



## Financing options for energy efficiency improvements in residential buildings in Greece

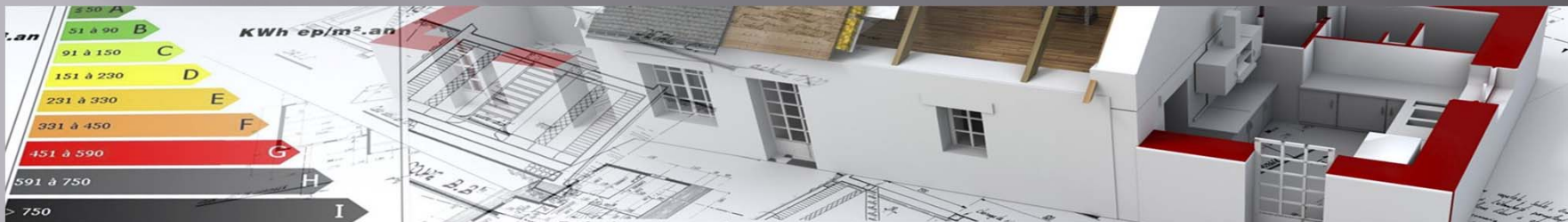
Harris Andreosatos

Dipl. Mechanical Engineer, MSc  
Energy Policy Analysis Department



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ENERGY SOURCES AND SAVING

Provision of Highly Efficient Heating & Cooling Solutions for Residential Buildings  
Villa Cagnola (Gazzada Schianno, Varese, 18-19/10/2017)



## Energy efficiency of buildings

The improvement of energy efficiency performance of buildings is the most effective way to achieve objectives related to:

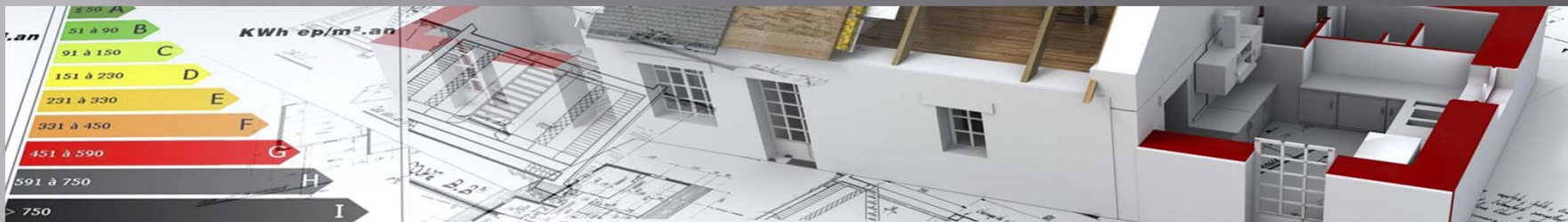
- The creation of a sustainable future with low carbon content,
- Creation of new jobs,
- Reduction of energy costs in businesses,
- The social impact of rising energy prices
- Reduction of dependence on external energy suppliers



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## Energy Efficiency Targets set by E.U.

The climate & energy goals for a competitive, secure and low-carbon EU economy:

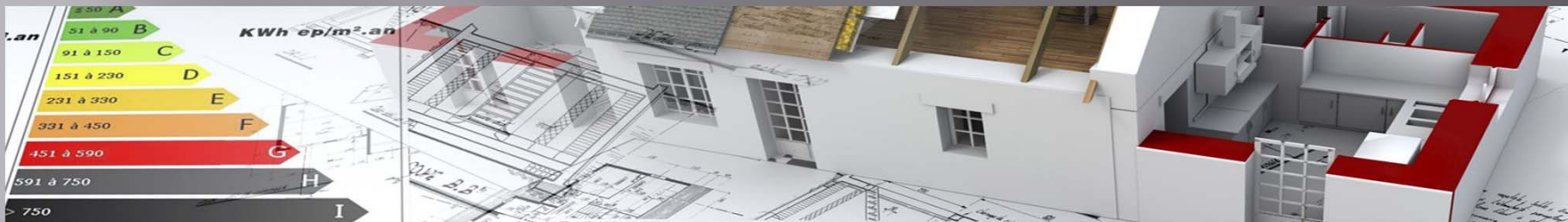
- ♦ A reduction in greenhouse gas (GHG) emissions by 40% below the 1990 level,
- ♦ An EU-wide binding target for renewable energy of at least 27% in 2030,
- ♦ Renewed ambitions for energy efficiency policies , of at least 27% in 2030,
- ♦ A new governance system and a set of new indicators to ensure a competitive & secure energy system.



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## Legislative Framework of Greece

### Presidential Decree 100/2010 (ΦΕΚ Α 177) for Energy Auditors

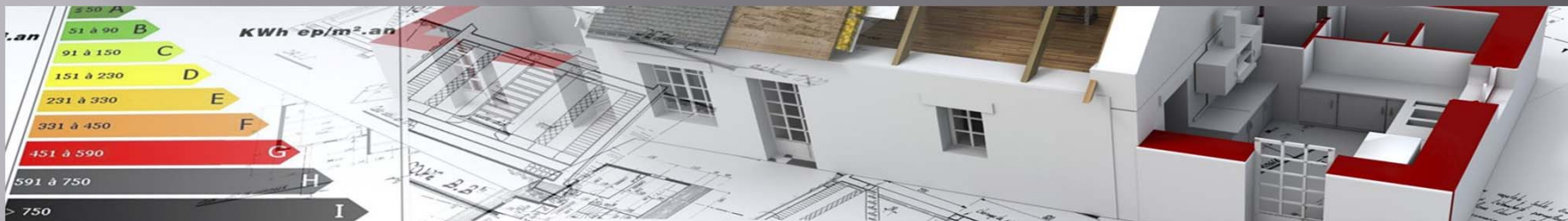
- Qualifications of energy auditors for buildings heating, ventilation and air conditioning systems
- Conditions and requirements for authorizing energy auditors
- Payment of energy auditors
- Qualifications of energy auditors
- Licensing of energy auditors
- Creation of a registry for energy auditors
- Imposition of administrative and other penalties



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## Legislative Framework of Greece

### “Regulation on the Energy Performance of Buildings” – (KENAK) D6/B/oik.5825/30.03.2010

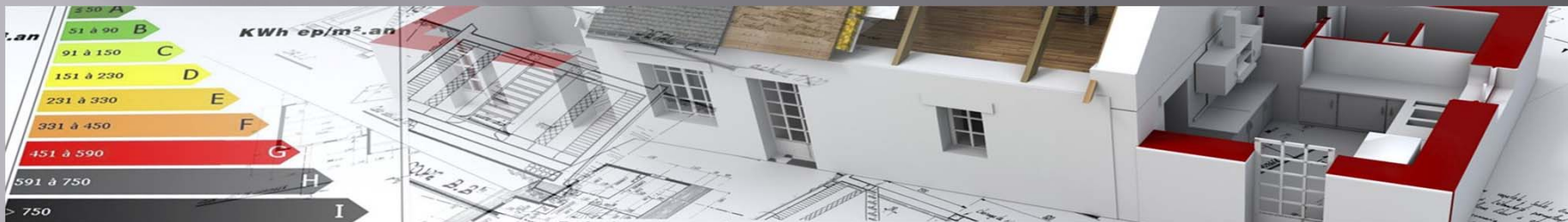
- Methodology of calculation of buildings energy performance
- Approved calculation method – calculation parameters
- Climate zones based on heating degree days
- Minimum energy efficiency building requirements
- Minimum building specifications
- Technical characteristics of reference building
- Energy efficiency study
- Energy performance certificate



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## Legislative Framework of Greece

Law 4122/2013 (ΦΕΚ Α 42) transposition of Directive 2010/31/EE into national legislation

The issuing of the Energy Performance Certificate (EPC) is mandatory:

