HELLENIC REPUBLIC

HELLENIC STATISTICAL AUTHORITY

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PRESS RELEASE

SURVEY ON ENERGY CONSUMPTION IN HOUSEHOLDS, 2011-2012

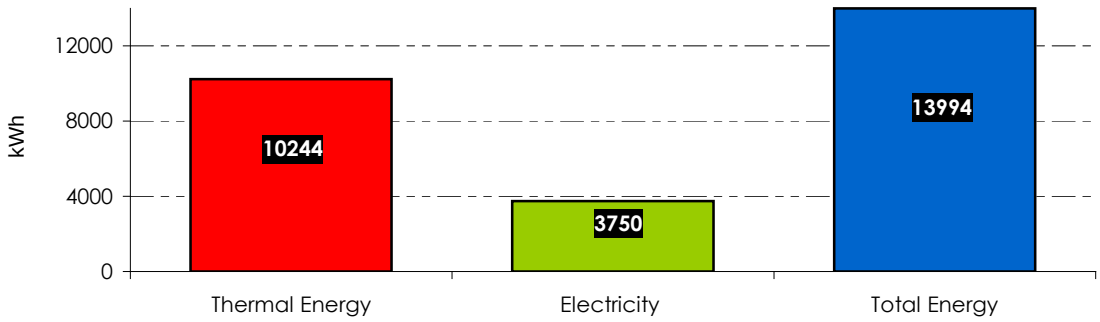
The Hellenic Statistical Authority conducted for the first time, during October 2011 – September 2012, the Survey on Energy Consumption in Households, with which data have been collected on energy consumption by end use (space heating – cooling, domestic hot water production, lighting, etc.) in the residential sector, as well as on quantities and type of fuels used. Additionally, data were recorded concerning the energy consumption habits of household members, type and number of devices and systems used, and also concerning the penetration of energy efficiency technologies in the residential sector. Finally, data have been collected on the socio-economic characteristics of the households.

The reference periods for energy data are the winter (October 2011 to April 2012) and summer months (May 2012 to September 2012), as well as the winter/summer months preceding the survey's conduct (October 2010 to April 2011and May 2011 to September 2011, respectively).

The survey was carried out with the assistance, as technical expert, of the Centre for Renewable Energy Sources and Energy Consumption – CRES (www.cres.gr).

According to the survey results, every household of the country consumes yearly, on average, 13994 kWh in order to cover its energy needs (Graph 1).

Graph 1. Average yearly energy consumption per household



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The survey data have also helped estimating the average annual total consumption of energy by fuel type used, as well as by type of end use. Aggregated data are presented in the following tables.

TABLE 1. Percentage distribution of total energy consumption by fuel type.

Oil	44.1
Natural gas	5.4
District heating	0.5
Kerosene	0.3
Olive cake	0.3
LPG	1.8
Firewood	17.4
Wood pellets	0.5
Solar thermal	2.9
Electricity	26.8
Total	100.0

TABLE 2. Percentage distribution of total energy consumption by type of end-use

Space heating	63.7
Domestic Hot Water Production	5.7
Cooking	17.3
Space cooling	1.3
Lighting	1.7
Appliances (electric/electronic)	10.2
Total	100.0

According to the survey results, the needs of a household for space heating and cooking represent 81% of the total annual energy consumed, while the household's energy needs are covered by oil and electricity to the extent of 44.1% and 26.8 %, respectively.

ENERGY CONSUMPTION – ENERGY CONSUMPTION INDICES

The detailed analysis of data on household annual thermal[1] energy and electricity[2] consumption, led to the extraction of useful conclusions, which are discussed below.

[1] Thermal is the energy derived mainly from the transformation of energy (e.g. fuel combustion) within the household (e.g. LPG for cooking or oil for space heating) or in a remote station (e.g. district heating), as well as primary production (e.g. energy produced from solar thermo siphon system for domestic heat water production). Electricity is not included.

[2] The energy produced in electricity power stations and being distributed to households through the electricity distribution network.

A. THERMAL ENERGY

The consumption of thermal energy has been estimated on the basis of the corresponding expenditures of households for space cooling, domestic hot water production and cooking, as reported in the questionnaire, and after taking into consideration the average fuel prices for the examined reference period and the net calorific value for each fuel[3].

