of the calibration variables Age and Sex, or HHsize and Sex. Moreover, calibration is to the numbers N^* of households in the subpopulations determined by the classes of the calibration variables, or the cells in crossings of some calibration variables. The calibration constraints (2) can also be written as:

$$\sum_{j=1}^{n} w_j x_j^* = \sum_{j=1}^{n} g_j d'_j x_j^* = N^* \qquad (2bis)$$

where x^* denotes the indicator (or membership) variable for any of the subpopulations corresponding to N^* (and n^*).

The above described calibration constraints are an important part of the calibration model. For completeness, we should just add mentioning that by extending the set of constraints with an appropriate global objective function measuring the "distance" between calibrated weights w_j and initial weights d'_j, and that by minimizing this objective function (under the given constraints):

- each $w_j = g_j d'_j = g_j \, d_j / p_j$ is as close as possible to the corresponding d'_j;
- each w_j (or g_j) is positive.

A detailed discussion of these issues is beyond the scope of this report.

Finally, we explain how the calibrated weights w_j are used to estimate totals and means of metric survey variables *y*, or counts and proportions corresponding to categories of categorical survey variables. Since each category of a categorical variable can be represented by an indicator variable *y*, and since totals and means of indicator variables are counts and proportions, respectively, our discussion hereafter can simply be stated in terms of totals and means for a survey variable *y*.

So, suppose that, for a survey variable *y* (being a metric or an indicator variable), the following parameters have to be estimated (where summations are over the entire population):

- the population total $Y = \sum_{j=1}^{N} y_j$,
- the population mean $\bar{Y} = \frac{1}{N} \sum_{j=1}^{N} y_j$.

Calibration methodology suggests the following estimate $\hat{Y}$ for total Y (where summation is over the entire respondent sample):

$$\hat{Y} = \sum_{j=1}^{n} w_j y_j \, . \qquad (3)$$

An alternative estimator is:

$$\hat{Y}^{alt} = \frac{N}{\sum_{j=1}^{n} w_j} \sum_{j=1}^{n} w_j y_j \,. \tag{3bis}$$

But, since $\sum_{j=1}^{n} w_j = N$ is included as a calibration constraint, in the present case of estimating the total of *y* for the entire population, $\hat{Y}^{alt} = \hat{Y}$.

Obviously, the mean $\bar{Y}$ is estimated by:

$$\hat{\bar{Y}} = \frac{1}{N} \sum_{j=1}^{n} w_j y_j = \frac{\sum_{j=1}^{n} w_j y_j}{\sum_{j=1}^{n} w_j} = \frac{\hat{Y}}{N}. \tag{4}$$

Now, suppose that for a survey variable *y*, the total and mean within an arbitrary subpopulation, with size N^* and number of responding households n^*, are to be estimated, i.e. we want to estimate:

- the subpopulation total $Y^* = \sum_{j=1}^{N^*} y_j$,
- the subpopulation mean $\bar{Y}^* = \frac{1}{N^*} \sum_{j=1}^{N^*} y_j$.

Again, calibration methodology suggests the following estimate $\hat{Y}^*$ for subpopulation total Y^*:

$$\hat{Y}^* = \sum_{j=1}^{n^*} w_j y_j \,. \tag{5}$$

If N^* is known, an alternative estimator is:

$$\hat{Y}^{*alt} = \frac{N^*}{\sum_{j=1}^{n^*} w_j} \sum_{j=1}^{n^*} w_j y_j \,. \tag{5bis}$$

If $\sum_{j=1}^{n^*} w_j = N^*$ is included as a calibration constraint (and therefore N^* is known), then $\hat{Y}^{*alt} = \hat{Y}^*$.

Obviously, the subpopulation mean $\bar{Y}^*$ can be estimated by either:

$$\hat{\bar{Y}}^* = \frac{1}{N^*} \sum_{j=1}^{n^*} w_j y_j \,, \tag{6}$$

provided N^* is known, or by:

$$\hat{\bar{Y}}^{*alt} = \frac{\sum_{j=1}^{n^*} w_j y_j}{\sum_{j=1}^{n^*} w_j}. \qquad (6bis)$$

If $\sum_{j=1}^{n^*} w_j = N^*$ is included as a calibration constraint (and therefore N^* is known), then $\hat{\bar{Y}}^{*alt} = \hat{\bar{Y}}^{*}$.

2.4.3 CONSTRUCTION OF THREE NEW VARIABLES BY AGGREGATION

The survey applies to the consumption of several different energy sources. To get a clear view on the total use of fuel and energy, we aggregated some of them. A new variable TOTAL_WOOD is a summation of the consumption of logs, pellets, wood waste and wood shavings. TOTAL_FUEL contains natural gas, fuel oil, coal, gas from a tank and from a cylinder, light oil and total wood. Aggregating total fuel and the total electricity consumption, gives information about the total use of energy.

The variables that are used for the calculation also contained some “missing values”. If this is the case for a household, the aggregation is labelled as a “missing value”.

3 ANALYSIS OF THE RESULTS OF THE SURVEY

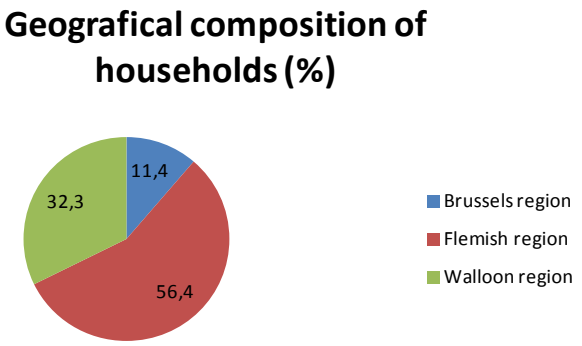
After a process of data arrangements and weight-constructing as is described in previous chapter 2, the set of data was ready for further statistical analysis. The results of the weighted data set are presented in this report. All the questions of the survey are grouped by theme.

In a first analysis, a **selection of questions** are presented and analyzed. For each theme, we start with an overview of most relevant questions and highlight the questions that are taken into account in this report. In ANNEX 7, a list is added with the relationship between each question in the survey and the name of the Excel-dataset accompanying this report. All questions (including graphs or tables) are available in an excel file accompanying this report. If available, the results of this survey are compared to other sources at Belgian level (like the census of 2001, data from the land register). The themes are:

- General characteristics of the dwelling and its occupants
- Energy related characteristics of the dwelling
- Characteristics of heating systems and sanitary hot water systems
- Energy consumption and presence of energy sources
- Electrical appliances

In a second part, **some cross results** are presented and evaluated. The cross results are chosen to help improve the understanding of the energy consumption and its evolution in the households.

As explained in the introduction, Belgium is a federal state. The regions are authorized for certain aspects of energy policy. For this reason, it is interesting to analyze the results not only at Belgian level, but also at regional level. The following figure represents the number of households per region in this survey. This division is very close to the official statistics on the number of private households per region[18], due to the Calwei weights. The Flemish region is the biggest region with 56 % of the households. Almost a third of the Belgian people live in the Walloon region. The capital, Brussels, accounts for 11%.



[18] The official amount of private households are in thousands (in 2009): Brussels: 511,5 (11,1%), Wallonia: 1493,8 (32,4%), Flanders: 2601,2 (56,5%) and Belgium: 4606,5.

Figure 1: Number of households in the regions (survey results)

3.1 ANALYSIS OF QUESTIONS PER THEME

3.1.1 GENERAL CHARACTERISTICS OF THE DWELLING AND ITS OCCUPANTS

The questions considered most relevant for this theme are listed in the following table. The questions in bold are included in this report, all results of the questions can be found in the excel files accompanying this report. In the Annex 7, a list shows the relation between each question in the survey and the name of the Excel-dataset in which the results are analyzed. It is also indicated if a comparable question was included in the census of 2001. If so, this comparison is also included in this report.

	GENRAL CHARACTERISTICS OF THE DWELLING AND ITS OCCUPANTS	CENSUS 2001?
Q28	**Which type of dwelling?**	X
Q30	**Ownership of the dwelling**	X
Q31	In case of ownership of the dwelling: build or bought?	
Q32	**When was the house originally built? (first inhabited)**	X
TOTAL_SURFACE	**Calculated total surface of all levels in the dwelling**	
TOTAL_HEATED_SURFACE	**Calculated total heated surface of all levels in the dwelling**	X
Q109	Number of occupants of the house/home/dwelling?	
Q117	Is the head of the family male or female?	
Q118	Year of birth of head of the family?	
Q119	Highest degree/diploma of the head of the family?	
Q120	Head of the family's primary activity?	
Q122	Monthly income of all occupants of the house/home (categorized)? (Income= net-income from labour /own company, all social benefits, income from renting)	
CONT81	Vicinity of the house / dwelling?	

Table 5: Relevant questions on the general characteristics of the dwelling and its occupants

A first characteristic is the **type of dwelling** [variable Q28]. Figure 2 shows that a third of the households in Belgium lives in an open single-family house. In the Flemish and Walloon region the percentage is even higher (40%). In Brussels, more than two third (69%) of the households lives in an apartment, studio, loft or room. In Figure 2 the category 'half open with attached garages' represents 3% of the dwelling types in Belgium. In subsequent analyses this dwelling type is joined together with the category 'half open single-family houses', in this chapter.

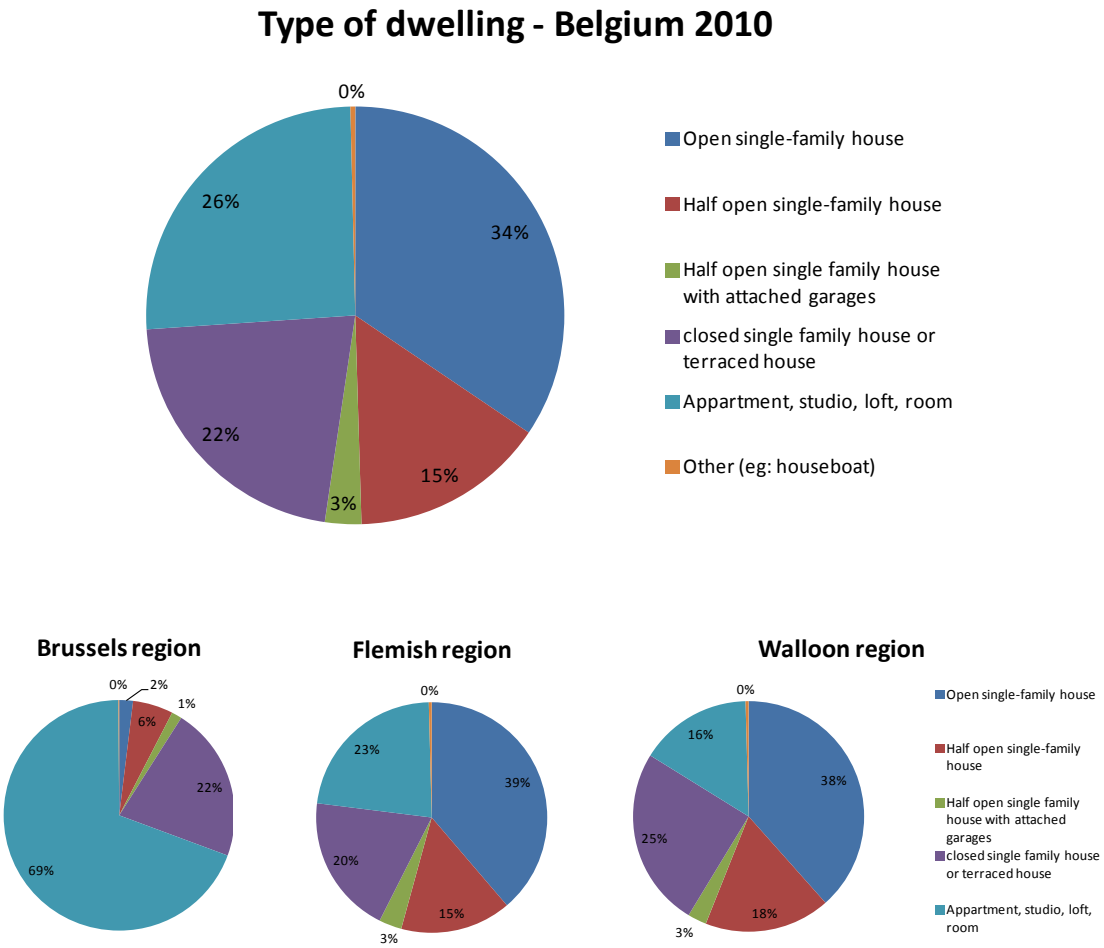


Figure 2: Type of dwelling in Belgium and in the regions (survey results)

The last general official socio-economic survey[19] (SES 2001 or census 2001) took place in 2001. The questionnaire also included the type of dwelling variable. In 2001, 36% of Belgian households were living in an open house, 20% in a half-open, 22% in a closed dwelling and 20% lived in an apartment or studio. The data in the two surveys show that the number of households living in apartments has increased from 20% in 2001 to 26% in 2011, while the number of households in open houses and half open houses has decreased.

More recent information can also be found in the official land register[20]. The database contains the number of accommodations per region. Such an accommodation is a building or a part of it, intended to be used for housing. There are however some difficulties with these data: the database does not have information about a building and the number of apartments in it if it is owned by one single owner. In this case, the database contains 1 building and only 1 accommodation. For buildings with apartments that are owned by different owners, there is no problem. For this reason, it is difficult to fully compare the results of this survey with the data from the land register in 2010.

[19] Source: **NIS, Nationaal Instituut van de Statistiek.** Databank met geanonimiseerde antwoorden binnen Vlaanderen op vragen van de socio-economische enquête. 2001.

[20] Source: **Economics, FOD.** http://statbel.fgov.be/nl/statistieken/cijfers/economie/bouw_industrie/gebouwenpark/ . [Online] Federal government, 24 08 2011.

The comparison of the data from the census 2001, the current survey (on 2011) and the land register (on 2010) are presented in the following figure.

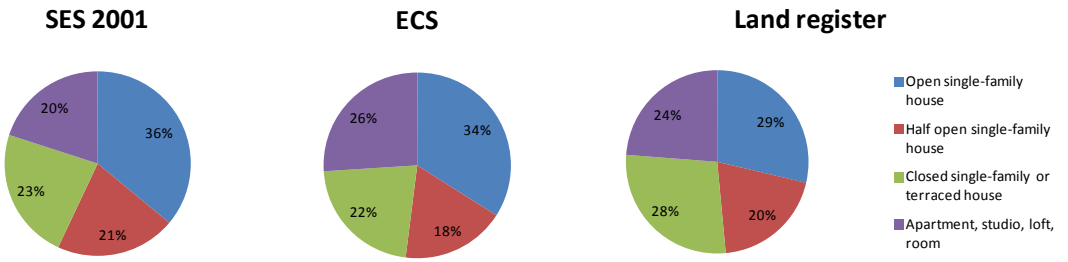


Figure 3: Comparison of the type of dwelling between the census 2001, the current survey and the land register (Belgium)

A second characteristic is the **ownership of the dwelling** [variable Q30]. Figure 4 shows that 67% of the households in Belgium owns (a part of) the property they live in. In the Flemish and Walloon region, the number is even higher, with 73% in Flanders and 68% in the Walloon region. In Brussels only 39% owns the property, the number of households who rent is much higher.

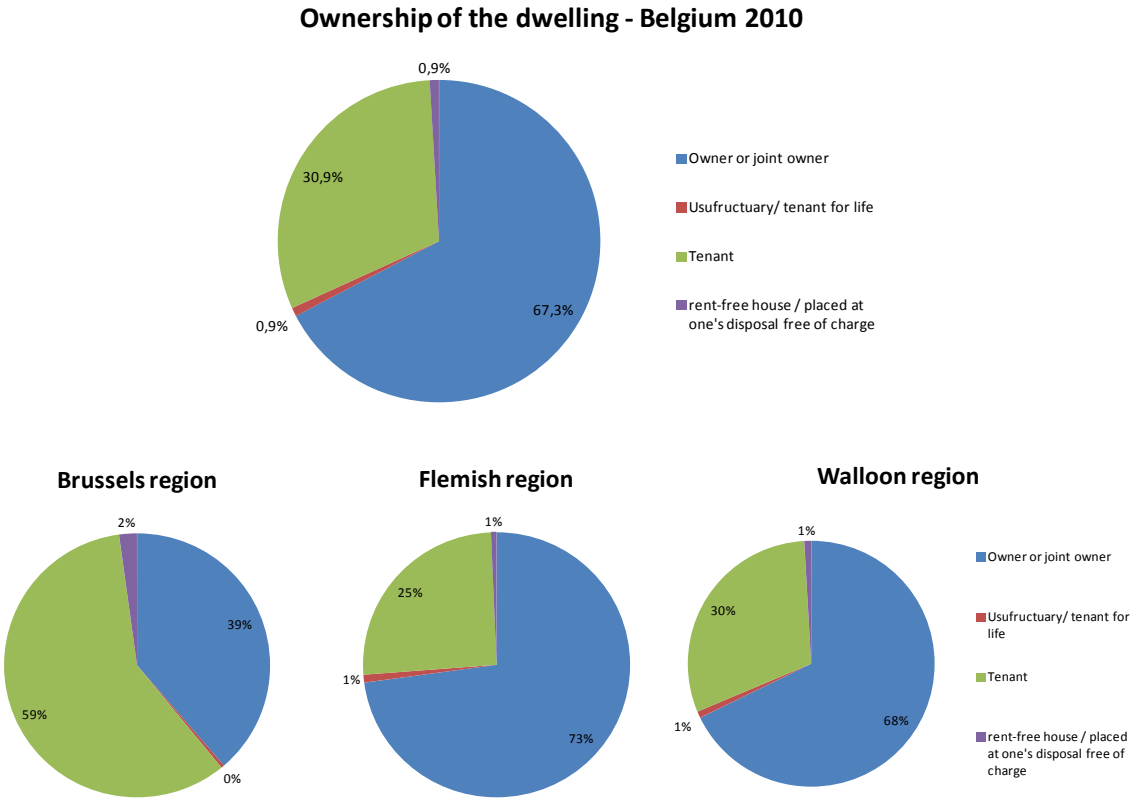


Figure 4: Ownership of the dwelling in Belgium and the regions (survey results)

The socio economic survey of 2001 also includes a question about ownership. Here, only 2 categories are included in the question. The respondent had to choose between (joint-) owner/usufructuary/ tenant for life or tenant. The same division is made for the ECS. Figure 6 shows the comparison.

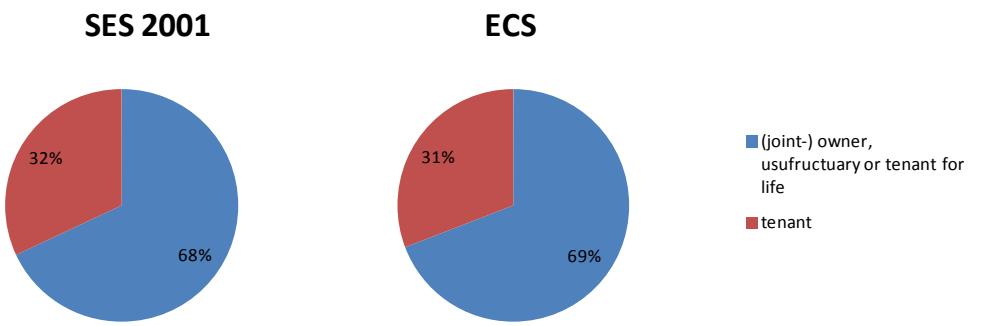
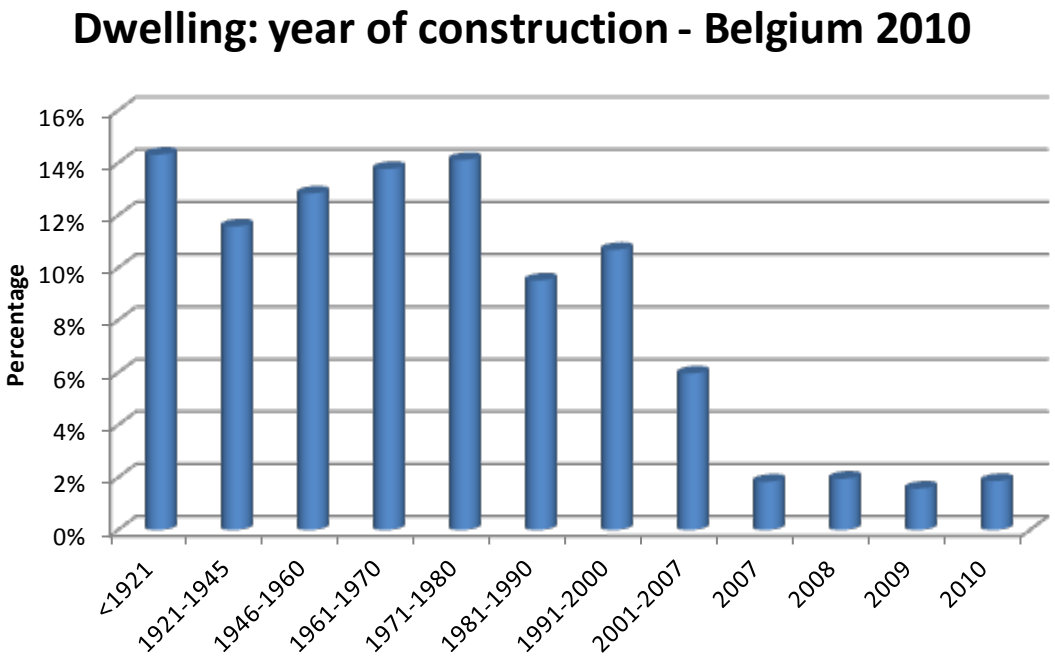


Figure 5: Comparison of the ownership of the dwelling between census 2001 and the current survey.

The results of the 2001 and the current survey are very similar.

A third characteristic is the **age of the building** [variable Q32], and it represents the year or decade in which the house was originally built. Figure 6 shows that 14% of Belgian houses was built before 1921, 12% was built between 1921 and 1945, 27% was built after the second world war and before the oil crises in the early 1970's. 35% was built between 1971 and 2001, and 14% was built in 2001 or after. In general, Brussels and the Walloon region have an 'older' housing stock than the Flemish region.



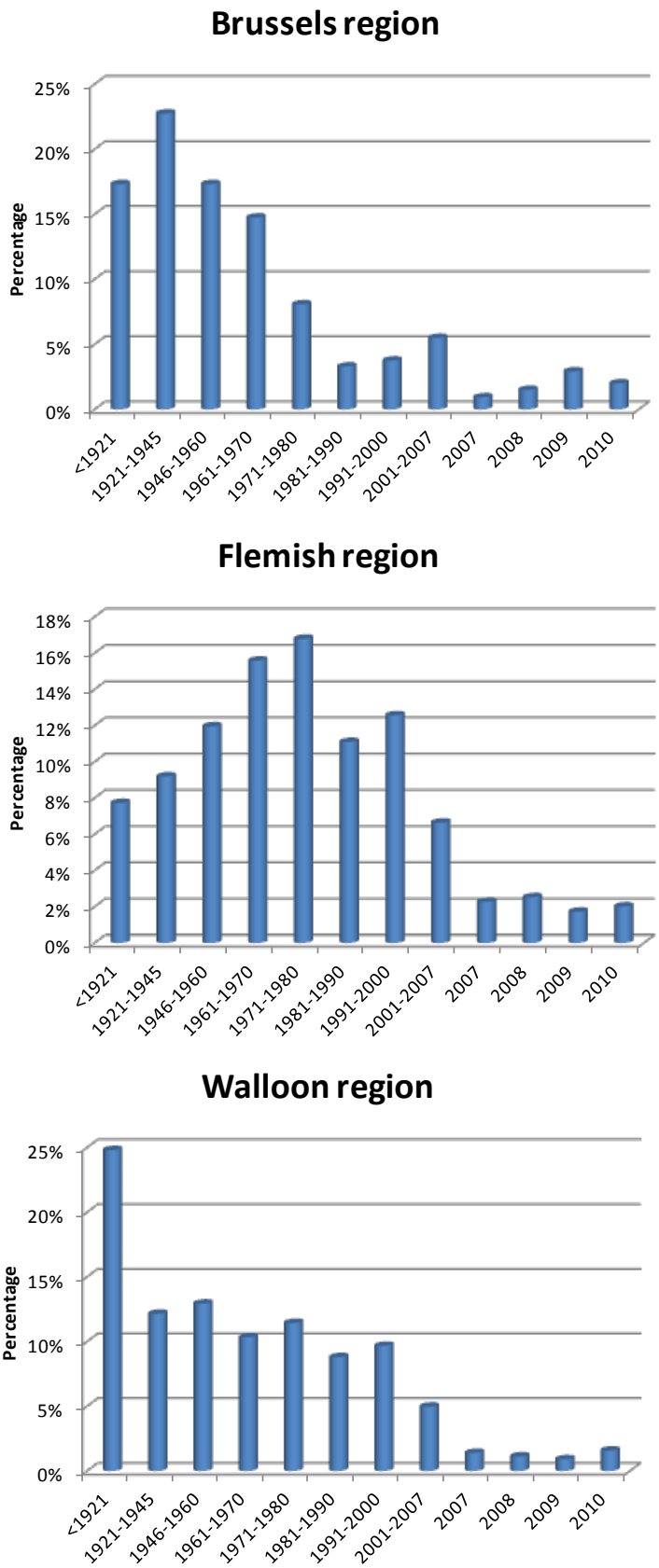


Figure 6: Age category of the dwelling in Belgium and per region (survey results)

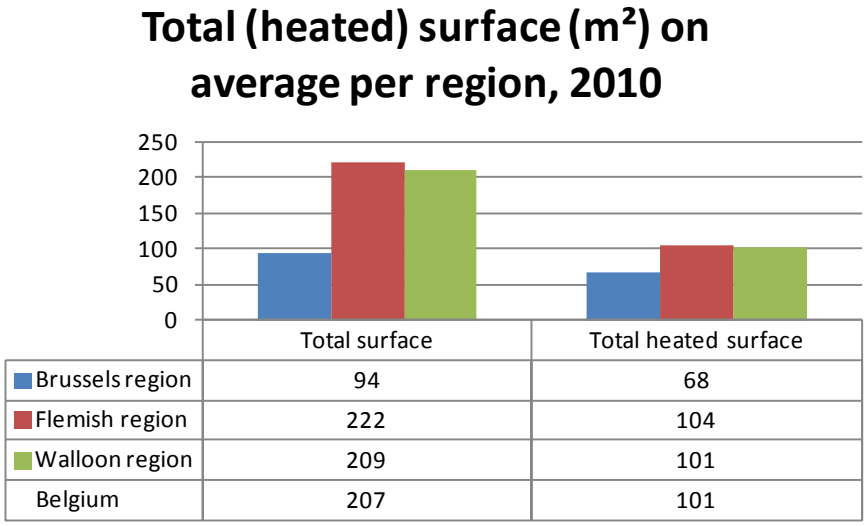
The most recent information to compare with, is the database of the land register[21]. A subdivision into age-categories is present. The categories are a bit different from those we used in the survey.

Region	Before 1918	1919-1945	1946-1961	1962-1970	1971-1981	After 1981
Brussels region	31%	20%	24%	17%	6%	2%
Flemish region	18%	7%	20%	20%	15%	20%
Walloon region	44%	12%	13%	11%	8%	12%
Belgium	29%	10%	17%	17%	12%	16%

Table 6: Age category of buildings for housing according to the land register

For Belgium, in the oldest age category, the land register reports a significantly higher percentage than the current survey. In contrast, the percentage of houses in the age category compared to houses built after 1981 is lower in the land register than in the current survey.

A fourth characteristic is the **total (heated) surface** [calculated result]. Figure 7 shows the average total surface of a dwelling and the average heated surface. The average total surface of a dwelling in Belgium is 207 m^2, of which 101 m^2 is heated. The Flemish region has the highest average surface of the 3 regions, Brussels the lowest. The Brussels region has also the highest % of apartments (Figure 2), which can explain this result.



	Total surface	Total heated surface
Brussels region	94	68
Flemish region	222	104
Walloon region	209	101
Belgium	207	101

Figure 7: Total (heated) surface (m^2) per dwelling, in Belgium and per region, 2010 (survey results)

Figures are to be considered as best estimates made by the respondents. Respondents were not given rules to make these estimates.

[21] Source: **Economics, FOD.** http://statbel.fgov.be/nl/statistieken/cijfers/economie/bouw_industrie/gebouwenpark/ . [Online] Federal government, 24 08 2011

In the census 2001, questions were raised concerning the surface of the living area. This does not correspond fully with the questions in the current survey. The general comparison is shown in the following figure.

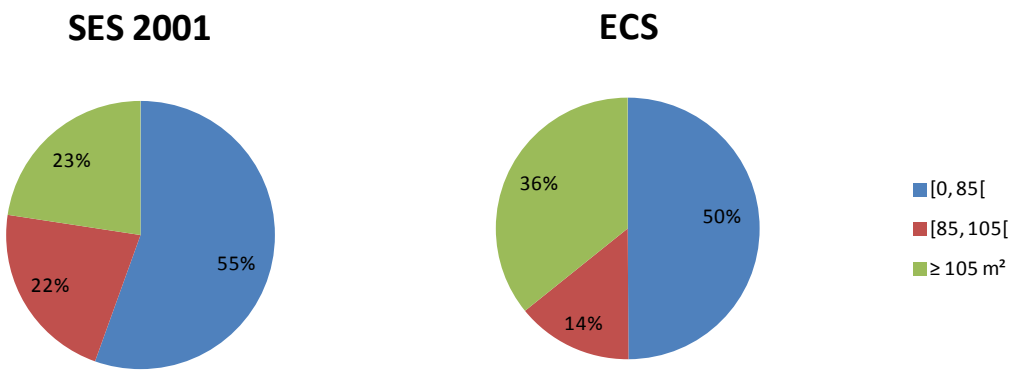


Figure 8: Comparison of the average (heated) surface between the census 2011 and the current survey (Belgium)

3.1.2 ENERGY RELATED CHARACTERISTICS OF THE DWELLING

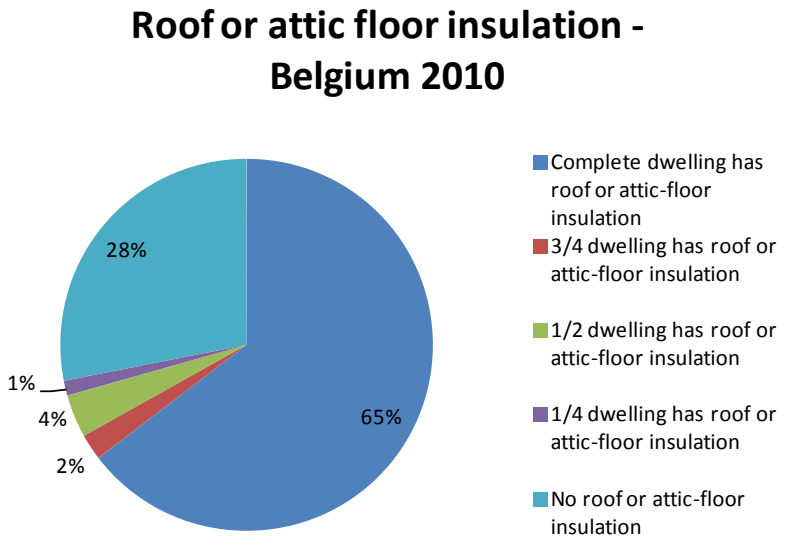
The questions considered relevant for this theme are listed in the following table. The questions in bold are included in this report, all questions can be found in the excel files accompanying this report. In the Annex 7 a list shows the relation between each question in the survey and the name of the Excel-dataset in which the results are analyzed. It is also indicated if a comparable question was included in the census of 2001. If so, this comparison is also included in this report.

	ENERGY RELATED CHARACTERISTICS OF THE DWELLING	NIS 2001
Q451	Can you control the temperature of your dwelling?	
Q46	At what temperature do you heat the living parts of your dwelling (dining and living room) during the day when someone is home in °C?	
Q471	When do you lower the temperature in the dwelling?	
Q49	How many baths (no showers) do you and your family take on average during the week in your dwelling?	
Q50	How many showers do you and your family take on average during the week in your dwelling?	
Q56_1	Amount of water-saving shower heads in the dwelling?	
Q56_2	Amount of shower heads with water saving mode	
Q62	In case of solar energy for sanitary hot-water supply and or for space-heating: Surface in m² of the solar panels?	
Q63	Do you use solar panels for heating the water of the swimming pool?	
Q65	Do you produce electricity with Photovoltaic-PV-panels?	
Q69	**Does the dwelling have roof or attic-floor insulation?**	X
Q72	**Ground floor of the dwelling completely or partly provided with floor insulation?**	
Q74	Is the ceiling of the basement or crawl space insulated (partly of completely)?	
Q78	**Outer walls of the dwelling completely or partly provided with insulation?**	X
Q811	Window frame: which material is used ?	
Q821	**Type of glazing in the dwelling (1st)**	

Q822	Type of glazing also used in the dwelling (2nd)	
Q823	Type of glazing also used in the dwelling (3rd)	
Q83	**Number (share) of windows with double glazing?**	X
Q84	**Number (share) of windows with high efficiency glazing or super insulating glass?**	
Q851	Type of ventilation (1st) in the dwelling	
Q852	Type of ventilation (2nd) in the dwelling	
Q853	Type of ventilation (3rd) in the dwelling	
Q854	Type of ventilation (4th) in the dwelling	
Q86	Does your dwelling have an air-conditioning system (integrated system or mobile)?	
Q88	Age of the air-conditioning system (years)?	
Q91	What is the cooling temperature in summer during the day °C?	
Q92	What is the cooling temperature in summer during the night °C?	

Table 7: Relevant questions on the energy related characteristics of the dwelling

A first characteristic is the **presence of roof or attic-floor insulation** [variable Q69]. Figure 9 shows that 65% of the dwellings in Belgium reports to have roof or attic floor insulation for the whole dwelling. 28% claims to have no roof or attic floor insulation. A smaller number of dwellings (7%) has partial roof or attic floor insulation in place. The Flemish region has the most dwellings with complete roof or attic floor insulation in place (68%), although still ¼ of the dwellings has no form of roof insulation. In Brussels-Capital and the Walloon region, 33% of the houses does not have any roof or attic floor insulation.



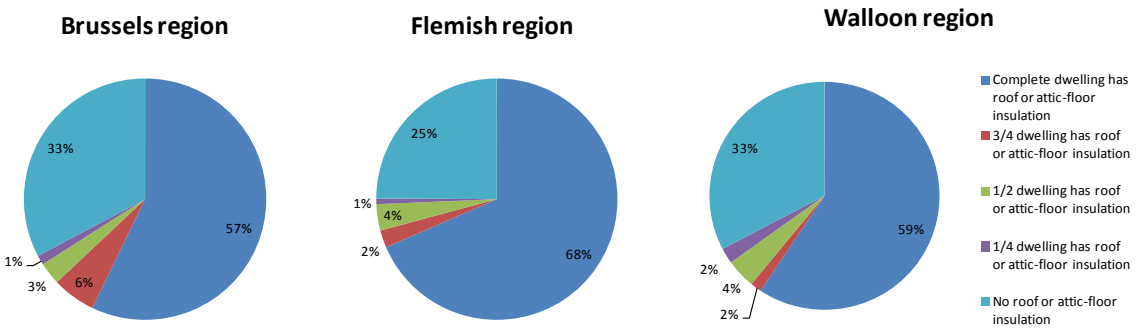


Figure 9: Presence of roof or attic-floor insulation in Belgium and the regions (survey results)

In the census 2001, there were also questions on the presence of roof insulation. In 2001, 43% of the houses had no kind of roof insulation present. This number has declined to 28% in the current survey. This evolution can be explained by the growing awareness of the importance of roof insulation, and of course the existence of (regional) premiums and possible tax deductions.

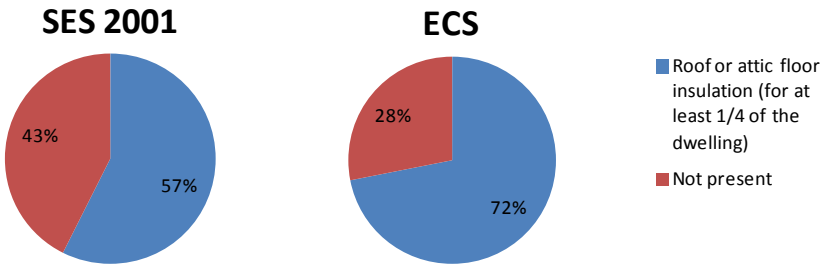


Figure 10: Comparison between census 2001 and current survey results on the presence of (partial) roof insulation in Belgium

A second characteristic is the **presence of (ground) floor insulation** [variable Q72]. Figure 11 shows that 76% of houses has no floor insulation and only 19% has floor insulation for the complete dwelling. Households living in the Brussels region, seem to have the least floor insulation. The results for the Flemish and Walloon region are very similar to the overall Belgian results. In the census 2001, this question was not asked and therefore we can't make any comparison with 2001 results.