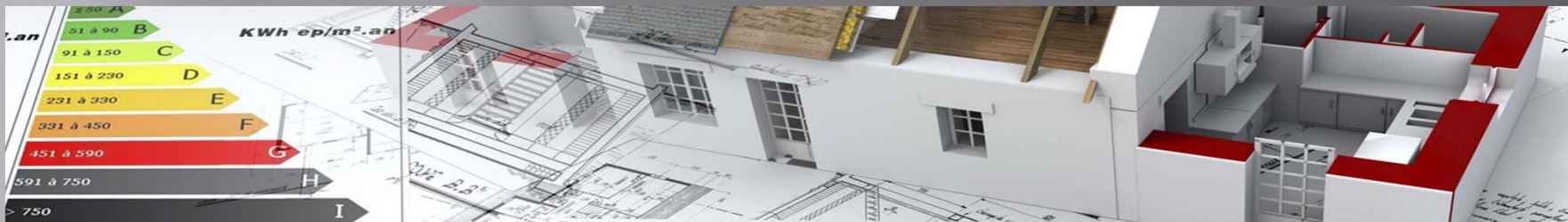
- After the construction of:
  - new building/apartment (multi family building) or when a major renovation of a building is carried out
- Buildings that participate in energy efficiency financial programs, such as “Energy efficiency at household buildings” program
- Public sector buildings 250m<sup>2</sup> (from 9/7/2015)
- During the sale or rental of a building/detached houses



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## Legislative Framework of Greece

Law 4122/2013 (ΦΕΚ Α 42) transposition of Directive 2010/31/EE into national legislation

### Nearly Zero Energy Buildings (NZEB):

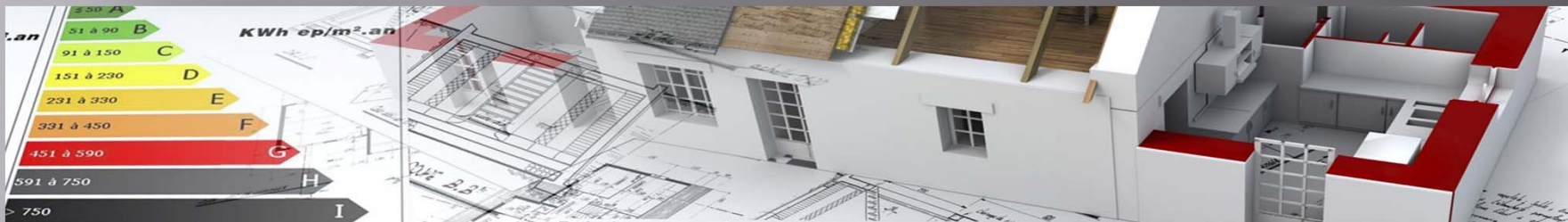
- Low energy consumption
- Energy needs should be covered by RES
- From 01.01.2019 all new premises/buildings occupied by public sector (central government) should be NZEB
- From 01.01.2021 all new public buildings should be NZEB



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## Legislative Framework of Greece

Law 4342/2015 (ΦΕΚ Α 143) transposition of Directive 2012/27/E.C. into national legislation

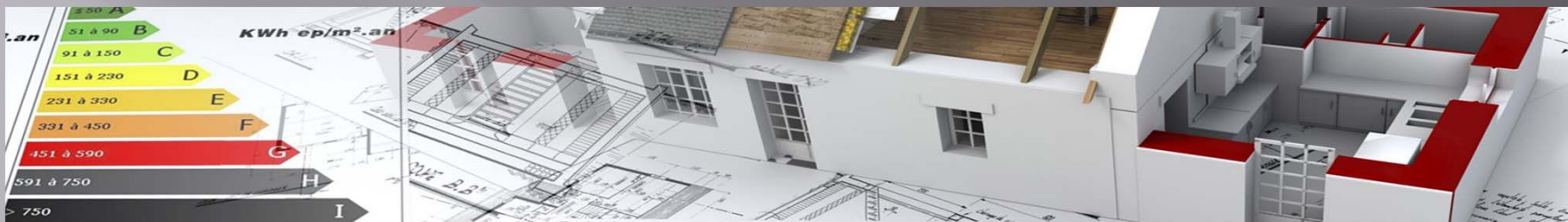
- From 01.01.2014, 3% of the total floor area of heated and/or cooled buildings owned and occupied by central government is renovated each year to meet at least the minimum energy performance requirements.



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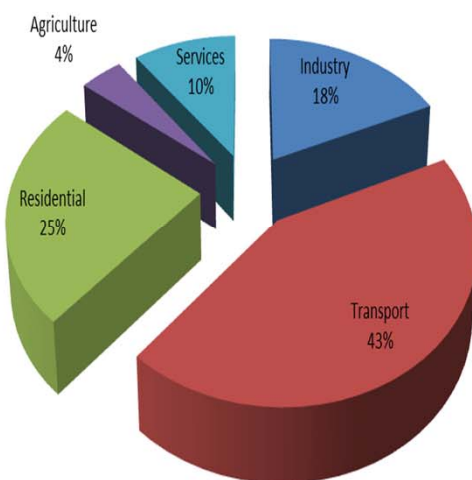
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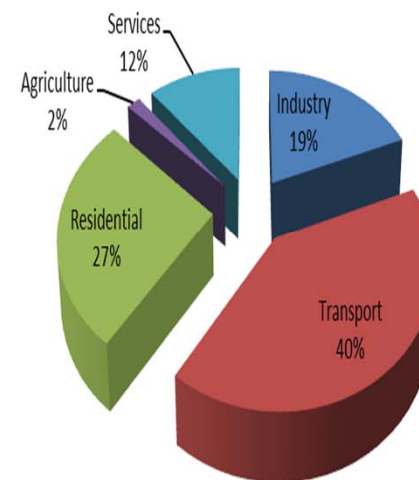


## Final Energy Consumption per sector in Greece

Final Energy Consumption per sector in Greece - 2010



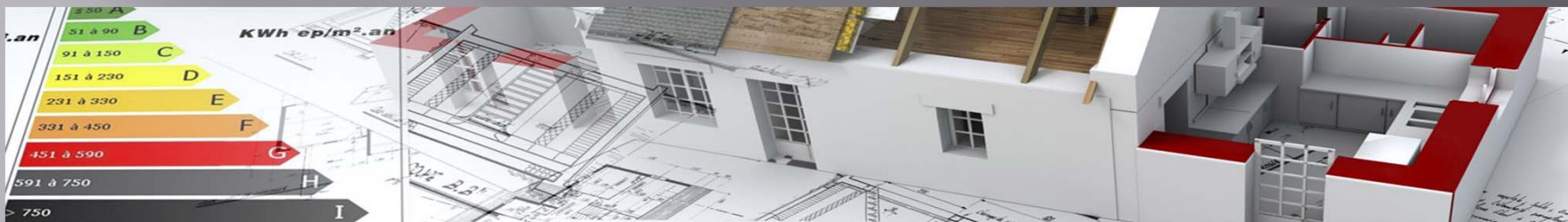
Final Energy Consumption per sector in Greece - 2015



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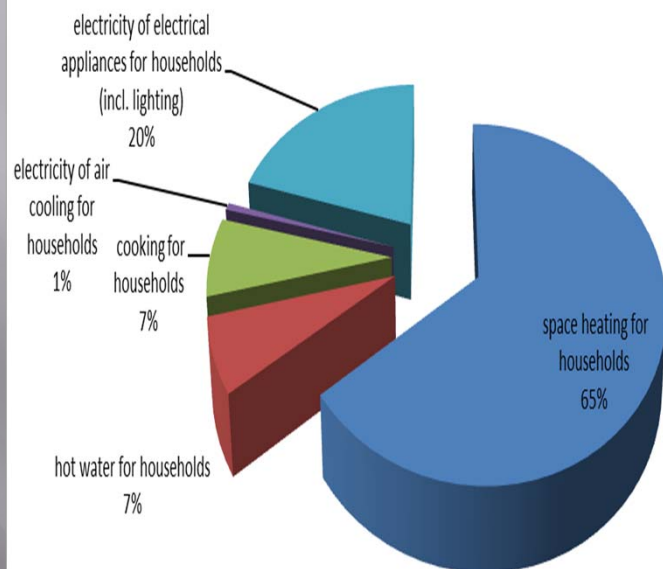
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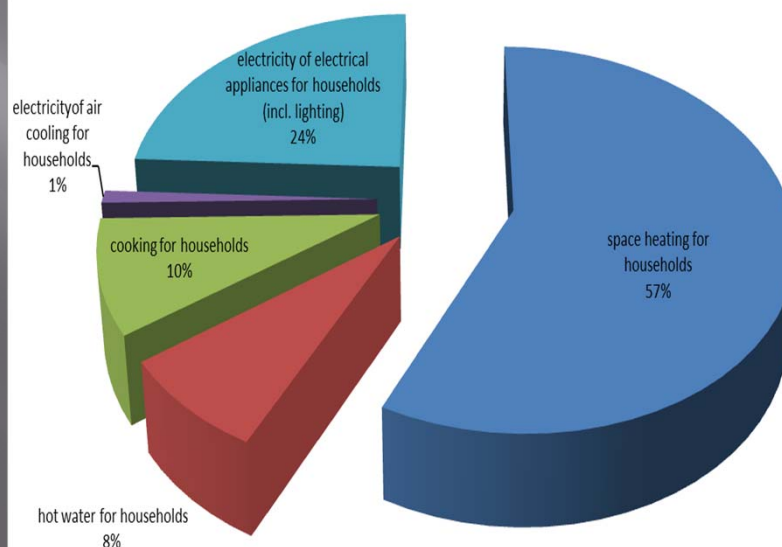