According to survey results:

Average annual thermal energy consumption per household (kWh)	10244

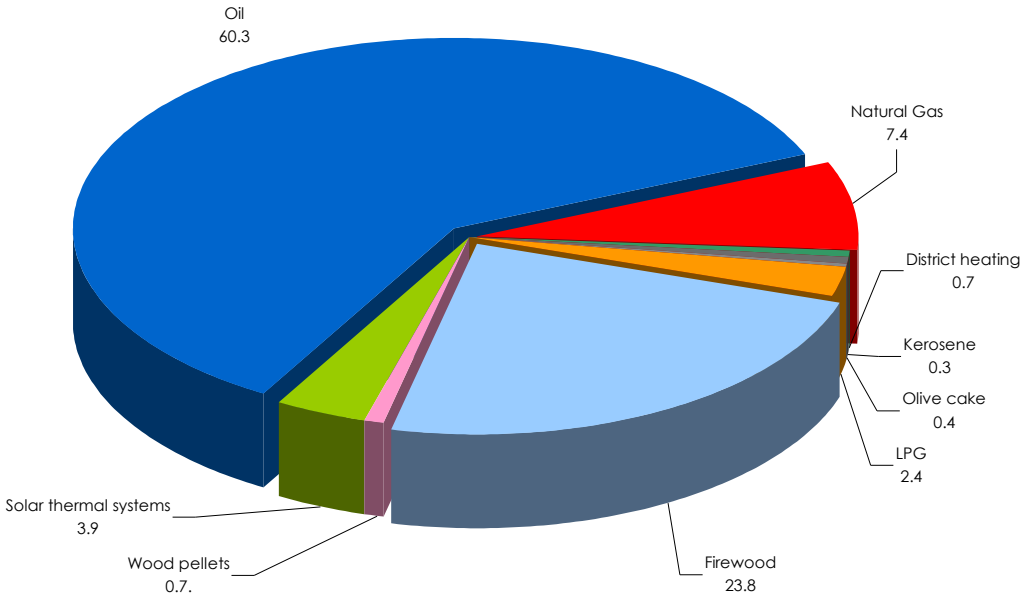
An estimated 85.9% of the thermal energy consumed is intended to cover the needs for domestic heating. Analytically, the percentage distribution of this thermal energy by type of end use is presented in table 3 below:

TABLE 3: Average thermal energy consumption per household – Percentage distribution by type of end use.

Type of end use	
Space heating	85.9
Domestic Hot Water Production	4.4
Cooking	9.7
Total	**100.0**

The annual average consumption of thermal energy by fuel type is presented in Graph 2, as follows:

Graph 2. Thermal energy consumption - Percentage distribution by fuel type



[3] Using fuel prices, e.g. for oil €/lt, the quantity of oil consumed in lt/year was calculated taking into consideration expenditures, reported as €/year. Subsequently, from the calculated quantity of oil the corresponding thermal energy consumed was calculated using the calorific value of oil in kWh/lt. The calorific value can be in kWh and also in kcal or in GJ. In these latter cases appropriate conversion coefficients were used.

The fuel mostly used for thermal energy –e.g. space heating, cooking and domestic heat water production– is oil (60.3%), followed by firewood (23.8%). The use of natural gas in the aforementioned areas is still at low levels, at approximately 7.4%.

B. ELECTRICITY

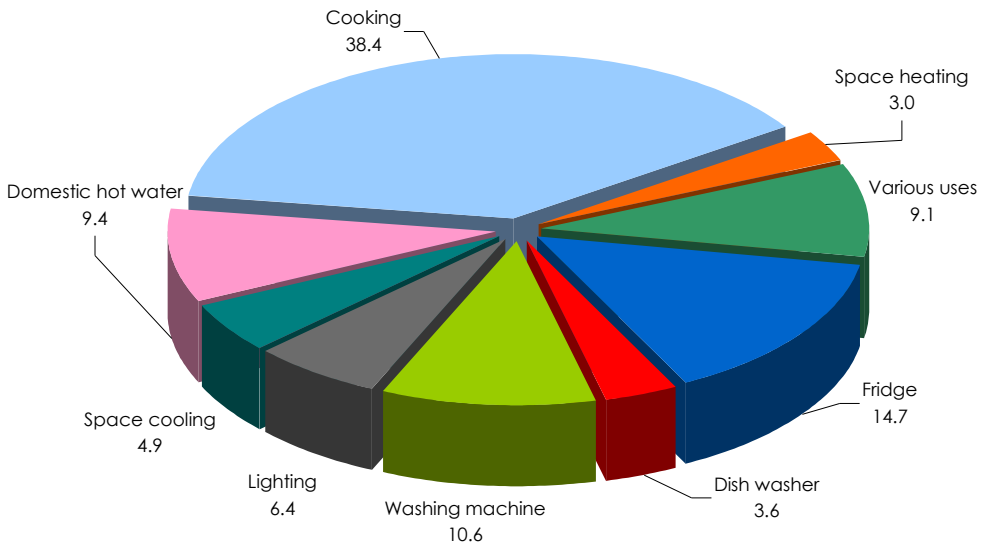
The methodological approach to the estimation of electricity consumption was based on the expenditure on electricity, as reported in the questionnaire, on the average electricity tariffs for the examined reference period and on the characteristics and use of the electric appliances that households possess[4].