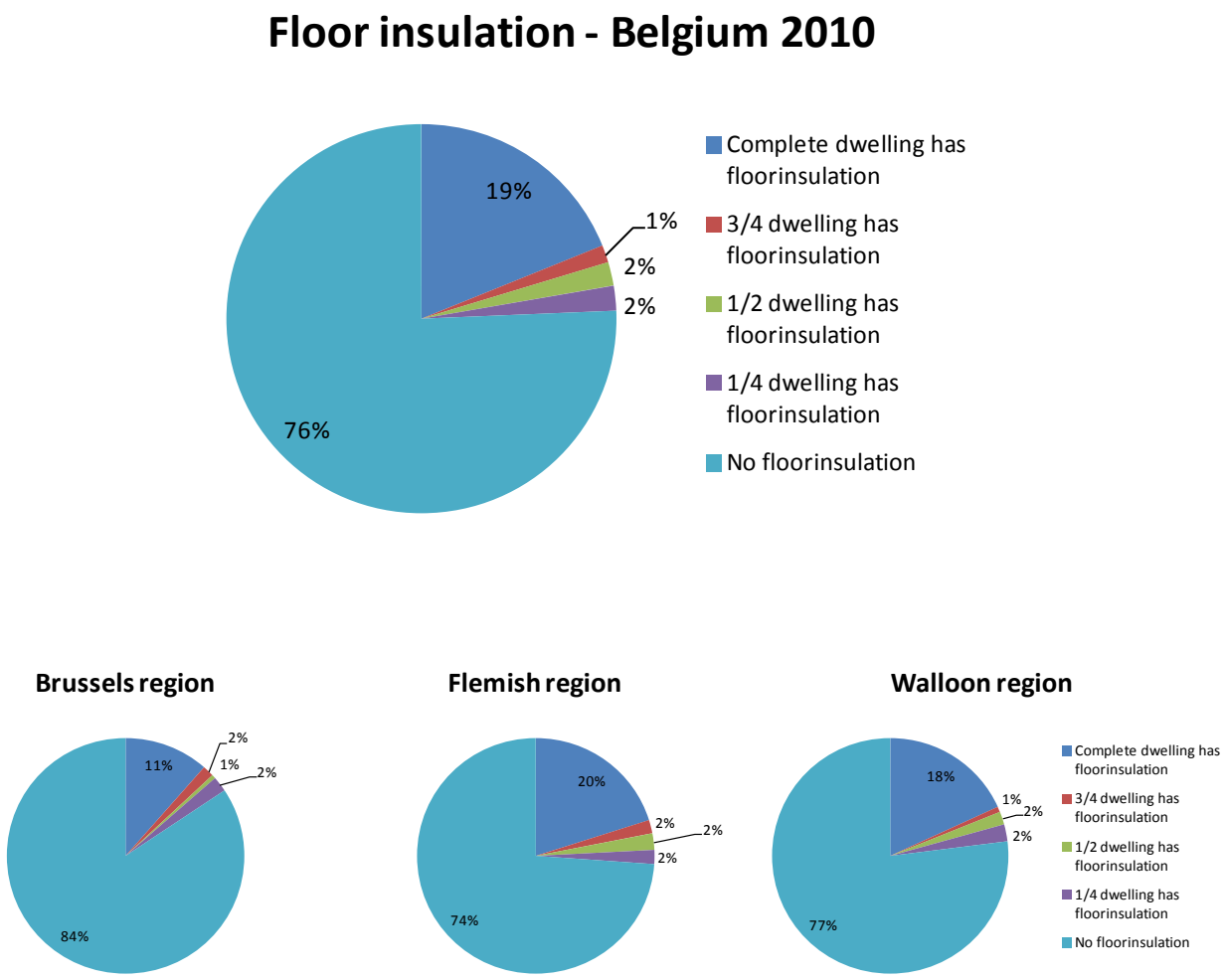


Figure 11: Presence of floor insulation in Belgium and the regions (survey results)

A third characteristic is the **presence of insulation of the outer walls** [variable Q78]. Figure 12 shows that 62% of the houses in Belgium has no form of outer wall insulation, 29% says all outer walls have been insulated and 9% has partial insulation of the outer walls. The Walloon region has similar results as the whole of Belgium, Brussels has less dwellings with outer wall insulation present (12% full, 5% partial), the Flemish region has 34% of houses with full outer wall insulation, and has 38% houses with no form of outer wall insulation.

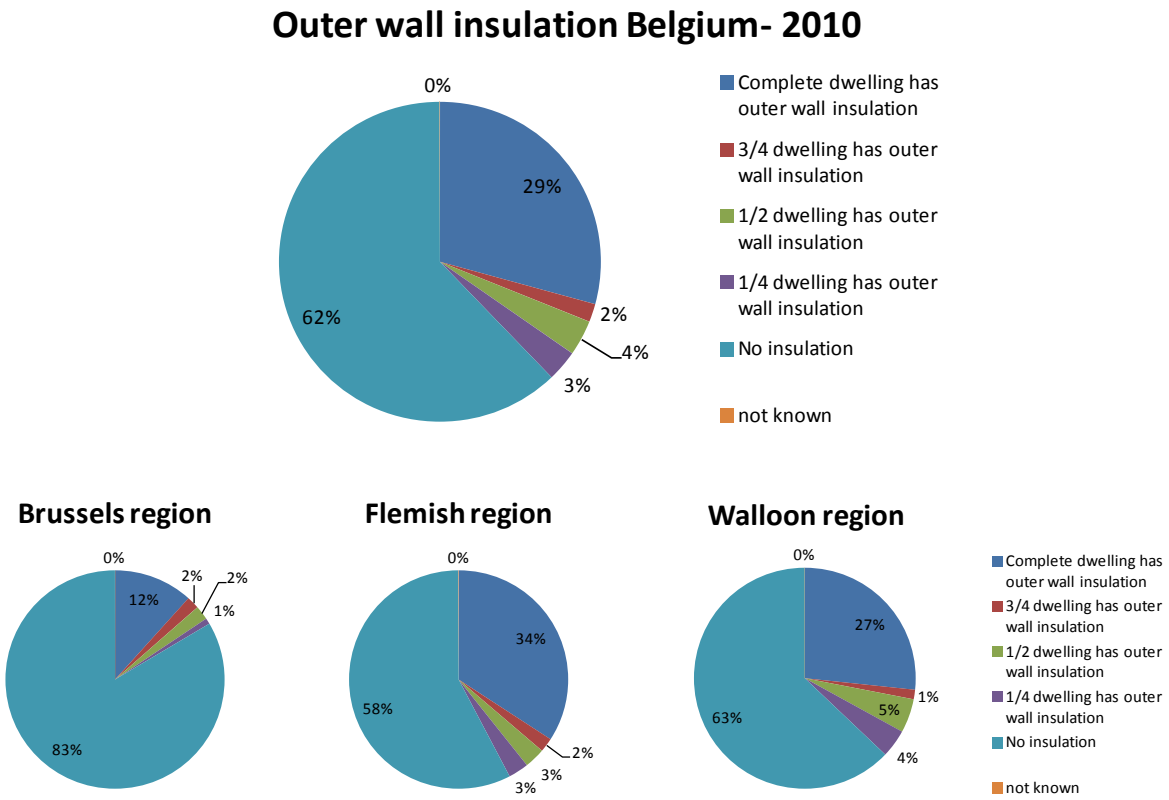


Figure 12: Presence of insulation of the outer walls in Belgium and the regions (survey results)

In the census of 2001, questions were asked on the presence of outer wall insulation. In the following figure, the results of the current survey are compared with the census 2001 results.

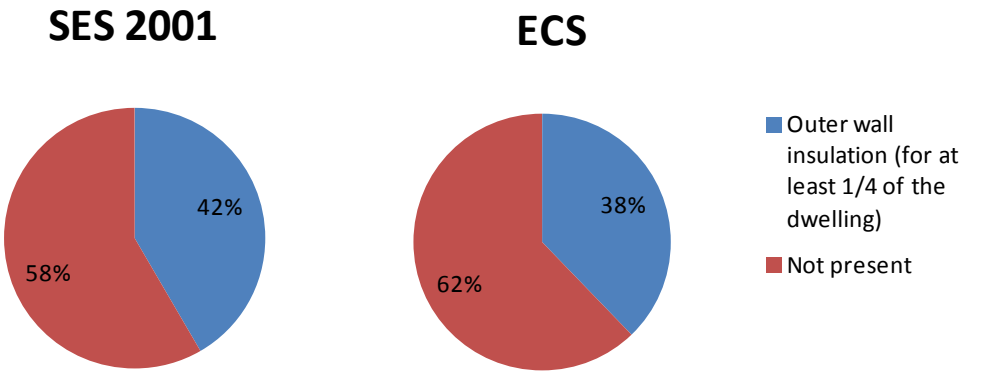


Figure 13: Comparison between census 2001 and current survey results on the presence of (partial) outer wall insulation in Belgium

The results of the current survey and the census 2001 show similar results, although a slight inconsistency can be observed. In 2001 58% had no form of outer wall insulation and in 2011 it appears to have increased to 62%.

A fourth, fifth and sixth characteristic is the **dominant type of glazing**, **number or share of windows with double glazing** [variable Q83] and the **number or share of windows with high efficiency or super insulating glazing** [variable Q84].

Before looking at the share of double glazing and high efficiency or super insulating glazing, the results of the dominant type of glazing in the dwellings are presented in the following table [variable Q821].

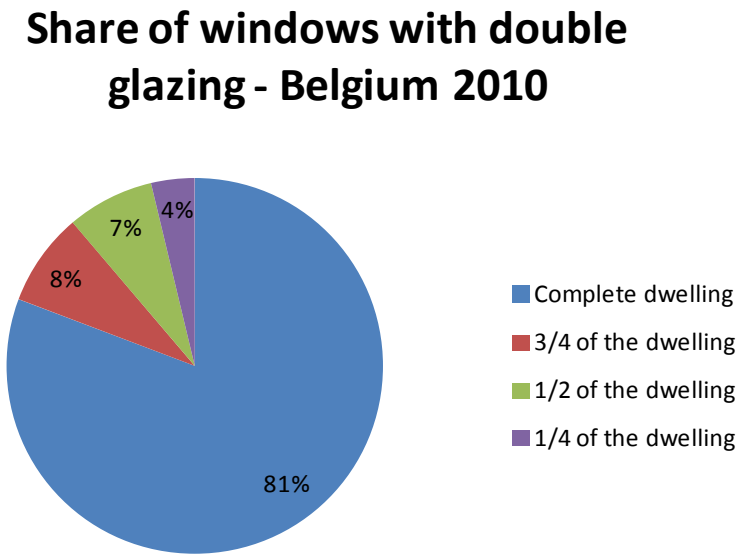
% (1st type of glazing)	single glazing	double glazing	HE or super insulating glazing
Brussels	19,8%	73,9%	6,3%
Flemish region	16,6%	67,8%	15,6%
Walloon region	16,0%	75,0%	9,1%
Belgium	16,8%	70,8%	12,4%

Table 8: Dominant type of glazing in dwellings in Belgium and the regions (survey results)

In Belgium, 16,8% has as main type of glazing single glazing. In Brussels, this percentage is slightly higher (19,8%), and in the Flemish and Walloon region, the figures are similar to the Belgian overall results. High efficiency or super insulating glazing is most present in the Flemish region.

A large majority (92%) of the Belgian dwellings has only one type of glazing. The glazing in 12% of the Belgian houses is exclusively of the type 'single'. 68% has only double glazing and another 12% contains solely high efficiency or super insulating glazing.

In the next figures we look at the shares of double glazing and the shares of high efficiency or super insulating glazing, in case these are (partially) present in the dwellings. In Belgium, 81% of dwellings have double glazing for the whole dwelling. In the different regions, the results are very similar to the Belgian overall results.



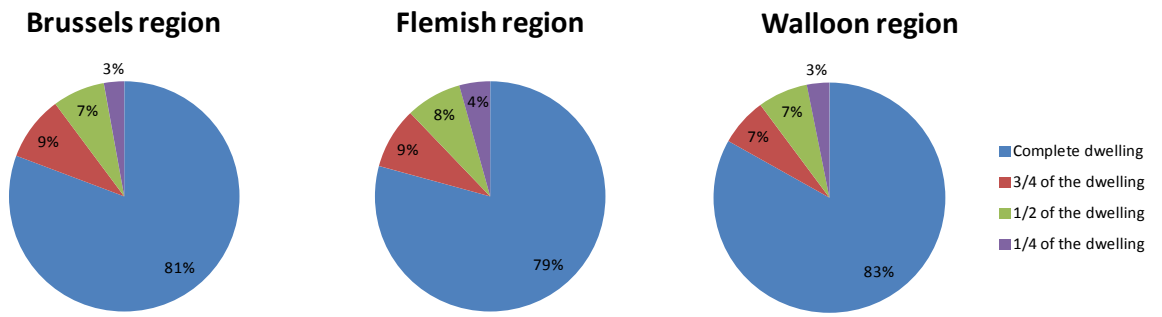


Figure 14: Share of windows with double glazing in Belgium and the regions (survey results)

If we look at the share of high efficiency or super insulating glazing, the results for Belgium show that 68% of houses has this type of glazing for the whole house. The results for the regions are again very similar.

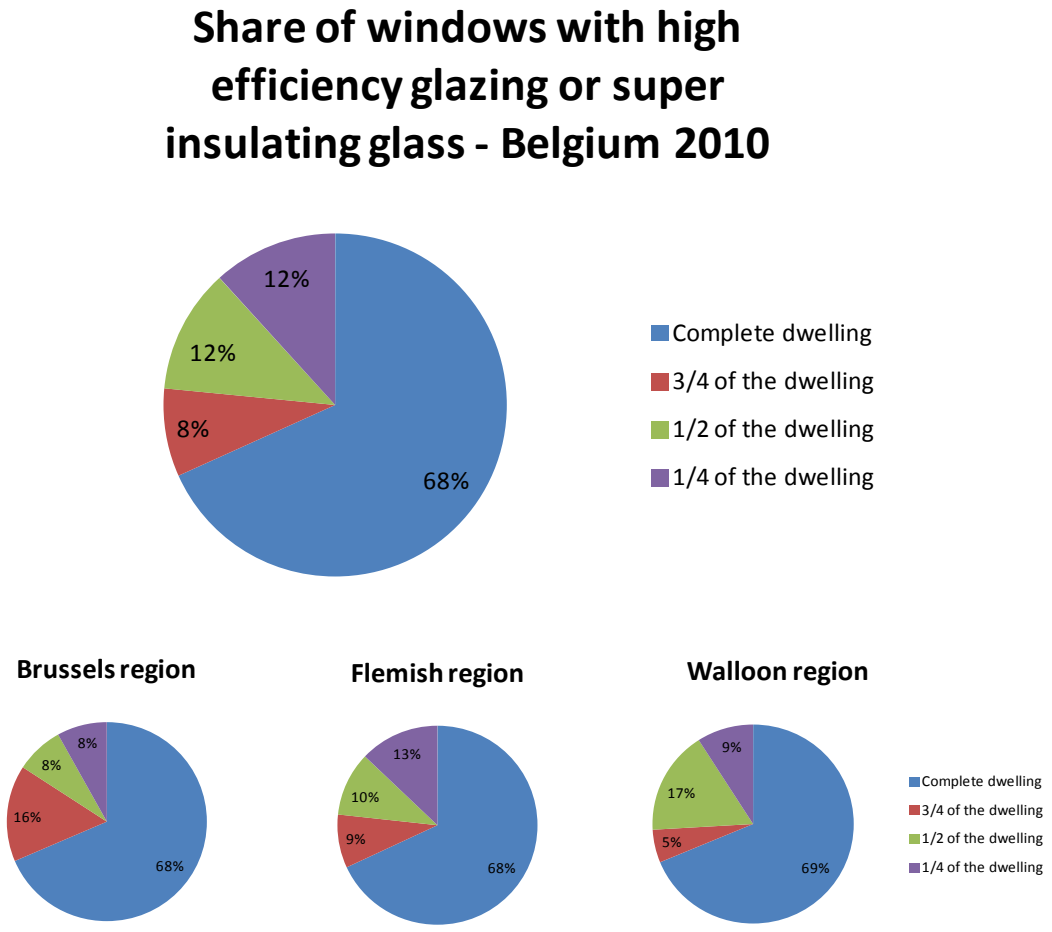


Figure 15: Share of windows with high efficiency or super insulating glazing in Belgium and the regions (survey results)

In the census 2001, questions were asked about the presence of double (or high efficiency) glazing and single glazing. These results can be compared with the results of the present survey.

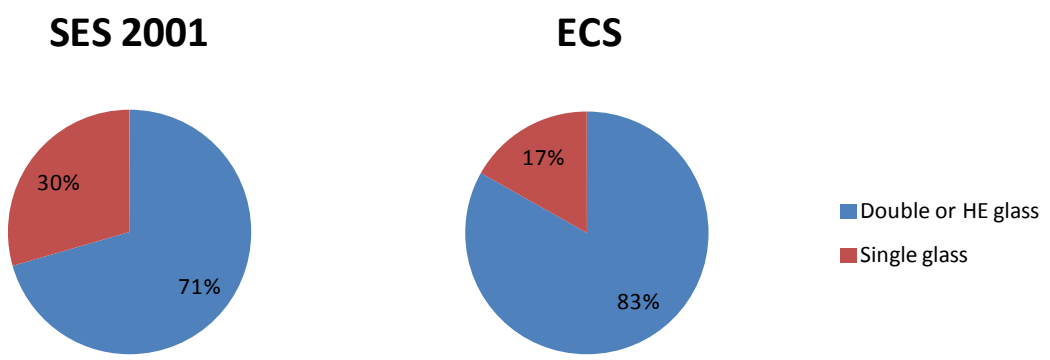


Figure 16: Comparison of the presence of double (or high efficiency) glazing and single glazing in the census 2001 and the current survey in Belgium

The results of the census 2001 show that 71% had (partial) double or high efficiency glazing. In the current survey, this % has risen to 83%. Again, the effect of more awareness on energy savings, and the premiums and tax deductions can explain this evolution.

3.1.3 INVESTMENTS WITHIN THE NEXT 5 YEARS

The plans for investments within the next 5 years by households is examined for an energy efficient heating system [Q103], insulation for roof or attic floor [Q104], insulation for exterior wall [Q105], installing high efficiency glass or super-insulating glass [Q106], floor insulation for the ground floor [Q107] and sun panels for electricity (PV-panels) or heating / sanitary hot water [Q108].
The results of the analysis are included in an Excel file (ECS_2012_Investment.xlsx) by region and for Belgium.

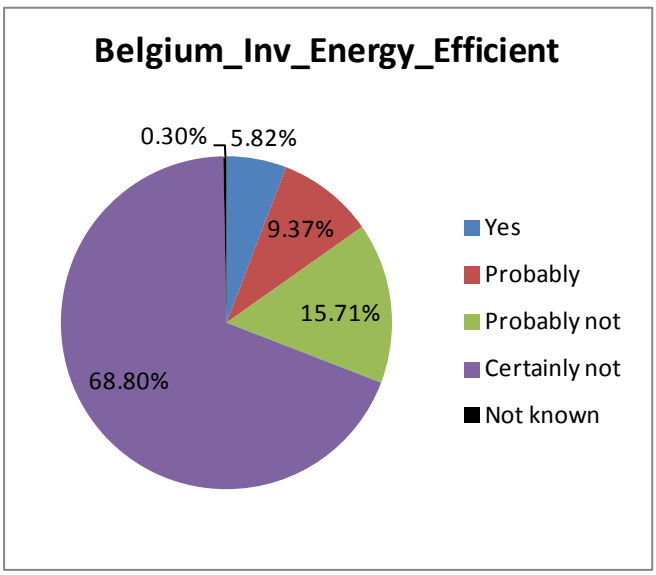


Figure 17: Investment plans in an energy efficient heating system within the next 5 years (eg: heat pump, high efficiency boiler, condensing boiler)in Belgium, 2010

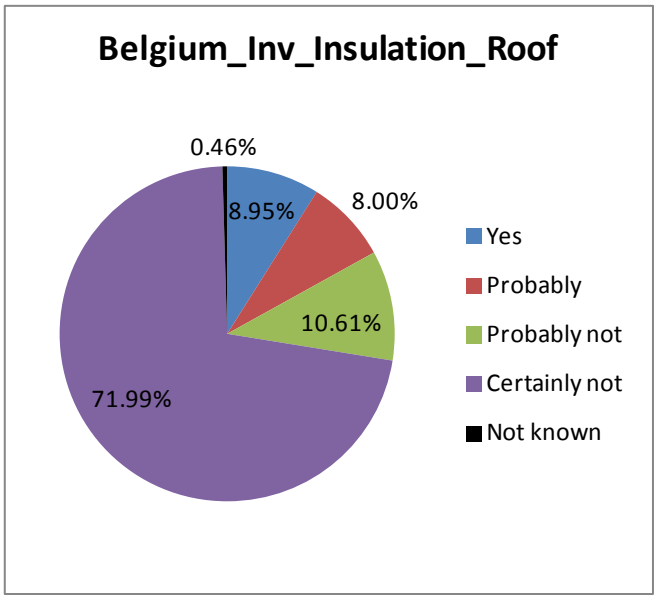


Figure 18: Investment plans in insulation for roof or attic floor within the next 5 years in Belgium, 2010

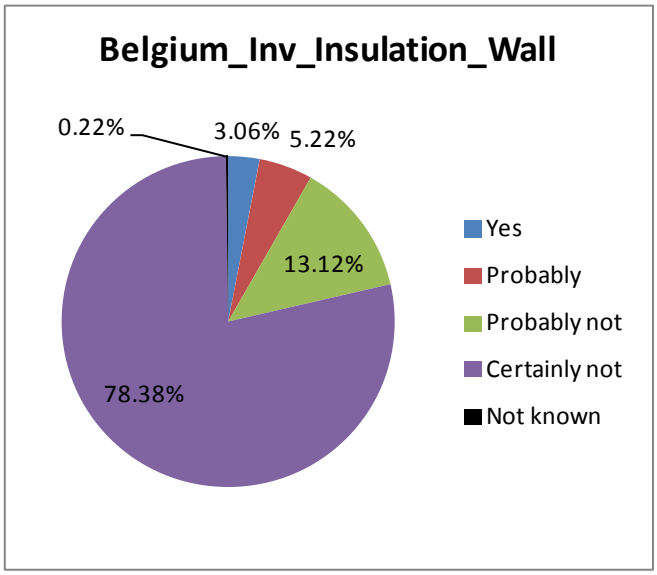


Figure 19: Investment plans in insulation of exterior wall within the next 5 years in Belgium, 2010

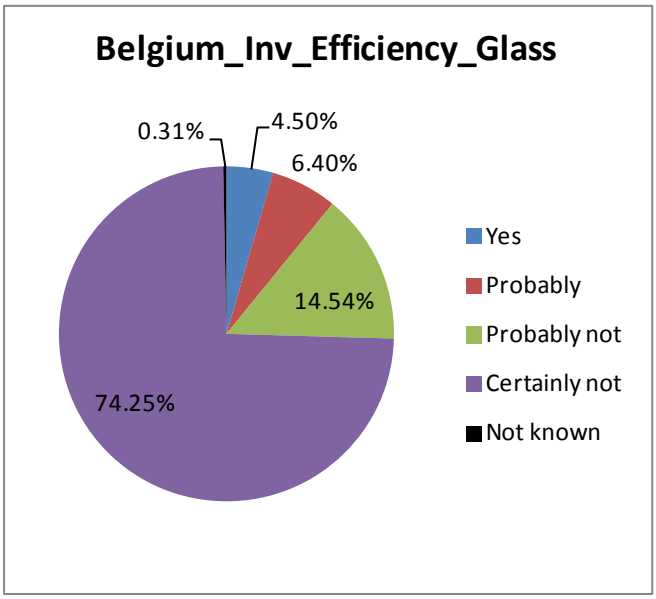


Figure 20: Investment plans for installing high efficiency glass or super-insulating glass within the next 5 years in Belgium, 2010

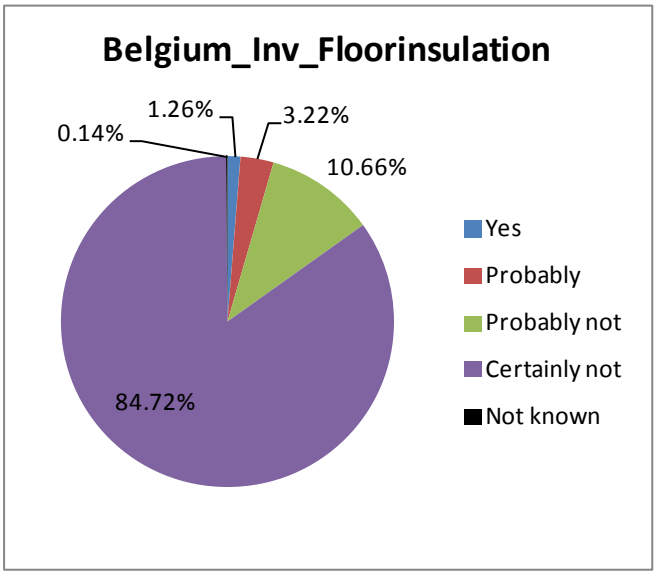


Figure 21: Investment plans in floor insulation for the ground floor within the next 5 years in Belgium, 2010

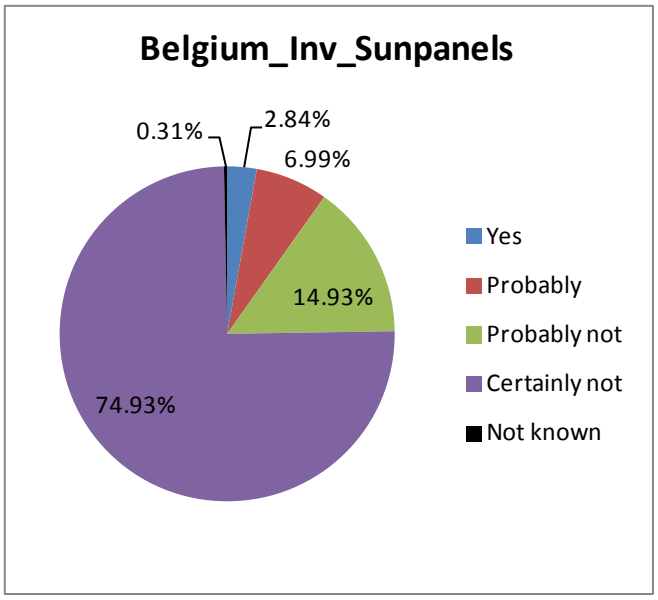


Figure 22: Investment plans in sun panels for electricity (PV-panels) or heating / sanitary hot water within the next 5 years in Belgium, 2010

3.1.4 CHARACTERISTICS OF THE HEATING SYSTEMS AND SANITARY HOT WATER SYSTEMS

The questions considered relevant for this theme are listed in the following table. The questions in bold are included in this report, all questions can be found in the excel files accompanying this report. In the Annex 7 a list shows the relation between each question in the survey and the name of the Excel-dataset in which the results are analysed. It is also indicated if a comparable question was included in the census of 2001. If so, this comparison is also included in this report.

	CHARACTERISTICS OF THE HEATING SYSTEMS AND SHW SYSTEMS	NIS 2001
Q4	**With which fuel do you mainly heat your dwelling?**	X
Q5	Do you heat your dwelling with a second source of energy?	
Q6	What is second most important source of energy you use in the dwelling?	
Q7	**With which system do you mainly heat your dwelling?**	X
Q8	**Which type of natural gas boiler (individual central heating) do you use?**	
Q9	**Which type of fuel oil boiler (individual central heating) do you use ?**	
Q10	From which period is the individual central heating system?	
Q16	How many radiators/convectors does the dwelling hold?	
Q17	How many radiators/convectors have radiator foil?	
Q18	How many radiators/convectors have thermostatic valves?	
Q19	Amount of separate direct heaters in the dwelling (besides the individual or collective central heating installation)?	
Q201, Q202, Q203	separate heater 1, 2, 3(besides the individual or collective central heating installation): Which type?	

V78	How old in years is the oldest electric heating appliance? (separate direct heater besides the individual or collective central heating installation)
V86	How old in years is the oldest wood pellet stove (separate direct heater besides the individual or collective central heating installation)?
V88	How old in years is the oldest fireplace or built-in cassette (separate direct heater besides the individual or collective central heating installation)?
Q23	How many days a week do you use your separate direct heating system (besides the individual or collective central heating installation) during heating season?
Q24	**How many separate decentral heating appliances are present in the household (in dwelling without central heating) ?**
Q251, Q252, Q253, Q254	**separate decentral heater 1, 2, 3 and/or 4 (in dwelling without central heating): Which type?**
V92	How old in years is the oldest electric accumulator appliance? (separate direct heater in dwelling without central heating)
V93	Does the oldest electric accumulator appliance (separate direct heater in dwelling without central heating) have a label of high efficiency (label A)?
V94	How old in years is the oldest direct electric convector appliance? (separate direct heater in dwelling without central heating)
V95	Does the oldest direct electric convector appliance (separate direct heater in dwelling without central heating) have a label of high efficiency (label A)?
V96	How old in years is the oldest electric underfloor heating? (separate direct heater in dwelling without central heating)
V97	Does the oldest electric underfloor heating (separate direct heater in dwelling without central heating) have a label of high efficiency (label A)?
V98	How old in years is the oldest gas stove? (separate direct heater in dwelling without central heating)
V99	Does the oldest gas stove (separate direct heater in dwelling without central heating) have a label of high efficiency (HR or HR+)?
V100	How old in years is the oldest fuel oil stove? (separate direct heater in dwelling without central heating)
V101	Does the oldest fuel oil stove (separate direct heater in dwelling without central heating) has a label of high efficiency (Optimaz)?
V102	How old in years is the oldest coal stove? (separate direct heater in dwelling without central heating)
V103	Does the oldest coal stove (separate direct heater in dwelling without central heating) have a label of high efficiency (BENOR)?
V104	How old in years is the oldest wood pellet stove (separate direct heater in dwelling without central heating)?
V106	How old in years is the oldest fireplace or built-in cassette (separate direct heater in dwelling without central heating)?
Q52	In which way do you heat the water of your bath, shower and/or sink: sanitary hot-water supply?
Q5301, Q5302	**installation-type 1, 2 for sanitary hot-water supply (bath, shower and or sink)?**
Q57	How do you provide your kitchen with hot water?

Q58	Do you use the same installation for heating the kitchen water as for heating the water for bath, shower/sink?
Q5901, Q5902	**installation-type 1,2 for sanitary hot-water supply (kitchen)?**
Q143,Q145, Q147, Q149, Q151, Q153, Q155, Q157, Q159, Q161, Q163, Q165, Q167, Q169	**From which period dates the sanitary hot water installation (for each type of installation)?**

Table 9: Relevant questions on the characteristics of the heating systems and SHW systems

A first characteristic is the **type of fuel** [variable Q4] that is used **as main energy source for heating**. Figure 23 shows that the main fuel used for heating by households in Belgium is natural gas (55%). The results per region show diverging results: in Brussels 77% of the households uses natural gas as main source for heating, followed by fuel oil (17%). In the Flemish region, 61% uses natural gas as main heating source, followed by fuel oil (27%). In the Walloon region, fuel oil is the main source for heating (47%), natural gas follows with 39%. The different results are partially caused by the presence of a natural gas network (or not). The natural gas grid is more extended in the Flemish region (and certainly in the urbanized Brussels region) than in the Walloon region. This is linked with the lower inhabitants density in Wallonia.

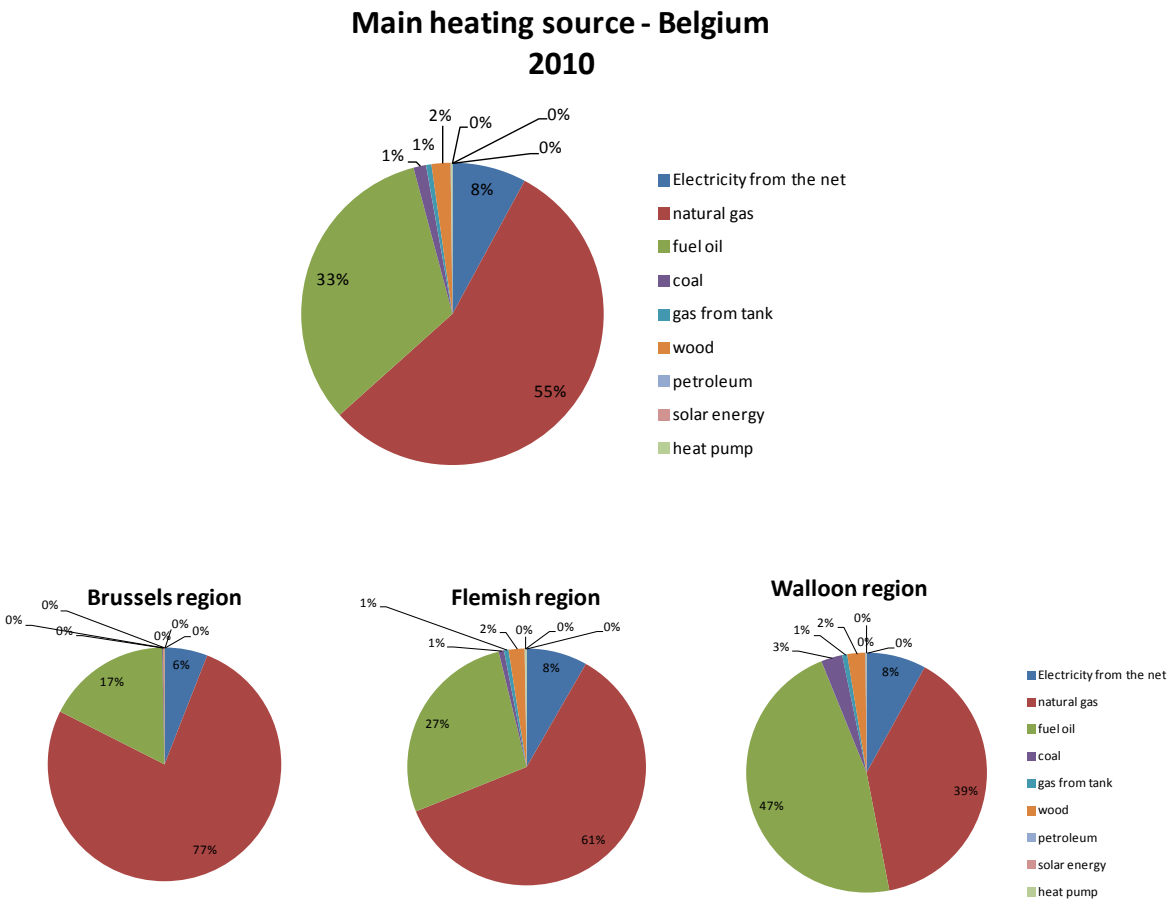


Figure 23: Main type of energy source used for heating (survey results)

In the following figure, the comparison is made between the main fuel used in the current survey and the results from the census 2001.

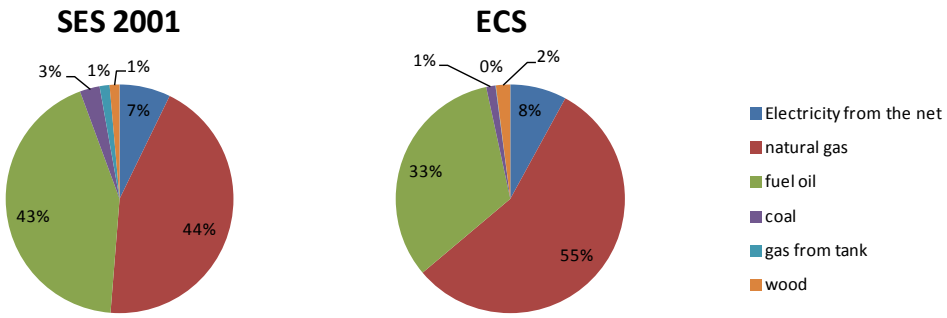


Figure 24: Comparison of the main type of energy source for heating between the current survey and the census 2001 in Belgium

In 2001, approximately the same number of households used natural gas (44%) and fuel oil (43%) as their main energy source for heating. In the current survey, we see a shift from fuel oil to natural gas. The use of coal was already small in 2001 and has further declined. The use of wood as main fuel has increased, but remains small.

A second interesting characteristic is the **type of system that is used to (mainly) heat the dwelling** [Q7].

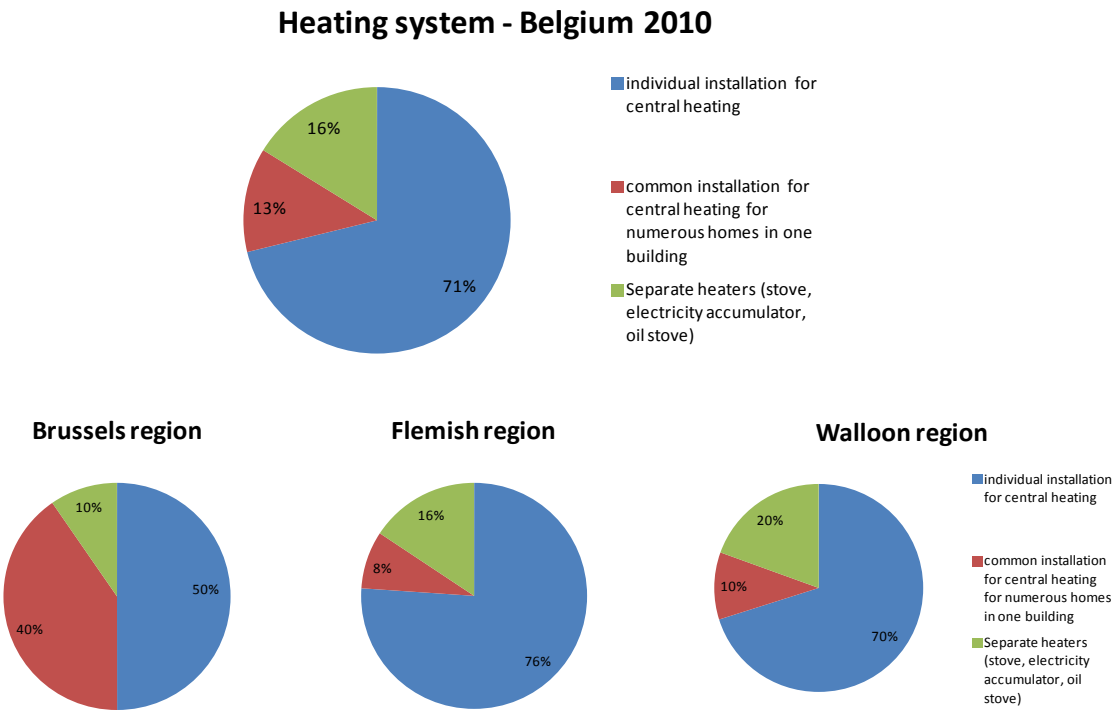


Figure 25: Type of heating system (survey results)

71% of Belgian households in the survey has an individual central heating system. If we add the collective central heating systems, we see that 84% of the Belgian households has central heating in place (individual or collective). Again, as was also the case for the type of fuel used, there are differences between the regions. In Brussels, only 50% has an individual central heating system, in Flanders 76% and in the Walloon region 70%. If we add here also the collective central systems, we see that in Brussels 90% of the households has central heating, in Flanders 84% and in Wallonia 80%.