## Total households Consumption (ktoe) by end uses in Greece

Total households consumption by end uses (ktoe) 2010



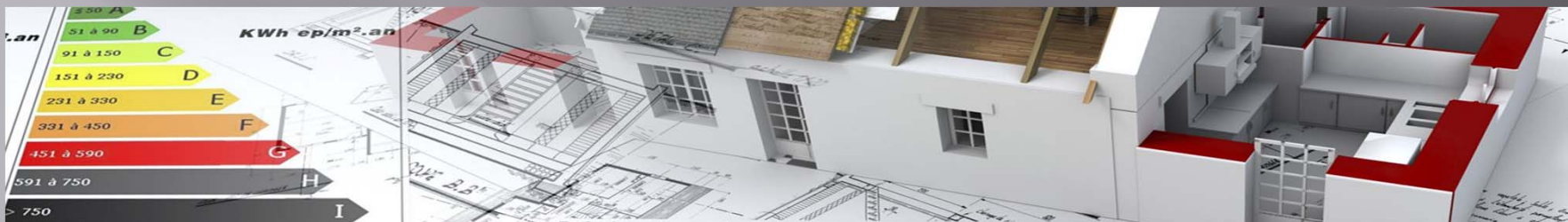
Total households consumption by end uses (ktoe) 2014



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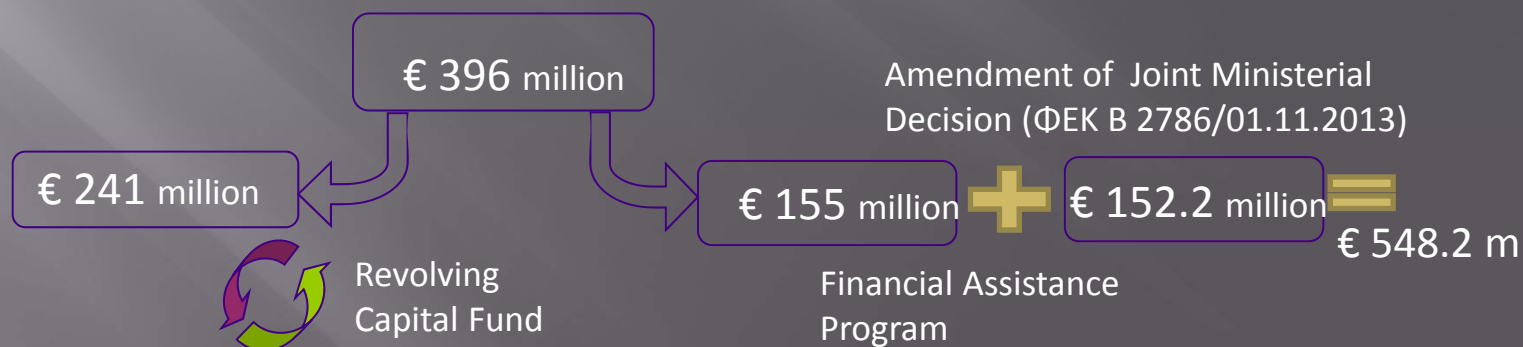
## Energy Efficiency at Household buildings

The goal of this program was to:

- Provide incentives for energy efficiency interventions in households

Program budget :

- The initial budget was 396,000 €, co-financed by European Regional Development Fund as well as National Financial Resources, through the Regional Operational Programs of the National Strategic Reference Framework (NSRF) 2007-2013.

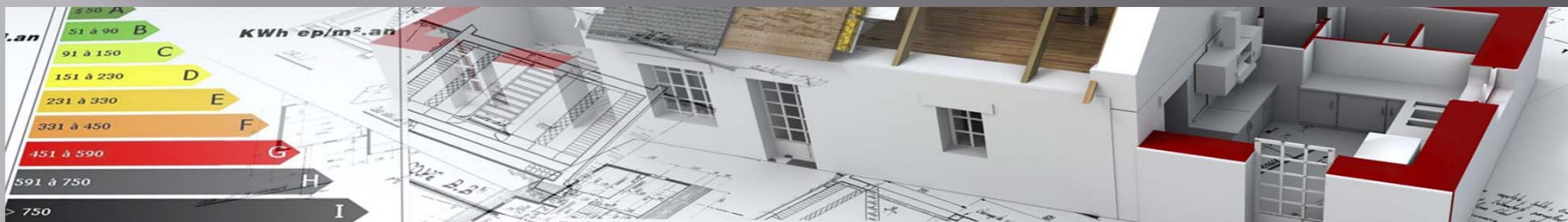


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## Energy Efficiency at Household buildings

Eligible households for participating in the program:

- Detached houses
- Multi-family houses
- Single-family houses

Most of these buildings have problems related to:

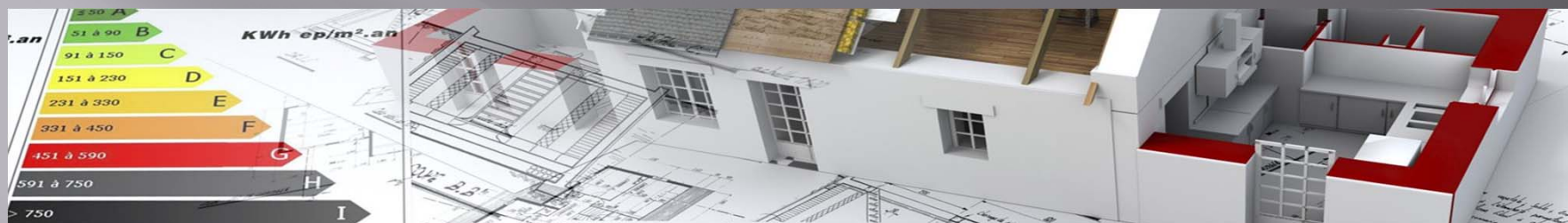
- ✓ Partial or total lack of heat insulation
- ✓ Outdated technology windows/doors (frames/single glazing)
- ✓ Lack of sun protection on southern and western sides
- ✓ Inadequate maintenance of heating/air conditioning systems
- ✓ Tenant behavior (lack of info about energy efficiency, etc)



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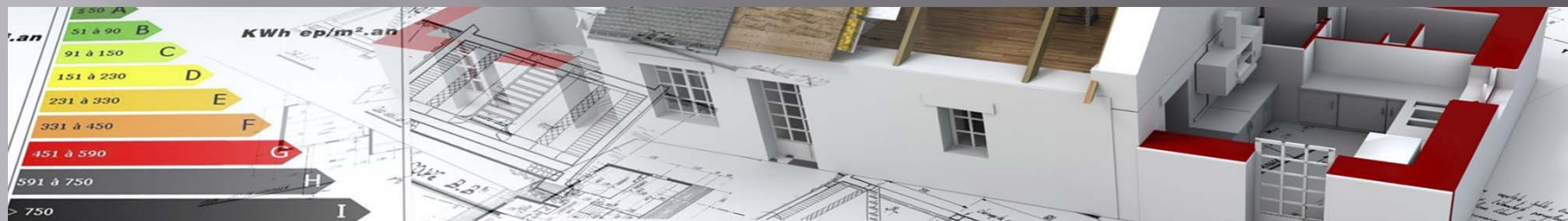


## Energy Efficiency at Household buildings

Who can join the program:

Individuals who meet the following income criteria:

	Beneficiary Category		
	A	B	Γ
<b>Unmarried-Individual income(I.I.)</b>	$I.I. \leq 12.000\text{€}$	$12.000\text{€} < I.I. \leq 40.000\text{€}$	$40.000\text{€} < I.I. \leq 60.000\text{€}$
<b>Married – family income (F.I.)</b>	$F.I. \leq 20.000\text{€}$	$20.000\text{€} < F.I. \leq 60.000\text{€}$	$60.000\text{€} < F.I. \leq 80.000\text{€}$
<b>Incentive</b>	<ul style="list-style-type: none"> <li>• 30% Interest free loan</li> <li>• 70% Capital subsidy</li> <li>• Cost coverage of energy audits</li> </ul>	<ul style="list-style-type: none"> <li>• 65% Interest free loan</li> <li>• 35% Capital subsidy</li> <li>• Cost coverage of energy audits</li> </ul>	<ul style="list-style-type: none"> <li>• 15% Capital subsidy</li> <li>• 85% Interest free loan</li> <li>• Cost coverage of energy audits</li> </ul>