According to the survey results:

Average annual electricity consumption per household (kWh)	3750

Graph 3 below presents the percentage distribution of electricity by type of end use.

Graph 3. Electricity consumption - Percentage distribution by type of end use.



On average, 38.4% of the annual total electricity consumed by a household is used for cooking, 14.7% for the fridge, 10.6% for the washing machine, 6.6% for lighting and 4.9% for space cooling.

[4] In the case where the respondents have reported the consumed electric energy which refers to a four-month period, this specific value was used, yet extrapolated for the whole year. If the respondents have reported the expenditure corresponding exclusively to the amount of consumed electric energy, then the corresponding amount of consumed electric energy was estimated on the basis of the current electricity tariffs, and this value was extrapolated for the whole year. Finally, in the case where the respondents have reported the total expenditure as this figures on the "actual" bills of electricity for a 4-month period, all the extra charges that are not directly linked to the consumption of electricity (e.g. taxes, charges in favour of third parties) were subtracted form the aforementioned total expenditure and then, on the basis of the current electricity tariff the amount of the consumed electric energy was estimated and then extrapolated for the whole year.

As noted above, the survey collected information on the appliances in the possession of the household for cooking and other uses, electric and electronic appliances, with the option of multiple answers. The relevant tables 4 and 5 are presented below:

TABLE 4. Cooking appliances

	% of total households
Hobs (electricity)	93.2
Hobs (LPG)	8.9
Hobs (natural gas)	0.4
Oven (electricity)	89.1
Oven (LPG)	1.2
Oven (natural gas)	0.3
Microwave oven	38.6
Woodstove	5.2
Fireplace	10.5

TABLE 5. Electric and electronic appliances

	% of total households
Fridge (with or without freezer)	99.9
Dish washer	33.2
Washing machine (with or without tumble dryer)	95.8
Iron	95.6
Vacuum cleaner	81.1
Game console	8.8
TV	99.1
Computer (desktop, laptop)	54.1
Internet devices (modem, rooter, etc.)	49.8

ENERGY CONSUMPTION AND DEGREE OF URBANIZATION

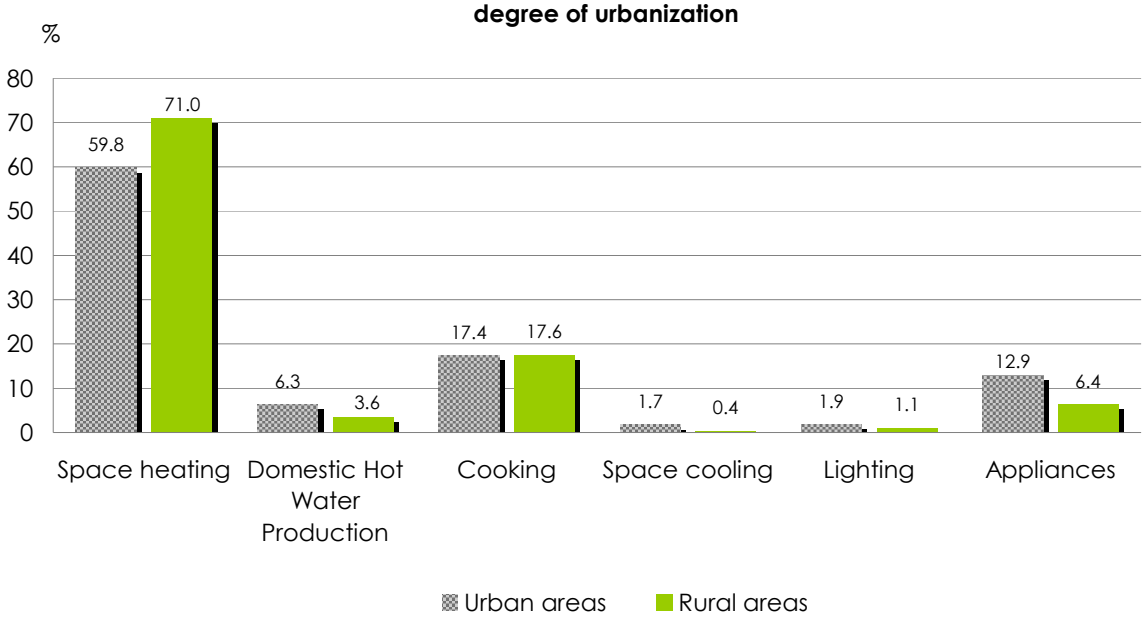
According to the survey results, energy consumption is directly influenced by the degree of urbanization of the area in which the dwelling is located. Table 6 presents the annual average thermal energy and electricity consumption of a household by degree of urbanization.