In the following figure, we compare the results of this survey with the results of the census 2001.

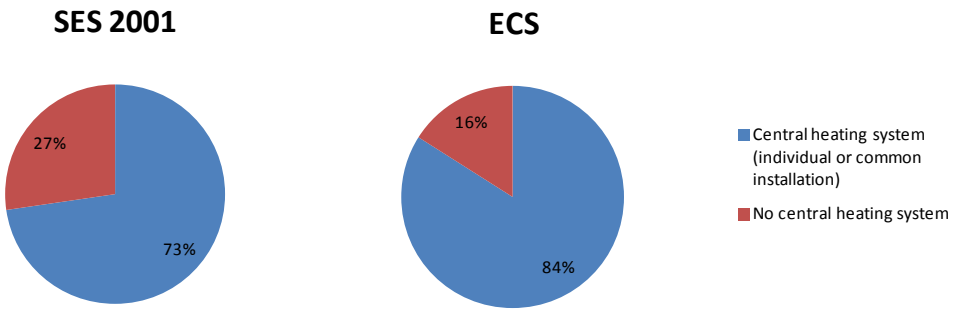


Figure 26: Comparison the heating system between the current survey and the census 2001 in Belgium

In 2001, 73% of households in Belgium had central heating. According to the results of the current survey, this number has risen to 84%.

The third and fourth characteristic is the **type of boiler for individual central heating** [Q8 and Q9]. A distinction is made for individual central heating on natural gas and on fuel oil.

61% of the Belgian individual *central heating systems on natural gas* are high efficiency (HR^+) or condensing boilers (HR TOP). 39% of the systems do not have an energy efficiency label. Figure 27 shows certain differences between the regions. In the Flemish region 68% of those natural gas boilers have an energy efficiency label, whereas in the Walloon region 49% and in the Brussels Capital region 43% have an energy efficiency label.

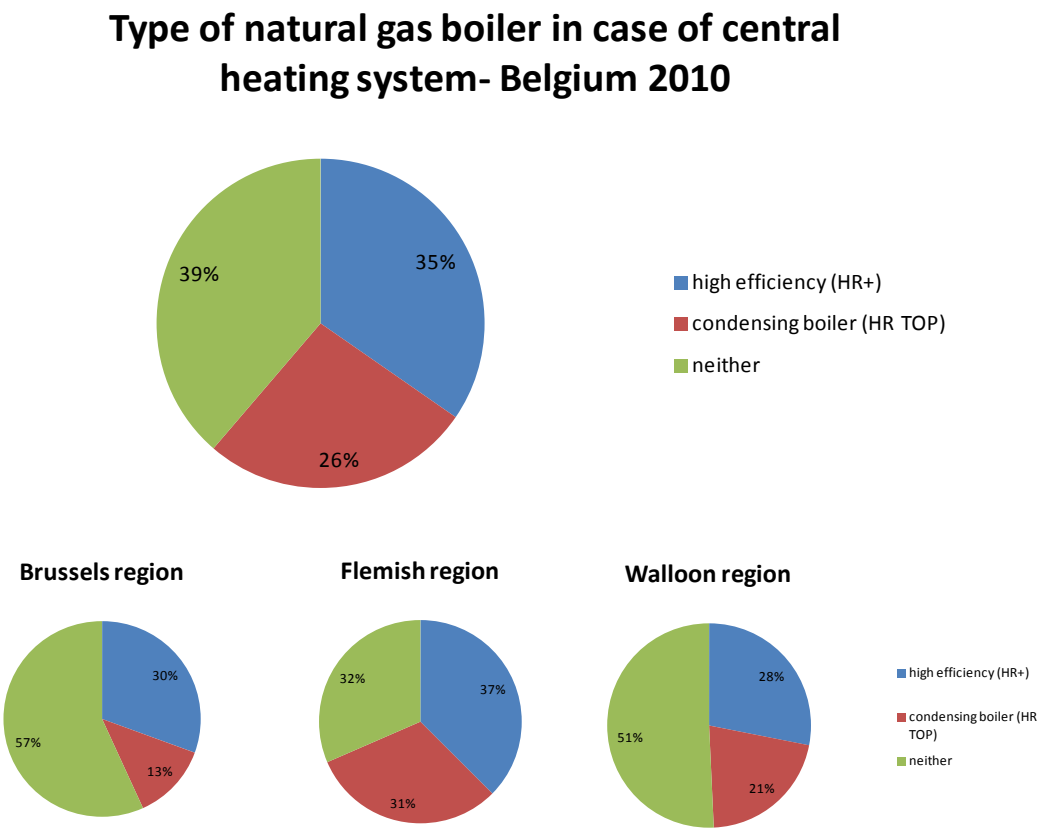
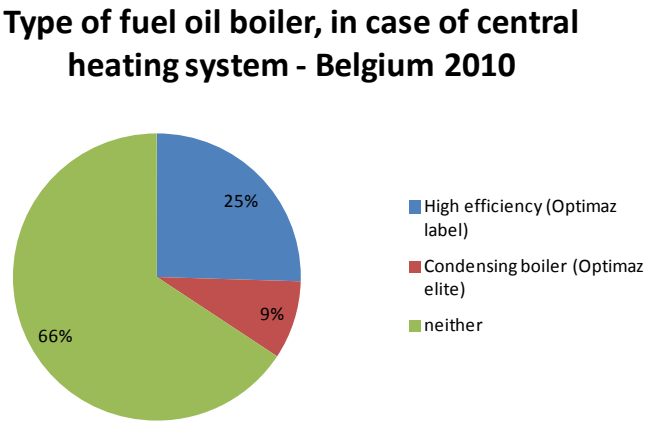


Figure 27: Type of natural gas boiler for individual central heating (survey results)

For *individual central heating systems on fuel oil* , Figure 28 shows relatively less energy efficient systems than is the case for natural gas. 34% of the Belgian individual central heating systems on fuel oil are high efficiency (Optimaz label) or condensing boilers (Optimaz elite label). 66% of the systems do not have an energy efficiency label. There are some small differences between the regions. In the Brussels Capital region 42% of fuel oil boilers have an energy efficiency label, whereas in the Flemish region 38% and in the Walloon region 30% has an energy efficiency label.



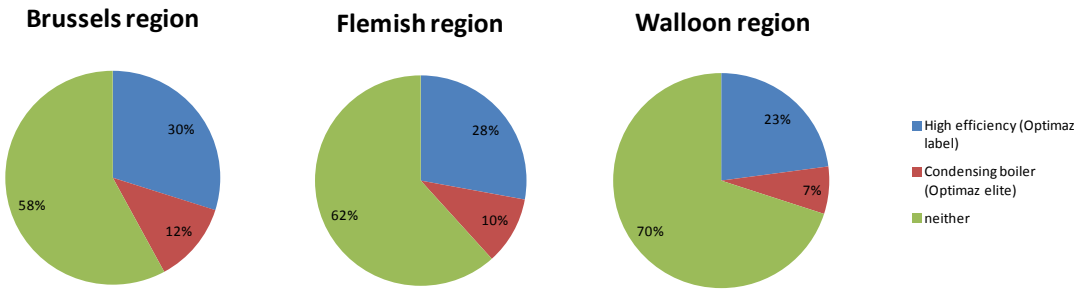


Figure 28: Type of fuel oil boiler for individual central heating (survey results)

A fifth characteristic is the number **of decentral heating appliances** [Q24]. Dwellings that are not equipped with a (individual or collective) central heating system mostly use one or more separate heating appliances.

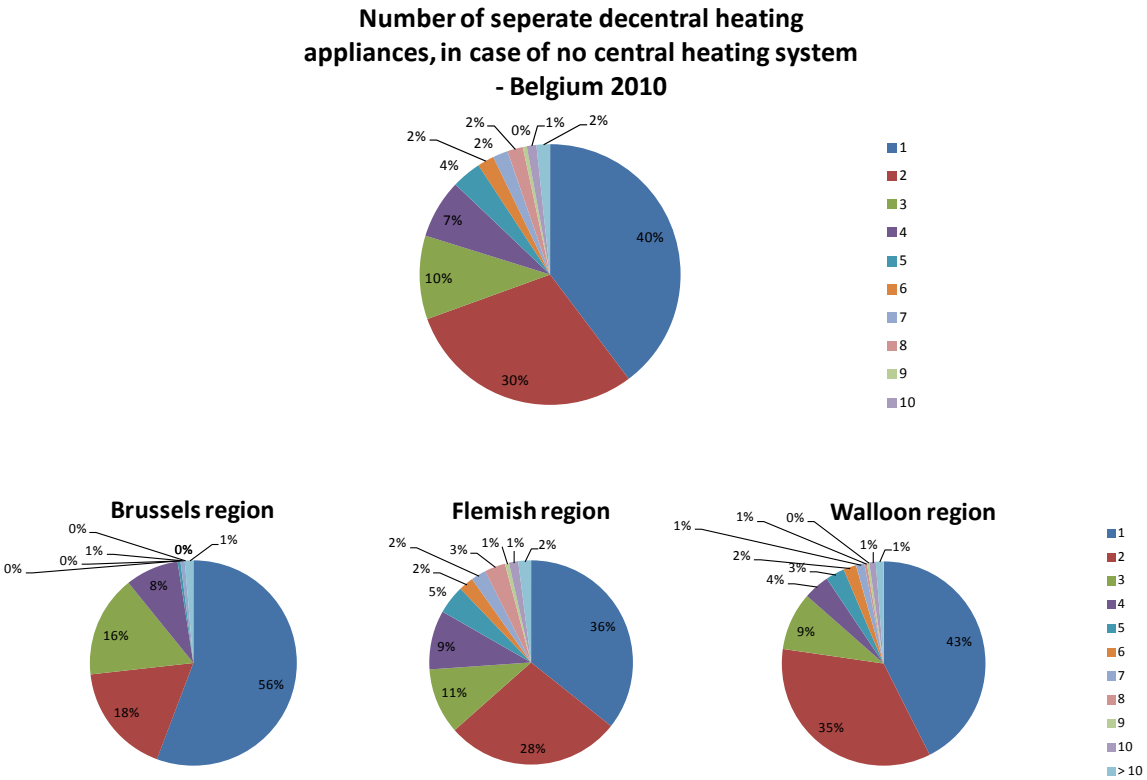


Figure 29: Number of decentral heating appliances in case there is no individual or collective central heating system (survey results)

In Figure 29 we see that 40% of Belgian households (without central heating system) use only one decentral heating appliance for heating a part of or the whole dwelling. 30% uses two appliances. 80% of households, who heat in a decentral manner; use no more than 3 appliances. Between the three regions differences can be noticed: In the Brussels Capital region only 10% of the households with decentral heating are using more than 3 appliances while in the Walloon region 13% and in the Flemish region 25% are using more than 3 appliances.

A sixth characteristic is the **type of decentral heating appliances** [Q251, Q252, Q253, Q254]. In this analysis the total number of decentral heating appliances is taken into account. This means that in case dwellings use more than one appliance, all appliances are summed up. The decentral heating appliances of dwellings that are equipped with a central heating system and have one or more direct heating appliances in surplus are not accounted for in this analysis.

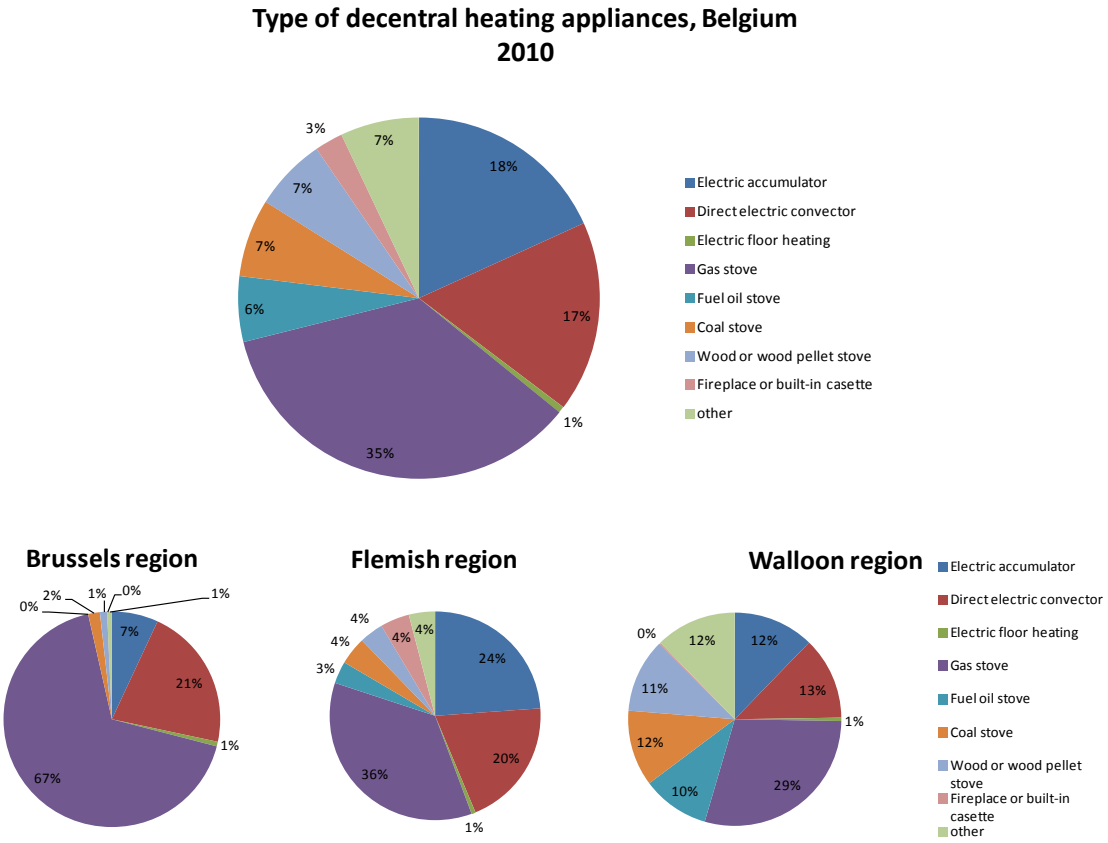


Figure 30: Type of decentral heating appliances for dwellings that are not equipped with a central heating system (survey results)

Figure 30 shows that the principal type of decentral heating appliances in Belgium is gas stoves with a share of 35%. If the shares of the electric accumulators (18%), direct electric convectors (17%) and electric floor heating (1%) are summed up, they exceed the share of gas stoves with 1%, representing 36% of the total number of decentral heating appliances. The category 'others' are considered to be mainly fuel oil stoves (based on the answers in the questionnaires) and together with fuel oil stoves, they have a share of 13%. The sum of the shares of all wood appliances (stoves, fireplaces and build-in cassettes) represents 10% and coal stoves represent 7%. Figure 30 also illustrates the differences between the regions. The biggest difference is that in Brussels and Flanders there is a clear preference for the use of gas and electrical appliances. In the Walloon region almost all types have the same share: gas stoves (29%), electrical (26%), fuel oil stoves (22%, including the type 'other') and coal stoves (12%). The remaining part of decentral appliances in Wallonia are wood appliances and these account for 11%.

A seventh characteristic is the **type of sanitary hot water (SHW) appliance in kitchens and bathrooms** [Q5301, Q5302, Q5901, Q5902]. The principal type of sanitary hot water systems in kitchens and bathrooms (bath, shower and/or sink) in Belgium is a geyser or boiler which is part of

the heating system. 61% of the Belgian households heats water this way. Those who have a separate boiler mostly have an electrical one. In Figure 31, we notice certain differences between the regions. The central heating concept is mostly present in Flanders (67%), whereas in Wallonia and Brussels around 50% of the households makes use of it. Next to the shared central heating/SHW-appliances, 22% of the sanitary hot water appliances in Flanders are separate electric boilers. In the Walloon region, the second most important type of sanitary hot water appliance is the separate electric boiler, with a share of 29%. In Brussels the separate boiler on natural gas represents 21%, followed by the separate electric boiler (17%).

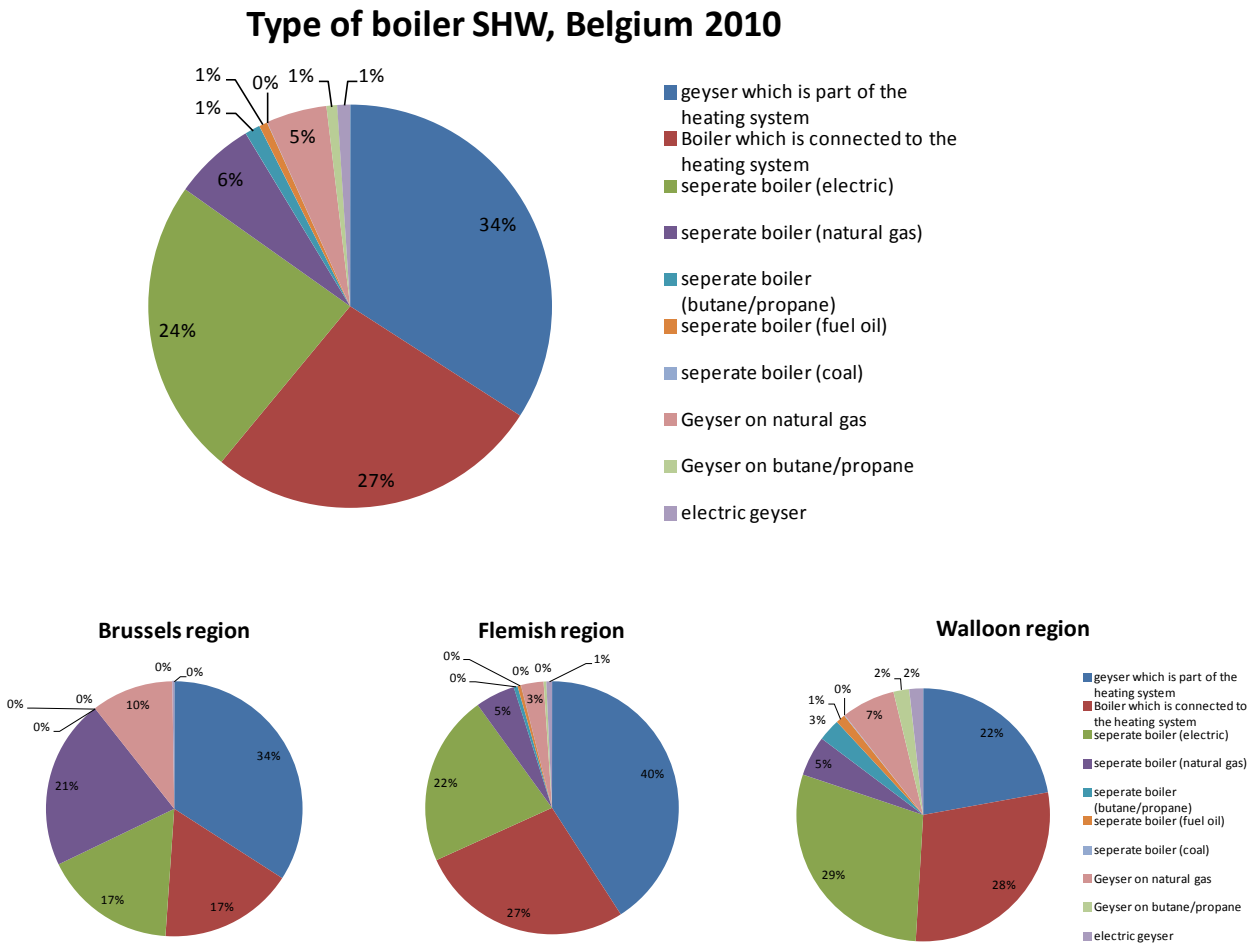


Figure 31: Type of boiler/geyser for sanitary hot water (bathroom) per type per region and in Belgium (survey results)

For the analysis above (type of SHW-installation) all installations were taken into account. This means: when a household makes use of more than one installation for heating sanitary water (for example: one in the kitchen and one in the bathroom), they were all accounted for.

The eighth characteristic is also referring to the sanitary hot water system. **The number of sanitary hot water appliances according to their age** is described in Figure 32. For this analysis, also all installations were taken into account (sometimes there is more than one SHW-installation in the dwelling). More than 60% of the installations are not older than a decade. Almost a third of them are bought after 2007. The differences between the regions are small.

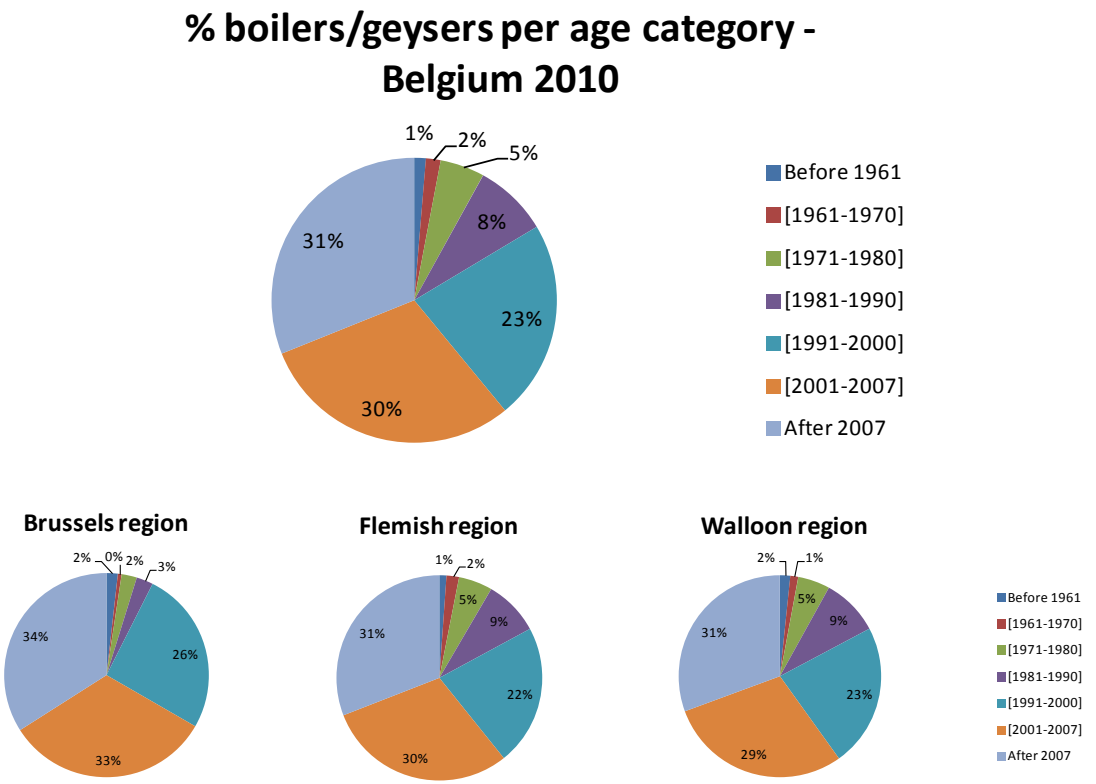


Figure 32: The amount of SHW installation per age category (survey results)

3.1.5 ENERGY CONSUMPTION AND PRESENCE OF ENERGY SOURCES

The questions considered most relevant for this theme are listed in the following table. The questions in bold are included in this report, all questions can be found in the excel files accompanying this report. In the Annex 7 a list shows the relation between each question in the survey and the name of the Excel-dataset in which the results are analyzed.

V1	**Use of electricity in household?**
V8	**Use of natural gas in household?**
V15	**Use of fuel oil in household?**
V22	**Use of coal in household?**
V29	**Use of gas from tank (propane) in household?**
V36	**Use of gas from cylinder (butane) in household?**
V43	**Use of logs in household?**
V50	**Use of wood pellets in household?**
V57	**Use of wood waste in household?**
V64	**Use of wood shavings in the household?**
V71	Use of other energy source in household?
V2_ele_bought	**How much electricity bought CORRECTED for 2010 (kWh/year)?**
V2_ele_PV	**How much electricity produced by PV CALCULATED with 8m²/KWp and 950 kWh/kWp (kWh/year)?**

V2_ele_tot	**How much electricity consumed (bought CORRECTED for 2010 + PV) PV (kWh/year)?**
V9_gas_tot	**How much natural gas consumed (CORRECTED and in kWh for 2010)**
V16_FO_tot	**How much fuel oil was consumed CORRECTED and 10,08 kWh/l (kWh/12 months)**
V23_COAL_tot	**How much coal was consumed CORRECTED and 8,14 kWh/kg (kWh/12 months)**
V30_PROPT_tot	**How much gas from tank was consumed CORRECTED and 6,44 kWh/l (kWh/ year)**
V37_BUTC_tot	**How much gas (from cylinder) was consumed CORRECTED and 12,68 kWh/kg (kWh/year)**
V44_WOLO_tot	**How many logs were consumed CORRECTED (density used: 370kg/m³ ; calorific value used: 15,47 MJ/kg, source: VITO 2011/TEM/R/158) (kWh/year)**
V51_WOPE_tot	**How many pellets were consumed CORRECTED (density used: 600kg/m³ ; calorific value used: 16,30 MJ/kg) (kWh/year)**
V58_WOWA_tot	**How much wood waste was consumed CORRECTED (density used: 370kg/m³ ; calorific value used: 16,00 MJ/kg) (kWh/year)?**
V65_WOSH_tot	**How many wood shavings were consumed CORRECTED (density used: 347kg/m³ ; calorific value used: 15,80 MJ/kg) (kWh/year)?**
V72_Lightpetr_tot	**How much light oil was consumed CORRECTED and 10,75 kWh/l (in kWh/year)**

Table 10: Relevant questions on energy consumption

In the previous section on the characteristics of the heating system, we already provided the results of the main fuel (or energy source) used for heating. A lot of households use more than 1 type of energy source in their homes. For electricity, natural gas, fuel oil, coal, butane, propane and all kinds of wood (pellets, logs, shavings, wood waste) we have made an overview of the **type of fuels present** (not necessarily as main energy source for heating, but also as secondary heating source or for other purposes).

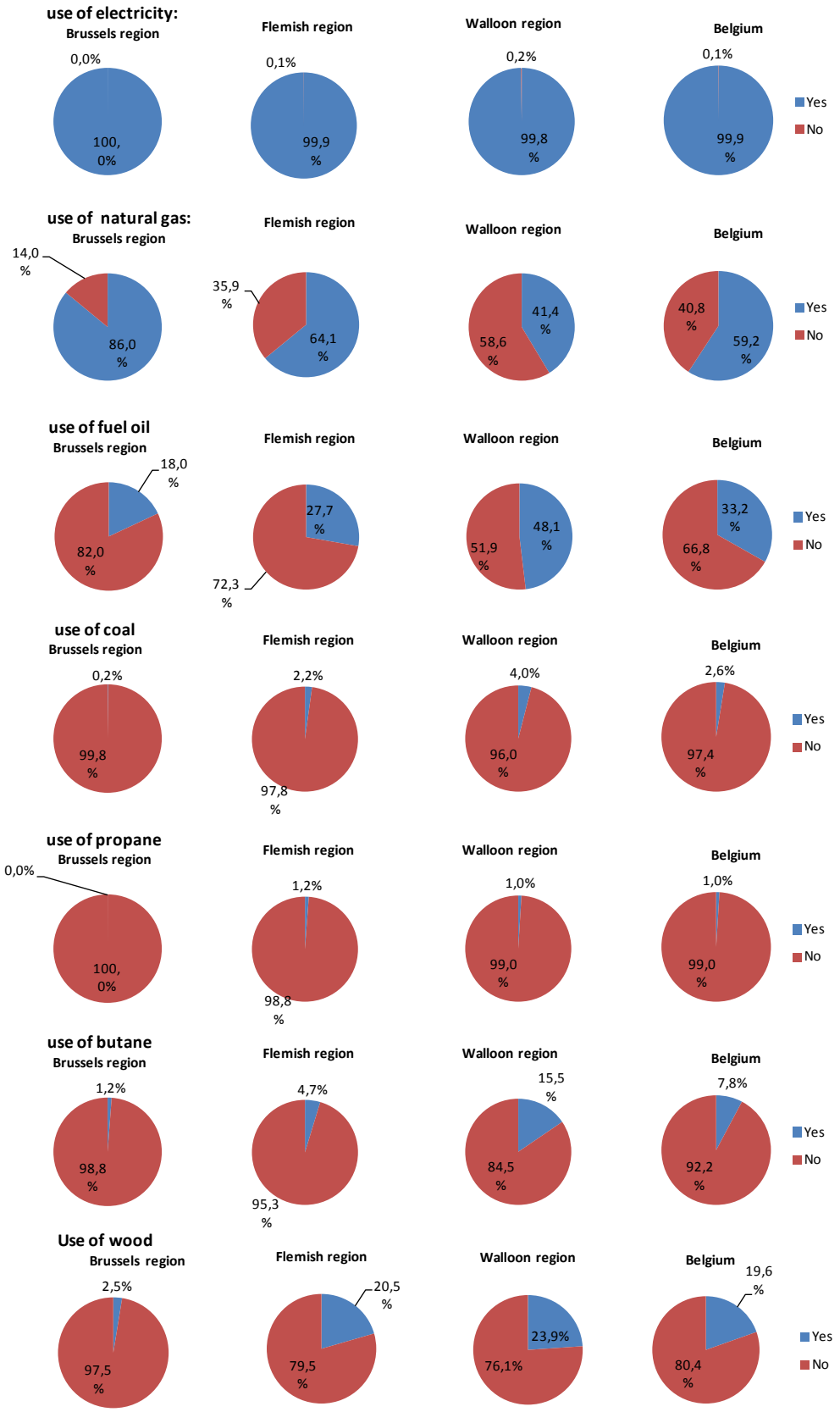
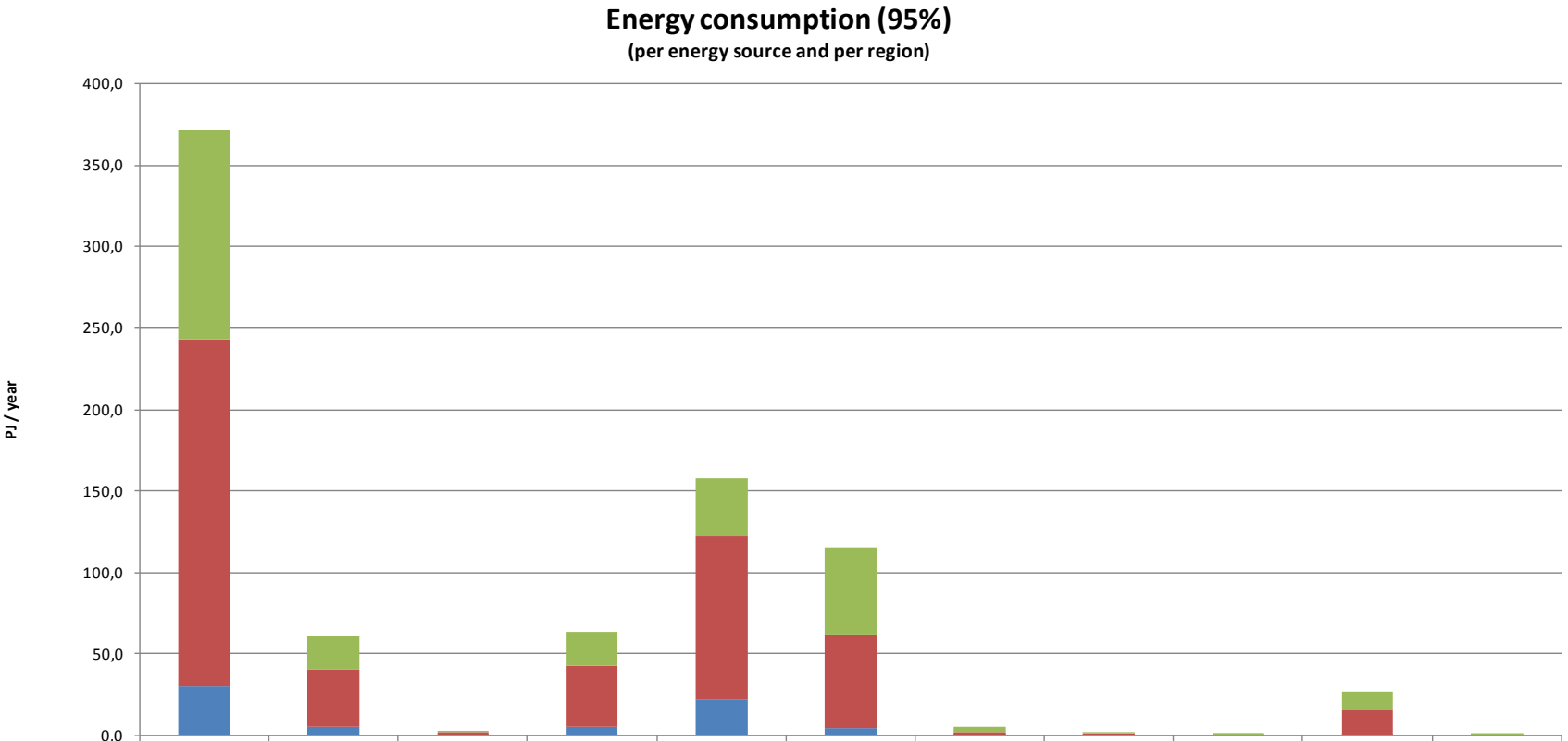


Figure 33: Overview of types of energy source present in the households in Belgium and the regions (survey results)

Electricity is present in practically all households. Natural gas is present in 59% of the households in Belgium. This is slightly higher than the results of the main heating source (55%), which means that a part of it is probably used for other purposes like cooking. Fuel oil is present in 33% of the Belgian households, which is the same % as the main heating type (see Figure 23). This means that when fuel oil is present, this is also used as main fuel for heating. Coal is more present in the households than it is used as a main source for heating. This means that coal is also used as secondary heating source. Butane is used in 8% of the Belgian households. Butane (gas from cylinders) is not present in the results of the main heating source, which suggests that butane is probably used for cooking or hot water production. Propane (gas from tank) is used in only 1% of the households and this percentage is the same as that of the main fuel for heating, which means the presence of propane is totally linked to heating purpose. Wood is used in 20% of Belgian households. This is a lot higher than the percentage of the households that use wood as main heating source (2%). The use of wood as secondary heating source is the reason for this difference.

In the following figure, the **total energy consumption** (including the bought or produced electricity) for Belgium and its regions is presented. Because the 2,5 % highest and lowest values are not taken into consideration, the results are based on 95% of the total surveys.



	Total energy	Electricity bought	Electricity produced by PV	Electricity consumed	Natural gas	Fuel oil	Coal	Propane (tank)	Butane (cilinder)	Wood	Light petroleum
Walloon region	128,1	20,7	0,7	21,4	35,1	53,7	3,5	0,6	0,8	10,7	0,2
Flemish region	213,7	35,5	2,0	37,3	99,9	57,7	1,9	1,1	0,6	15,3	0,0
Brussels region	29,6	5,0	0,0	5,0	22,3	4,0	0,0	0,0	0,0	0,3	0,0
Total	371,3	61,2	2,7	63,7	157,3	115,4	5,4	1,7	1,4	26,4	0,2

Figure 34: Total energy consumption in Belgium and its regions in 2010 [PJ $_{LHV}$](survey results)

As explained in chapter 2 (paragraph 2.4.1-step 4), for all the energy related variables 2,5% of both sides of the distribution were removed from the analysis. Nevertheless, some individual remaining figures for the natural gas consumption seems to be high. The distribution has a very high standard deviation and is skewed, which makes the results for natural gas somewhat biased.

In the following table, the total energy consumption in the regional energy balances and federal energy balance (Eurostat) is presented. Be aware that the sum of the regional energy balances is not equal to the federal energy statistics. Regional energy balances are constructed using top-down and bottom-up data on energy consumption by the household sector, the federal statistics use top down delivery statistics. To allocate energy use to the different end user sectors (like households), the federal statistics use division % to estimate the energy supply to different sectors.

2010	source	coal	LPG/ butane/ propane	gasoline	fuel oil	natural gas	wood/ charcoal	other liquid biofuels	electricity	heat	TOTAL
Walloon Region	Walloon energy balance[22]	1,337	2,494		49,234	38,786	5,596		24,996	0,620	123,065
Flemish region	Flemish energy balance 2010 (july 2012)[23]	3,779	1,189	0,503	96,855	104,866	4,606		41,424		253,223
Brussels Region	Brussels energy balance[24]	0,093	0,147		7,386	23,231	0,229		5,314	0,064	36,459
Belgium	EUROSTAT[25]	4,858	1,978		126,130	160,178	10,688	0,005	72,994	0,466	377,297

Table 11: Energy consumption per source and region in PJ (LHV)

The natural gas consumption in the survey is close to the total of the regional energy balances. Although the consumptions in the survey are in all regions lower than those in the regional energy balances.

Fuel oil consumption in the Flemish energy balance is a lot higher than in the survey results. The fuel oil in the Flemish energy balance is calculated based on average fuel oil consumption per households, multiplied with an estimate of the number of houses using fuel oil. Average oil consumption is based on the 2-yearly surveys performed by order of VEA (Flemish Energy Agency), the number of households using fuel oil is based on an estimate (starting with the census of 2001, and adding new housing and an estimate of demolished houses). In the Brussels-Capital region, the regional energy balance also has a higher value for fuel oil consumption than the survey results. For the Walloon region, the survey gives higher results than the regional energy balance.

The results for wood (total of logs, pellets, waste, shavings) in the survey are very interesting, because there are not a lot of data sources available to estimate the use of it in households. A lot of people use wood as a second heating source, and the quantities are difficult to monitor, among other reasons because there is a lot of wood without purchase. The survey suggests that consumption is a lot higher than was reported until now in the regional and federal energy balances.