## Energy Efficiency at Household buildings

### Eligible energy efficiency interventions:

No	Categories / Sub-categories of interventions
1	<b>Replacement of window frames &amp; Shading systems</b> A. Sliding or sliding windows B. Open window frame Γ. Single glazing Δ. External fixed shading systems and external covers
2	<b>Thermal insulation placement in the building cell including the roof and pilot</b> A. External thermal insulation of the roof and pilot B. External thermal insulation of building cell Γ. Internal heat insulation
3	<b>Upgrading the heating &amp; water supply system</b> A. Central heating system B. Stand alone (wall – mounted) burner-boiler system Γ. Automatic control for operating the heating system Δ. System having as main use RES or CHP E. Solar systems for domestic hot water

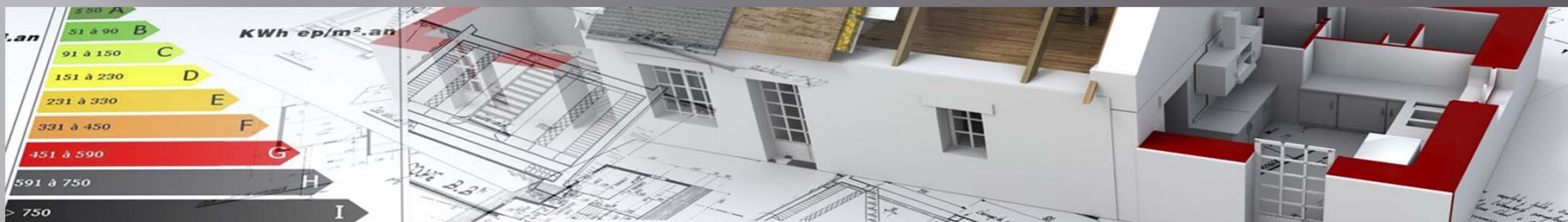


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## Energy Efficiency at Household buildings

Web site/portal of the program:

**BASIC STEPS**

**DO YOU KNOW THE ENERGY EFFICIENCY OF YOUR HOUSE?**

\* The application is only available in Greek version

For more information:  
Click here to see the FAQs (in Greek)  
Call 210-9797400

- Find Supplier
- Submit your company

[Contact us](#) | [Information Material](#)

[Library](#)

**News / Publications** (see all News)

Only Available in Greek

"Energy Efficiency at Household Buildings"

Download:  
The Program Guide

**Energy efficiency at buildings**

Buildings and transportation are the most energy-consuming sectors in Greece. Buildings in Greece account for approximately 36% of the total energy consumption, while, during the years 2000-2005, relevant energy consumption increased by approximately 24%, one of the highest increases in Europe.

One of the main reasons why Greek buildings consume so much energy is that they are old and have no built-in state-of-the-art technology, due to the lack of relevant legislation over the last 30 years.

Most of these buildings have problems relating to:

- partial or total lack of heat insulation;
- outdated technology windows/doors (frames/single glazing);
- lack of sun protection on southern and western sides;
- inadequate use of Greece's high solar potential;
- inadequate maintenance of heating / air conditioning systems, resulting in poor performance.

Another important factor affecting building's energy performance is tenant behavior. Users-tenants, who lack information about the rational use and management of energy, often tend to waste energy, e.g. by installing individual air conditioning systems without a relevant study, using low efficiency appliances, not performing maintenance of heating systems, etc.

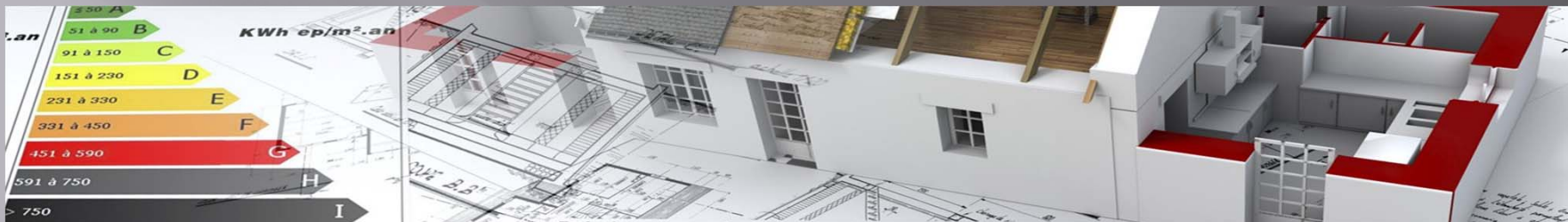
Within this context, the Ministry of the Environment, Energy and Climate Change (YPEKA), having completed the legal framework on buildings' energy efficiency, has developed a set of financial incentives, with co-financing from the European Union, for the implementation of energy efficiency upgrading interventions in residential buildings, via the "Energy Efficiency at Household Buildings" Program.



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## Energy Efficiency at Household buildings

### Additional information related to the program:

- Program guidelines
- Program website (<http://exoikonomisi.ypeka.gr>)
- Helpdesk 210 9797400
- Task force for guidance and solving problems

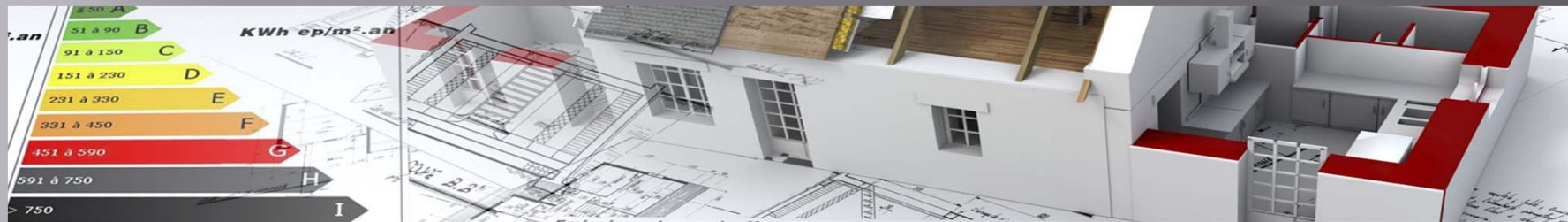
Maximum eligible budget for energy efficiency interventions: € 15,000 (incl. VAT) per household



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## Energy Efficiency at Household buildings

### Energy Auditors:

There is a Registry ([www.buildingcert.gr](http://www.buildingcert.gr)) for all Energy Auditors

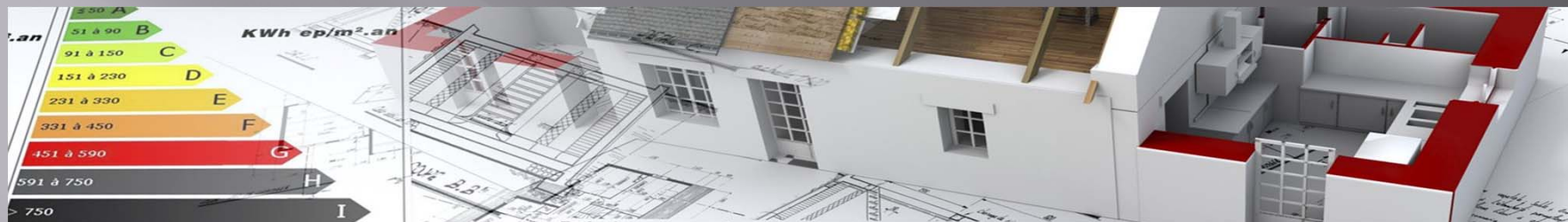
The screenshot shows the website of the Ministry of Environment, Energy and Climate Change, specifically the section for the Register of Energy Auditors. The page is in Greek and features a search bar where users can select a region from a dropdown menu. The dropdown menu is currently open, showing a list of regions including ΑΓΙΟΝ ΟΡΟΣ, ΑΤΤΙΚΗ, ΑΡΓΟΛΙΔΑ, ΑΡΚΑΔΙΑ, ΑΧΑΪΑΣ, ΒΕΛΟΝΑΣ, ΒΕΡΟΙΑΣ, ΒΟΙΩΤΙΑΣ, ΓΡΕΒΕΝΩΝ, ΔΡΑΜΑΣ, ΔΩΔΕΚΑΝΗΣΟΥ, ΕΒΡΟΥ, ΕΥΒΟΙΑΣ, ΕΥΡΥΤΑΝΙΑΣ, ΖΑΚΥΝΘΟΥ, ΗΛΕΙΑΣ, ΗΜΑΘΙΑΣ, ΗΡΑΚΛΕΙΟΥ, ΘΕΣΣΑΛΟΝΙΚΗΣ, ΙΩΑΝΝΙΝΩΝ, ΚΑΒΑΛΑΣ, ΚΑΡΔΙΤΣΗΣ, ΚΑΣΤΟΡΙΑΣ, ΚΕΡΚΥΡΑΣ, and ΚΕΦΑΛΛΗΝΙΑΣ. The page also includes a search button labeled 'Αναζήτηση' and a footer with the logos of KAPE and YΠΕΚΑ.