TABLE 6: Percentage distribution of annual total energy consumption by degree of urbanization.

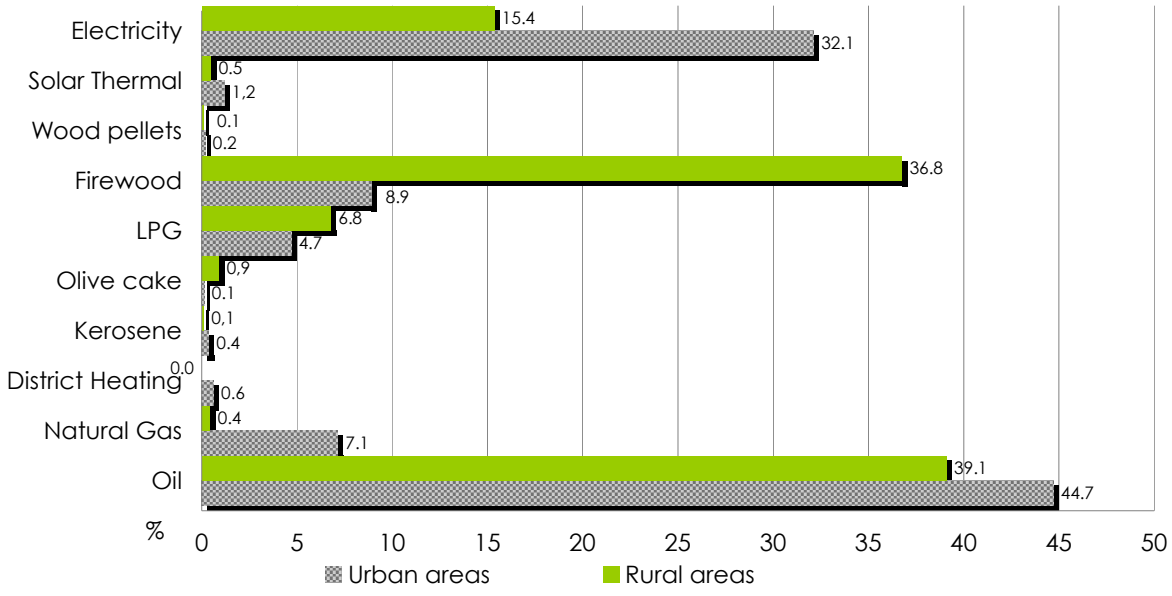
	Urban areas	Rural areas
Thermal energy (kWh)	8453	16923
Electricity (kWh)	4000	3070

According to table 6, the needs of a household in thermal energy are much higher in rural areas, while the needs for electricity are higher in urban areas.