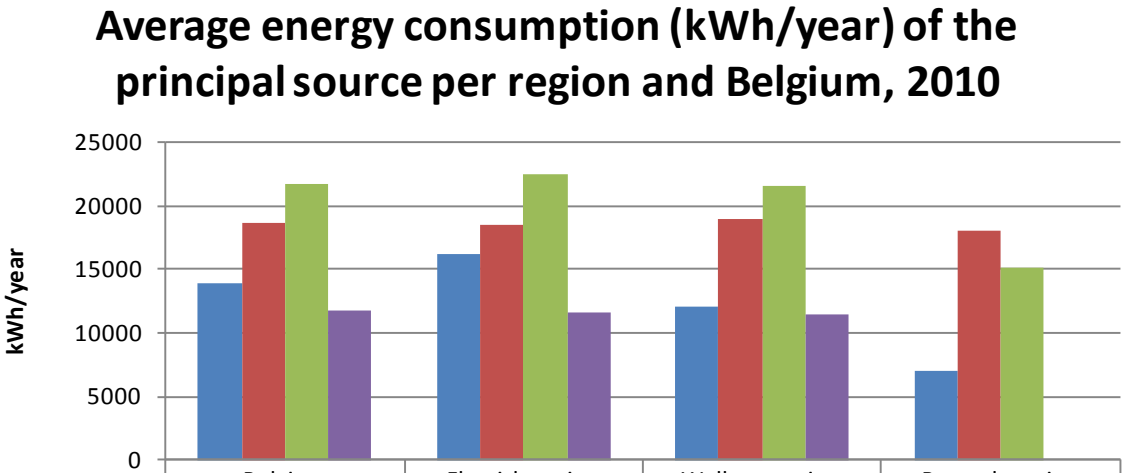
The electricity use in the regional energy balances is higher than the survey results.

[22] Latest official version available on http://energie.wallonie.be ('Bilan énergétique wallon')
[23] Latest official version available on http://www.emis.vito.be/ ('energiebalansen')
[24] Latest official version available on http://www.bruxellesenvironnement.be
[25] http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/database database consulted on 22/08/2012

The total consumption of coal in the survey is comparable with the sum of coal use in the regional energy balances, but there are differences between the regional results. The consumption of coal for the Walloon region is higher in the survey than in the Walloon energy balance, while for the Flemish and Brussels Capital region the consumption of coal is lower in the survey than in the regional energy balances.

In the following section, the analysis was made for the **average energy consumption per household** for Belgium and its regions. Because the 2,5% highest and lowest values are not taken into consideration, the results are again based on 95% of the total surveys.

The 2 following figures require some explanation. In Figure 35 we asked the households with which energy source they mainly heat their dwelling. Depending on the answer, we divided the households into groups with the same principal heating source. We calculated, per group and per region, the average consumption of that principal heating source (only of that source!). Finally, electricity is expressed in primary energy, to make it more comparable with the other energy sources (factor X 2,5 is used to convert it into primary energy) .



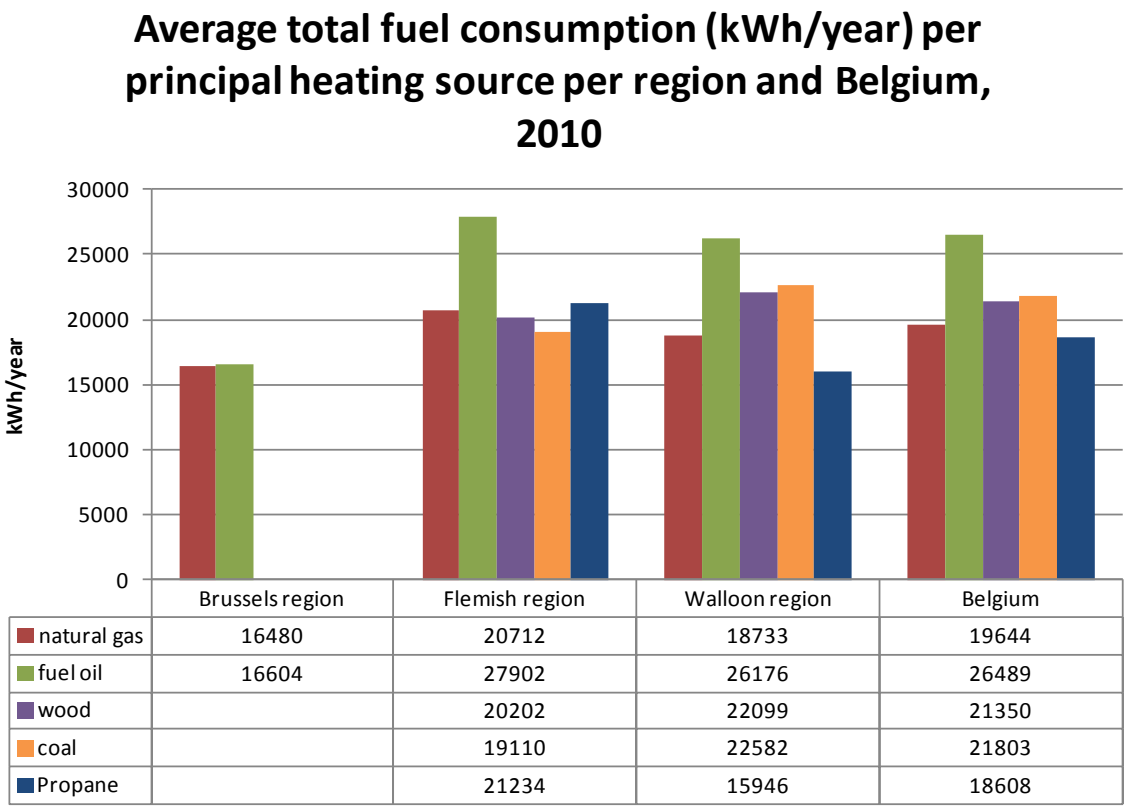
	Belgium	Flemish region	Walloon region	Brussels region
Electricity	13886	16121	12063	7044
Natural gas	18563	18540	19008	17995
Fuel oil	21676	22518	21524	15059
Wood	11703	11587	11480	

Figure 35: Average energy consumption ONLY of the main heating source per dwelling and per region and in Belgium (kWh/year, dwelling) grouped by main heating source (survey results) Note: electricity is expressed in primary energy

When fuel oil is the principal energy source for heating, households are consuming more than when the principal heating fuel is natural gas, electricity or wood (except Brussels). If we assume that there is no significant difference in efficiency between a boiler/geyser on natural gas or on fuel oil, there can be several possible explanations for this finding. Apartments are often heated with natural gas. This type of dwelling doesn't consume lots of energy because they are enclosed. Furthermore, small houses, studios, rooms or flats can also be quickly heated by for example an electric heater. The higher average consumption of fuel oil, compared to the others could be attributed to the fact that the use of fuel oil decreases as the buildings become closer and increases as the heated surface becomes larger. Moreover, buildings that are heated by fuel oil, are probably older and larger (see Figure 50, Figure 51 and Figure 52). Because of the small amount of

survey results for Brussels in the group 'Wood' energy consumption figures are not presented in Figure 35.

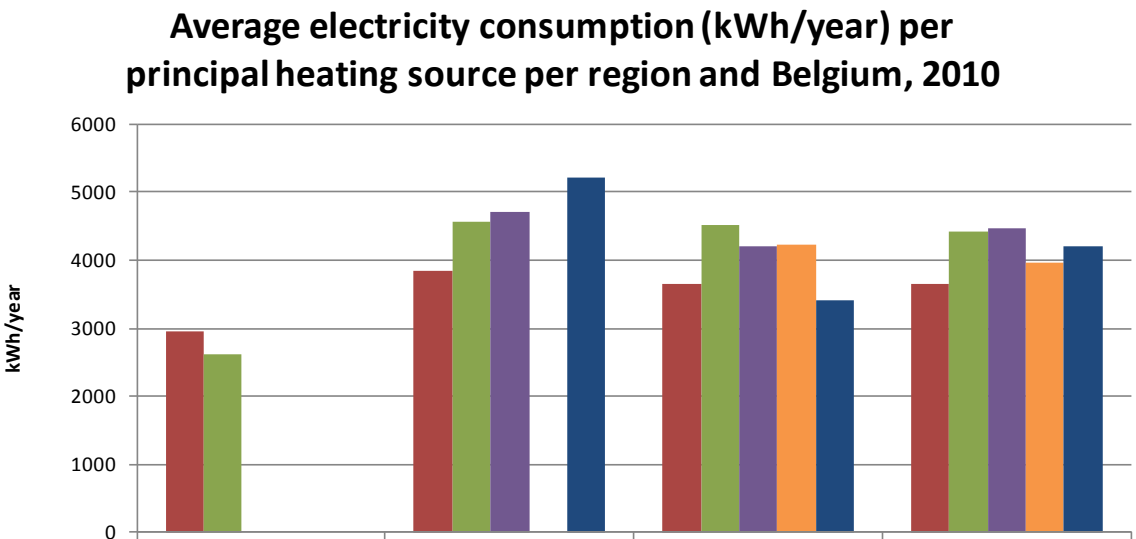
Figure 36 contains the average TOTAL energy consumption per group of principal energy source, without the electricity use. The difference with Figure 35 is that in that figure the average consumption of the main energy source ONLY is calculated and that electricity is included (as a category of main heating source) and expressed in primary consumption. For example, given that the principal heating source is natural gas, the average natural gas consumption of a household in Flanders is 18540 kWh/year. If we look at the total fuel consumption, we see a fuel use of 20712 kWh/year. This means that next to the natural gas, another fuel is used, presumably as a second source for heating. The comparison of the two figures can give some insights in secondary fuel use. For the main heating source 'wood', we mentioned in the previous paragraph that for Brussels the results are probably biased. That is why those results were not included in Figure 36.



	Brussels region	Flemish region	Walloon region	Belgium
natural gas	16480	20712	18733	19644
fuel oil	16604	27902	26176	26489
wood		20202	22099	21350
coal		19110	22582	21803
Propane		21234	15946	18608

Figure 36: Average TOTAL energy consumption (kWh/year, dwelling) per principal energy source per dwelling per region and for Belgium (survey results)

For households using other sources than electricity for heating, the average electricity consumption per household was calculated and presented in Figure 37. The results are very similar for all regions and for Belgium.



	Brussels region	Flemish region	Walloon region	Belgium
natural gas	2957	3841	3650	3663
fuel oil	2620	4562	4509	4423
wood		4710	4219	4467
coal			4242	3961
Propane		5221	3403	4215

Figure 37: Average electricity consumption per principal heating source other than electricity (kWh/year, dwelling) per dwelling per region and for Belgium (survey results)

Avoiding a biased picture, Figure 37 only includes the average consumptions for which the number of the survey results is sufficient.

3.1.6 DISTRIBUTION IN REFERENCE CONSUMERS

Eurostat uses reference consumers for gas and electricity prices that are presented at national level for EU Member States.

Reference consumers for gas and electricity are characterised by the following annual consumption bands:

Electricity households:
Da (Very small): annual consumption below 1 000 kWh
Db (Small): annual consumption between 1 000 and 2 500 kWh
Dc (Medium): annual consumption between 2 500 and 5 000 kWh
Dd (Large): annual consumption between 5 000 and 15 000 kWh
De (Very large): annual consumption above 15000 kWh

Natural gas households:
D1 (Small): annual consumption below 20 GJ (or 5556 kWh)
D2 (Medium): annual consumption between 20 and 200 GJ
D3 (Large): annual consumption above 200 GJ (or 55556 kWh)

We can use those references to characterize the households in our survey. This information is not published by Eurostat and so couldn't be compared.

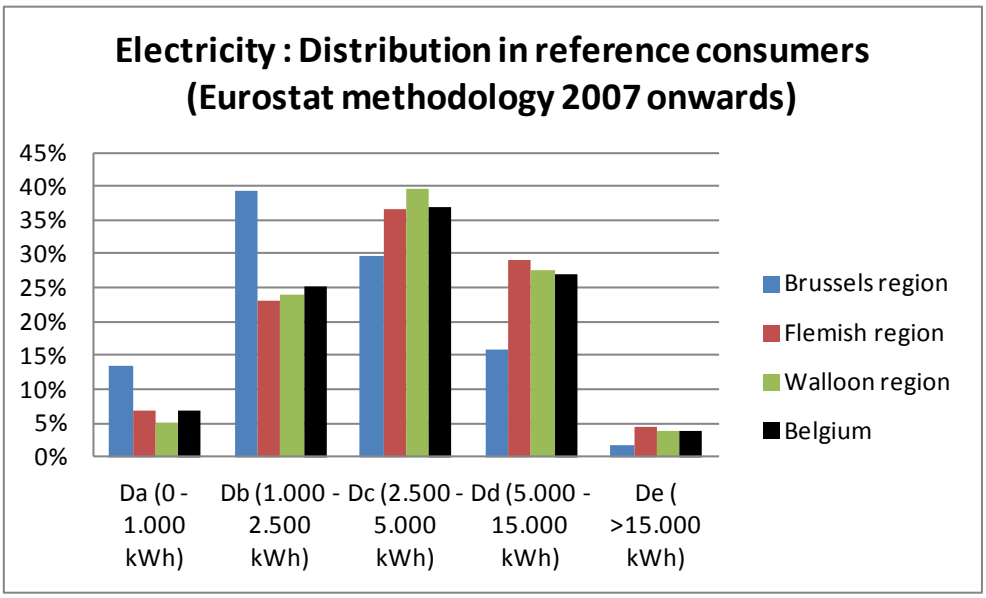


Figure 38: Electricity consumption divided in reference consumers for regions and Belgium, 2010

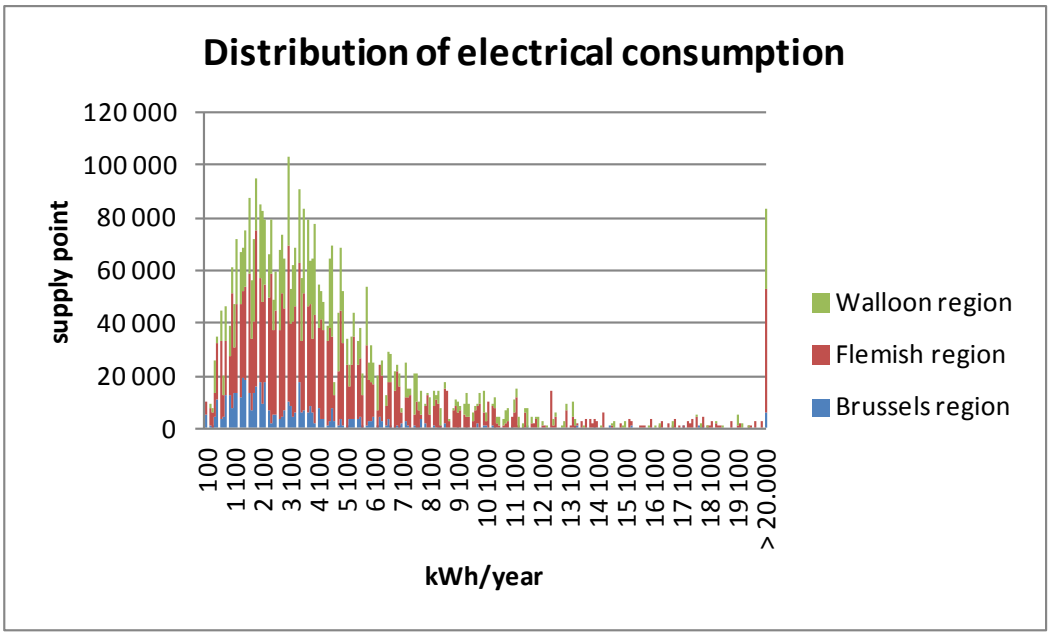


Figure 39: Electricity consumption distribution for regions and Belgium, 2010

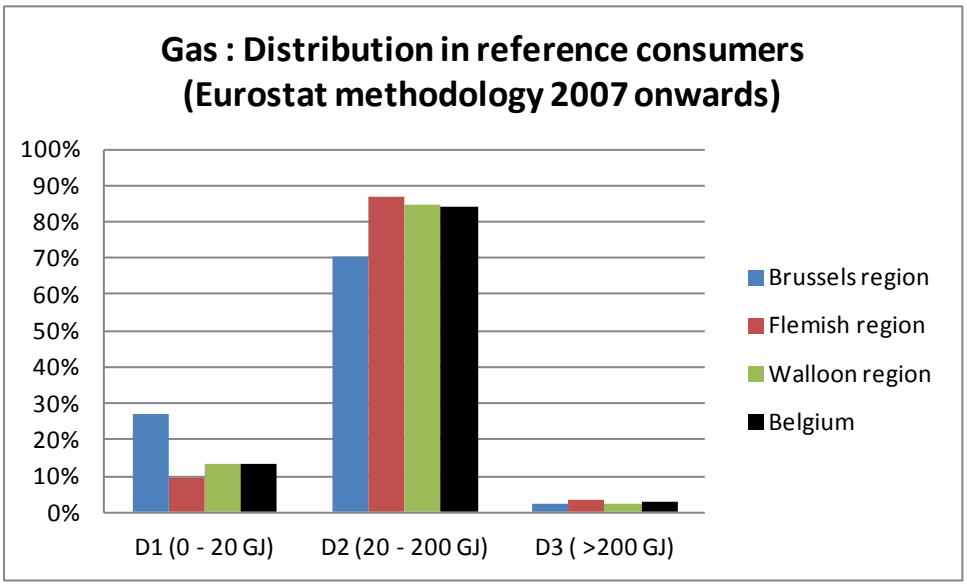


Figure 40: Gas consumption divided in reference consumers for regions and Belgium, 2010

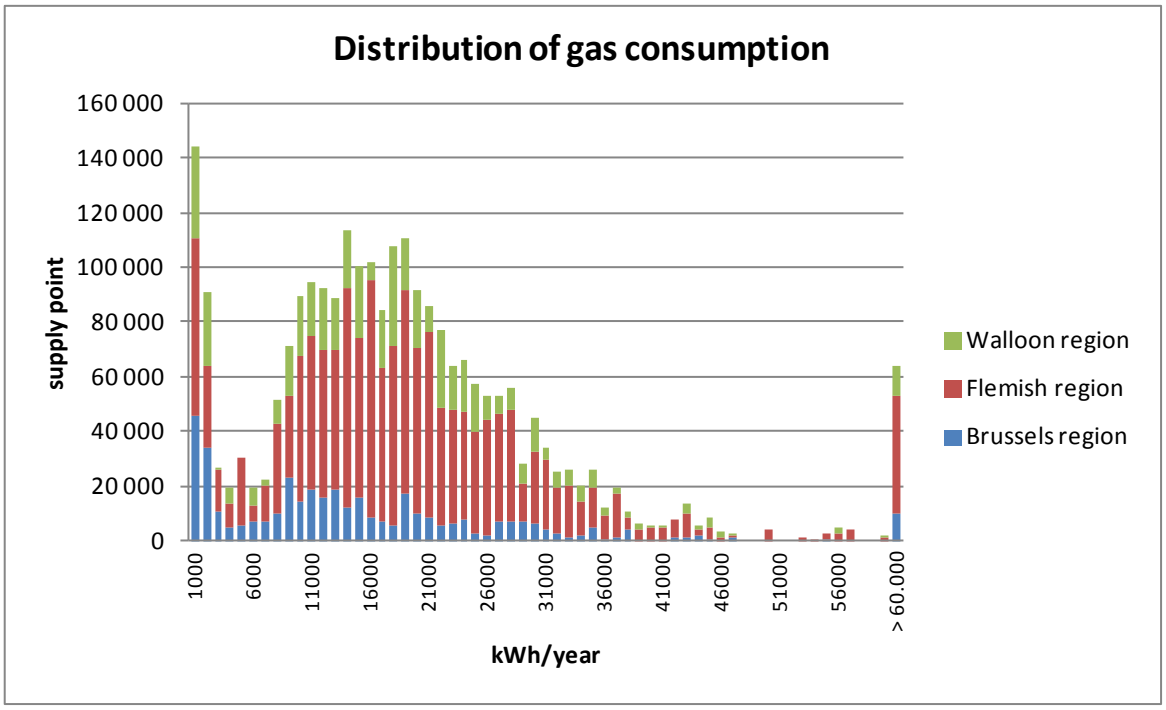


Figure 41: gas consumption distribution for regions and Belgium, 2010

3.1.7 COOKING: PLATE AND OVEN

The questions considered relevant for this theme are the kind of hob: **electrical plate hob** [V211], **induction hob** [V213], **natural gas hob** [V215], **butane/propane hob** [V217], **combination of hobs** (electrical-natural gas-propane/butane-induction) [V219]?
The **age** of the oldest hob is also examined, for each type [V212, V214, V216, V218 and V220].
The kind of oven is also investigated: **microwave** [V221], **electrical oven** [V222], **gas oven** [V223], **steam oven** [V224], **bread oven** [V225], and **a combination of ovens** [V226], (microwave and/or electrical and/or gas and or steam in one oven).

The Excel file (ECS_2012_Plate_Oven.xlsx) analyzes the cooking hobs and ovens used by households by Belgian region and for Belgium as a whole (please refer to Annex 7 for further details). In the file, the term "plate" is used in place of "hob".

The graphs below show the share of **type of hobs** with electrical plate hob (ELEC), induction hob (IND), natural gas hob (NG), butane-propane hob (BUT/PROP) and a combination of hobs (COMB) in Belgium and by Belgian region.

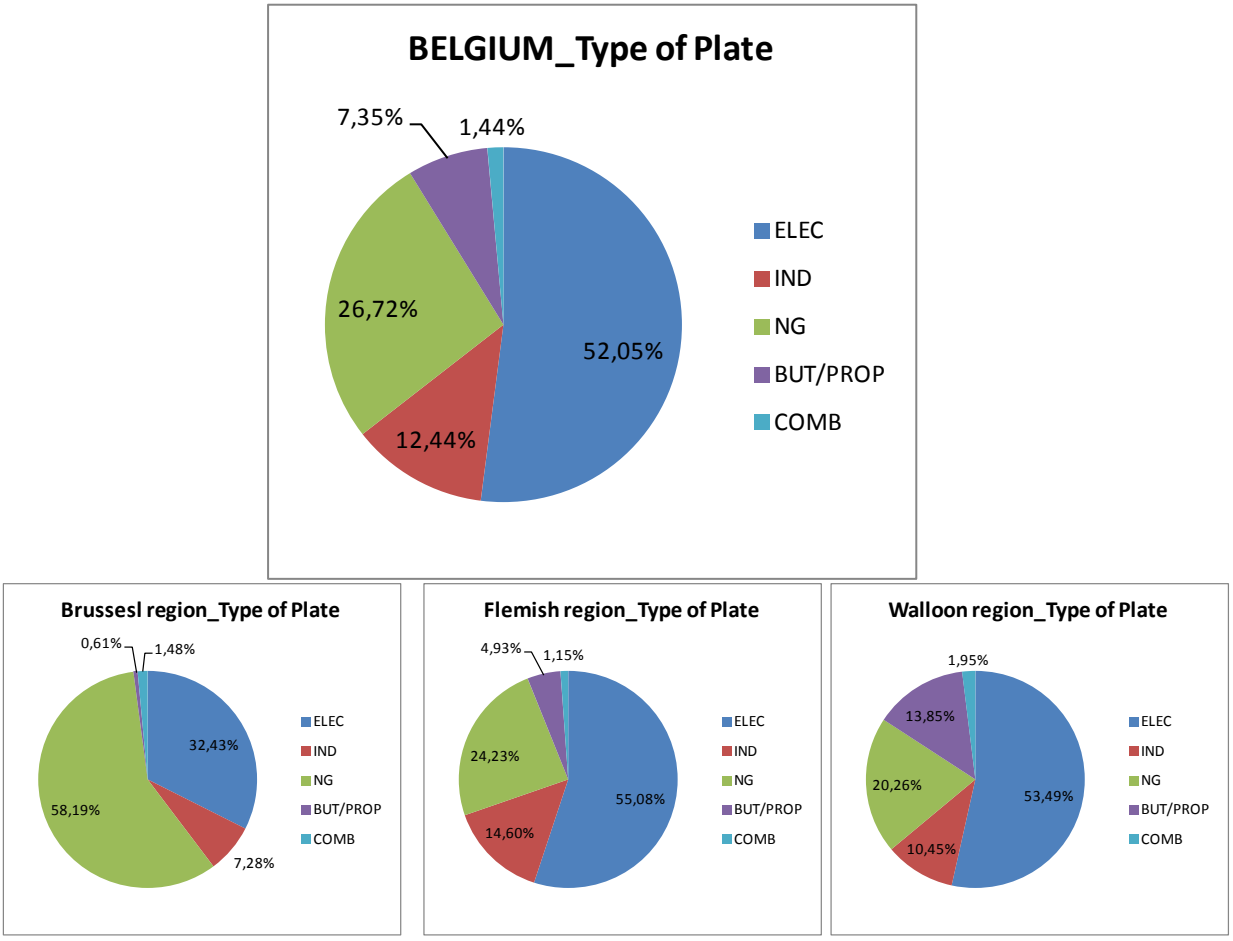


Figure 42: Distribution of type of hobs per region and in Belgium, 2010

Electrical plate hob (electrical only plus induction hob) is the hob that is mainly used in Belgium, except in Brussels region where the gas grid is predominant and extensively used by households, also for cooking purposes.

The same analysis is performed by **type of oven** with a breakdown of electrical oven (ELEC), gas oven (GAS) and combined oven (microwave and/or electrical and/or gas and or steam in one oven) (COMB).

The figure below show the share of **type of oven** in Belgium and by Belgian region.

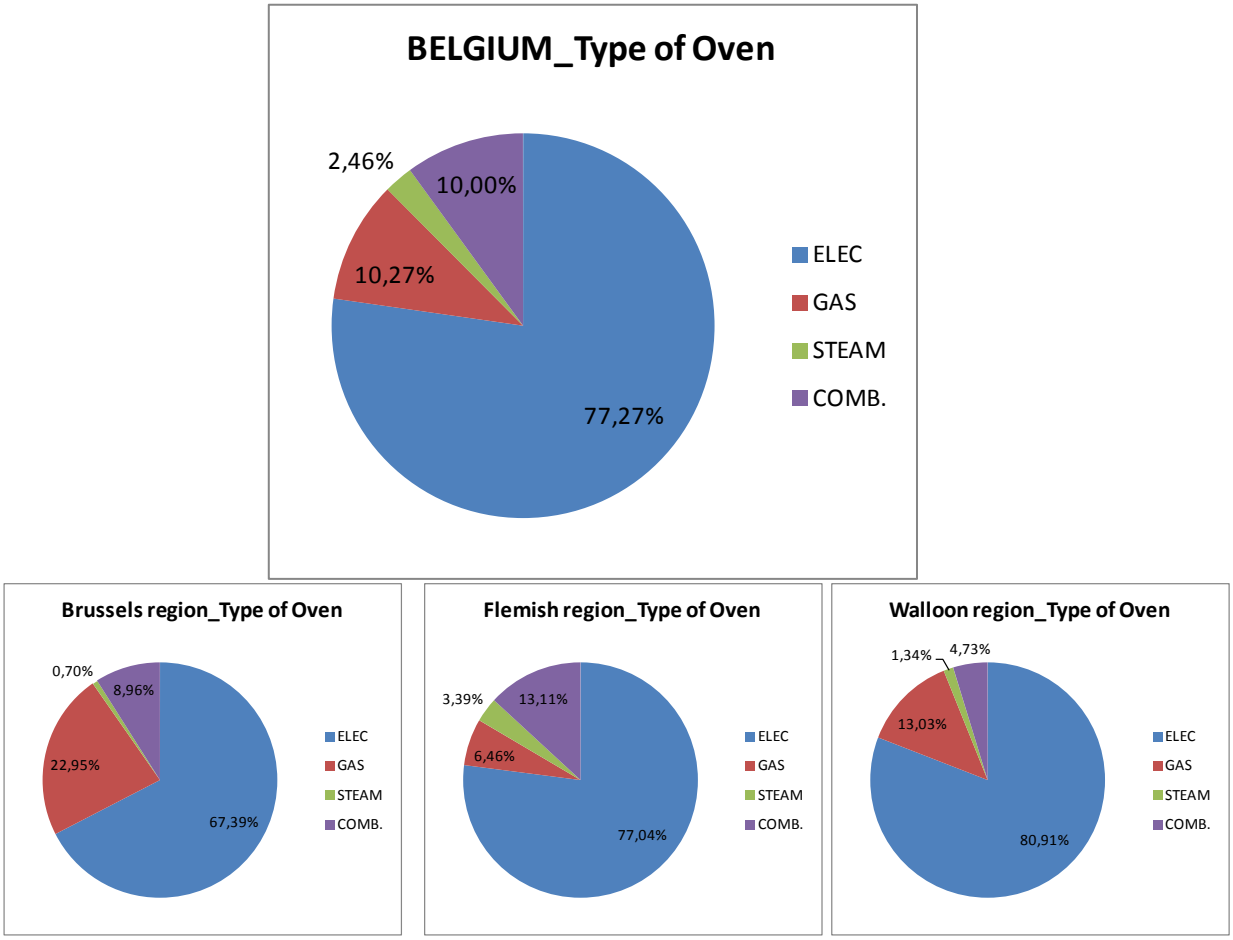


Figure 43: Distribution of type of oven per region and in Belgium, 2010

3.1.8 COLD: FRIDGE AND FREEZER

The use of **one-door** [V237] or **two-doors refrigerators** [V239] and **freezers** [V241] are analyzed in an Excel file (ECS_2012_Fridge_Freezer.xlsx) by region and for Belgium (see Annex 7 for details).

The **number** of devices [V238, V240 and V242], the **age** (V1011 to V1018, V1036 to V1040] and the **energy label** [V1001 to V1008, V1031 to V1035] of each refrigerator and each freezer used are also analysed.

The next figure presents the use and the label of **freezers in Belgium and per region**.

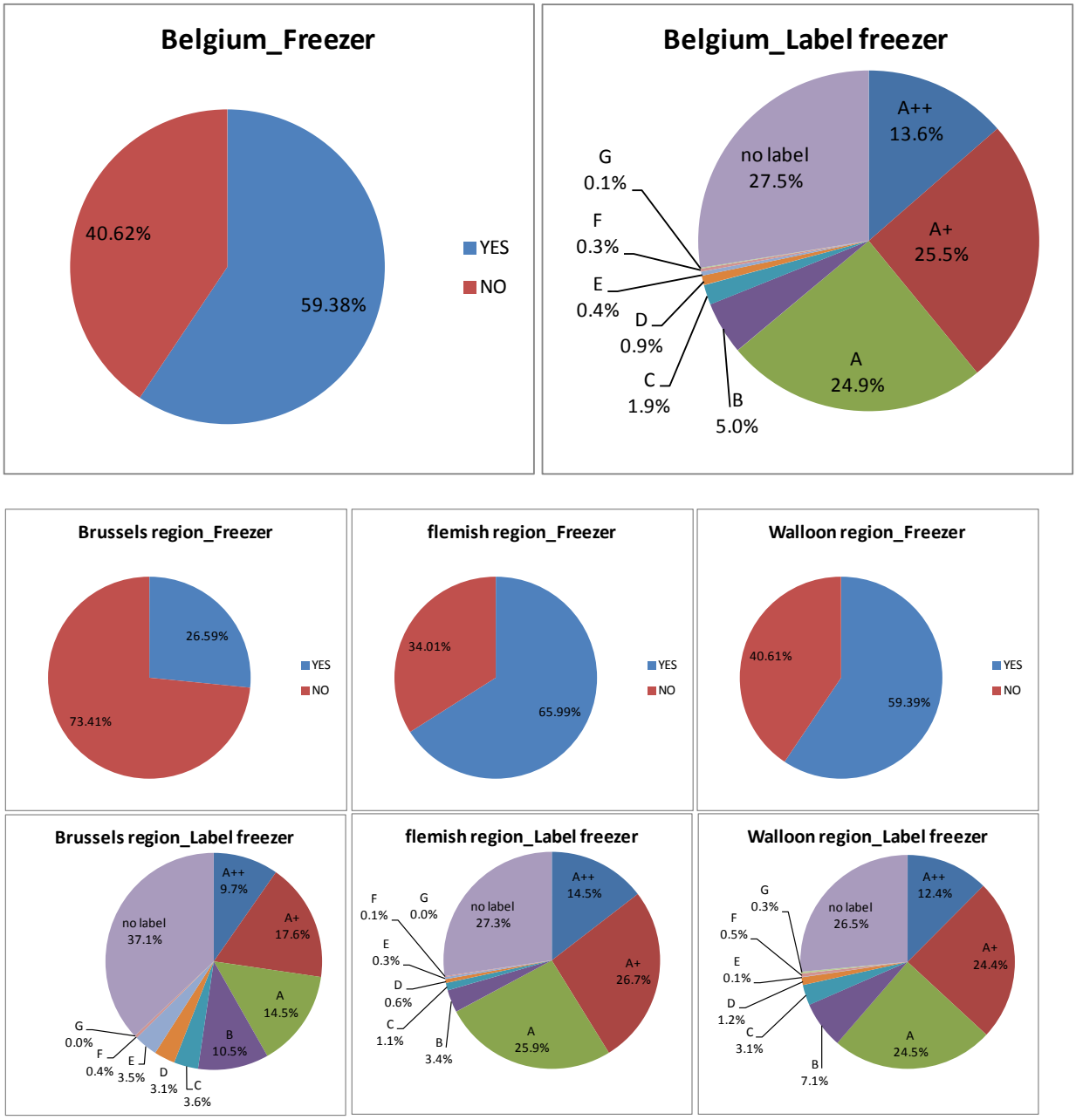


Figure 44: Use and labels of freezer per region and in Belgium, 2010

3.1.9 OTHER WHITE GOODS: DRYERS, DISHWASHER AND WASHING MACHINE

The questions about these white goods concern the use of **electrical dryers** [V243] with or without **heat pump** [V245], **natural gas dryer** [V247], **dishwasher** [V249] and **washing machine** [V251]. The **amount**, the **age** and the **energy label** of each device are also analysed as well as the **stand-by mode** of the device.

These questions are analyzed in an Excel file (ECS_2012_white_goods.xlsx) by region and for Belgium (see Annex 7).

The next figure presents the use and the energy label for **dishwashers** for Belgium and per region.

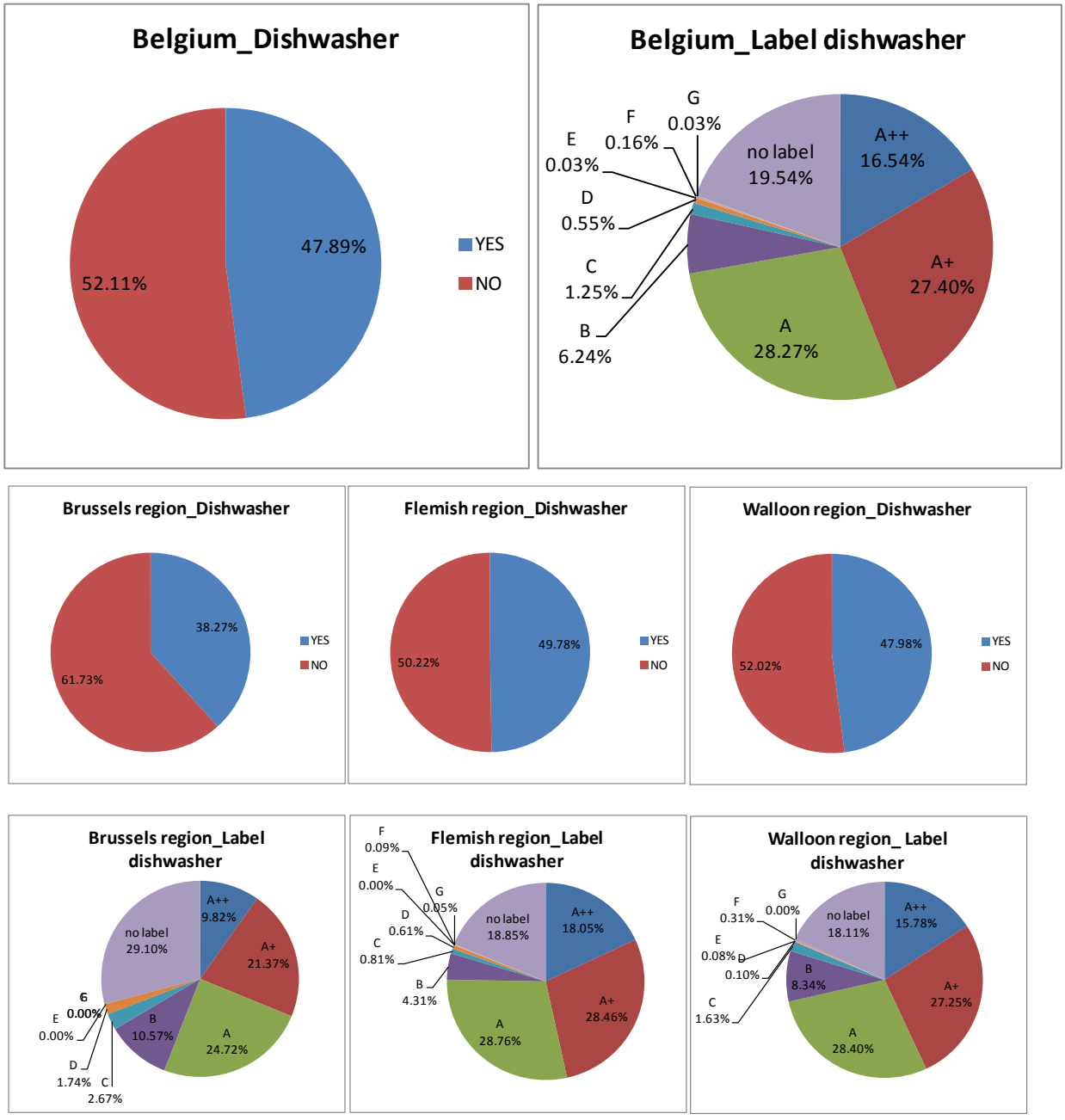


Figure 45: Use and energy label of dishwashers per region and in Belgium, 2010

3.1.10 TELEVISIONS

For this theme, the use and the amount of **LCD television** [V253], **plasma television** [V255] and **"ordinary" TV** [V257] are analyzed in an Excel file (ECS_2012_TV.xlsx) by region and for Belgium (see Annex 7).