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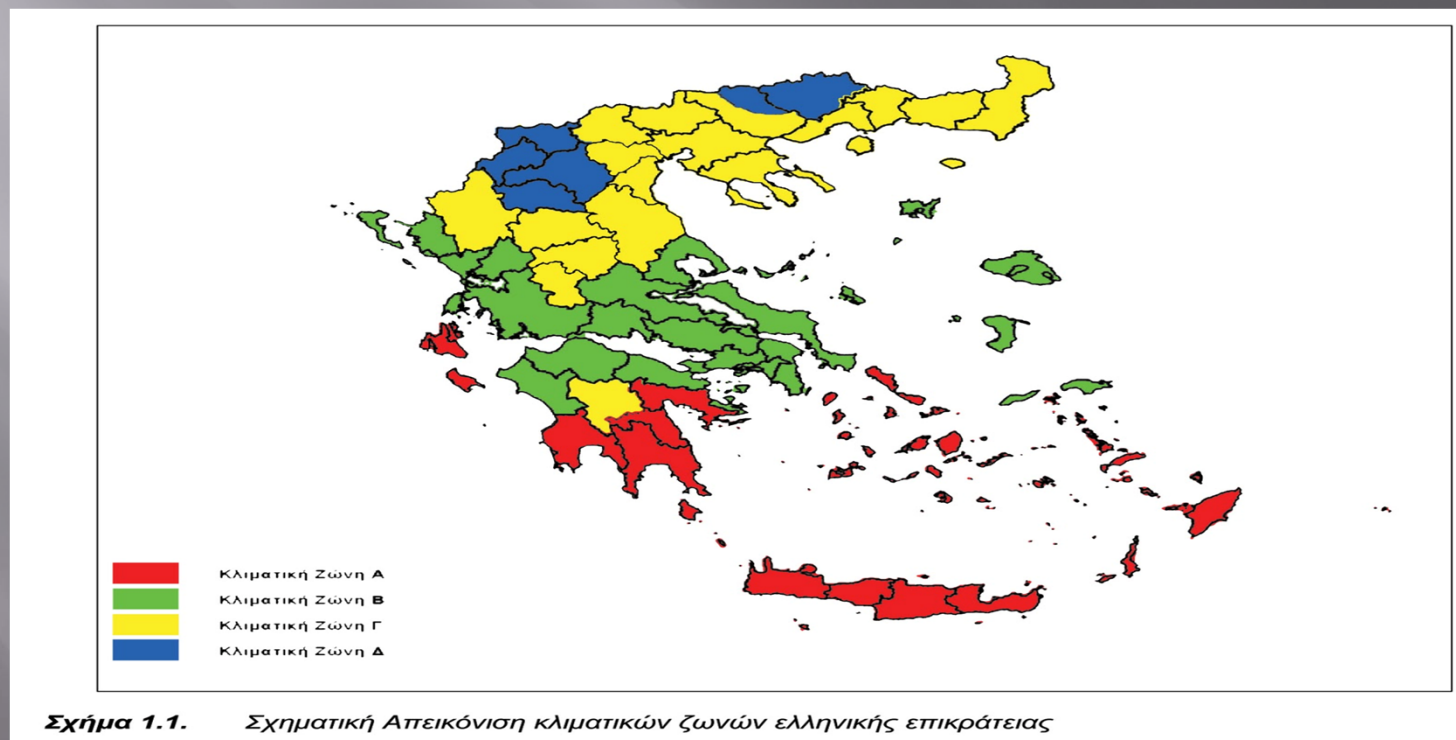
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## Energy Efficiency at Household buildings

Climatic zones of Greece:



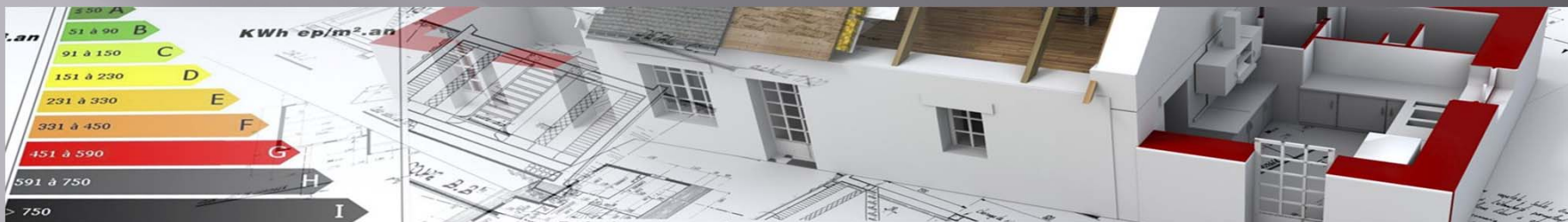
Σχήμα 1.1. Σχηματική Απεικόνιση κλιματικών ζωνών ελληνικής επικράτειας



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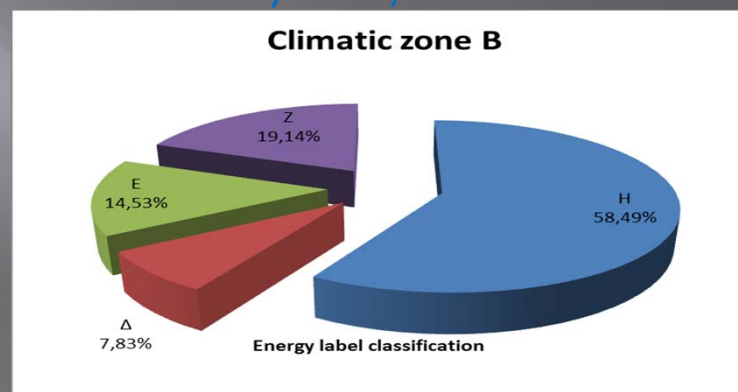
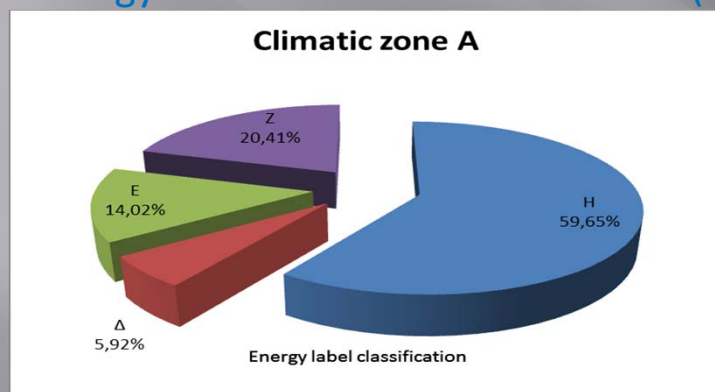
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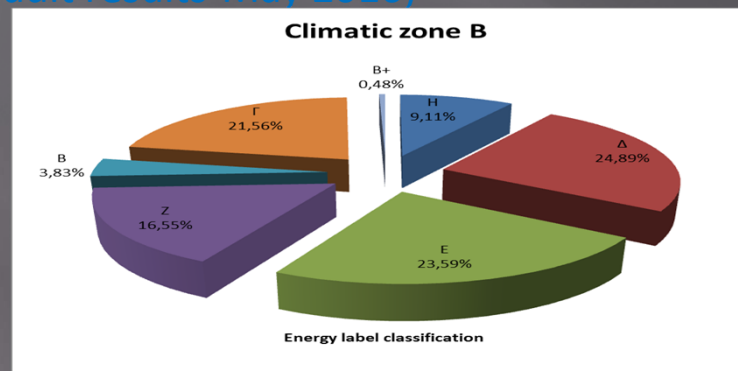
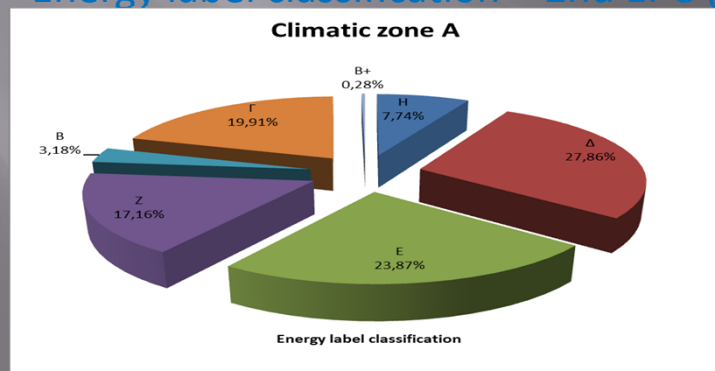