Graph 4. Total energy consumption - Percentage distribution by end use and degree of urbanization



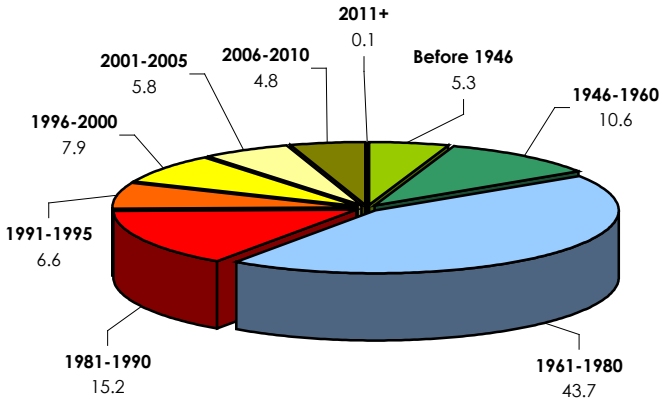
Graph 5. Total energy consumption - Percentage distribution by fuel type and degree of urbanization



The analysis of data on consumed energy by degree of urbanization leads to the conclusion that households in urban areas record an increased use of electricity and, to some extend, of oil, compared to households in rural areas. The use of firewood use is significantly higher in rural areas.

CHARACTERISTICS OF BUILDINGS

Graph 6.Percentage distribution of dwellings by age



The surveyed dwellings were permanent dwellings (99.9%), that is, dwellings used for at least six months per year. To include a dwelling in the survey it was required that the household could provide data (mostly bills) for at least 3 winter and 3 summer months.

According to the survey, 43.7% of the buildings had been built / completed in the 60's and 70's, while 18.6% were built / completed from 2000 onwards. 42% of the dwellings are on the ground floor of buildings and 53.4% are on upper floors (one or more floors / multi-floor apartment).

73.2% of dwellings are owned –of which 60.8% without financial obligations and 12.4% with financial obligations (loan / mortgage).

The average surface of dwellings is 84.8 m^2, with 23.6% of households living in dwellings with surface area up to 60 m^2, 41.7% with area 61-90 m^2 and 34.7% in dwellings with surface area more than 90 m^2.

THERMAL INSULATION

Five out of ten dwellings have thermal insulation, while one out of ten occupants does not know if thermal insulation exists in their dwelling. Thermal insulation types are presented in Table 7.

Graph 7. Existense of thermal insulation

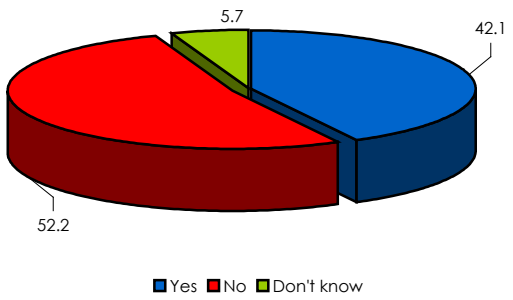


Table 7. Type of thermal insulation

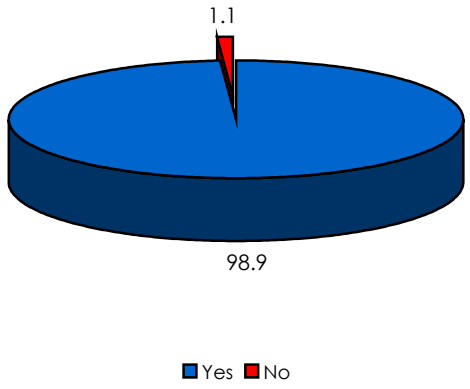
	%
Ceiling / roof	38.5
Floor	2.9
Façade	77.8
Inner surface of the walls	31.3
Supporting structure	18.3
Elsewhere	0. 5
Do not know	1.4

SPACE HEATING

98.9% of dwellings have some kind of space heating system/equipment. During the winter (2010/11 or 2011/12) period, 50.8% of households used a central heating system as main heating system, 48.6% used an independent heating system (autonomous) and 0.6% used district heating.

65.3% of the households mentioned that they have a central heating system equipped with an autonomy switch, while 34.7% haven't.

Graph 8.Existence of space heating



The fuel used for the main heating system is:

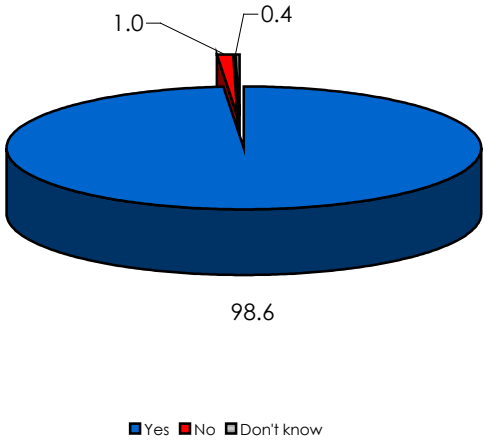
- 63.8% oil
- 12.4% electricity
- 12.0% biomass (firewood, wood pellets, wood briquettes, agricultural and forestry wastes) and
- 8.7% natural gas

Three out of ten households use –besides the main space heating system– a supplementary space heating system, being mostly a fireplace (32.3% of households using supplementary space heating system), air conditioning split units (28.2%) and portable electric heaters (electric stove, heater, radiator) (26.5%).