The **amount** [V254, V256 and V258] and the **stand-by mode** of each type of television when they are not in use are also investigated.

The next figure shows the repartition between LCD, plasma and ordinary TVs in Belgium and per region.

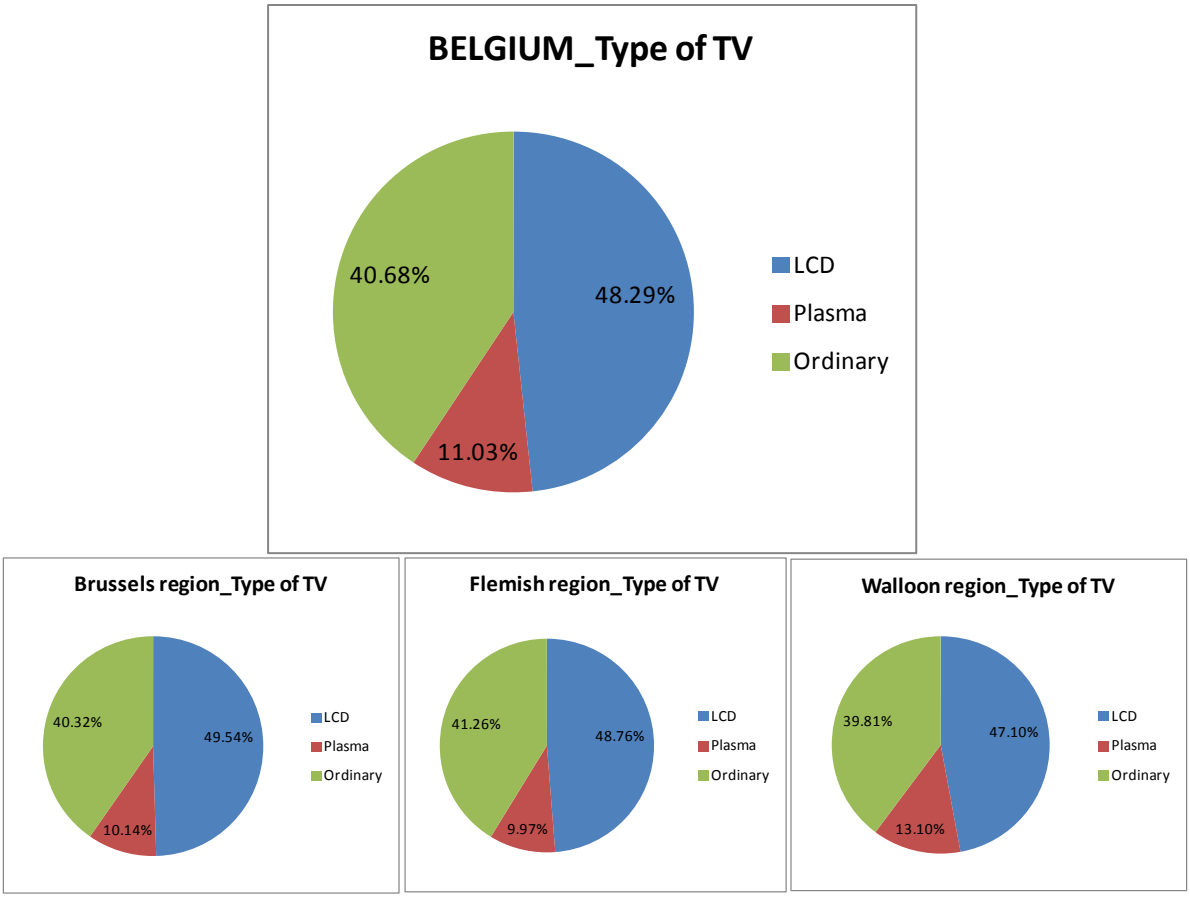


Figure 46: Use of LCD, plasma or ordinary TV per region and in Belgium, 2010

The penetration rate of TV is above 100% because there is more than one TV per household (114% in Belgium, from 101% in Brussels region to 118% in Flemish region).

However, some households do not have a television (3.9% in Belgium: 2.9% in Flemish region, 4.5% in Walloon region and 7.7% in Brussels region).

The table below shows the percentage of households leaving TVs on stand-by mode by type of display (LCD, plasma, ordinary (cathodic) TV) in Belgium and by Belgian region. For instance, 21% of Belgian households keeps continuously their ordinary TV on stand-by mode, but 41% if there is an LCD TV.

Device	Belgium	Brussels Region	Flemish region	Walloon region
LCD TV	40,6%	48,0%	44,0%	32,3%
Plasma TV	38,3%	53,1%	38,6%	34,7%
Ordinary TV	20,9%	25,2%	22,2%	17,5%

Table 12: Stand-by mode for TVs in Belgium and the regions (survey results)

3.1.11 PC AND MODEMS

The use and the amount of **computers with LCD** display [V259, V260], **plasma** display [V261, V262] or with **ordinary** monitor [V263, V264], the use and the amount of **portable computer/laptop** [V265, V266] and the use and the amount of **modems** [V267, V268] are analyzed in an Excel file (ECS_2012_PC_Modem.xlsx) by region and for Belgium (see Annex 7).
The **stand-by mode** when not in use is also examined for each device.

The figures below show the distribution of different types of PCs used in Belgium

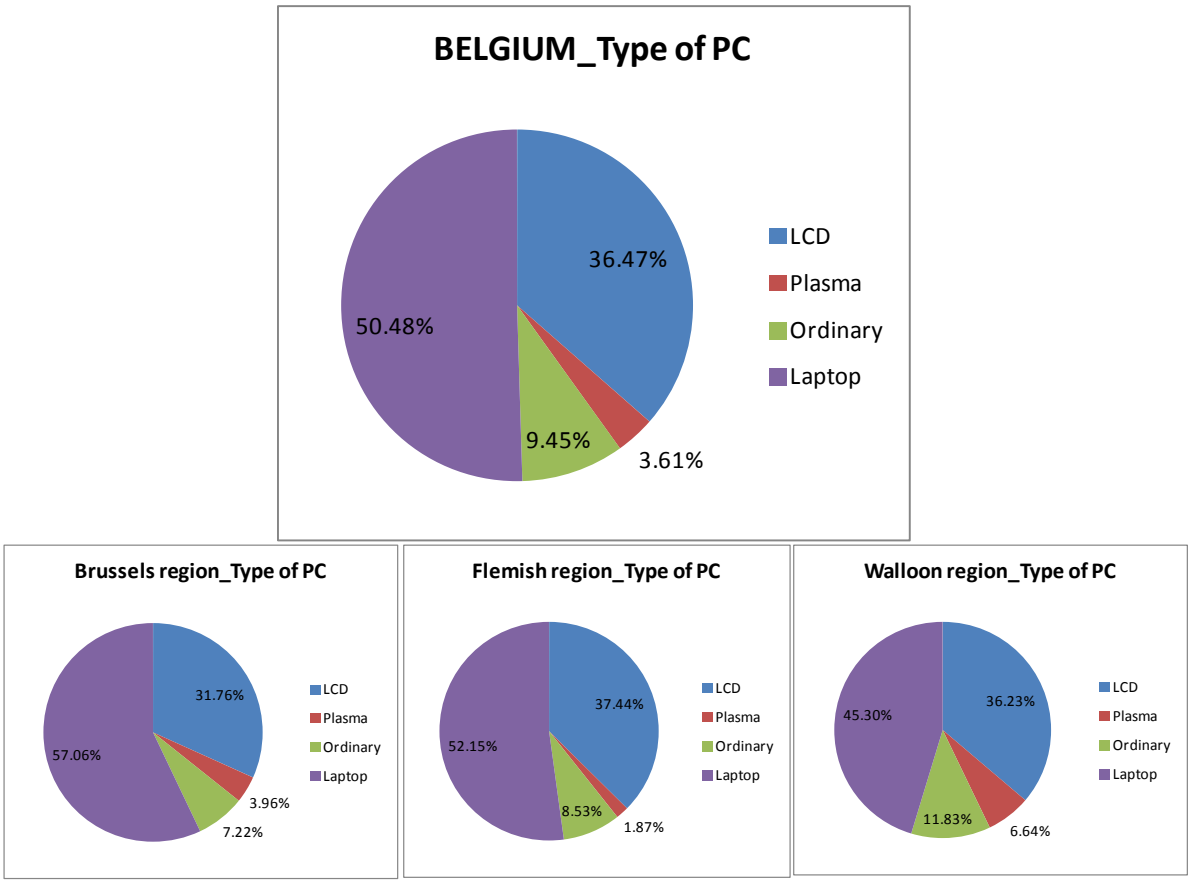


Figure 47: Use of PC by type per region and for Belgium, 2010

26% of households in Belgium do not have any PC (29% in Walloon region and 24% in Flemish region).
The number of PCs per region is higher than the number of households. In Belgium the penetration rate is 137%, with 123% in Brussels region and 142% in Flemish region.

The table below shows the percentage of households leaving their PCs and/or modems in stand-by mode by kinds of monitors and display devices (LCD PC, Plasma PC, CRT PC, lap top, modem) in Belgium and by Belgian region. For instance, the table shows that almost 28% of Belgian households keep continuously their LCD PC in stand-by mode, but only 18% for the CRT PC.

Device	Belgium	Brussels Region	Flemish region	Walloon region
LCD PC	27,6%	28,3%	27,2%	28,0%
Plasma PC	24,7%	40,9%	36,6%	16,0%
Ordinary PC	18,2%	7,0%	21,3%	16,4%
Lap top	20,3%	17,7%	22,3%	17,1%
Modems	79,8%	81,7%	84,5%	70,4%

Table 13: Stand-by mode for PCs and modems in Belgium and the regions, 2010 (survey results)

3.1.12 SMALL APPLIANCES

The use and the amount of **video and/or DVD players** [V269, V270]; **radio/CD players** [V271, V272]; **GSMs** [V273, V274]; **electric kettles** [V275, V276]; **coffee-makers** [V277, V278]; **toasters** [V279, V280]; **kitchen robots** [V281, V282]; **electric steamers** [V283, V284]; **(steam) irons** [V285, V286]; **wellness equipment** [V287, V288] (solarium, sauna, whirlpool) are reported by region and for Belgium.

The questions concern the **stand-by mode** of Video/DVD players, radio/CD players and coffee-makers.

The results of the analysis of small appliances are presented in an Excel file: ECS_2012_Small_Electro.xlsx.

The next figure presents the use of **GSMs (mobile phones)** in Belgium and per region.

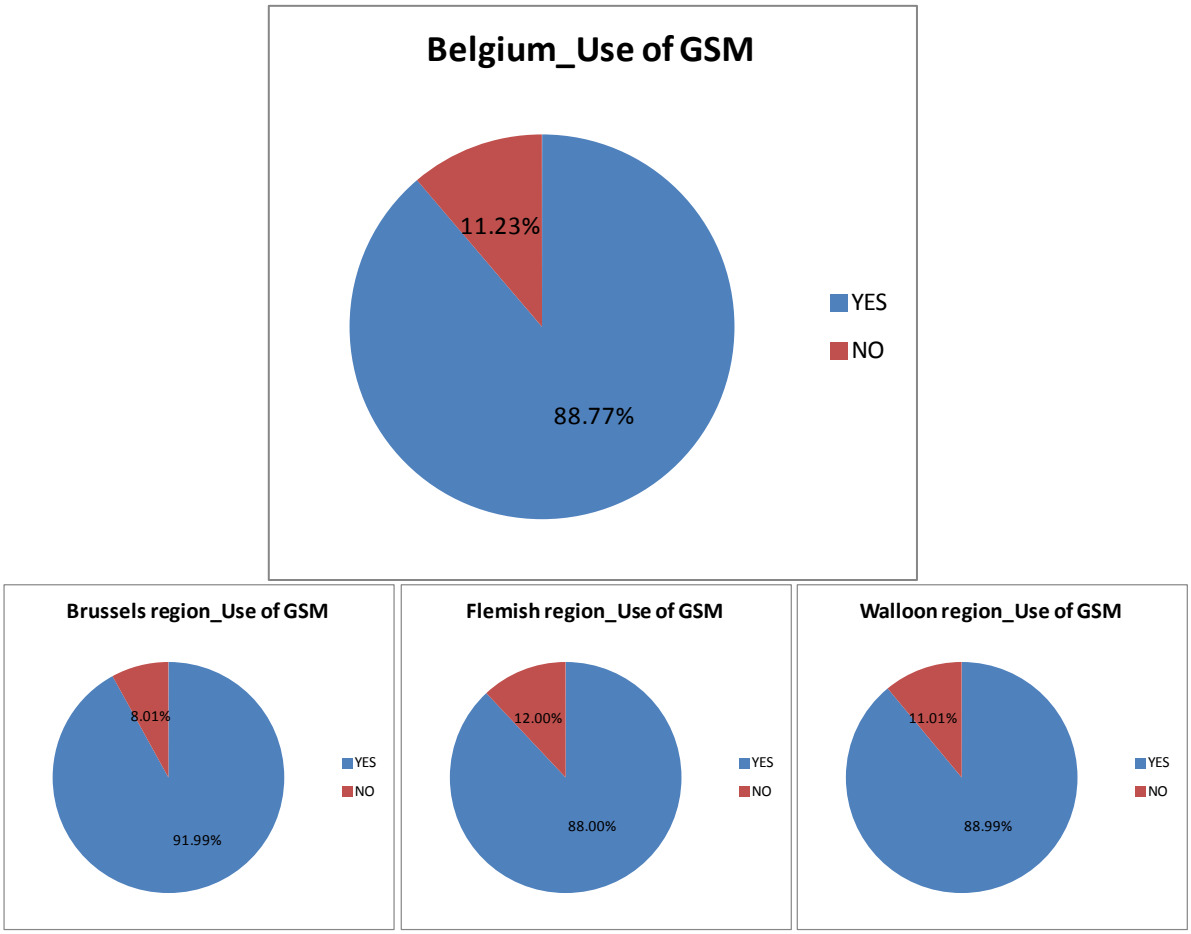


Figure 48: Use of GSMs by type per region and for Belgium, 2010

Device	Belgium	Brussels Region	Flemish region	Walloon region
Video/DVD player	50,2%	50,2%	44,5%	58,9%
Radio/CD player	25,8%	39,4%	19,0%	32,7%
GSM	88,8%	92,0%	88,0%	89,0%
Electric kettle	46,4%	53,2%	53,8%	31,1%
Coffee makers	69,0%	56,0%	72,0%	68,3%
Toasters	38,5%	47,0%	33,5%	44,4%
Kitchen robots	21,4%	28,6%	16,0%	28,4%
Electric steamer	10,8%	12,6%	9,4%	12,5%
Irons	78,6%	73,7%	81,6%	75,0%
Wellness equipment	3,9%	0,9%	6,1%	1,1%

Table 14: Use of small electric appliances in Belgium and the regions, 2010 (survey results)

3.1.13 LIGHTS

The amount of **lights** per type: normal light bulbs [V227], low energy light bulbs [V229], halogen lamps [V231], TL lamps [V233], LED lamps [V235] and the amount of them not often used are reported by households.
The results of the analysis can be found in an Excel file (ECS_2012_Lamps.xlsx) by region and for Belgium.

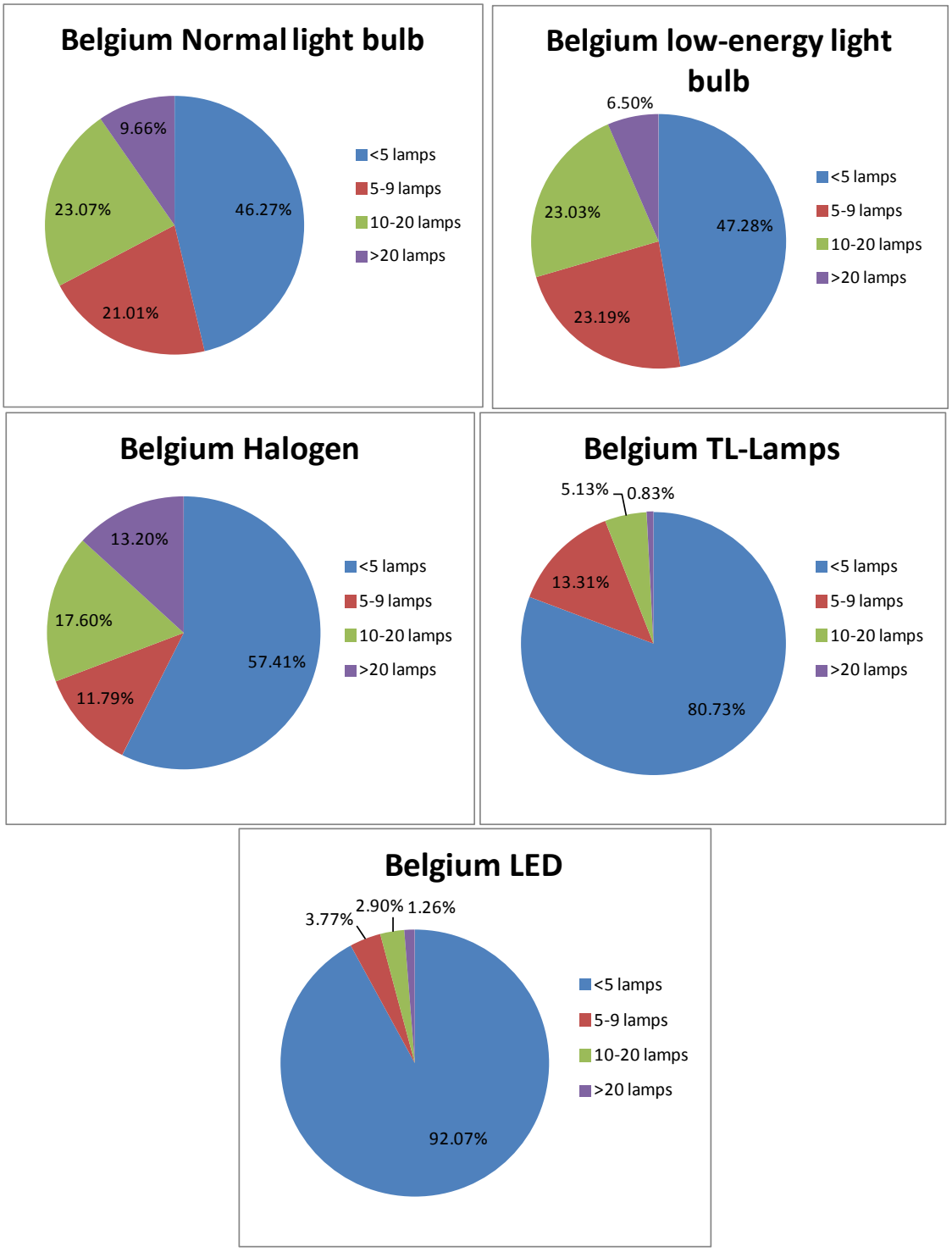


Figure 49: Amount of lights by type in households in Belgium, 2010

3.2 CROSS RESULTS

Combining variables can lead to very interesting insights. We have chosen several cross results that can be interesting for understanding the energy use observed in the households. This understanding can further help to improve the energy statistics in the households, both at federal and regional level. We have chosen the following cross analyses:

- Type of energy source in relation to dwelling characteristics
    - Per dwelling type
    - Per total (heated) surface
    - Per age of dwelling
- Average energy consumption in relation to dwelling characteristics and characteristics of the heating system
    - Per dwelling type
    - Per total (heated) surface
    - Per age of building
    - Per insulation level (glazing, roof insulation, outer wall insulation)
    - Per type of heating system/appliance
- Electricity use in relation to presence and type of appliances

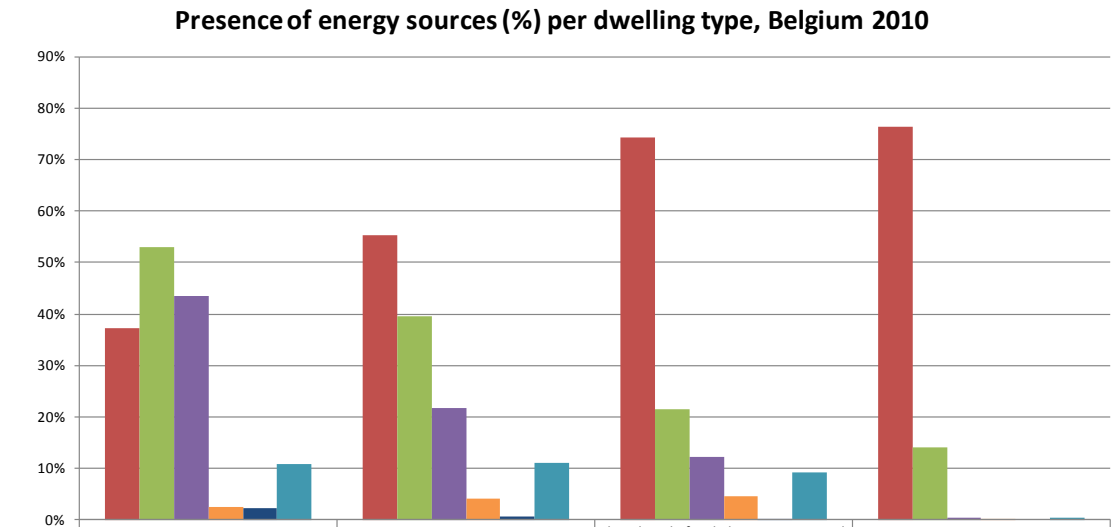
3.2.1 TYPE OF ENERGY SOURCE IN RELATION TO DWELLING CHARACTERISTICS

In these analyses, the presence of an energy source, e.g. electricity, natural gas, fuel oil, coal, propane, butane and wood (yes or no) is crossed with dwelling characteristics:

- dwelling type
- Total (heated) surface
- Age of dwelling

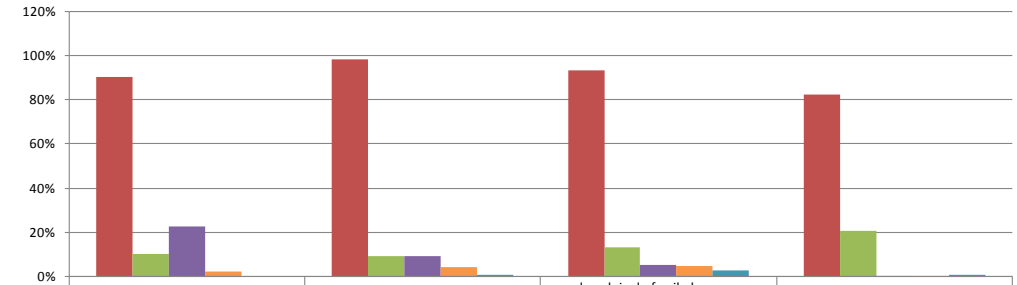
As almost 100% of the households have access to electricity, electricity is left out of the further analyses under paragraph 3.2.1.

In the first crossing, we look at the **presence of an energy source per type of dwelling** [V8, V15, V43+V50+V57+V64, V22, V29, V36 **X** Q28].



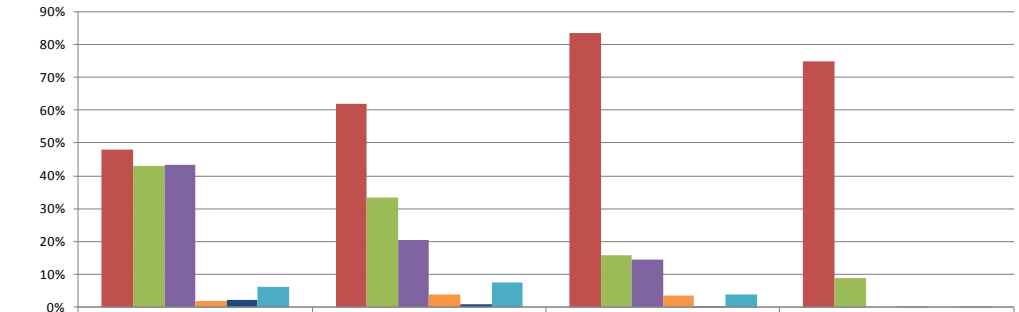
	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Gas	37%	55%	74%	76%
Fuel oil	53%	40%	21%	14%
Wood	44%	22%	12%	0%
Coal	2%	4%	5%	0%
Propane	2%	1%	0%	0%
Butane	11%	11%	9%	1%

Brussels region



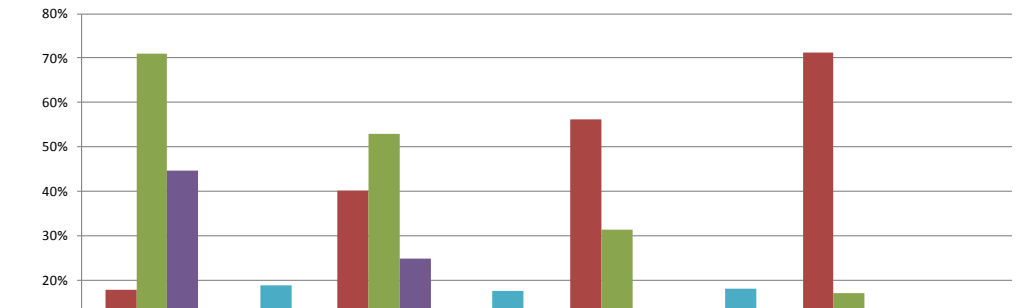
	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Gas	90%	98%	93%	82%
Fuel oil	10%	9%	14%	21%
Wood	23%	9%	5%	0%
Coal	2%	4%	5%	0%
Butane	0%	1%	3%	1%

Flemish region



	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Gas	48%	62%	83%	75%
Fuel oil	43%	33%	16%	9%
Wood	43%	21%	15%	0%
Coal	2%	4%	4%	0%
Propane	2%	1%	0%	0%
Butane	6%	7%	4%	0%

Walloon region



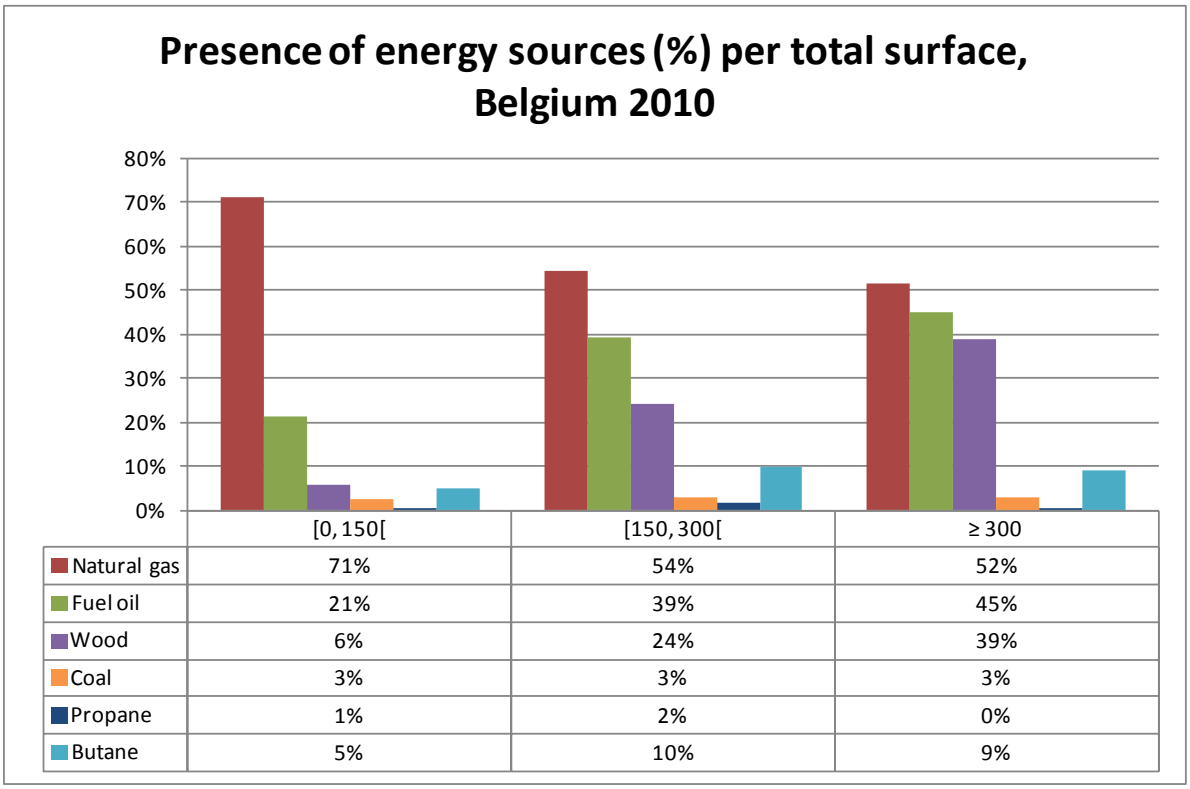
	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Gas	18%	40%	56%	71%
Fuel oil	71%	53%	31%	17%
Wood	45%	25%	11%	2%
Coal	3%	5%	7%	0%
Propane	2%	0%	0%	0%
Butane	19%	18%	18%	1%

Figure 50: % of households per dwelling type where the energy source is present, Belgium and the regions (survey results)

For Belgium we can conclude from Figure 50 that the open single family houses mostly consume fuel oil, while the other types choose more for natural gas. Another striking fact is the presence of wood. According to the results of the question on the principal heating source [variable Q4], only 2% of the households uses wood as main energy source. This is in contrast with the high percentages of presence of wood we see here. It confirms the conclusions accompanying Figure 33 where we stated that wood is probably used a lot as secondary heating source.

If we look at the regions, there are some differences in the presence of fuels. In the Walloon region, 71% of the open single family houses uses fuel oil. While in Flanders open single family houses use between 40 and 50% natural gas, fuel oil or/and wood. The high presence of butane (gas in cylinders) in Wallonia in all types of dwellings, except in apartments, is also remarkable.

In a second crossing, we look at the **presence of an energy source per total surface** [V8, V15, V43+V50+V57+V64, V22, V29, V36 **X** TOTAL_SURFACE]

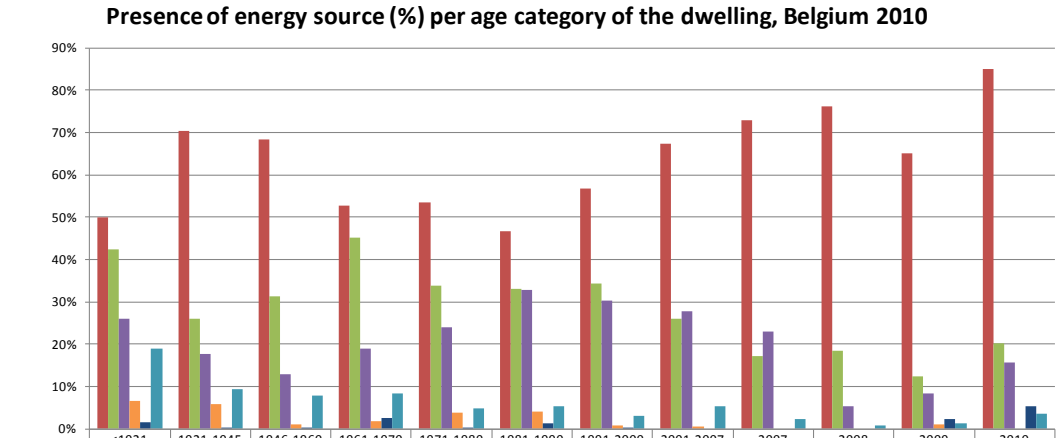


	[0, 150[	[150, 300[	≥ 300
Natural gas	71%	54%	52%
Fuel oil	21%	39%	45%
Wood	6%	24%	39%
Coal	3%	3%	3%
Propane	1%	2%	0%
Butane	5%	10%	9%

Figure 51: % of households per category of total surface of the dwelling where the energy source is present, Belgium (survey results)

The total surface of the dwelling is a parameter with high variability. In order to analyze it, we subdivided it into 3 categories. Some differences can be noticed. The smaller the dwelling (and the more chance that it is an apartment or closed house), the more natural gas is used. The bigger the dwelling the more important fuel oil becomes, and the more a second source for heating is used, which is often wood.

In a third crossing, we look at the **presence of an energy source per age category of the dwelling** [V8, V15, V43+V50+V57+V64, V22, V29, V36 **X Q32**]



	<1921	1921-1945	1946-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2007	2007	2008	2009	2010
Natural gas	50%	70%	68%	53%	53%	47%	57%	67%	73%	76%	65%	85%
Fuel oil	42%	26%	31%	45%	34%	33%	34%	26%	17%	18%	12%	20%
Wood	26%	18%	13%	19%	24%	33%	30%	28%	23%	5%	8%	16%
Coal	7%	6%	1%	2%	4%	4%	1%	0%	0%	0%	1%	0%
Propane	2%	0%	0%	2%	0%	1%	0%	0%	0%	0%	2%	5%
Butane	19%	9%	8%	8%	5%	5%	3%	5%	2%	1%	1%	3%

Figure 52: % of households per age category of the dwelling where the energy source is present, Belgium 2010 (survey results)

Figure 52 shows the current use of fuels in relationship with the original year of construction of the dwelling. If you look at the figure you should bear in mind that an unknown number of dwellings may have been originally equipped with other fuel types, like fuel oil. During renovations some of these dwellings have shifted to natural gas. This shift could be important for dwellings somewhat older, where a replacement of the heating installation has already been done.

Wood and coal are mostly used as secondary heating fuel. These were perhaps not present at the time of construction of the dwelling but could have been added later.

Because of the reasons mentioned above, it is somewhat difficult to comment on the results of Figure 52. One thing is clear for the most recent dwellings (1990-2010), where the impact of fuel switches might be lower: the presence of natural gas has become more important and the presence of fuel oil decreases.

3.2.2 AVERAGE ENERGY CONSUMPTION IN RELATION TO DWELLING CHARACTERISTICS AND CHARACTERISTICS OF THE HEATING SYSTEM

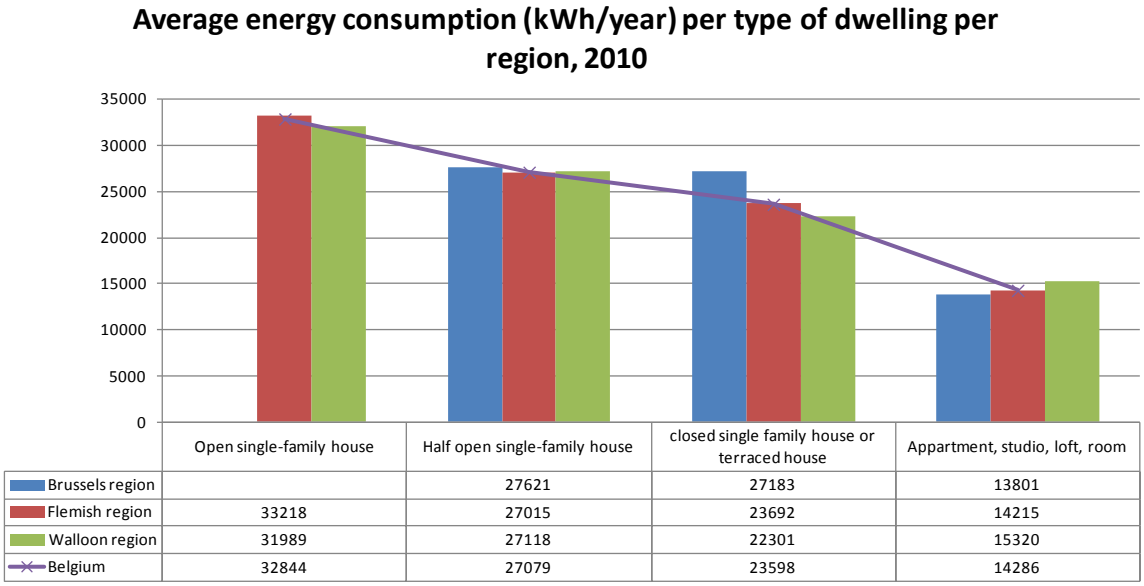
In this analysis, the average consumption of an energy source, e.g. electricity, natural gas, fuel oil, coal, propane, butane and wood is crossed with dwelling characteristics:

- dwelling type
- total surface
- age of building
- number of occupants
- insulation/glazing
- type of heating system/appliances

For each region, we calculate the average energy consumption (not only the source that is used for heating). Electricity is not expressed in primary energy.

In a first analysis, we look at the **average energy consumption per dwelling type** [calculated average total energy consumption (including electricity) per dwelling X Q28].

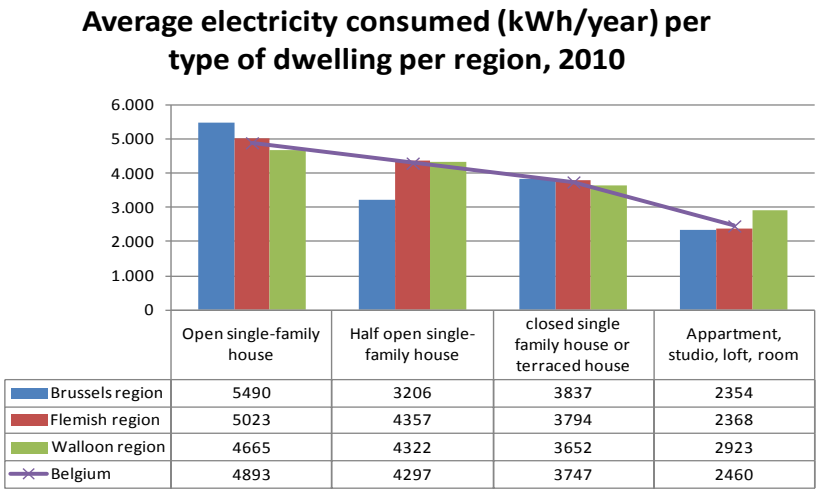
Figure 53 shows that open houses will, on average, consume more energy compared to the other types. The more the dwelling is enclosed, the lower the energy consumption. Apart from Brussels, there is no big difference between the regions. Please note that the Brussels-Capital region counts much more (and smaller) apartments. Therefore the energy consumption will be lower. The energy use of the open single family houses in Brussels is left out of the analysis because it is based on a too small amount of survey results.