## Energy Efficiency at Household buildings

Energy label classification – 1st EPC (audit results-May 2016)



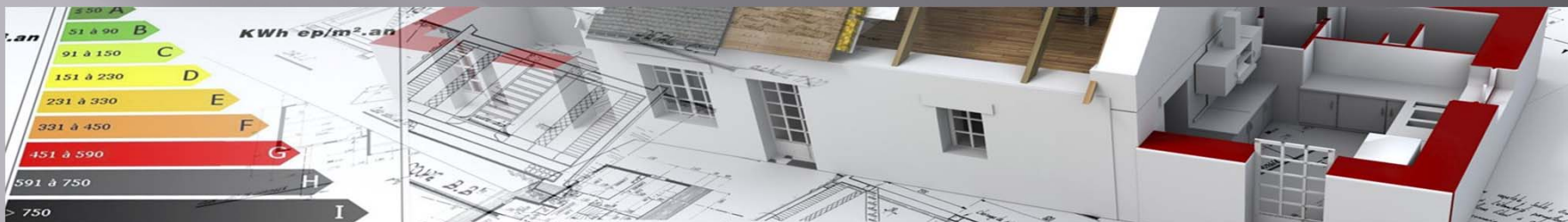
Energy label classification – 2nd EPC (audit results-May 2016)



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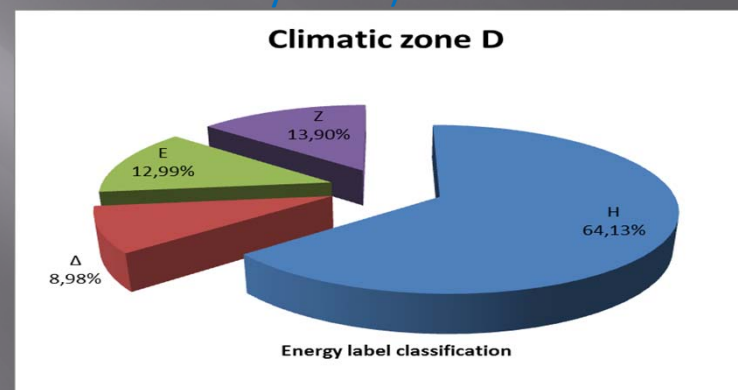
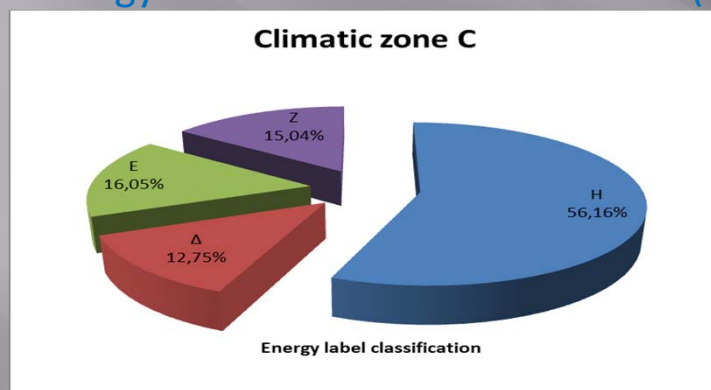
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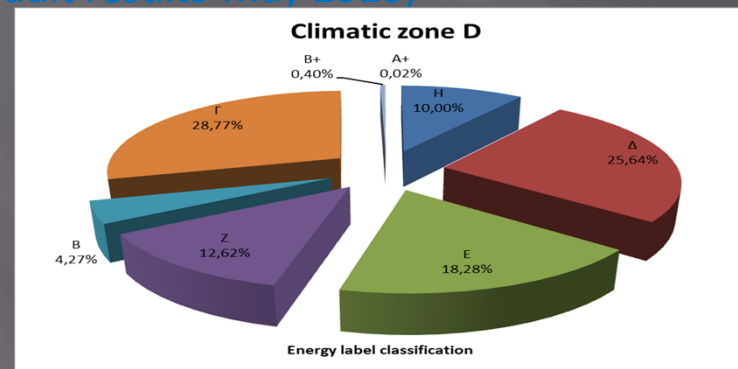
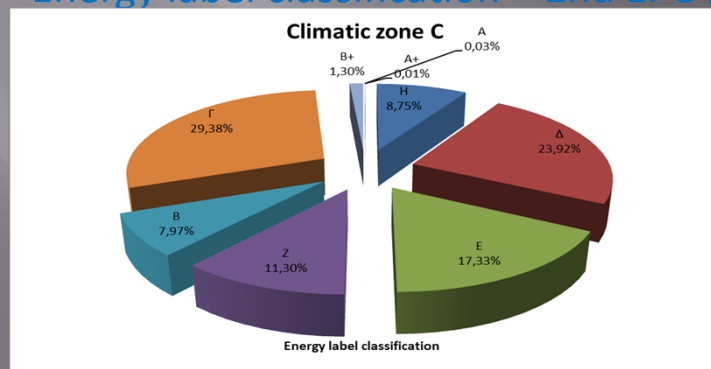


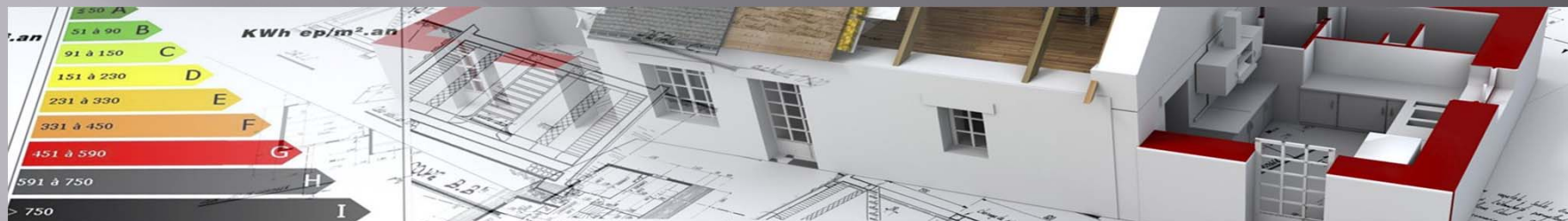
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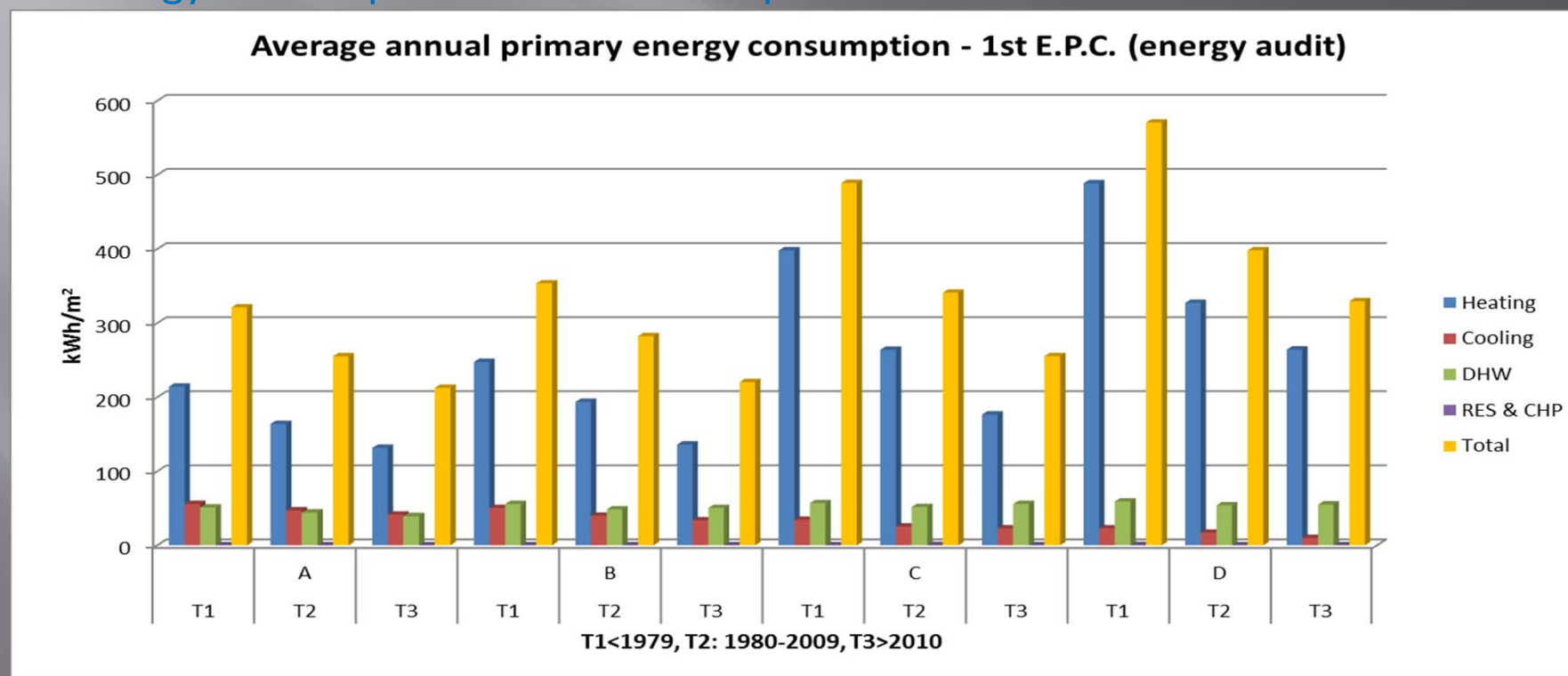
Energy label classification – 2nd EPC (audit results-May 2016)