DOMESTIC HOT WATER PRODUCTION

98,6% of households have in the dwelling some kind of system / equipment in order to satisfy their needs for hot running water.

Graph 9. Existence of Domestic Hot Water

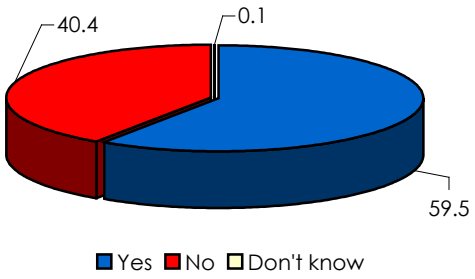


Specifically for domestic hot water production, 74.5% of households use an electrical thermo siphon system, 37.6% a solar thermo siphon system, and 25.2% a system linked to the central heating system (boiler).

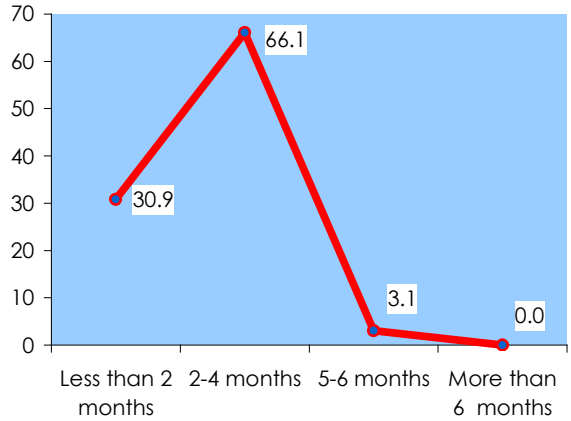
SPACE COOLING

Six out of ten households use some kind of system in order to keep their dwelling (all of it or part/s of it) cool during the summer months. This space cooling system at a percentage of 99.7% concerns independent air conditioning units (splits), while central cooling systems have been recorded for approximately 0.3 % of the households.

Graph 10. Existence of space cooling system

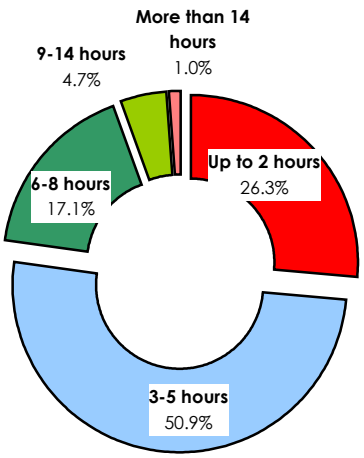


Graph 11. Air conditioning use by duration of use



66.1% of households that cool their dwelling use independent air conditioning units for space cooling 2-4 months per year, while 30.9% use such units for less than 2 months.

Graph 12. Average daily use of air conditioning



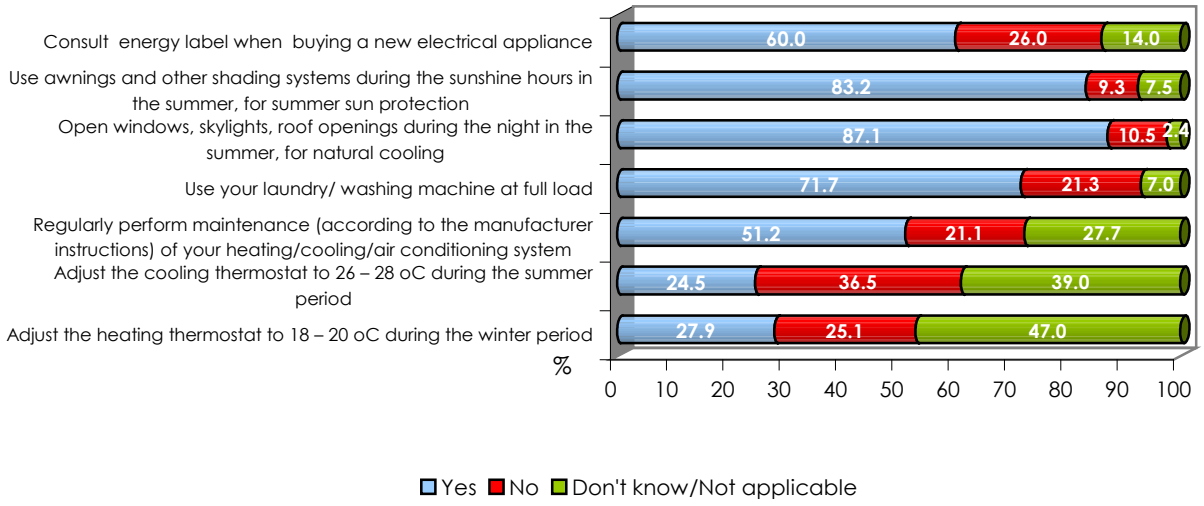
Concerning daily use of independent air conditioning units, approximately half of the households use them for 3-5 hours per day during the summer months (May to September).