	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Brussels region		27621	27183	13801
Flemish region	33218	27015	23692	14215
Walloon region	31989	27118	22301	15320
Belgium	32844	27079	23598	14286

Figure 53: Average energy consumption (kWh/year, dwelling) per type of dwelling per region, 2010 (survey results)

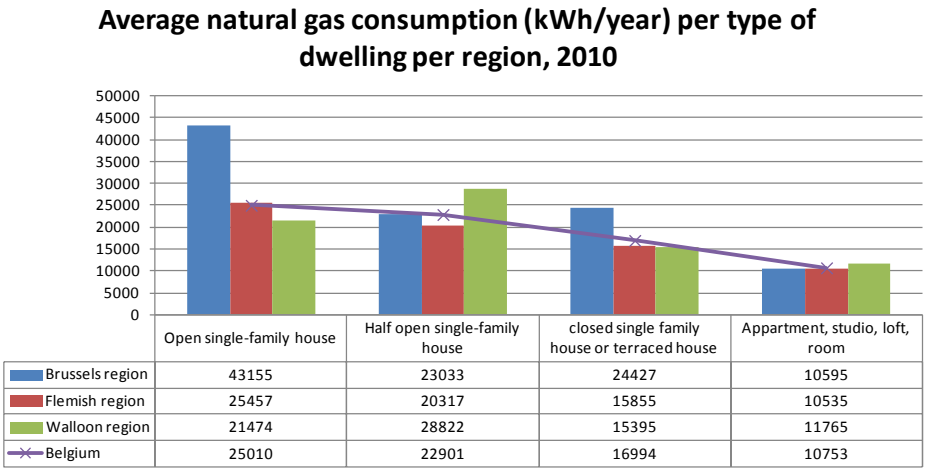
Figure 54, Figure 55, Figure 56 and Figure 57, present the average electricity, natural gas, fuel oil and wood consumption per type of dwelling.



	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Brussels region	5490	3206	3837	2354
Flemish region	5023	4357	3794	2368
Walloon region	4665	4322	3652	2923
Belgium	4893	4297	3747	2460

Figure 54: Average electricity consumption (kWh/year, dwelling) per type of dwelling per region, 2010 (excluding dwellings with electricity as main source for heating) (survey results)

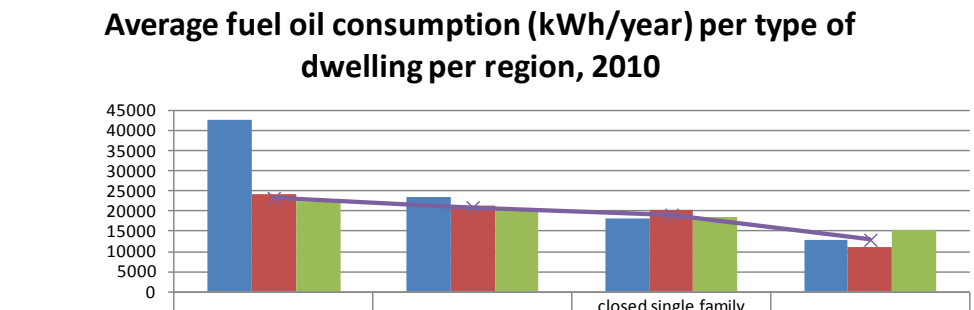
The average electricity consumption of a dwelling (where electricity is not used as main heating source) is clearly higher in open single-family houses than in more enclosed dwellings.



	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Brussels region	43155	23033	24427	10595
Flemish region	25457	20317	15855	10535
Walloon region	21474	28822	15395	11765
Belgium	25010	22901	16994	10753

Figure 55: Average natural gas consumption (kWh/year, dwelling) per type of dwelling per region, 2010 (survey results)

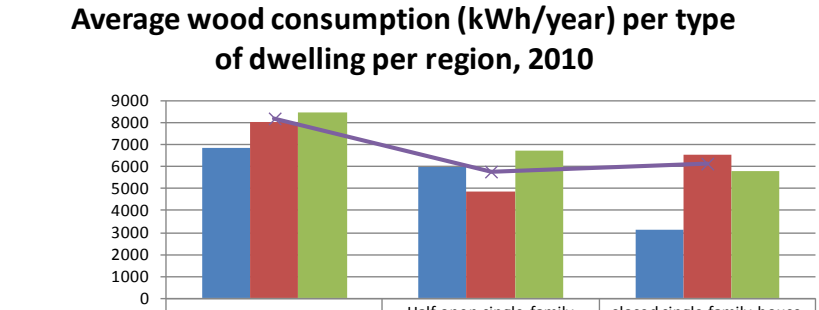
In the results for Belgium we see that the more the dwelling is enclosed, the lower the natural gas consumption is. All dwellings that use natural gas are taken into account here, so no difference is made between households using natural gas as main fuel for heating and households using natural gas for other purposes.



	Open single-family house	Half open single-family house	closed single family house or terraced house	Appartment, studio, loft, room
Brussels region	42755	23357	18312	12962
Flemish region	24064	21485	20173	11091
Walloon region	22392	20458	18502	15223
Belgium	23284	20986	19118	12934

Figure 56: Average fuel oil consumption (kWh/year, dwelling) per type of dwelling per region, 2010 (survey results)

The average fuel oil consumption also decreases the more the dwelling is enclosed.



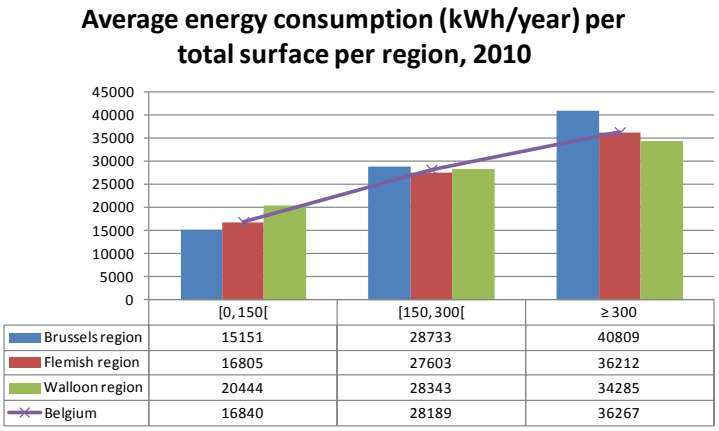
	Open single-family house	Half open single-family house	closed single family house or terraced house
Brussels region	6877	5962	3127
Flemish region	8034	4872	6564
Walloon region	8473	6751	5808
Belgium	8205	5785	6147

Figure 57: Average wood consumption (kWh/year, dwelling) per type of dwelling (excluding apartments and dwellings that use wood as main heating fuel) per region, 2010 (survey results)

Figure 57 represents the average wood consumption per dwelling type, excluding the households that heat mainly on wood and excluding the category of apartments, studio's, lofts and rooms, because of the low number of survey results.

In a second analysis of the average energy consumption in relation to dwelling characteristics, we look at the **average energy consumption per total surface** [calculated average total energy consumption per dwelling X calculated total surface] .

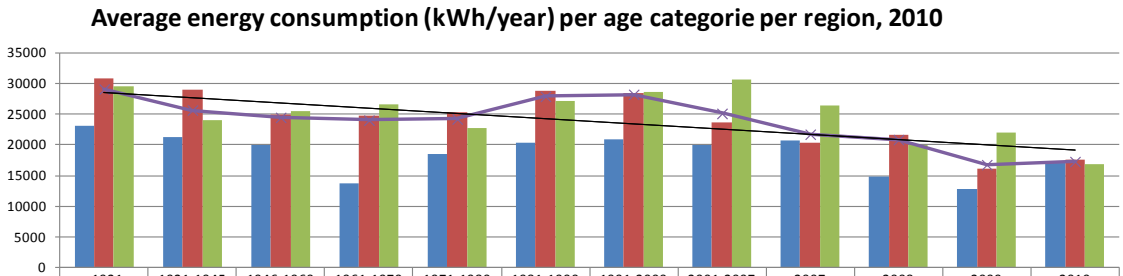
The combination of the average energy consumption and the total surface gives the expected increasing line, Figure 58. The larger the dwelling, the more space has to be heated. The number of some electrical appliances, like lighting, is also directly linked to the surface.



	[0, 150[	[150, 300[	≥ 300
Brussels region	15151	28733	40809
Flemish region	16805	27603	36212
Walloon region	20444	28343	34285
Belgium	16840	28189	36267

Figure 58: Average energy consumption (kWh/year, dwelling) per total surface per region, 2010 (survey results)

In a third analysis, we look at the **average energy consumption per age category of the dwelling.** [calculated average total energy consumption per dwelling X Q32]. The question Q32 on the year of construction of the dwelling yields interesting results in combination with average energy consumption. Older houses seem to consume more energy, compared to new ones. However, older houses could have already been renovated at some point in time. A further analysis on the relationship between energy consumption and the timing of renovation would be interesting [variable Q34 and Q35].



	<1921	1921-1945	1946-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2007	2007	2008	2009	2010
Brussels region	23159	21193	20023	13762	18497	20372	20826	19924	20680	14852	12738	17049
Flemish region	30808	28876	25012	24771	25240	28714	28451	23627	20246	21686	16158	17533
Walloon region	29499	23984	25541	26543	22713	27061	28609	30535	26371	20025	22002	16765
Belgium	29072	25655	24464	24008	24193	27889	28213	25110	21727	20858	16774	17278

Figure 59: Average energy consumption (kWh/year, dwelling) per age category of the dwelling per region, 2010 (survey results)

In a fourth analysis of this section, we look at the **average energy consumption per number of occupants** [calculated average total energy consumption per dwelling X Q109]. The higher the number of occupants, the more the household consumes, but this is not a linear relationship.

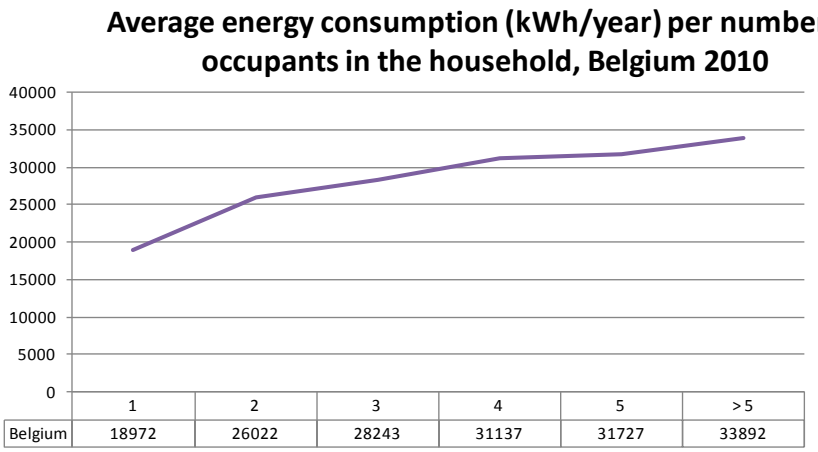


Figure 60: Average energy consumption (kWh/year) per amount of occupants in the household, Belgium 2010 (survey results)

The descending line in Figure 61 is probably due to energy consumptions that are more or less independent of the number of persons into the household, e.g. space heating, lighting and consumer electronics (e.g. television). This effect is even more explicit going from 1 to 2 and from 2 to 3 persons, as Figure 61 shows. The average energy consumption of a single person household is 18 972 kWh/year. If a second person joins in, the average consumption will increase with 13 011 kWh/year. A third person into the household will lead to an extra energy use of 9 414 kWh/year and so on.

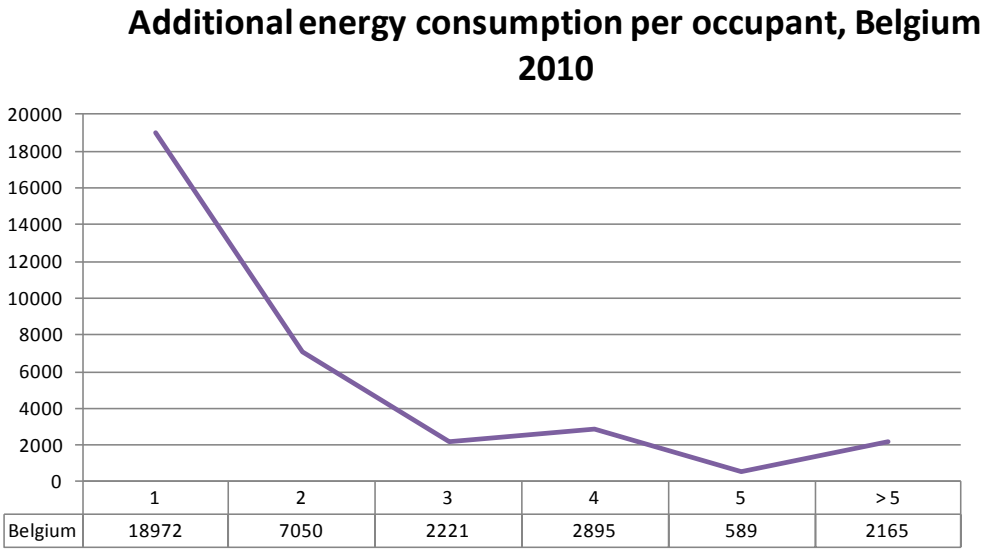
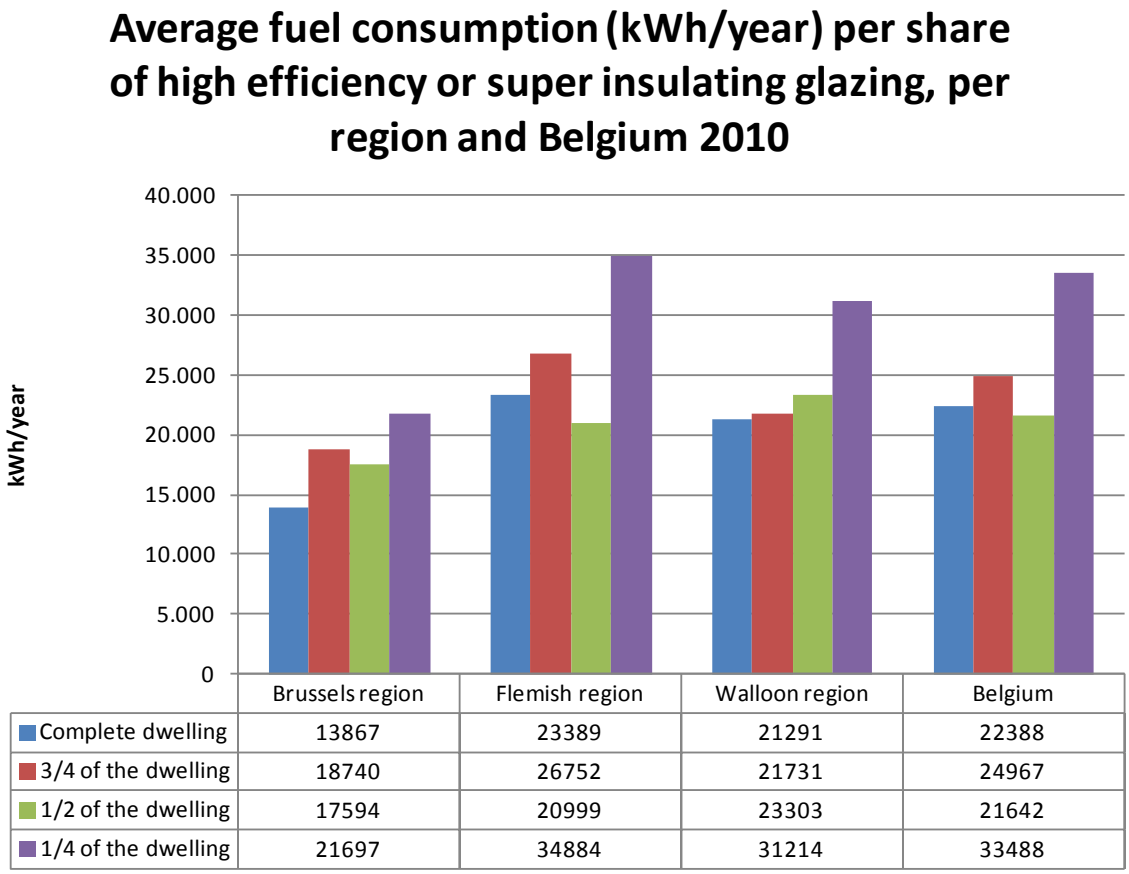


Figure 61: Additional average energy consumption (kWh/year) per occupant, Belgium 2010

The fifth set of analyses relates **the average fuel consumption per household with the insulation level**. In the next three analyses we try to find out how strong the relationship is between the average fuel consumption (electricity consumption is excluded) and the presence of energy efficient glazing, the level of roof or attic-floor insulation and the level of outer wall insulation. For all these analyses the dwellings that use electricity as main source for heating are excluded, because of the different consumption pattern.

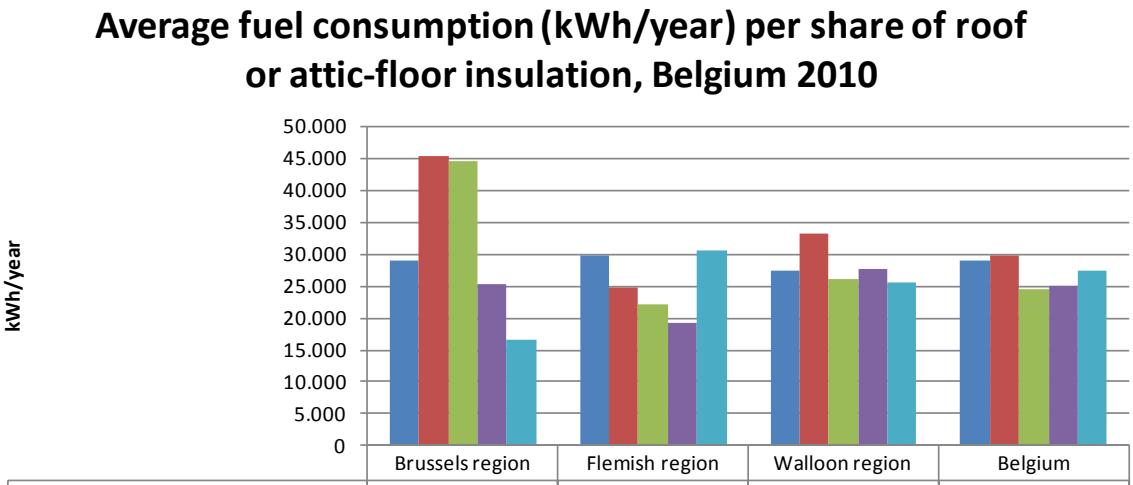
Figure 62 starts with the average total fuel consumption per household and per level of presence of high efficiency glazing or super insulating glazing [calculated average total energy consumption per dwelling X Q84]



	Brussels region	Flemish region	Walloon region	Belgium
Complete dwelling	13867	23389	21291	22388
3/4 of the dwelling	18740	26752	21731	24967
1/2 of the dwelling	17594	20999	23303	21642
1/4 of the dwelling	21697	34884	31214	33488

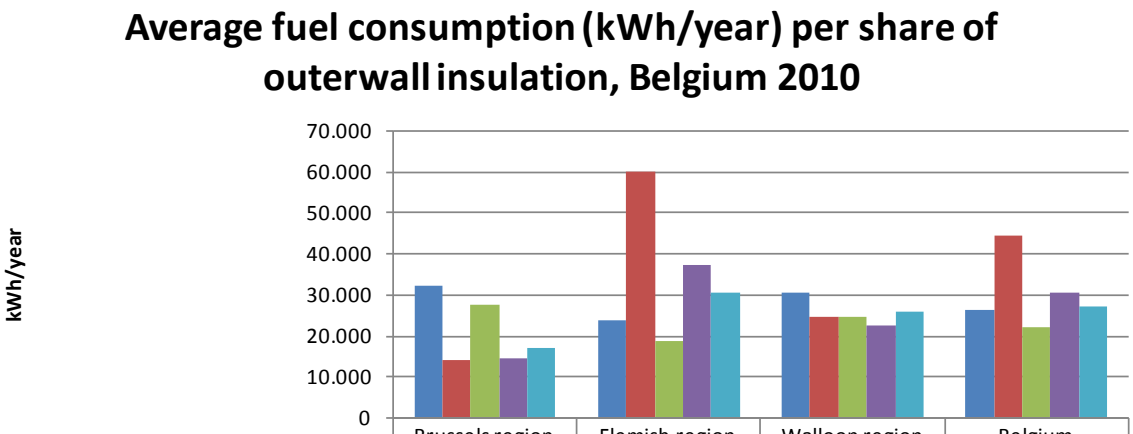
Figure 62: Average total fuel consumption per dwelling, per level of high efficiency or super insulating glazing, per region and for Belgium (survey results)

Belgian dwellings that are completely equipped with high efficiency or super insulating glazing are clearly consuming less energy (excluding electricity) than dwellings where only one fourth of the windows is equipped with high efficiency or super insulating glazing. The same conclusion can be made for the regions. The sometimes strange variations in average fuel consumption for the categories '½ of the dwelling and ¾ of the dwelling' can be partially explained by the small number of respondents in these categories.



	Brussels region	Flemish region	Walloon region	Belgium
Complete dwelling has roof or attic-floor insulation	28981	29774	27468	28953
3/4 dwelling has roof or attic-floor insulation	45271	24655	33118	29657
1/2 dwelling has roof or attic-floor insulation	44664	22162	26060	24584
1/4 dwelling has roof or attic-floor insulation	25303	19099	27624	24994
No roof or attic-floor insulation	16481	30499	25691	27531

Figure 63: Average total fuel consumption per dwelling, per level of roof or attic-floor insulation, per region and for Belgium (survey results)



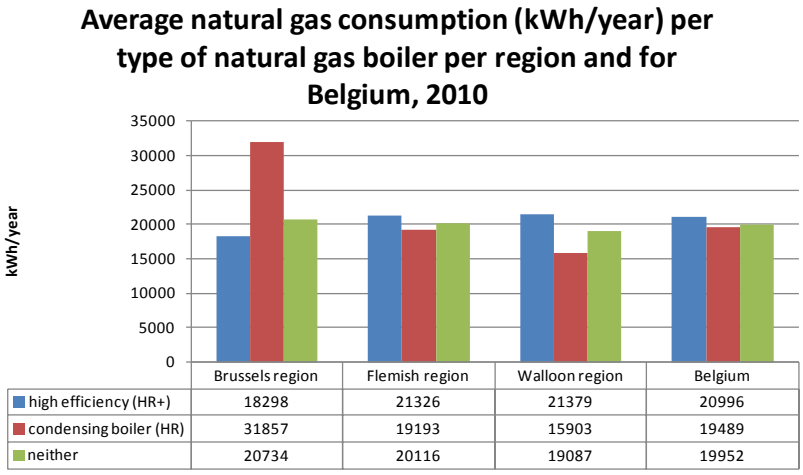
	Brussels region	Flemish region	Walloon region	Belgium
Complete dwelling has outer wall insulation	32229	23903	30479	26213
3/4 dwelling has outer wall insulation	14291	60084	24778	44367
1/2 dwelling has outer wall insulation	27811	18983	24682	22081
1/4 dwelling has outer wall insulation	14539	37526	22458	30446
No insulation	16952	30606	25857	27068

Figure 64: Average total fuel consumption per dwelling, per level of outer wall insulation, per region and for Belgium (survey results)

Figure 63 and Figure 64 are not presenting the results we had expected. Looking closer at the results of the survey, there is only a small number of respondents in the categories with only ¼, ½

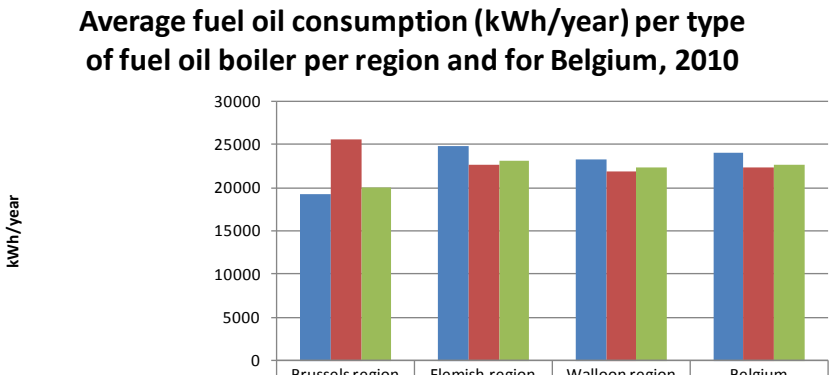
and ¾ equipped with roof, attic-floor or outer wall insulation. The results of these categories may therefore be biased. In the Brussels capital region and the Walloon region, the average fuel consumption for dwellings totally equipped with insulation is more than the average fuel consumption for dwellings where is no insulation. This seems strange. In both analyses, no distinction was made between large or small dwellings, the type of dwelling (enclosed or not), the type of heating appliances etc, which could probably explain the strange results. Further cross-analysis is required to understand these results.

In the next analysis **the relationship between energy consumption and the characteristics of the heating system** is examined. Figure 65 and Figure 66 show the average natural gas and fuel oil consumption per type of boiler. Both figures are representing dwellings using an individual central heating system.



	Brussels region	Flemish region	Walloon region	Belgium
high efficiency (HR+)	18298	21326	21379	20996
condensing boiler (HR)	31857	19193	15903	19489
neither	20734	20116	19087	19952

Figure 65: Average consumption of natural gas per dwelling and per type of boiler for households using an individual central heating system on natural gas, per region and for Belgium (survey results)



	Brussels region	Flemish region	Walloon region	Belgium
High efficiency (Optimaz label)	19308	24783	23274	24038
Condensing boiler (Optimaz elite)	25590	22600	21920	22383
neither	20020	23172	22349	22710

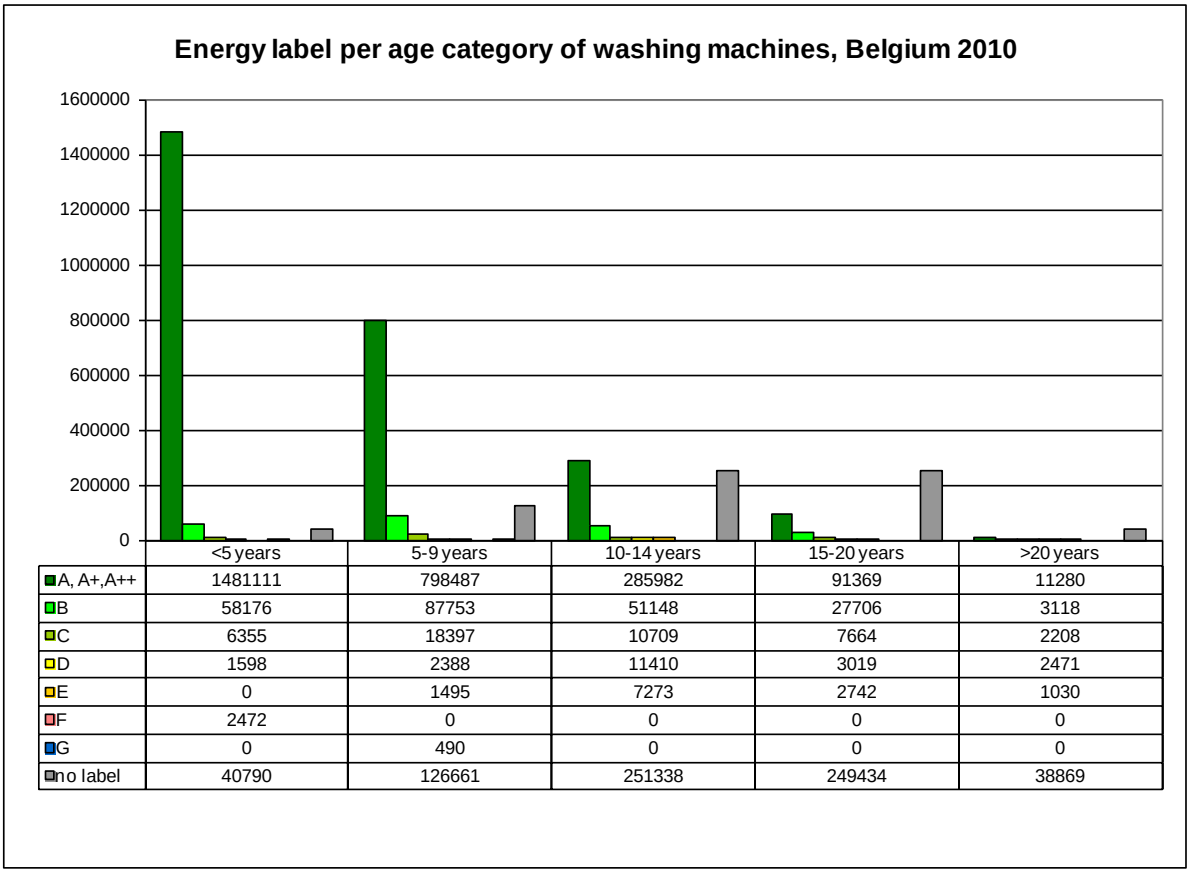
Figure 66: Average consumption of fuel oil per dwelling and per type of boiler for households using an individual central heating system on fuel oil, per region and for Belgium (survey results)

It is difficult to comment on the results of Figure 65 and Figure 66. It is remarkable that households with an individual central heating system without energy label have a lower or comparable average natural gas consumption than households having a system with an energy label. The same goes for the individual central heating systems on fuel oil. However, a lot of parameters are influencing the average natural gas/fuel oil consumption and these parameters are not taken into account in both analyses. The size of the dwelling, the level of being enclosed by other dwellings, the level of insulation, the age of the dwelling, the number of occupants,… could explain the results. Further cross-analysis is required to understand these results.

3.2.3 ENERGY LABEL PER AGE CATEGORY

In the next analysis, we cross **the energy label per age category of some electrical appliances**: washing machines (see Figure 67) and freezers (see Figure 68).

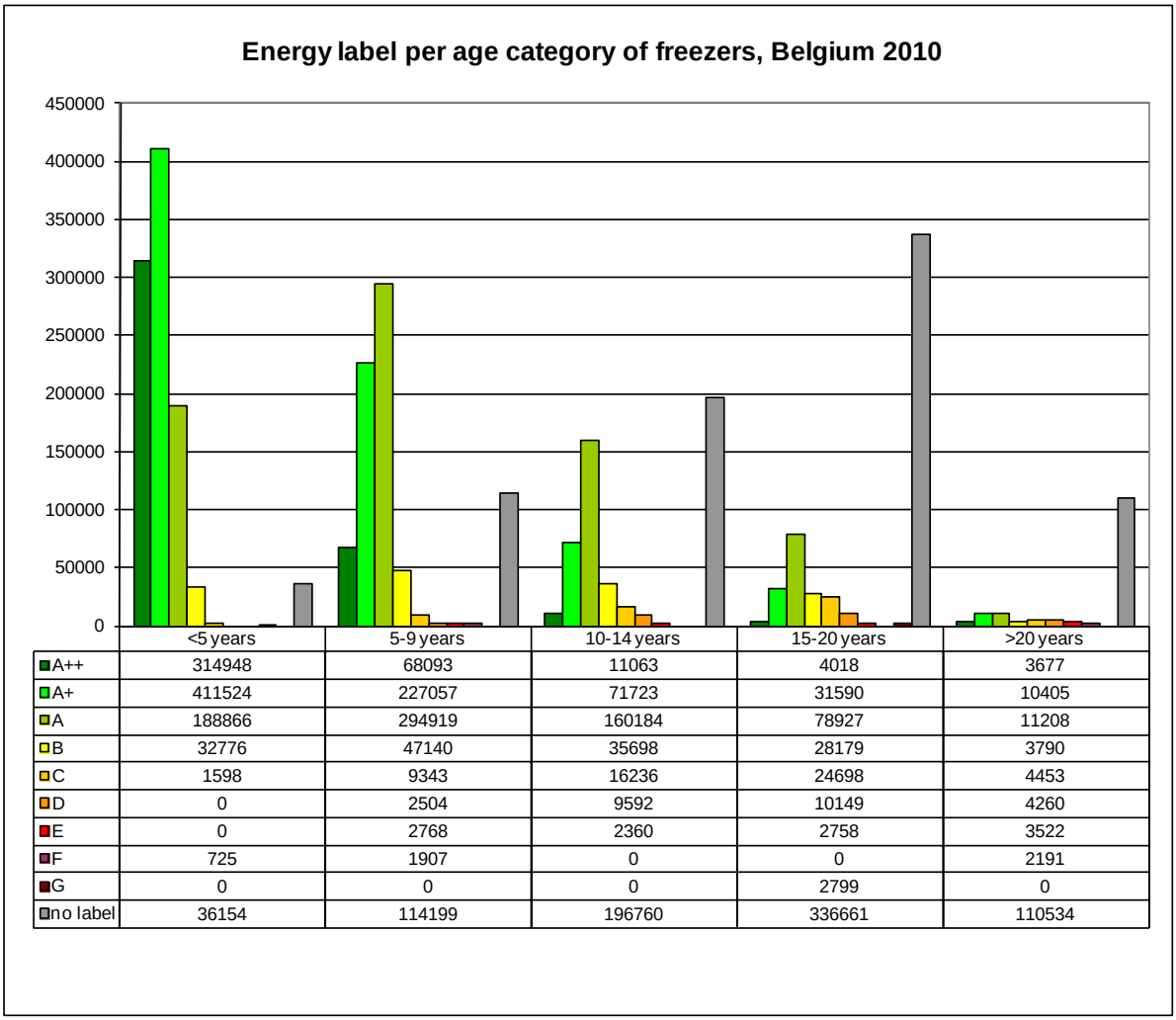
Figure 67**.** makes clear that many washing machines are quite new. Indeed, 43% of total number of washing machines are less than 5 years old and 71% are not older than a decade. This explains why the big majority of washing machines (72%) are labelised A or higher. Briefly summarised, the washing machines used by Belgian households are young and energy efficient.



	<5 years	5-9 years	10-14 years	15-20 years	>20 years
A, A+,A++	1481111	798487	285982	91369	11280
B	58176	87753	51148	27706	3118
C	6355	18397	10709	7664	2208
D	1598	2388	11410	3019	2471
E	0	1495	7273	2742	1030
F	2472	0	0	0	0
G	0	490	0	0	0
no label	40790	126661	251338	249434	38869

Figure 67: Energy label per age category of washing machines, Belgium 2010

Figure 68 shows that the freezers used by Belgian households are older than the existing washing machines. 34% of total number of freezers are less than 5 years old while 23% are older than 15 years (11% more than washing machines). In terms of energy label, the older the freezer, the higher the chance that the energy label of the appliance is low or unknown.



	<5 years	5-9 years	10-14 years	15-20 years	>20 years
A++	314948	68093	11063	4018	3677
A+	411524	227057	71723	31590	10405
A	188866	294919	160184	78927	11208
B	32776	47140	35698	28179	3790
C	1598	9343	16236	24698	4453
D	0	2504	9592	10149	4260
E	0	2768	2360	2758	3522
F	725	1907	0	0	2191
G	0	0	0	2799	0
no label	36154	114199	196760	336661	110534

Figure 68: Energy label per age category of freezers, Belgium 2010

4 CONCLUSIONS

The main conclusions from the survey results presented in this reports are summarized in this chapter.

The **analysis of the questions** concerning the **general characteristics of the dwellings** showed that since the census 2001, the *type of dwelling* is shifted somewhat from open and half-open single family houses to apartments and studios. The Brussels region as an urbanized area, has a significantly higher percentage of apartments and studios than the other regions, as can be expected. Concerning the *ownership of the dwelling*, we see that not much has changed between the census 2001 and the current survey results. Again, the Brussels region shows a different picture than the other regions: a lot less households own their dwelling than in Flanders or Wallonia. If we look at the *year of construction*, we see that the Flemish region has the 'newest' housing stock. The average (heated) surface of the dwellings is the lowest in the Brussels region. This is consistent with the fact that Brussels has a high percentage of apartments and studios.

The **energy related characteristics of the dwellings** were also analyzed, specifically the presence and level of insulation and types of glazing. For *roof and attic-floor insulation* we see a large increase in presence since the census of 2001. In 2001, 43% had no form of roof insulation, and this number has declined to 28%. *Floor insulation* is not present in about ¾ of the dwellings. No comparison could be made with the situation in 2001. For *outer wall insulation*, we see that the situation in 2001 and the results from the current survey are similar. For *glazing* the situation has changed significantly since 2001. In 2001, 30% of the houses in Belgium still had single glazing as the dominant type of glazing, in the current survey only 17% has single glazing. The houses in the Flemish region have the highest % of high efficiency or super insulating glazing of the 3 regions. The explicit evolution towards more insulation can be explained by the growing awareness of the importance of insulation, and of course the existence of (regional) premiums and tax deductions in Belgium.

Also for **heating systems and sanitary hot water systems**, an analysis of some important questions was described in the report. The *main heating source* in Belgium is natural gas with 55%. There is definitely a shift since 2001, when the shares of natural gas and fuel oil were almost equal (43% and 44%). The survey also shows large differences in main heating source between the regions: in Brussels natural gas is the main fuel in 77% of the dwellings, in Flanders 61% and in the Walloon region 39%. In Wallonia, fuel oil is still the main fuel for heating (47%). The results are what can be expected: in Brussels, as an urban area, natural gas is omnipresent. In Wallonia, the natural gas grid is not as extended as in Flanders. *Central heating* is present in 84% of the houses (individual or in common), which is higher than the results of the census 2001 (73%). 61% of the individual central heating systems on natural gas has an energy efficiency label (HR+ or condensing boiler HR), while 44% of the individual central heating systems on fuel oil has an energy efficiency label (Optimaz, Optimaz Elite). In the Flemish region, the share of energy efficient central heating systems on natural gas is clearly higher than in the other regions, while for fuel oil, the share is almost equal in all regions. There is no comparison possible with the census of 2001.

Households heating their dwelling with only one or more decentral heating appliances (no central heating system) chose mostly for electrical appliances (accumulator 18% and convector 17%) and gas stoves (35%). In the Walloon region gas stoves (39%) and electrical appliances (26%) are also preferred, but in comparison with the other regions there is also a significant share of fuel oil stoves (22%) and coal stoves(12%). Decentral wood appliances counts for a share of 8% in the Flemish region and 11% in the Walloon region. In the Brussels Capital region these are negligible. The *type of boiler for hot water production* is mainly a geyser or boiler which is part of the heating system (61%). Also remarkable is that 60% of the boilers/geysers is not older than a decade.