## Energy Efficiency at Household buildings

Energy consumption of households per climatic zone – 1<sup>st</sup> E.P.C.

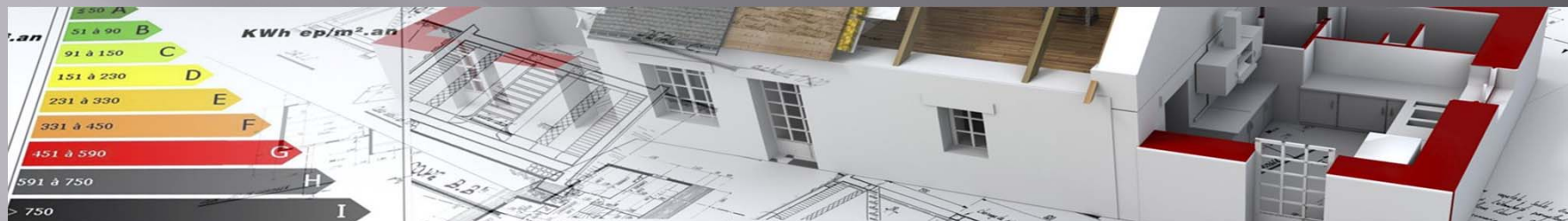


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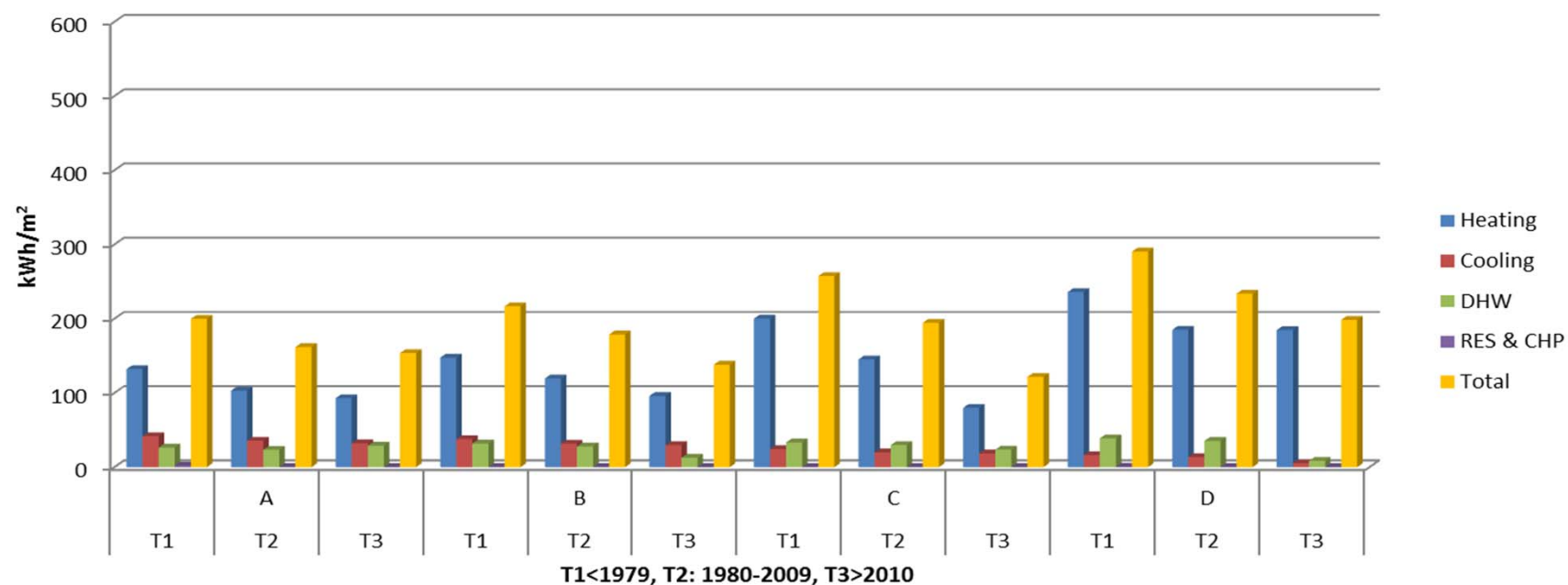
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## Energy Efficiency at Household buildings

### Energy consumption of households per climatic zone – 2nd E.P.C.

Average annual primary energy consumption - 2nd E.P.C. (energy audit)