BEHAVIORAL PRACTICE TOWARDS EFFICIENT USE OF ENERGY

The rational use of energy consumed in the residential sector is also achieved through the behavioral energy practices and habits of users. The appropriate setting of thermostats of heating and cooling systems, the use of tents, shutters and other awnings during the summer, the use of washing machines with full washing load, etc. may contribute to decreasing the consumption of electric energy by households.

Graph 13 below presents the households (in percent) which choose or not to adopt specific practices towards a more efficient use of energy.

Graph 13. Behavioral practices towards efficient use of energy



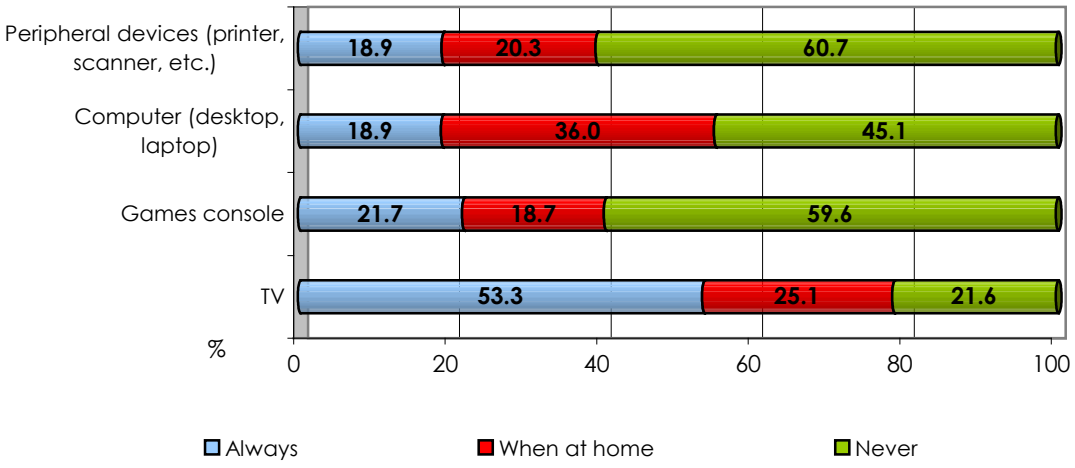
The analysis of the results obtained from setting the thermostats of space heating and cooling systems according to a more energy efficient behavior (adjusting at 18 - 20 °C and 26 - 28 °C, respectively), implies a reduction greater than 13% in the average thermal energy consumption for space heating, and greater than15% for space cooling.

Nocturnal natural cooling of the dwelling (open windows, skylights, roof openings) during the night in summer results in these households consuming, on average, 21% less electricity for space cooling.

Households using full washing load for washing machines or dish washers (that is, with full capacity according to their characteristics) record, on average, lower electricity consumption by approximately 17%.

Finally, concerning the energy behavioral practice of households and keeping electric appliances on standby mode when not used, according to the survey data, almost 8 out of 10 households put the TV set on standby mode (53.3% always and 25.1% when being in the dwelling) and only 2 out of 10 shutdown their TV when not used (Graph 14).