If we look at **energy consumption and the presence of energy sources**, we see that electricity is *present* in practically all households. We also see that natural gas is present in 59% of the Belgian households, while only 55% uses it as a main fuel for heating. This means that natural gas is also used for other purposes (like cooking). If fuel oil is present in the dwelling (33%), it seems to be also used as main fuel for heating (33%). The presence of certain fuel types in comparison with the percentage of this fuel as main fuel, gives an indication which fuels are used for other purposes or as a secondary fuel for heating (like for example for coal, butane and wood is the case). We also calculated the *total energy consumption* based on the survey, and compared this with the regional energy balances and the federal energy statistics reported to Eurostat. The largest differences can be seen in the fuel oil consumption and wood consumption. Fuel oil consumption in the Flemish energy balance is higher than the survey results, for the Walloon region, we observe the opposite. For wood, all regions report lower energy consumptions in the regional energy balance than the results of the survey. Since wood consumption is difficult to monitor, the results of this survey will help improve the quality of the regional and also the federal energy balances. The analysis of the average energy consumption per dwelling and per type of main fuel used, shows that dwellings with fuel oil consume the most. This is consistent with the fact that fuel oil is mostly used in larger, older houses. The comparison between the average consumption of the main fuel only, and the total average consumption (excluding electricity) for the same category of houses, shows that secondary fuels are used. Presumably a part is used for secondary heating. For households using other sources than electricity for heating, the average electricity consumption per household and per type of main fuel is very similar for all regions and for Belgium.

In a second part, **cross results** are presented and evaluated. The **presence of an energy source is compared with dwelling characteristics**. A first dwelling characteristic is the *dwelling type*. Open single family houses mostly consume fuel oil, while the other types choose for natural gas. Wood is present in 44% of the open single family houses, 22% in half-open houses and 12% in closed family houses. Because only 2% of houses uses wood as a main energy source for heating, this means that wood is largely used as a secondary energy source. A second dwelling characteristic is the *surface*. The smaller the dwelling, the higher the chance that it is an apartment or closed house, the more one chooses for natural gas. The bigger the dwelling the more important fuel oil is, and the more a second source for heating is needed, which is often wood. A third is the year or *period of construction*. The presence of coal and butane is linked with the age of the buildings: in the younger ones, their use has almost disappeared. On the opposite, the use of natural gas is more extensive in more recent dwellings.

We also crossed **average energy consumption with dwelling characteristics and characteristics of the heating system**. If we look at *dwelling type*, we see that open houses will, on average, consume more energy compared with the other types. Concerning the *surface*, we see that the bigger the dwelling, the more space one has to heat and to install electrical appliances, the more energy is consumed. The *age or period* in which the house is built is a third characteristic. As could be expected, older houses seem to consume more energy, compared to new ones. However, older houses have often been renovated at some point in time. We also looked at the relationship

between average energy consumption and the *number of occupants*. The higher the number of occupants, the more the household consumes, but this relationship is of course not linear. The additional energy used decreases with the number of occupants. The average fuel consumption of Belgian dwellings completely equipped with high efficiency or super insulating glazing is lower than in dwellings where only one fourth of the windows is equipped with energy efficient glazing. In the last cross analysis for this theme, we expected conformation of the lower average energy consumption for dwellings equipped with an energy efficient central heating system on natural gas or fuel oil in comparison with systems without energy efficiency label, or where insulation level of the outer shell of the building is better. The results are however not so obvious. Other parameters have to be taken into consideration like the type or size of dwelling. Further cross analysis is thus required.

Overall, the survey provides results of good quality that can positively be used for further analysis. Further work will be done to see how the results (especially for wood) can be incorporated in the (regional) energy balances. Belgium will look for opportunities to integrate results of the survey into official reporting on the European Directives ESD 2006/32, Renewable 2009/28, EPB 2002/91 and 2010/31.

5 APPENDIX

Annex 1, 2, 3, 4 and 5 can be found in the extra document called “APPENDIX”.
Annex 6 “list of variables and number of responses” and annex 7 “List of relation between question and Excel-dataset” is enclosed further in the report.

ANNEX 1 : SURVEY IN FRENCH AND DUTCH

Annex 1 can be found in the extra document “APPENDIX”.

ANNEX 2: GUIDEBOOK 1, 2 AND 3 FOR INTERVIEWERS

Annex 2 can be found in the extra document “APPENDIX”.

ANNEX 3: INTRODUCTION LETTER FOR RESPONDENTS

Annex 3 can be found in the extra document “APPENDIX”.

ANNEX 4: PRESENTATION FOR TRAINING COURSE INTERVIEWERS

Annex 4 can be found in the extra document “APPENDIX”.

ANNEX 5: CONTACT SHEET IN FRENCH AND DUTCH

Annex 5 can be found in the extra document “APPENDIX”.

ANNEX 6: LIST OF VARIABLES AND NUMBER OF RESPONSES

NAME	LABEL	Number of responses
ID	ID	3396
POSTCODE	Postal code/ ZIP	3396
GEMEENTN	Village/city	3396
LANGUAGE	Language of the interview	3396
SEX	Sex: male/female	3396
AGECAT	Age category	3396
PROVINCE	Province	3396
REGION	Region	3396
ENQ	Number of the pollster	3364
PROV3	Prov3	3375
REFNIS	Refnis-code	3396
GROUPNR	groupnumber	3396
HHNR	HHNr Houshold number	3396
V1	Use of electricity in household?	3394
V2	How much electricity consumed (kWh/year)?	2646
V2_ele_buyed	How much electricity buyed CORRECTED for 2010 (kWh/year)?	3088
V2_ele_PV	How much electricity produced by PV CALCULATED with 8m²/KWp and 950 kWh/kWp (kWh/year)?	142
V2_ele_tot	How much electricity consumed (buyed CORRECTED for 2010 + PV) PV (kWh/year)?	3094
V3	How much did you pay for the electricity (€, VAT incl)?	3065
V5	What was begin date of electricity bill?	3073
V6	What was final date of electricity bill?	3078
V8	Use of natural gas in household?	3393
V9	How much natural gas consumed?	1534
V9_gas_tot	How much natural gas consumed (CORRECTED and in kWh for 2010)	1782
V10	How much did you pay for this (natural gas) (€, VAT incl)?	1766
V11	Wich unit was used for natural gas?	1805
V12	What was begin date of natural gas bill?	3204
V51_WOPE_tot	How many pellets were consumed CORRECTED (density used: 600kg/m³ ; calorific value used: 16,30 MJ/kg,source: VITO 2011/TEM/R/158) (kWh/year)	44
V52	How much did you pay for this (wood pellets) (€, VAT incl)?	44
V53	Wich unit was used (wood pellets) kg or m³?	47
V57	Use of wood waste in household?	3395
V58	How much wood waste was consumed?	106
V58_WOWA_tot	How much wood waste was consumed CORRECTED (density used: 370kg/m³ ; calorific value used: 16,00 MJ/kg,source: VITO 2011/TEM/R/158) (kWh/year)?	106
V59	How much did you pay for this (wood waste) (€, VAT incl)?	130
V60	Wich unit was used (wood waste) kg or m³?	117
V64	Use of wood shavings in the household?	3395
V65	How much wood shavings was consumed?	2
V65_WOSH_tot	How much wood shavings was consumed CORRECTED (density used: 347kg/m³ ; calorific value used: 15,80 MJ/kg,source: VITO 2011/TEM/R/158) (kWh/year)?	2
V66	How much did you pay for this (wood shavings) (€, VAT incl)?	2
V67	Wich unit was used (wood shavings) kg or m³?	2
V71	Use of other energy source in household?	3358
V72	How much was consumed of the other energy source?	27
V72_Lamppetr_tot	How much lamppetrole was consumed CORRECTED and 10,75 kWh/l (in kWh/year)	27
V73	How much did you pay for this (other energy source)(€, VAT incl)?	26
V77	What is the unit of the 'other energy source?	3396
B11_S11	Which other energy source is used in household (besides all mentioned sources)	3396
Q4	With wich fuel do you heat your dwelling mainly?	3391
Q4_C	With wich fuel do you heat your dwelling mainly? CORRECTION	3392
Q4_NRJ	With wich fuel do you heat your dwelling mainly (based on ENERGY)?	3395
Q5	Do you heat your dwelling with a second source of energy?	3394
Q6	What is second most important source of energy you use in the dwelling?	757
Q6_C	What is second most important source of energy you use in the dwelling- CORRECTED?	989
V13	What was final date of natural gas bill?	3206
V15	Use of fuel oil in household?	3394
V16	How much fuel oil was consumed (liter/12 months)?	1062
V16_FO_tot	How much fuel oil was consumed CORRECTED and 10,08 kWh/l (kWh/12 months)	1108
V17	How much did you pay for the fuel oil (€, VAT incl)?	1062
V22	Use of coal in household?	3393
V23	How much coal was consumed (kg/12 months)?	86
V23_COAL_tot	How much coal was consumed CORRECTED and 8,14 kWh/kg (kWh/12 months)	86
V24	How much did you pay for this (coal) (€, VAT incl)?	80
V29	Use of gas from tank in household?	3395
V30	How much gas from tank was consumed (liter year)?	28
V30_PROPT_tot	How much gas from tank was consumed CORRECTED and 6,44 kWh/l (kWh/ year)	29
V31	How much did you pay for this (gas from tank) (€, VAT incl)?	29
V36	Use of gas from cylinder in household?	3395
V37	How much gas (from cilinder) was consumed (liter/year)?	234
V37_BUTC_tot	How much gas (from cilinder) was consumed CORRECTED and 12,68 kWh/kg (kWh/year)	247
V38	How much did you pay for this (gas from cylinder) (€, VAT incl)?	233
V43	Use of logs in household?	3395
V44	How many logs were consumed?	611
V44_WOLO_tot	How many logs were consumed CORRECTED (density used: 370kg/m³ ; calorific value used: 15,47 MJ/kg, source: VITO 2011/TEM/R/158) (kWh/year)	611
V45	How much did you pay for this (logs) (€, VAT incl)?	603
V46	Wich unit was used (logs) kg or m³?	637
V50	Use of wood pellets in household?	3393
V51	How many wood pellets consumed?	44
Q7	With which system do you heat your dwelling mainly?	3391
Q8	Which type of natural gas boiler (individual central heating) do you use?	1388
Q9	Which type of fuel oil boiler (individual central heating) do you use ?	878
Q10	From which period is the individual central heating system?	2390
Q11	Which type of heat pump?	3
Q12	Age of heat pump (years)?	3
Q13	Power of heat pump? (kVA)	1
Q14	What is the COP-factor ot the heat pump (between 2,5 and 6) ?	2
Q151	How does the first part of the central heating work in the dwelling or building (in case of 1 common installation for more dwellings in one building)?	2871
Q152	How does the second (if there is) part of the central heating work in the dwelling or building (in case of 1 common installation for more dwellings in one building)?	87
Q153	How does the third part (if there is) of the central heating work in the dwelling or building (in case of 1 common installation for more dwellings in one building)?	1
Q16	How many radiators/convectors does the dwelling hold have?	2777
Q17	How many radiators/convectors have radiator foil?	2773

5 Appendix

Q18	How many radiators/convectors have thermostatic valves?	2778
Q19	Amount of separate direct heaters in the dwelling (besides the individual or collective central heating installation)?	2871
Q201	separate heater 1(besides the individual or collective central heating installation): Which type?	962
Q202	separate heater 2 (besides the individual or collective central heating installation): Which type?	100
Q203	separate heater 3 (besides the individual or collective central heating installation): Which type?	5
Q204	NO RESPONSES separate heater 4 (besides the individual or collective central heating installation): Which type?	0
Q205	NO RESPONSES separate heater 5 (besides the individual or collective central heating installation): Which type?	0
Q206	NO RESPONSES separate heater 6 (besides the individual or collective central heating installation): Which type?	0
Q207	separate heater 7 (besides the individual or collective central heating installation): Which type?	3396
Q20B	Which other type of individual seperate direct heater was used? (besides the individual or collective central heating installation)?	3396
V78	How old in years is the oldest electric heating appliancer? (seperate direct heater besides the individual or collective central heating installation)	457
V79	Does the oldest electric heating appliance (seperate direct heater besides the individual or collective central heating installation) has a label of high efficiency (label A)?	438
V80	How old in years is the oldest gas stove (seperate direct heater besides the individual or collective central heating installation)?	35
V81	Does the oldest gas stove (seperate direct heater besides the individual or collective central heating installation) has a label of high efficiency (HR or HR+)?	36
V82	How old in years is the oldest fuel oil stove (seperate direct heater besides the individual or collective central heating installation)?	35
V83	Does the oldest fuel oil stove (seperate direct heater besides the individual or collective central heating installation) has a label of high efficiency (Optimaz)?	33
V84	How old in years is the oldest coal stove (seperate direct heater besides the individual or collective central heating installation)?	22
V85	Does the oldest coal stove (seperate direct heater besides the individual or collective central heating installation) has a label of high efficiency (BENOR)?	22
V86	How old in years is the oldest wood pellet stove (seperate direct heater besides the individual or collective central heating installation)?	239
V88	How old in years is the oldest fireplace or built-in cassette (seperate direct heater besides the individual or collective central heating installation)?	235
V90	How old in years is the oldest 'other type of seperate direct heater' (seperate direct heater besides the individual or collective central heating installation)?	22
Q23	How many days a week do you use your separate direct heating system (besides the individual or collective central heating installation) during heating season?	949
Q24	How many seperate decentral heating appliances in household (in dwelling without central heating) ?	518
Q251	separate decentral heater 1 (in dwelling without central heating): Which type?	518
Q252	separate decentral heater 2 (in dwelling without central heating): Which type?	101
Q253	separate decentral heater 3 (in dwelling without central heating): Which type?	11
Q254	separate decentral heater 4 (in dwelling without central heating): Which type?	1
Q255	NO RESPONDENTS WITH separate decentral heater 5 (in dwelling without central heating): Which type?	0
Q25B	Which other type of seperate decentral direct heater was used? (in dwelling without central heating)?	3396
V92	How old in years is the oldest electric accumulator appliance? (seperate direct heater in dwelling without central heating)	79
V93	Does the oldest electric accumulator appliance (seperate direct heater in dwelling without central heating) has a label of high efficiency (label A)?	78
V94	How old in years is the oldest direct electric convector appliance? (seperate direct heater in dwelling without central heating)	116
V95	Does the oldest direct electric convector appliance (seperate direct heater in dwelling without central heating) has a label of high efficiency (label A)?	108
V96	How old in years is the oldest electric underfloor heating? (seperate direct heater in dwelling without central heating)	10
V97	Does the oldest electric underfloor heating (seperate direct heater in dwelling without central heating) has a label of high efficiency (label A)?	9
V98	How old in years is the oldest gas stove? (seperate direct heater in dwelling without central heating)	161
V99	Does the oldest gas stove (seperate direct heater in dwelling without central heating) has a label of high efficiency (HR or HR+)?	169
V100	How old in years is the oldest fuel oil stove? (seperate direct heater in dwelling without central heating)	32
V101	Does the oldest fuel oil stove (seperate direct heater in dwelling without central heating) has a label of high efficiency (Optimaz)?	31
V102	How old in years is the oldest coal stove? (seperate direct heater in dwelling without central heating)	41
V103	Does the oldest coal stove (seperate direct heater in dwelling without central heating) has a label of high efficiency (BENOR)?	41
V104	How old in years is the oldest wood pellet stove (seperate direct heater in dwelling without central heating)?	55
V106	How old in years is the oldest fireplace or built-in cassette (seperate direct heater in dwelling without central heating)?	25
V108	How old in years is the oldest 'other type of seperate direct heater' (seperate direct heater in dwelling without central heating)?	79
Q28	Which type of dwelling?	3395
Q28B	Which type of 'other dwelling'?	3396
V110	Is your flat located directly under the roof?	832
V111	Is your flat located under an uninhabited attic?	832
V112	Is your flat located above a basement, crawl space, garage or other unheated space?	832
V113	Is your flat is located on the ground floor but not above a basement or garage?	832
V114	Is your flat is located in between other appartments/ studio's, with at least one flat below and one above?	832
V115	Is your flat located otherwise?	832
Q30	Ownership of the dwelling	3395
Q31	In case of ownership of the dwelling: build or bought?	2337
Q32	When the house was originally settled? (first inhabited)	3236
Q33	How long does your family live in this home, epxressed in years	3390
Q34	Has the property been renovated thoroughly once (also by previous owners) ?	2365
Q35	When was the last thorough renovation?	1243
Q36	Are you planning to renovate the house thoroughly wihtin 5 years?	2362
Q37	Is the house used for the exercise of a liberal profession or for independent personal services?	3393
V116	Does your dwelling have a basement or crawl space (in case of flats: only take the storeys in mind of your own dwelling)?	3395

V135_C	What is the surface area of this not yet mentioned level/storey in m²? CORRECTION	76
V136	level/intensity of heating the 'other, not yet mentioned storey' during heating season?	141
V136_C	level/intensity of heating the 'other, not yet mentioned storey' during heating season? CORRECTION	77
V137	Does your dwelling have another (not yet mentioned) level/storey?	0
V38_SPE8	NO RESPONDENTS In case your dwelling has another storey that was not mentioned, which other storey is it?	3396
V138	NO RESPONDENTS What is the surface area of this not yet mentioned level/storey in m²?	0
V139	NO RESPONDENTS level/intensity of heating the 'other, not yet mentioned storey' during heating season?	0
V140	NO RESPONDENTS Does your dwelling have another (not yet mentioned) level/storey?	0
V38_SPE9	NO RESPONDENTS In case your dwelling has another storey that was not mentioned, which other storey is it?	3396
V141	NO RESPONDENTS What is the surface area of this not yet mentioned level/storey in m²?	0
V142	NO RESPONDENTS level/intensity of heating the 'other, not yet mentioned storey' during heating season?	0
TOTAL_SURFACE	Calculated total surface of all levels in the dwelling	3321
TOTAL_HEATED_SURFACE	Calculated total heated surface of all levels in the dwelling	3321
HEATEDvsTOTAL_SURFACE	Calculated heated versus total surface of all levels in the dwelling	3321
Q41	Does your dwelling have a heated indoor swimming pool?	3395
Q42	What is the surface area of your heated indoor swimming pool in m²?	5
Q43	Does your dwelling have a heated outdoor swimming pool?	3395
Q44	What is the surface area of your heated outdoor swimming pool in m²?	43
Q451	Can you control the temperature of your dwelling?	3394
Q452	Can you control the temperature of your dwelling?	730
Q453	Can you control the temperature of your dwelling?	57
Q454	Can you control the temperature of your dwelling?	4
Q455	Can you control the temperature of your dwelling?	1
Q456	NO RESPONDENTS Can you control the temperature of your house?	0
Q46	At what temperature do you heat the living parts of your dwelling (dining and living room) during the day when someone is home in °C?	3344
Q471	When do you lower the temperature in the dwelling?	3391
Q472	When do you lower the temperature in the dwelling?	1717
Q473	When do you lower the temperature in the dwelling?	380
Q474	NO RESPONDENTS When do you lower the temperature in the house?	0
Q48	What is the moderate temperature in the dining and living room during the night or during the day when nobody is at home in °C?	3011
Q49	How many baths (no showers) do you and your family take on average during the week in your dwelling?	3389
Q50	How many showers do you and your family take on average during the week in your dwelling?	3391
Q51	How long does a shower take on average in your family (expressed in minutes/shower)?	2885
Q52	In which way do you heat the water of your bath, shower and/or sink: sanitary hot-water supply?	829
Q5301	installation-type 1 for sanitary hot-water supply (bath, shower and or sink)?	3093
Q5302	installation-type 2 for sanitary hot-water supply (bath, shower and or sink)?	73
Q5303	installation-type 3 for sanitary hot-water supply (bath, shower and or sink)?	1
Q5304	NO RESPONDENTS installation-type 4 for sanitary hot-water supply (bath, shower and or sink)?	0
Q5314	NO RESPONDENTS installation-type 14 for sanitary hot-water supply (bath, shower and or sink)?	0
V143	From which period dates the installation (geyser which is part of the heating system) for sanitary hot-water supply (bath, shower and or sink)	1008
V144	NO RESPONDENTS What is the volume (liters) of the geyser which is part of the heating system for sanitary hot-water supply (bath, shower and or sink)	0
V145	From which period dates the installation (Boiler which is connected to the heating system) for sanitary hot-water supply (bath, shower and or sink)	815
V146	What is the volume (liters) of the Boiler which is connected to the heating system for sanitary hot-water supply (bath, shower and or sink)	732
V147	From which period dates the installation (separate boiler -electric) for sanitary hot-water supply (bath, shower and or sink)	716
V148	What is the volume (liters) of the seperate boiler (electric) for sanitary hot-water supply (bath, shower and or sink)	713
V149	From which period dates the installation (separate boiler -natural gas) for sanitary hot-water supply (bath, shower and or sink)	222
V150	What is the volume (liters) of the seperate boiler (natural gas) for sanitary hot-water supply (bath, shower and or sink)	180
V151	From which period dates the installation (separate boiler -propane/butane) for sanitary hot-water supply (bath, shower and or sink)	33
V152	What is the volume (liters) of the seperate boiler (prpane/butane) for sanitary hot-water supply (bath, shower and or sink)	29
V153	From which period dates the installation (separate boiler -fuel oil) for sanitary hot-water supply (bath, shower and or sink)	24
V154	What is the volume (liters) of the seperate boiler (fuel oil) for sanitary hot-water supply (bath, shower and or sink)	21
V155	From which period dates the installation (separate boiler -coal) for sanitary hot-water supply (bath, shower and or sink)	1
V156	What is the volume (liters) of the seperate boiler (coal) for sanitary hot-water supply (bath, shower and or sink)	1
V157	From which period dates the installation (geyser on natural gas) for sanitary hot-water supply (bath, shower and or sink)	148
V159	From which period dates the installation (geyser on propane/butane) for sanitary hot-water supply (bath, shower and or sink)	29
V161	From which period dates the installation (electric geyser) for sanitary hot-water supply (bath, shower and or sink)	29
V163	From which period dates the installation (solar boiler with post-heating) for sanitary hot-water supply (bath, shower and or sink)	25
V164	What is the volume (liters) of the solar boiler with post-heating for sanitary hot-water supply (bath, shower and or sink)	23
V165	From which period dates the installation (solar boiler without post-heating) for sanitary hot-water supply (bath, shower and or sink)	7
V166	What is the volume (liters) of the solar boiler without post-heating for sanitary hot-water supply (bath, shower and or sink)	7
V167	From which period dates the installation (heat pump boiler with post-heating) for sanitary hot-water supply (bath, shower and or sink)	4
V168	What is the volume (liters) of the heat pump boiler with post-heating for sanitary hot-water supply (bath, shower and or sink)	2
V169	From which period dates the installation (heat pump boiler without post-heating) for sanitary hot-water supply (bath, shower and or sink)	4
V170	What is the volume (liters) of the heat pump boiler without post-heating for sanitary hot-water supply (bath, shower and or sink)	4
Q56_1	Amount of water-saving shower heads in the dwelling?	3298
Q56_2	Amount of shower heads with water saving mode	3305
Q57	How do you provide your kitchen with hot water?	824
Q58	Do you use the same installation for heating the kitchen water as for heating the water for bath, shower/sink?	3122
Q5901	installation-type 1 for sanitary hot-water supply (kitchen)?	567
Q5902	installation-type 2 for sanitary hot-water supply (kitchen)?	5
Q5903	NO RESPONDENTS installation-type 3 for sanitary hot-water supply (kitchen)?	0
Q5914	NO RESPONDENTS installation-type 14 for sanitary hot-water supply (kitchen)?	0
V171	From which period dates the installation (geyser which is part of the heating system) for sanitary hot-water supply (kitchen)	36
V173	From which period dates the installation (Boiler which is connected to the heating system) for sanitary hot-water supply (kitchen)	23
V174	What is the volume (liters) of the Boiler which is connected to the heating system for sanitary hot-water supply (kitchen)	22
V175	From which period dates the installation (separate boiler -electric) for sanitary hot-water supply (kitchen)	402
V176	What is the volume (liters) of the seperate boiler (electric) for sanitary hot-water supply (kitchen)	405
V177	From which period dates the installation (separate boiler -natural gas) for sanitary hot-water supply (kitchen)	20
V178	What is the volume (liters) of the seperate boiler (natural gas) for sanitary hot-water supply (kitchen)	17
V179	From which period dates the installation (separate boiler -propane/butane) for sanitary hot-water supply (kitchen)	4
V180	What is the volume (liters) of the seperate boiler (prpane/butane) for sanitary hot-water supply (kitchen)	4
V181	NO RESPONSES From which period dates the installation (separate boiler -fuel oil) for sanitary hot-water supply (kitchen)	0
V182	NO RESPONSES What is the volume (liters) of the seperate boiler (fuel oil) for sanitary hot-water supply (kitchen)	0
V183	NO RESPONSES From which period dates the installation (separate boiler -coal) for sanitary hot-water supply (kitchen)	0
V184	NO RESPONSES What is the volume (liters) of the seperate boiler (coal) for sanitary hot-water supply (kitchen)	0
V185	From which period dates the installation (geyser on natural gas) for sanitary hot-water supply (kitchen)	16
V187	From which period dates the installation (geyser on propane/butane) for sanitary hot-water supply (kitchen)	4
V189	From which period dates the installation (electric geyser) for sanitary hot-water supply (kitchen)	42
V191	NO RESPONSES From which period dates the installation (solar boiler with post-heating) for sanitary hot-water supply (kitchen)	0
V192	NO RESPONSES What is the volume (liters) of the solar boiler with post-heating for sanitary hot-water supply (kitchen)	0
V193	From which period dates the installation (solar boiler without post-heating) for sanitary hot-water supply (kitchen)	2
V194	What is the volume (liters) of the solar boiler without post-heating for sanitary hot-water supply (kitchen)	2
V195	NO RESPONSES From which period dates the installation (heat pump boiler with post-heating) for sanitary hot-water supply (kitchen)	0
V196	NO RESPONSES What is the volume (liters) of the heat pump boiler with post-heating for sanitary hot-water supply (kitchen)	0
V197	From which period dates the installation (heat pump boiler without post-heating) for sanitary hot-water supply (kitchen)	2
V198	What is the volume (liters) of the heat pump boiler without post-heating for sanitary hot-water supply (kitchen)	2
Q62	In case of solar energy for sanitary hot-water supply and or for space-heating: Surface in m² of the solar panels?	43

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Q63	Do you use solar panels for heating the water of the swiming pool?	50
Q64	In case of solar energy heating water of the swimming pool: Surface in m² of the solar panels?	6
Q65	Do you produce electricity with Photovoltaïc-PV-panels?	3394
Q66	In case of PV-panels for electricity production: Surface in m² of the PV-panels?	142
Q67	Type of roof from the dwelling?	3380
Q68	Does your roof have an 'underroof' construction below the roof (important for keeping dry the insulation, so it effects the grade of insulation)	2718
Q69	Does the dwelling have roof or attic-floor insulation?	2703
Q701	Which materials (1st) were used for insulating the roof	1879
Q702	Which materials (2nd) were also used for insulating the roof	99
Q703	NO RESPONSES Which materials (3rd) were also used for insulating the roof	0
Q70B	NO RESPONSES Which 'other materials' for roof insulation?	3396
Q71	What is the thickness of the roof insulation in cm?	1731
Q72	Ground floor of the dwelling completely or partly with floor insulation?	2685
Q731	Which materials (1st) were used for insulating the ground floor	601
Q732	Which materials (2nd) were also used for insulating the ground floor	12
Q733	NO RESPONSES Which materials (3rd) were also used for insulating the ground floor	0
Q73B	Which 'other materials' for ground floor insulation?	3396
Q74	Is the ceiling of the basement or crawl space insulated (partly of completely)?	2062
Q751	Which materials (1st) were used for insulating the ceiling in basement	230
Q752	Which materials (2nd) were also used for insulating the ceiling in basement	3
Q753	NO RESPONSES Which materials (3rd) were also used for insulating the ceiling in basement	0
Q75B	NO RESPONSES Which other material for ceiling insulation of basement?	3396
Q76	What is thickness of the insulation of the ceiling from the basement/crawl space in cm?	208
Q771	Are the outer walls (type 1) completely or partly...	3250
Q772	Are the outer walls (type 2) completely or partly...	100
Q773	Are the outer walls (type 3) completely or partly...	1
Q774	NO RESPONSES Are the outer walls (type 4) completely or partly...	0
Q77B	Which 'other type' of outer wall?	3396
Q78	Outer walls of the dwelling completely or partly with insulation?	3201
Q791	Where is placement of the outer wall insulation in type 1 of the outer walls?	1174
Q792	Where is placement of the outer wall insulation in type 2 of the outer walls?	30
Q793	Where is placement of the outer wall insulation in type 3 of the outer walls?	3
Q801	Which materials (1st) were used for insulating the outer walls	1084
Q802	Which materials (2nd) were also used for insulating the outer walls	20
Q803	NO RESPONSES Which materials (3rd) were also used for insulating the outer walls	0
Q80B	Which other type of outer wall insulation was used?	3396
Q811	Window profile: which material is used ?	3387
Q812	Window profile: which 2nd material is also used?	342
Q813	Window profile: which 3rd material is also used?	20
Q814	NO RESPONSES Window profile: which 4th material is also used?	0
Q81B	NO RESPONSES Which other type of material is used for the window profile?	3396
Q821	Type of glazing in the dwelling (1st)	3394
Q822	Type of glazing also used in the dwelling (2nd)	333
Q823	Type of glazing also used in the dwelling (3rd)	9
Q83	Number (share) of windows with double glazing?	2617
Q84	Number (share) of windows with high efficiency glazing or super isolating glass?	511
Q851	Type of ventilation (1st) in the dwelling	3389
Q852	Type of ventilation (2nd) in the dwelling	146
Q853	Type of ventilation (3rd) in the dwelling	14
Q854	Type of ventilation (4th) in the dwelling	1
Q855	NO RESPONSES Type of ventilation (5th) in the dwelling	0
Q86	Does your dwelling have an airconditioningsystem (integrated system or mobile)?	3395
Q87	What is the refrigerating capacity of the airconditioning system in kW?	45
Q88	Age of the airconditioningsystem (years)?	113
V199	Do you cool during summer the ground floor?	94
V200	Part of the surface area of ground floor which is cooled	32
V201	Do you cool during summer the housing unit (in case of flats/studio/loft/ room -type of dwelling)?	22
V202	Part of the surface area of housing unit which is cooled	16
V203	Do you cool during summer the first floor?	89
V204	Part of the surface area of first floor which is cooled	43
V205	Do you cool during summer the second floor?	18
V206	Part of the surface area of second floor which is cooled	6
V207	Do you cool during summer the attic?	45
V208	Part of the surface area of attic which is cooled	4
V209	Do you cool during summer another not mentioned level/storey?	10
V210	Part of the surface area of 'other not mentioned leve'l which is cooled	1
Q91	What is the cooling temperature in summer during the day °C?	108
Q92	What is the cooling temperature in summer during the night °C?	81
V211	Presence of an electrical hot plate?	3395
V212	What age (in years) is the oldest electrical hot plate at your home?	1728
V213	Presence of an induction hot plate?	3395
V214	What age (in years) is the oldest induction hot plate at your home?	425
V215	Presence of a hot plate on natural gas?	3395
V216	What age (in years) is the oldest hot plate on natural gas at your home?	964
V217	Presence of a hot plate on butane/propane?	3395
V218	What age (in years) is the oldest hot plate on butane/propane at your home?	254
V219	Presence of a combination hot plate (electrical-natural gas-propane/butane-induction)?	3395
V220	What age (in years) is the oldest combination hot plate (electrical-natural gas-propane/butane-induction) at your home?	61
V221	Presence of a microwave oven?	3395
V222	Presence of an electrical oven?	3395
V223	Presence of a gasoven?	3395
V224	Presence of a steam oven?	3395
V225	Presence of a bread oven?	3395
V226	Presence of a combination oven (microwave and/or electrical and/or gas and or steam in one oven)?	3395
V227	Amount of normal light bulbs in the home?	3389
V228	Amount of normal lightbulbs that are not often in use?	2577
V229	Amount of low -energy light bulbs in the home?	3391
V230	Amount of low -energy lightbulbs that are not often in use?	2767
V231	Amount of halogen lamps in the home?	3390
V232	Amount of halogen lamps that are not often in use?	2123
V233	Amount of TL-lamps (Tube Luminescent) in the home?	3391
V234	Amount of TL-lamps (Tube Luminescent) that are not often in use?	2430
V235	Amount of LED-lamps (Light Emitting Diode) in the home?	3391
V236	Amount of LED-lamps (Light Emitting Diode) that are not often in use?	634
V237	Use of refridgerator_one_door minimum 2 times a week?	3394
V238	Amount of refridgerators_one_door used minimum 2 times a week?	2262
V1001	Which is the energylabel of the first refridgerator_one_door	2091
V1002	Which is the energylabel of the second refridgerator_one_door	306
V1003	Which is the energylabel of the third refridgerator_one_door	20
V1004	Which is the energylabel of the fourth refridgerator_one_door	5
V1005	Which is the energylabel of the fifth refridgerator_one_door	4

V1011	Age of the first refridgerator_one_door	2202
V1012	Age of the second refridgerator_one_door	332
V1013	Age of the third refridgerator_one_door	23
V1014	Age of the fourth refridgerator_one_door	5
V1015	Age of the fifth refridgerator_one_door	4
V239	Use of refridgerator_two_doors (incl. freezer) minimum 2 times a week?	3393
V240	Amount of refridgerators_two_doors (incl. freezer) used minimum 2 times a week?	1377
V1006	Which is the energylabel of the first refridgerator_two_doors (incl. freezer)	1302
V1007	Which is the energylabel of the second refridgerator_two_doors (incl. freezer)	75
V1008	Which is the energylabel of the third refridgerator_two_doors (incl. freezer)	4
V1009	NO RESPONSES Which is the energylabel of the fourth refridgerator_two_doors (incl. freezer)	0
V1016	Age of the first refridgerator_two_doors (incl. freezer)	1352
V1017	Age of the second refridgerator_two_doors (incl. freezer)	79
V1018	Age of the third refridgerator_two_doors (incl. freezer)	4
V1019	NO RESPONSES Age of the fourth refridgerator_two_doors (incl. freezer)	0
V241	Use of freezer minimum 2 times a week?	3394
V242	Amount of freezer used minimum 2 times a week?	2041
V1031	Which is the energylabel of the first freezer	1910
V1032	Which is the energylabel of the second freezer	231
V1033	Which is the energylabel of the third freezer	23
V1034	Which is the energylabel of the fourth freezer	4
V1035	Which is the energylabel of the fifth freezer	1
V1036	Age of the first freezer	2022
V1037	Age of the second freezer	237
V1038	Age of the third freezer	23
V1039	Age of the fourth freezer	4
V1040	Age of the fifth freezer	1
V243	Use of electrical dryer minimum 2 times a week?	3394
V244	Amount of electrical dryer used minimum 2 times a week?	1754
V1046	Which is the energylabel of the first electrical dryer	1631
V1047	Which is the energylabel of the second electrical dryer	4
V1048	NO RESPONSES Which is the energylabel of the third electrical dryer	0
V1051	Age of the first electrical dryer	1729
V1052	Age of the second electrical dryer	4
V1053	NO RESPONSES Age of the third electrical dryer	0
V1056	Is the first electrical dryer left in stand-by modus when not in use?	1754
V1057	Is the second electrical dryer left in stand-by modus when not in use?	4
V1058	NO RESPONSES Is the third electrical dryer left in stand-by modus when not in use?	0
V245	Use of electrical dryer with heat pump minimum 2 times a week?	3395
V246	Amount of electrical dryer with heat pump used minimum 2 times a week?	48
V1071	Is the first electrical dryer with heat pump left in stand-by modus when not in use?	48
V1072	NO RESPONSES Is the second electrical dryer with heat pump left in stand-by modus when not in use?	0
V247	Use of natural gas dryer minimum 2 times a week?	3395
V248	Amount of natural gas dryer used minimum 2 times a week?	7
V249	Use of dishwasher minimum 2 times a week?	3395
V250	Amount of dishwasher used minimum 2 times a week?	1636
V1091	Which is the energylabel of the first dishwasher	1508
V1092	Which is the energylabel of the second dishwasher	8
V1093	NO RESPONSES Which is the energylabel of the third dishwasher	0
V1096	Age of the first dishwasher	1620
V1097	Age of the second dishwasher	8
V1098	NO RESPONSES Age of the third dishwasher	0
V1101	Is the first dishwasher left in stand-by modus when not in use?	1636
V1102	Is the second dishwasher left in stand-by modus when not in use?	8
V1103	NO RESPONSES Is the third dishwasher left in stand-by modus when not in use?	0
V251	Use of washing machine minimum 2 times a week?	3395
V252	Amount of washing machines used minimum 2 times a week?	2927
V1106	Which is the energylabel of the first washing machine	2708
V1107	Which is the energylabel of the second washing machine	24
V1108	NO RESPONSES Which is the energylabel of the third washing machine	0
V1111	Age of the first washing machine	2901
V1112	Age of the second washing machine	24
V1113	NO RESPONSES Age of the third washing machine	0
V1116	Is the first washing machine left in stand-by modus when not in use?	2925
V1117	Is the second washing machine left in stand-by modus when not in use?	24
V1118	NO RESPONSES Is the third washing machine left in stand-by modus when not in use?	0
V253	Use of LCD-TV minimum 2 times a week?	3395
V254	Amount of LCD-TV's used minimum 2 times a week?	1863
V1131	Is the first LCD-TV left in stand-by modus when not in use?	1863
V1132	Is the second LCD-TV left in stand-by modus when not in use?	342
V1133	Is the third LCD-TV left in stand-by modus when not in use?	61
V1134	Is the fourth LCD-TV left in stand-by modus when not in use?	13
V1135	Is the fifth LCD-TV left in stand-by modus when not in use?	5
V255	Use of plasma TV minimum 2 times a week?	3394
V256	Amount of plasma TV's used minimum 2 times a week?	410
V1146	Is the first plasma TV left in stand-by modus when not in use?	410
V1147	Is the second plasma TV left in stand-by modus when not in use?	51
V1148	Is the third plasma TV left in stand-by modus when not in use?	8
V1149	Is the fourth plasma TV left in stand-by modus when not in use?	2
V1150	NO RESPONSES Is the fifth plasma TV left in stand-by modus when not in use?	0
V257	Use of ordinary TV minimum 2 times a week?	3395
V258	Amount of ordinary TV's used minimum 2 times a week?	1601
V1161	Is the first ordinary TV left in stand-by modus when not in use?	1601
V1162	Is the second ordinary TV left in stand-by modus when not in use?	241
V1163	Is the third ordinary TV left in stand-by modus when not in use?	42
V1164	Is the fourth ordinary TV left in stand-by modus when not in use?	8
V1165	Is the fifth ordinary TV left in stand-by modus when not in use?	3
V259	Use of computers with LCD display minimum 2 times a week?	3395
V260	Amount of computers with LCD displays used minimum 2 times a week?	1328
V1176	Is the first computer with LCD display left in stand-by modus when not in use?	1327
V1177	Is the second computer with LCD display left in stand-by modus when not in use?	224
V1178	Is the third computer with LCD display left in stand-by modus when not in use?	56
V1179	Is the fourth computer with LCD display left in stand-by modus when not in use?	18
V1180	Is the fifth computer with LCD display left in stand-by modus when not in use?	5
V261	Use of computers with plasma display minimum 2 times a week?	3393
V262	Amount of computers with plasma displays used minimum 2 times a week?	140
V1191	Is the first computer with plasma display left in stand-by modus when not in use?	140
V1192	Is the second computer with plasma display left in stand-by modus when not in use?	21
V1193	Is the third computer with plasma display left in stand-by modus when not in use?	6
V1194	Is the fourth computer with plasma display left in stand-by modus when not in use?	2
V1195	NO RESPONSES Is the fifth computer with plasma display left in stand-by modus when not in use?	0