Graph 14. Electric appliances on standby mode



The correlation of socioeconomic characteristics of household members with their energy consumption shows that:

- The average thermal energy consumption per person in one-person households is –on average– 66% higher than in multi-person households. Respectively, the electricity consumption per person is –on average– 69% higher in one-person households.
- The average thermal energy consumption in households with at least one member aged more than 65 years old is –on average–8% higher than in households with no members aged 65+. On the contrary, in households with at least one member aged more than 65 years old, the electricity consumption is by 17% lower than in households with no members aged 65+.
- In households with working members the average electricity consumption and the average thermal energy consumption are higher by 32% and 15%, respectively, compared to households without working members.
- Households with unemployed persons record average electricity consumption higher by 16% and average thermal energy consumption lower by 10% in comparison with households without unemployed members.
- In rented dwellings, thermal energy consumption was lower by 52% in comparison with owned dwellings and by 47% in comparison with dwellings provided for free. Moreover, electricity consumption in rented dwellings was lower by 11% in comparison with owned dwellings and by 1% compared with dwellings provided for free.

EXPLANATORY NOTES

Aim With the survey analytical data on energy consumption in households have been collected, specifically, on the type of end use (space heating / space cooling, lighting, cooking, domestic hot water production, electric appliances) as well as on fuels used (liquid and solid fuels, electricity, renewable energy sources) in relation to demographic and financial characteristics of the households.

Legal Basis The need on household final energy consumption data is derived from (a) the 1rst National Action Plan for Energy Efficiency - NEEAP (conducted for the Ministry of Environment, Energy and Climate Change concerning planning measures and actions on all sectors' –industry, transport, domestic, etc.– final energy consumption), covering time period 2008-2016, (b) the additional changes in the institutional framework according to L.3855/2010 on measures for improving energy efficiency in final use, (c) Law 3851/2010 on setting national targets for Renewable Energy Sources 2020, (d) instructions 2003/66/EU-2002/40/EU-2002/31/EU-2000/55, (e) the EU Regulation 1099/2008 on energy statistics and also Regulations EU859/2009 , EU643/2009, EU642/2009, EU275/2008 related to energy labeling of equipment / devices.

Financing The survey is being conducted in the framework of a European grant and after the decision of the Greek Ministry of Finance.

Conduct period 01/10/2011 to 30/09/2012.

Reference period Reference periods for energy data are current winter months (October 2011 to April 2012) and summer months (May 2011 to September 2012) or winter/summer months preceding the survey conduct (October 2010 to April 2011) and (May 2010 to September 2011), respectively.

Coverage The survey covered all private households throughout the country, irrespective of their size or socioeconomic characteristics. Excluded are:

- Collective households (boarding schools, nursing homes, hospitals, prisons, juvenile detention centers, camps, etc.).
- Households with more than five lodgers.
- Households with foreign members serving at diplomatic missions.

Total Energy Consumption The total energy consumed in a household in order to cover the household's needs in all kinds of end uses, that is for space heating, space cooling, domestic hot water production, cooking, lightning, electric and electronic appliances and in general for any other use demanding energy.

Thermal energy The energy derived mainly from the conversion of energy within the household (e.g. burning gas for cooking or oil for space heating) or in a remote energy station (e.g. for district heating), as well as from primary production (e.g. energy produced by solar thermo siphon panels for the production of domestic hot water). Electricity is not included.

Electricity The energy produced in power plants and distributed through the electricity network.

Methodology The survey is a sampling survey and is conducted in a sample of 3.600 households in the country (sampling fraction 0,08%). The two-stage area sampling was adopted for the survey with primary sampling units the areas (one or more unified city blocks, and ultimate sampling unit the household.

For the selection of primary sampling units (areas) each geographical region (NUTS 2) has been divided into three strata according to the urbanization degree of Municipalities / Local communities at which they belong. The former two Major City Agglomerations (Athens and Thessaloniki) are divided into 31 and 9 honogeneous strata, respectively, based on socio-economic characteristics of Municipalities included in these areas. The total number of strata is 79.

For the first stage of sampling, in each stratum a sample of areas is being selected with selection probability according to their size (number of households according to the 2001 Census). Total number of primary sampling units amounts to 612.

During the last sampling stage, in each sampling unit, the sample of households is common with that of the Household Budget Survey, being selected with equal probabilities, from the framework of dwellings that has been updated.

References More information on the survey (questionnaire, methodological information) is available on the webpage of the Hellenic Statistical Authority www.statistics.gr, Section: Statistical Themes > Household Income – Expenditures – Energy Consumption in the Residential Sector > Survey on Energy Consumption in Households.