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V263	Use of computers with ordinary monitor minimum 2 times a week?	3395
V264	Amount of computers with ordinary monitors used minimum 2 times a week?	355
V1206	Is the first computer with ordinary monitor left in stand-by modus when not in use?	355
V1207	Is the second computer with ordinary monitor left in stand-by modus when not in use?	32
V1208	Is the third computer with ordinary monitor left in stand-by modus when not in use?	7
V1209	Is the fourth computer with ordinary monitor left in stand-by modus when not in use?	2
V1210	Is the fifth computer with ordinary monitor left in stand-by modus when not in use?	1
V265	Use of portable computers/laptops minimum 2 times a week?	3395
V266	Amount of portable computers/laptops used minimum 2 times a week?	1772
V1221	Is the first portable computer/lap top left in stand-by modus when not in use?	1771
V1222	Is the second portable computer/lap top left in stand-by modus when not in use?	529
V1223	Is the third portable computer/lap top left in stand-by modus when not in use?	165
V1224	Is the fourth portable computer/lap top left in stand-by modus when not in use?	49
V1225	Is the fifth portable computer/lap top left in stand-by modus when not in use?	16
V267	Use of modems minimum 2 times a week?	3394
V268	Amount of modems used minimum 2 times a week?	2206
V1236	Is the first modem left in stand-by modus when not in use?	2206
V1237	Is the second modem left in stand-by modus when not in use?	92
V1238	Is the third modem left in stand-by modus when not in use?	12
V1239	Is the fourth modem left in stand-by modus when not in use?	4
V1240	Is the fifth modem left in stand-by modus when not in use?	1
V269	Use of video and/or DVD players or recorders minimum 2 times a week?	3395
V270	Amount of video and/or DVD players or recorders used minimum 2 times a week?	1699
V1251	Is the first video and/or DVD player or recorder left in stand-by modus when not in use?	1699
V1252	Is the second video and/or DVD player or recorder left in stand-by modus when not in use?	301
V1253	Is the third video and/or DVD player or recorder left in stand-by modus when not in use?	49
V1254	Is the fourth video and/or DVD player or recorder left in stand-by modus when not in use?	12
V1255	Is the fifth video and/or DVD player or recorder left in stand-by modus when not in use?	5
V271	Use of radio/CD players, ordinary radio's, clock-radio's minimum 2 times a week?	3395
V272	Amount of radio/CD players, ordinary radio's, clock-radio's used minimum 2 times a week?	2508
V1266	Is the first radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?	2507
V1267	Is the second radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?	1262
V1268	Is the third radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?	601
V1269	Is the fourth radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?	280
V1270	Is the fifth radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?	122
V273	Use of mobile (GSM) or portable phones minimum 2 times a week?	3395
V274	Amount of mobile (GSM) or portable phones used minimum 2 times a week?	3044
V275	Use of electric kettles minimum 2 times a week?	3395
V276	Amount of electric kettles used minimum 2 times a week?	1627
V277	Use of coffee-makers minimum 2 times a week?	3395
V278	Amount of coffee-makers used minimum 2 times a week?	2358
V1311	Is the first coffee-maker left in stand-by modus when not in use?	2358
V1312	Is the second coffee-maker left in stand-by modus when not in use?	215
V1313	Is the third coffee-maker left in stand-by modus when not in use?	4
V1314	NO RESPONSES Is the fourth coffee-maker left in stand-by modus when not in use?	0
V279	Use of toasters minimum 2 times a week?	3395
V280	Amount of toasters used minimum 2 times a week?	1379
V281	Use of kitchen robots minimum 2 times a week?	3395
V282	Amount of kitchen robots used minimum 2 times a week?	769
V283	Use of electric steamers minimum 2 times a week?	3395
V284	Amount of electric steamers used minimum 2 times a week?	369
V285	Use of (steam) irons minimum 2 times a week?	3395
V286	Amount of (steam) irons used minimum 2 times a week?	2757
V287	Use of wellness equipment (solarium, sauna, whirlpool) minimum 2 times a week?	3395
V288	Amount of solarium, sauna, whirlpool used minimum 2 times a week?	124
Q103	Planning an investment in an energyefficient heating system within the next 5 years (eg: heat pump, high efficiency boiler, condensing boiler)	3333
Q104	Planning an investment in insulation for your roof or attic floor within the next 5 years?	1640
Q105	Planning an investment in insulation your exterior wall within the next 5 years?	2450
Q106	Planning an investment for installing high efficiency glass or super-insulating glass within the next 5 years?	2876
Q107	Planning an investment in floorinsulation for the ground floor within the next 5 years?	2883
Q108	Planning an investment in sunpanels for electricity (PV-panels) or heating / sanitary hot water within the next 5 years?	3385
Q109	Amount of occupants of the house/home/dwelling?	3394
Q110	Amount of kids (occupants) under the age of 16?	2509
Q111	Is the respondent the head of the family/houshold?	2508
Q112	Is respondent male/female?	3395
Q113	Year of birth of respondent?	3390
Q114	Highest degree/diploma of the respondent?	3391
Q114B	Other education/degree of respondent: which one?	3396
Q115	Respondents primary activity	3393
Q115B	Other primary activity of respondent: which one?	3396
Q116	Description of respondent's professional status	1740
Q117	Is the head of the family male or female?	329
Q118	Year of birth of head of the family?	330
Q119	Highest degree/diploma of the head of the family?	328
Q119B	Other primary activity of head of the family: which one?	3396
Q120	Head of the family's primary activity?	330
Q120B	Other primary activity of the head of the family: which one?	3396
Q121	Description of the professional status of the head of the family?	237
Q122	Monthly income of all occupants of the hous/home is between which level? (Income= netto-income from labour /own company, all social benefits, income from renting)	3268
INTHOUR	Timer	3396
CONT81	Vicinity of the house / dwelling?	3395
CONT82	Type of dwelling	3359
CONT83	Condition of the buildings in the neighbourhood	337
CONT84	Condition of the house of the respondent in comparison with the neighbourhood	3380
LCONTNR	number of contact attempts	3396
INTDATE	Date of the interview	3376
FCONTRES	final responscode	3396
DTBIRTH	Year of birth (source: national register?)	3396
URBAN08	Degree of urbanization (Eurostat-categories)	3395
AGE_3CL	Age categorie (source: national register?) (3)	3395
SEX_F	Male/female? (source: national register?)	3395
HHKLASSE	HHKLASSE = HH-grootteklasse (3)	3395
Q122RI	Level of income? (source: SILC 2010) levels? Q122RI = Inkomensklasse, met imputatie v	3395
DIP_CLI	level of Degree/diploma DIP_CLI = Diplomaklasse, met imputatie v (source: LFS 2011 T3)	3395
EIGENAAR	ownership or renter? EIGENAAR = Eigenaar versus anderen (2) (source: SILC 2010)	3395
SAMPWEI	WEIGHT factor for the SAMPLE SAMPWEI = Steekproefgewicht (STR-SRS van	3395
RESP_IMP	estimated chance of respons with imputated missings RESP_IMP = Met RESP_REG geïmputeerde mis	3395
INWEIIMP	initial weights (= WEIGHT factor for the SAMPLE DIVIDED BY estimated chance of respons with imputated missings) IniWei_imp = SampWei / RESP_imp	3395
CALWEI	WEIGHT for weighing results in analyses	3395
NAT_GAS_m_to_kWh	Use of natural gas in kWh for 2010 if V9= m³ (mean calorific value used of 36Mli/m³)	364
NAT_GAS_kwh_to_kwh	Use of natural gas in kWh for 2010 if V9=kWh	1167

NAT_GAS_IN_kWh	Natural gas: use in kWh/year	1531
LOGS_m	Logs: use from m³ to MJi (density used: 370kg/m³ ; calorific value used: 15,47 MJ/kg, source: VITO 2011/TEM/R/158)	537
PELLETS_m	Pellets: use from m³ to MJi (density used: 600kg/m³ ; calorific value used: 16,30 MJ/kg, source: VITO 2011/TEM/R/158)	4
WASTE_m	Waste: use from m³ to MJi (density used: 370kg/m³ ; calorific value used: 16,00 MJ/kg, source: VITO 2011/TEM/R/158)	79
SHAVINGS_m	Shavings: use from m³ to MJi (density used: 347kg/m³ ; calorific value used: 15,80 MJ/kg, source: VITO 2011/TEM/R/158)	0
LOGS_kg	Logs: use from kg to MJi (calorific value used: 15,47 MJ/kg, source: VITO 2011/TEM/R/158)	114
PELLETS_kg	Pellets: use from kg to MJi (calorific value used: 16,30 MJ/kg, source: VITO 2011/TEM/R/158)	40
WASTE_kg	Waste: use from kg to MJi (calorific value used: 16,00 MJ/kg, source: VITO 2011/TEM/R/158)	26
SHAVINGS_kg	Shavings: use from kg to MJi (calorific value used: 15,80 MJ/kg, source: VITO 2011/TEM/R/158)	2
LOGS_MJi	Wood logs: use in MJi/year	645
PELLETS_MJi	Wood pellets: use in MJi/year	44
WASTE_MJi	Wood waste: use in MJi/year	105
SHAVINGS_MJi	Wood shavings: use in MJi/year	2
TOTAL_WOOD	Sum of V44_WOLO V51_WOPE V58_WOWA V65_WOSH	695
TOTAL_FUEL	Sum of TOTAL_WOOD V9_GAS V16_FO V23_COAL V30_PROPT V37_BUTC V72_lamppetr_tot	2870
TOTAL_ENERGY	Sum of TOTAL_FUEL V2_ele_tot	2927
TOTAL_Ele_App	total electrical appliances	3396
dummy_ele	presence of electricity	3395
dummy_gas	presence of natural gas	3395
dummy_fueloil	presence of fuel oil	3396
dummy_coal	presence of coal	3395
dummy_prop	presence of propane	3395
dummy_but	presence of butane	3396
dummy_lamppetrol	presence of lamppetrol	3396
dummy_wood	presence of wood	3396

ANNEX 7: LIST OF RELATION BETWEEN QUESTION AND EXCEL-DATASET

THEME	CODE	QUESTION	NAME OF DATASET (EXCEL)
Use and consumption	V1	Use of electricity in household?	ECS_2012_Use
	V2	How much electricity consumed (kWh/year)?	
	V2_ele_buye	How much electricity buyed CORRECTED for 2010 (kWh/year)?	ECS_2012_Consumption
	V2_ele_PV	How much electricity produced by PV CALCULATED with 8m²/KWp and 950 kWh/kWp (kWh/year)?	ECS_2012_Consumption
	V2_ele_tot	How much electricity consumed (buyed CORRECTED for 2010 + PV) PV (kWh/year)?	ECS_2012_Consumption
	V3	How much did you pay for the electricity (€, VAT incl)?	
	V5	What was begin date of electricity bill?	
	V6	What was final date of electricity bill?	
	V8	Use of natural gas in household?	ECS_2012_Use
	V9	How much natural gas consumed?	
	V9_gas_tot	How much natural gas consumed (CORRECTED and in kWh for 2010)	ECS_2012_Consumption
	V10	How much did you pay for this (natural gas) (€, VAT incl)?	
	V11	Wich unit was used for natural gas?	
	V12	What was begin date of natural gas bill?	
	V13	What was final date of natural gas bill?	
	V15	Use of fuel oil in household?	ECS_2012_Use
	V16	How much fuel oil was consumed (liter/12 months)?	
	V16_FO_tot	How much fuel oil was consumed CORRECTED and 10,08 kWh/l (kWh/12 months)	ECS_2012_Consumption
	V17	How much did you pay for the fuel oil (€, VAT incl)?	
	V22	Use of coal in household?	ECS_2012_Use
	V23	How much coal was consumed (kg/12 months)?	
	V23_COAL_	How much coal was consumed CORRECTED and 8,14 kWh/kg (kWh/12 months)	ECS_2012_Consumption
	V24	How much did you pay for this (coal) (€, VAT incl)?	
	V29	Use of gas from tank in household?	ECS_2012_Use
	V30	How much gas from tank was consumed (liter year)?	
	V30_PROPT	How much gas from tank was consumed CORRECTED and 6,44 kWh/l (kWh/ year)	ECS_2012_Consumption
	V31	How much did you pay for this (gas from tank) (€, VAT incl)?	
	V36	Use of gas from cylinder in household?	ECS_2012_Use
	V37	How much gas (from cilinder) was consumed (liter/year)?	
	V37_BUTC_t	How much gas (from cilinder) was consumed CORRECTED and 12,68 kWh/kg (kWh/year)	ECS_2012_Consumption
	V38	How much did you pay for this (gas from cylinder) (€, VAT incl)?	
	V43	Use of logs in household?	ECS_2012_Use
	V44	How many logs were consumed?	
	V44_WOLO_	How many logs were consumed CORRECTED (density used: 370kg/m³ ; calorific value used: 15,47 MJ/kg, source: VITC	ECS_2012_Consumption
	V45	How much did you pay for this (logs) (€, VAT incl)?	
	V46	Wich unit was used (logs) kg or m³?	
	V50	Use of wood pellets in household?	ECS_2012_Use
	V51	How many wood pellets consumed?	
	V51_WOPE	How many pellets were consumed CORRECTED (density used: 600kg/m³ ; calorific value used: 16,30 MJ/kg,source: VI	ECS_2012_Consumption
	V52	How much did you pay for this (wood pellets) (€, VAT incl)?	
	V53	Wich unit was used (wood pellets) kg or m³?	
	V57	Use of wood waste in household?	ECS_2012_Use
	V58	How much wood waste was consumed?	
	V58_WOWA	How much wood waste was consumed CORRECTED (density used: 370kg/m³ ; calorific value used: 16,00 MJ/kg,sourc	ECS_2012_Consumption
	V59	How much did you pay for this (wood waste) (€, VAT incl)?	
	V60	Wich unit was used (wood waste) kg or m³?	
	V64	Use of wood shavings in the household?	ECS_2012_Use
	V65	How much wood shavings was consumed?	
	V65_WOSH_	How much wood shavings was consumed CORRECTED (density used: 347kg/m³ ; calorific value used: 15,80 MJ/kg,so	ECS_2012_Consumption
	V66	How much did you pay for this (wood shavings) (€, VAT incl)?	
	V67	Wich unit was used (wood shavings) kg or m³?	
	V71	Use of other energy source in household?	ECS_2012_Use
	V72	How much was consumed of the other energy source?	
	V72_Lamppe	How much lamppetrole was consumed CORRECTED and 10,75 kWh/l (in kWh/year)	ECS_2012_Consumption
	V73	How much did you pay for this (other energy source)(€, VAT incl)?	
	V77	What is the unit of the 'other energy source?	
	TOTAL_WO(	Sum of V44_WOLO V51_WOPE V58_WOWA V65_WOSH * Region	ECS_2012_Consumption
	TOTAL_FUE	Sum of TOTAL_WOOD V9_GAS V16_FO V23_COAL V30_PROPT V37_BUTC V72_lamppetr_tot * Region	ECS_2012_Consumption
	TOTAL ENEI	Sum of TOTAL_FUEL V2_ele_tot * Region	ECS_2012_Consumption

Heating syste	B11_S11	Which other energy source is used in household (besides all mentioned sources)	ECS_2012_Heating system
	Q4	With wich fuel do you heat your dwelling mainly?	ECS_2012_Heating system
	Q4_C	With wich fuel do you heat your dwelling mainly? CORRECTION	ECS_2012_Heating system
	Q4_NRJ	With wich fuel do you heat your dwelling mainly (based on ENERGY)?	ECS_2012_Heating system
	Q5	Do you heat your dwelling with a second source of energy?	ECS_2012_Heating system
	Q6	What is second most important source of energy you use in the dwelling?	ECS_2012_Heating system
	Q6_C	What is second most important source of energy you use in the dwelling- CORRECTED?	ECS_2012_Heating system
	Q7	With which system do you heat your dwelling mainly?	ECS_2012_Heating system
Ind. system	Q8	Which type of natural gas boiler (individual central heating) do you use?	ECS_2012_Ind system CH
	Q9	Which type of fuel oil boiler (individual central heating) do you use ?	ECS_2012_Ind system CH
	Q10	From which period is the individual central heating system?	ECS_2012_Ind system CH
Heat pump	Q11	Which type of heat pump?	ECS_2012_Heatpump
	Q12	Age of heat pump (years)?	ECS_2012_Heatpump
	Q13	Power of heat pump? (kVA)	ECS_2012_Heatpump
	Q14	What is the COP-factor ot the heat pump (between 2,5 and 6) ?	ECS_2012_Heatpump
Ind. Or coll. CH	Q151	How does the first part of the central heating work in the dwelling or building (in case of 1 common installation for more d	ECS_2012_CH ind or col
	Q152	How does the second (if there is) part of the central heating work in the dwelling or building (in case of 1 common installa	ECS_2012_CH ind or col
	Q153	How does the third part (if there is) of the central heating work in the dwelling or building (in case of 1 common installatio	ECS_2012_CH ind or col
	Q16	How many radiators/convectors does the dwelling hold have?	ECS_2012_CH ind or col
	Q17	How many radiators/convectors have radiator foil?	ECS_2012_CH ind or col
	Q18	How many radiators/convectors have thermostatic valves?	ECS_2012_CH ind or col
	Q19	Amount of separate direct heaters in the dwelling (besides the individual or collective central heating installation)?	ECS_2012_CH ind or col
	Q201	separate heater 1(besides the individual or collective central heating installation): Which type?	ECS_2012_CH ind or col
	Q202	separate heater 2 (besides the individual or collective central heating installation): Which type?	ECS_2012_CH ind or col
	Q203	separate heater 3 (besides the individual or collective central heating installation): Which type?	ECS_2012_CH ind or col
	Q204	NO RESPONSES separate heater 4 (besides the individual or collective central heating installation): Which type?	ECS_2012_CH ind or col
	Q205	NO RESPONSES separate heater 5 (besides the individual or collective central heating installation): Which type?	ECS_2012_CH ind or col
	Q206	NO RESPONSES separate heater 6 (besides the individual or collective central heating installation): Which type?	ECS_2012_CH ind or col
	Q207	separate heater 7 (besides the individual or collective central heating installation): Which type?	ECS_2012_CH ind or col
	Q20B	Which other type of individual seperate direct heater was used? (besides the individual or collective central heating insta	ECS_2012_CH ind or col
	V78	How old in years is the oldest electric heating appliancer? (seperate direct heater besides the individual or collective cer	ECS_2012_CH ind or col
	V79	Does the oldest electric heating appliance (seperate direct heater besides the individual or collective central heating insta	ECS_2012_CH ind or col
	V80	How old in years is the oldest gas stove (seperate direct heater besides the individual or collective central heating install	ECS_2012_CH ind or col
	V81	Does the oldest gas stove (seperate direct heater besides the individual or collective central heating installation) has a la	ECS_2012_CH ind or col
	V82	How old in years is the oldest fuel oil stove (seperate direct heater besides the individual or collective central heating inst	ECS_2012_CH ind or col
	V83	Does the oldest fuel oil stove (seperate direct heater besides the individual or collective central heating installation) has a	ECS_2012_CH ind or col
	V84	How old in years is the oldest coal stove (seperate direct heater besides the individual or collective central heating install	ECS_2012_CH ind or col
	V85	Does the oldest coal stove (seperate direct heater besides the individual or collective central heating installation) has a la	ECS_2012_CH ind or col
	V86	How old in years is the oldest wood pellet stove (seperate direct heater besides the individual or collective central heatin	ECS_2012_CH ind or col
	V88	How old in years is the oldest fireplace or built-in cassette (seperate direct heater besides the individual or collective cen	ECS_2012_CH ind or col
	V90	How old in years is the oldest 'other type of seperate direct heater' (seperate direct heater besides the individual or colle	ECS_2012_CH ind or col
	Q23	How many days a week do you use your separate direct heating system (besides the individual or collective central heat	ECS_2012_CH ind or col
Dir. Heaters	Q24	How many seperate decentral heating appliances in household (in dwelling without central heating) ?	ECS_2012_Direct heaters
	Q251	separate decentral heater 1 (in dwelling without central heating): Which type?	ECS_2012_Direct heaters
	Q252	separate decentral heater 2 (in dwelling without central heating): Which type?	ECS_2012_Direct heaters
	Q253	separate decentral heater 3 (in dwelling without central heating): Which type?	ECS_2012_Direct heaters
	Q254	separate decentral heater 4 (in dwelling without central heating): Which type?	ECS_2012_Direct heaters
	Q255	NO RESPONDENTS WITH separate decentral heater 5 (in dwelling without central heating): Which type?	ECS_2012_Direct heaters
	Q25B	Which other type of seperate decentral direct heater was used? (in dwelling without central heating)?	ECS_2012_Direct heaters
	V92	How old in years is the oldest electric accumulator appliance? (seperate direct heater in dwelling without central heating	ECS_2012_Direct heaters
	V93	Does the oldest electric accumulator appliance (seperate direct heater in dwelling without central heating) has a label of	ECS_2012_Direct heaters
	V94	How old in years is the oldest direct electric convector appliance? (seperate direct heater in dwelling without central hea	ECS_2012_Direct heaters
	V95	Does the oldest direct electric convector appliance (seperate direct heater in dwelling without central heating) has a label	ECS_2012_Direct heaters
	V96	How old in years is the oldest electric underfloor heating? (seperate direct heater in dwelling without central heating)	ECS_2012_Direct heaters
	V97	Does the oldest electric underfloor heating (seperate direct heater in dwelling without central heating) has a label of high	ECS_2012_Direct heaters
	V98	How old in years is the oldest gas stove? (seperate direct heater in dwelling without central heating)	ECS_2012_Direct heaters
	V99	Does the oldest gas stove (seperate direct heater in dwelling without central heating) has a label of high efficiency (HR o	ECS_2012_Direct heaters
	V100	How old in years is the oldest fuel oil stove? (seperate direct heater in dwelling without central heating)	ECS_2012_Direct heaters
	V101	Does the oldest fuel oil stove (seperate direct heater in dwelling without central heating) has a label of high efficiency (Op	ECS_2012_Direct heaters
	V102	How old in years is the oldest coal stove? (seperate direct heater in dwelling without central heating)	ECS_2012_Direct heaters
	V103	Does the oldest coal stove (seperate direct heater in dwelling without central heating) has a label of high efficiency (BEN	ECS_2012_Direct heaters
	V104	How old in years is the oldest wood pellet stove (seperate direct heater in dwelling without central heating)?	ECS_2012_Direct heaters
	V106	How old in years is the oldest fireplace or built-in cassette (seperate direct heater in dwelling without central heating)?	ECS_2012_Direct heaters
	V108	How old in years is the oldest 'other type of seperate direct heater' (seperate direct heater in dwelling without central hea	ECS_2012_Direct heaters

ECS_2012_Plate_Oven.xlsx

Plate and Oven	V211	Presence of an electrical hot plate?
	V212	What age (in years) is the oldest electrical hot plate at your home?
	V213	Presence of an induction hot plate?
	V214	What age (in years) is the oldest induction hot plate at your home?
	V215	Presence of a hot plate on natural gas?
	V216	What age (in years) is the oldest hot plate on natural gas at your home?
	V217	Presence of a hot plate on butane/propane?
	V218	What age (in years) is the oldest hot plate on butane/propane at your home?
	V219	Presence of a combination hot plate (electrical-natural gas-propane/butane-induction)?
	V220	What age (in years) is the oldest combination hot plate (electrical-natural gas-propane/butane-induction) at your home?
	V221	Presence of a microwave oven?
	V222	Presence of an electrical oven?
	V223	Presence of a gasoven?
	V224	Presence of a steam oven?
	V225	Presence of a bread oven?
	V226	Presence of a combination oven (microwave and/or electrical and/or gas and or steam in one oven)?

ECS_2012_Lamps.xlsx

Lamps	V227	Amount of normal light bulbs in the home?
	V228	Amount of normal lightbulbs that are not often in use?
	V229	Amount of low -energy light bulbs in the home?
	V230	Amount of low -energy lightbulbs that are not often in use?
	V231	Amount of halogen lamps in the home?
	V232	Amount of halogen lamps that are not often in use?
	V233	Amount of TL-lamps (Tube Luminescent) in the home?
	V234	Amount of TL-lamps (Tube Luminescent) that are not often in use?
	V235	Amount of LED-lamps (Light Emitting Diode) in the home?
	V236	Amount of LED-lamps (Light Emitting Diode) that are not often in use?

ECS_2012_Fridge_Freezer.xlsx

Fridge and freezer	V237	Use of refridgerator_one_door minimum 2 times a week?
	V238	Amount of refridgerators_one_door used minimum 2 times a week?
	V1001	Which is the energylabel of the first refridgerator_one_door
	V1002	Which is the energylabel of the second refridgerator_one_door
	V1003	Which is the energylabel of the third refridgerator_one_door
	V1004	Which is the energylabel of the fourth refridgerator_one_door
	V1005	Which is the energylabel of the fifth refridgerator_one_door
	V1011	Age of the first refridgerator_one_door
	V1012	Age of the second refridgerator_one_door
	V1013	Age of the third refridgerator_one_door
	V1014	Age of the fourth refridgerator_one_door
	V1015	Age of the fifth refridgerator_one_door
	V239	Use of refridgerator_two_doors (incl. freezer) minimum 2 times a week?
	V240	Amount of refridgerators_two_doors (incl. freezer) used minimum 2 times a week?
	V1006	Which is the energylabel of the first refridgerator_two_doors (incl. freezer)
	V1007	Which is the energylabel of the second refridgerator_two_doors (incl. freezer)
	V1008	Which is the energylabel of the third refridgerator_two_doors (incl. freezer)
	V1009	NO RESPONSES Which is the energylabel of the fourth refridgerator_two_doors (incl. freezer)
	V1016	Age of the first refridgerator_two_doors (incl. freezer)
	V1017	Age of the second refridgerator_two_doors (incl. freezer)
	V1018	Age of the third refridgerator_two_doors (incl. freezer)
	V1019	NO RESPONSES Age of the fourth refridgerator_two_doors (incl. freezer)
	V241	Use of freezer minimum 2 times a week?
	V242	Amount of freezer used minimum 2 times a week?
	V1031	Which is the energylabel of the first freezer
	V1032	Which is the energylabel of the second freezer
	V1033	Which is the energylabel of the third freezer
	V1034	Which is the energylabel of the fourth freezer
	V1035	Which is the energylabel of the fifth freezer
	V1036	Age of the first freezer
	V1037	Age of the second freezer
	V1038	Age of the third freezer
	V1039	Age of the fourth freezer
	V1040	Age of the fifth freezer

ECS_2012_White_goods.xlsx

Electro White goods	V243	Use of electrical dryer minimum 2 times a week?
	V244	Amount of electrical dryer used minimum 2 times a week?
	V1046	Which is the energylabel of the first electrical dryer
	V1047	Which is the energylabel of the second electrical dryer
	V1048	NO RESPONSES Which is the energylabel of the third electrical dryer
	V1051	Age of the first electrical dryer
	V1052	Age of the second electrical dryer
	V1053	NO RESPONSES Age of the third electrical dryer
	V1056	Is the first electrical dryer left in stand-by modus when not in use?
	V1057	Is the second electrical dryer left in stand-by modus when not in use?
	V1058	NO RESPONSES Is the third electrical dryer left in stand-by modus when not in use?
	V245	Use of electrical dryer with heat pump minimum 2 times a week?
	V246	Amount of electrical dryer with heat pump used minimum 2 times a week?
	V1071	Is the first electrical dryer with heat pump left in stand-by modus when not in use?
	V1072	NO RESPONSES Is the second electrical dryer with heat pump left in stand-by modus when not in use?
	V247	Use of natural gas dryer minimum 2 times a week?
	V248	Amount of natural gas dryer used minimum 2 times a week?
	V249	Use of dishwasher minimum 2 times a week?
	V250	Amount of dishwasher used minimum 2 times a week?
	V1091	Which is the energylabel of the first dishwasher
	V1092	Which is the energylabel of the second dishwasher
	V1093	NO RESPONSES Which is the energylabel of the third dishwasher
	V1096	Age of the first dishwasher
	V1097	Age of the second dishwasher
	V1098	NO RESPONSES Age of the third dishwasher
	V1101	Is the first dishwasher left in stand-by modus when not in use?
	V1102	Is the second dishwasher left in stand-by modus when not in use?
	V1103	NO RESPONSES Is the third dishwasher left in stand-by modus when not in use?
	V251	Use of washing machine minimum 2 times a week?
	V252	Amount of washing machines used minimum 2 times a week?
	V1106	Which is the energylabel of the first washing machine
	V1107	Which is the energylabel of the second washing machine
	V1108	NO RESPONSES Which is the energylabel of the third washing machine
	V1111	Age of the first washing machine
	V1112	Age of the second washing machine
	V1113	NO RESPONSES Age of the third washing machine
	V1116	Is the first washing machine left in stand-by modus when not in use?
	V1117	Is the second washing machine left in stand-by modus when not in use?
	V1118	NO RESPONSES Is the third washing machine left in stand-by modus when not in use?

ECS_2012_TV.xlsx

TV	V253	Use of LCD-TV minimum 2 times a week?
	V254	Amount of LCD-TV's used minimum 2 times a week?
	V1131	Is the first LCD-TV left in stand-by modus when not in use?
	V1132	Is the second LCD-TV left in stand-by modus when not in use?
	V1133	Is the third LCD-TV left in stand-by modus when not in use?
	V1134	Is the fourth LCD-TV left in stand-by modus when not in use?
	V1135	Is the fifth LCD-TV left in stand-by modus when not in use?
	V255	Use of plasma TV minimum 2 times a week?
	V256	Amount of plasma TV's used minimum 2 times a week?
	V1146	Is the first plasma TV left in stand-by modus when not in use?
	V1147	Is the second plasma TV left in stand-by modus when not in use?
	V1148	Is the third plasma TV left in stand-by modus when not in use?
	V1149	Is the fourth plasma TV left in stand-by modus when not in use?
	V1150	NO RESPONSES Is the fifth plasma TV left in stand-by modus when not in use?
	V257	Use of ordinary TV minimum 2 times a week?
	V258	Amount of ordinary TV's used minimum 2 times a week?
	V1161	Is the first ordinary TV left in stand-by modus when not in use?
	V1162	Is the second ordinary TV left in stand-by modus when not in use?
	V1163	Is the third ordinary TV left in stand-by modus when not in use?
	V1164	Is the fourth ordinary TV left in stand-by modus when not in use?
	V1165	Is the fifth ordinary TV left in stand-by modus when not in use?

ECS_2012_PC.xlsx

Computer and modem	V259	Use of computers with LCD display minimum 2 times a week?
	V260	Amount of computers with LCD displays used minimum 2 times a week?
	V1176	Is the first computer with LCD display left in stand-by modus when not in use?
	V1177	Is the second computer with LCD display left in stand-by modus when not in use?
	V1178	Is the third computer with LCD display left in stand-by modus when not in use?
	V1179	Is the fourth computer with LCD display left in stand-by modus when not in use?
	V1180	Is the fifth computer with LCD display left in stand-by modus when not in use?
	V261	Use of computers with plasma display minimum 2 times a week?
	V262	Amount of computers with plasma displays used minimum 2 times a week?
	V1191	Is the first computer with plasma display left in stand-by modus when not in use?
	V1192	Is the second computer with plasma display left in stand-by modus when not in use?
	V1193	Is the third computer with plasma display left in stand-by modus when not in use?
	V1194	Is the fourth computer with plasma display left in stand-by modus when not in use?
	V1195	NO RESPONSES Is the fifth computer with plasma display left in stand-by modus when not in use?
	V263	Use of computers with ordinary monitor minimum 2 times a week?
	V264	Amount of computers with ordinary monitors used minimum 2 times a week?
	V1206	Is the first computer with ordinary monitor left in stand-by modus when not in use?
	V1207	Is the second computer with ordinary monitor left in stand-by modus when not in use?
	V1208	Is the third computer with ordinary monitor left in stand-by modus when not in use?
	V1209	Is the fourth computer with ordinary monitor left in stand-by modus when not in use?
	V1210	Is the fifth computer with ordinary monitor left in stand-by modus when not in use?
	V265	Use of portable computers/laptops minimum 2 times a week?
	V266	Amount of portable computers/laptops used minimum 2 times a week?
	V1221	Is the first portable computer/lap top left in stand-by modus when not in use?
	V1222	Is the second portable computer/lap top left in stand-by modus when not in use?
	V1223	Is the third portable computer/lap top left in stand-by modus when not in use?
	V1224	Is the fourth portable computer/lap top left in stand-by modus when not in use?
	V1225	Is the fifth portable computer/lap top left in stand-by modus when not in use?
	V267	Use of modems minimum 2 times a week?
	V268	Amount of modems used minimum 2 times a week?
	V1236	Is the first modem left in stand-by modus when not in use?
	V1237	Is the second modem left in stand-by modus when not in use?
	V1238	Is the third modem left in stand-by modus when not in use?
	V1239	Is the fourth modem left in stand-by modus when not in use?
	V1240	Is the fifth modem left in stand-by modus when not in use?

ECS_2012_Small-Electro.xlsx

Electro small appliances	V269	Use of video and/or DVD players or recorders minimum 2 times a week?
	V270	Amount of video and/or DVD players or recorders used minimum 2 times a week?
	V1251	Is the first video and/or DVD player or recorder left in stand-by modus when not in use?
	V1252	Is the second video and/or DVD player or recorder left in stand-by modus when not in use?
	V1253	Is the third video and/or DVD player or recorder left in stand-by modus when not in use?
	V1254	Is the fourth video and/or DVD player or recorder left in stand-by modus when not in use?
	V1255	Is the fifth video and/or DVD player or recorder left in stand-by modus when not in use?
	V271	Use of radio/CD players, ordinary radio's, clock-radio's minimum 2 times a week?
	V272	Amount of radio/CD players, ordinary radio's, clock-radio's used minimum 2 times a week?
	V1266	Is the first radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?
	V1267	Is the second radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?
	V1268	Is the third radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?
	V1269	Is the fourth radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?
	V1270	Is the fifth radio/CD player / ordinary radio / clock-radio left in stand-by modus when not in use?
	V273	Use of mobile (GSM) or portable phones minimum 2 times a week?
	V274	Amount of mobile (GSM) or portable phones used minimum 2 times a week?
	V275	Use of electric kettles minimum 2 times a week?
	V276	Amount of electric kettles used minimum 2 times a week?
	V277	Use of coffee-makers minimum 2 times a week?
	V278	Amount of coffee-makers used minimum 2 times a week?
	V1311	Is the first coffee-maker left in stand-by modus when not in use?
	V1312	Is the second coffee-maker left in stand-by modus when not in use?
	V1313	Is the third coffee-maker left in stand-by modus when not in use?
	V1314	NO RESPONSES Is the fourth coffee-maker left in stand-by modus when not in use?
	V279	Use of toasters minimum 2 times a week?
	V280	Amount of toasters used minimum 2 times a week?
	V281	Use of kitchen robots minimum 2 times a week?
	V282	Amount of kitchen robots used minimum 2 times a week?
	V283	Use of electric steamers minimum 2 times a week?
	V284	Amount of electric steamers used minimum 2 times a week?
	V285	Use of (steam) irons minimum 2 times a week?
	V286	Amount of (steam) irons used minimum 2 times a week?
	V287	Use of wellness equipment (solarium, sauna, whirlpool) minimum 2 times a week?
	V288	Amount of solarium, sauna, whirlpool used minimum 2 times a week?

ECS_2012_Investment.xlsx

Investment	Q103	Planning an investment in an energyefficient heating system within the next 5 years (eg: heat pump, high efficiency boiler, c
	Q104	Planning an investment in insulation for your roof or attic floor within the next 5 years?
	Q105	Planning an investment in insulation your exterior wall within the next 5 years?
	Q106	Planning an investment for installing high efficiency glass or super-insulating glass within the next 5 years?
	Q107	Planning an investment in floorinsulation for the ground floor within the next 5 years?
	Q108	Planning an investment in sunpanels for electricity (PV-panels) or heating / sanitary hot water within the next 5 years?