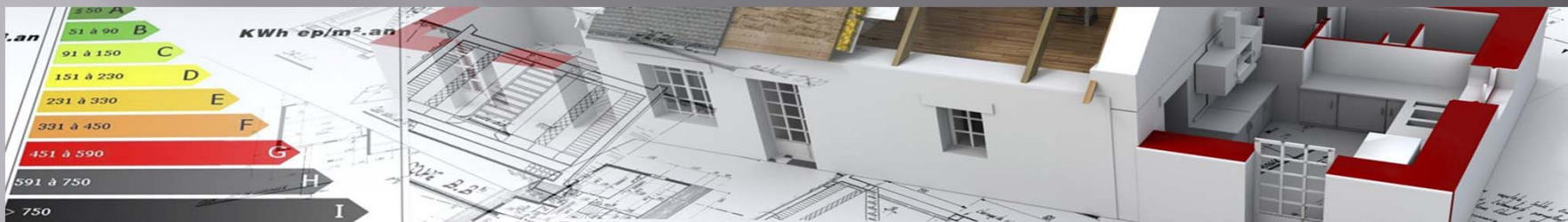


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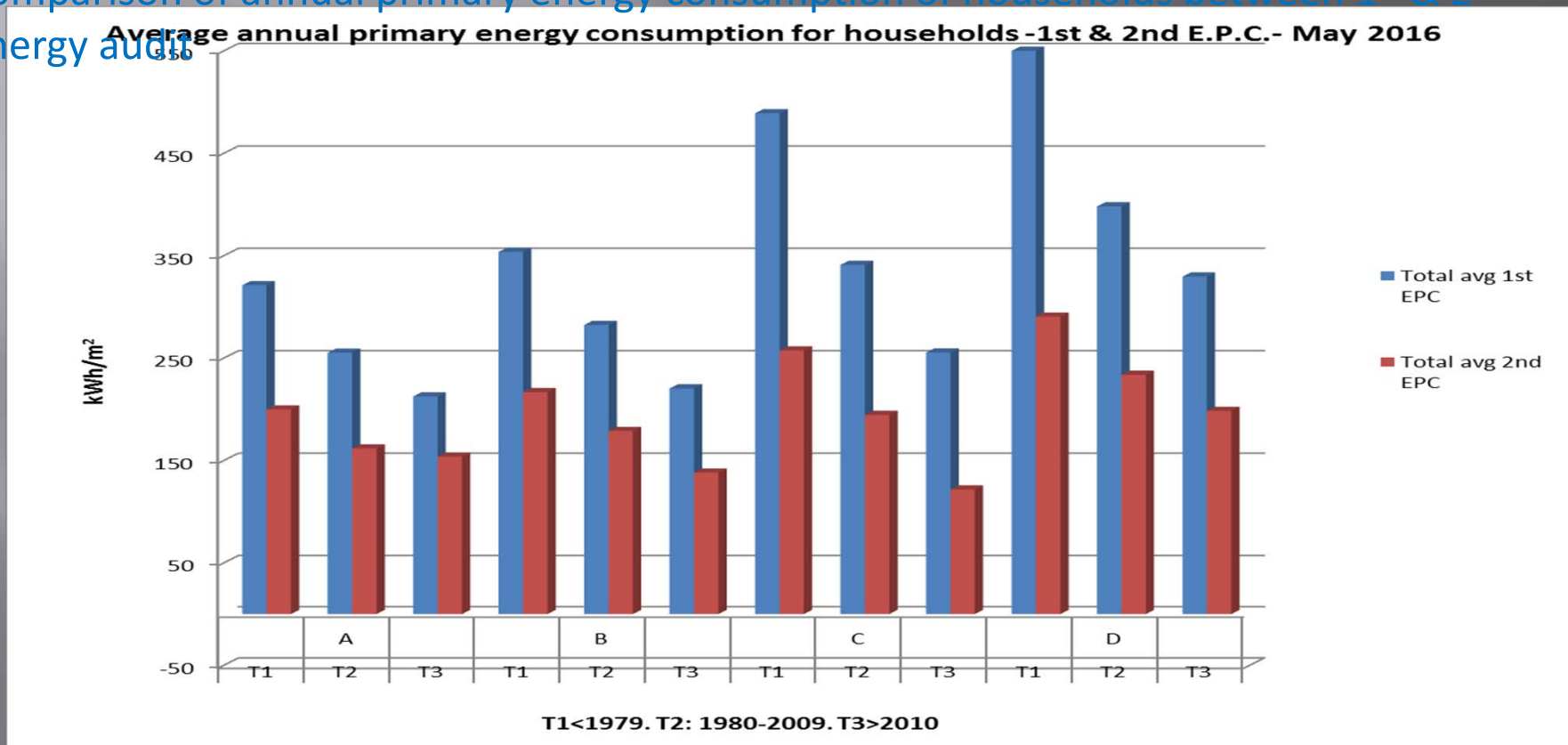
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## Energy Efficiency at Household buildings

Comparison of annual primary energy consumption of households between 1<sup>st</sup> & 2<sup>nd</sup> energy audit

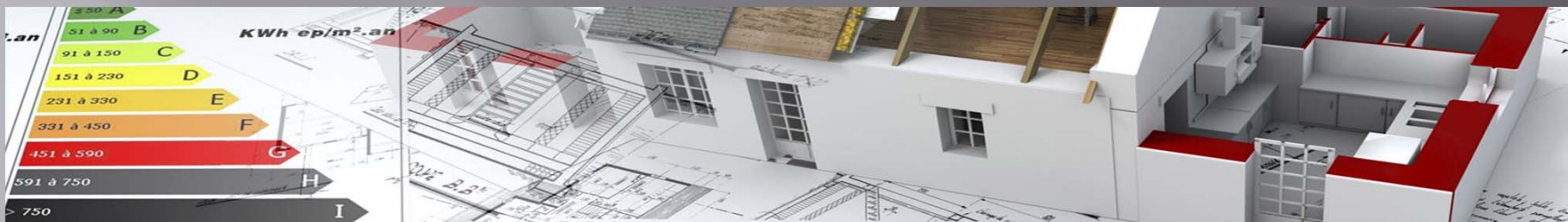


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## Energy Efficiency at Household buildings

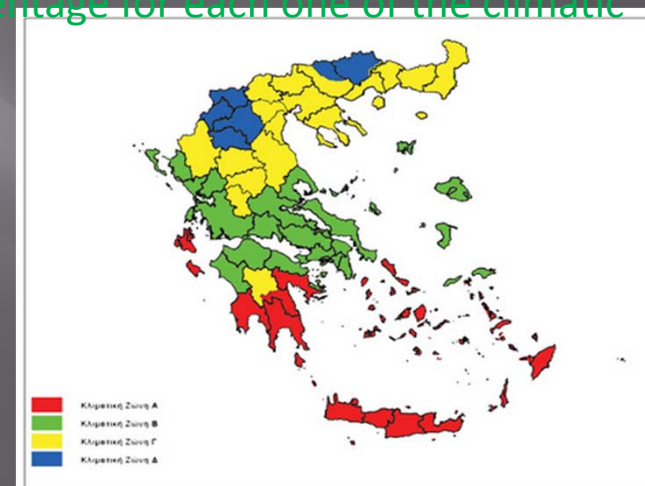
Therefore, up to 2016, the average energy savings percentage for each one of the climatic zones is:

💧 **A:** 36.86%

💧 **B:** 37.86%

💧 **C:** 45.65%

💧 **D:** 46.22%



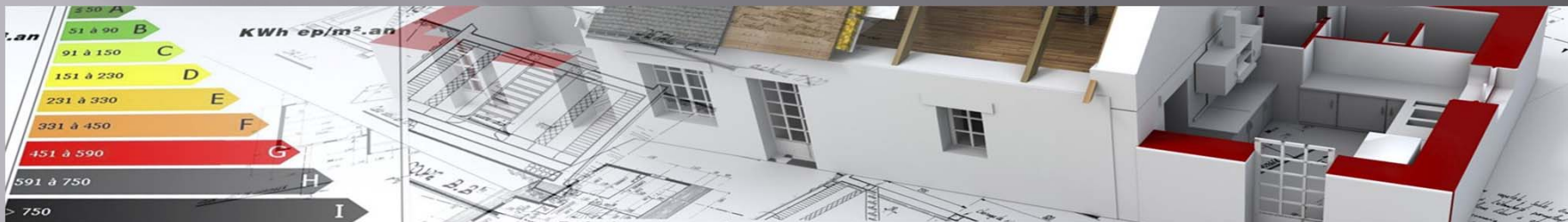
Achieved energy savings (up to the end of 2016, 45.403 issued EPC after the conduction of 2<sup>nd</sup> energy audit) is 753.91 GWh/yr



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## Energy Efficiency at Household buildings II

The goal of this program is to:

Provide incentives for energy efficiency interventions in households though addressing practical problems encountered during the implementation phase of the previous program (Energy Efficiency at Households buildings I).

Main changes compared to Energy Efficiency at Household buildings I focus on:

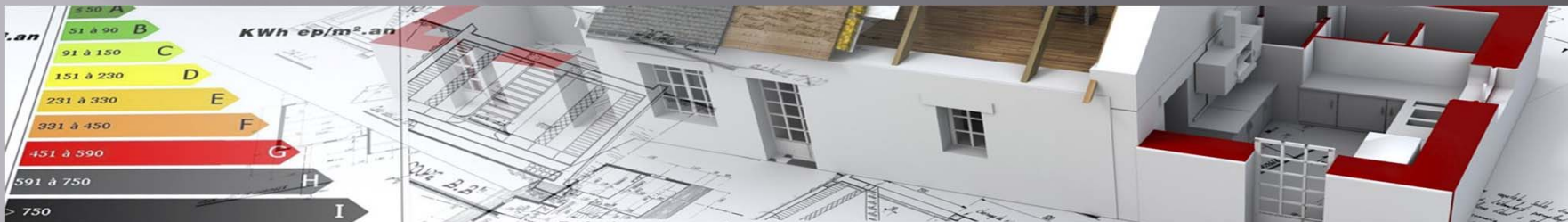
- Issues related to improving procedures
- Faster decision – making
- Ensuring the implementation of all integrated proposed energy interventions



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## Energy Efficiency at Household buildings II

### Program budget :

For this program, a new Regulation on Energy Performance on Buildings have been issued last July. The estimated budget is about € 500 million

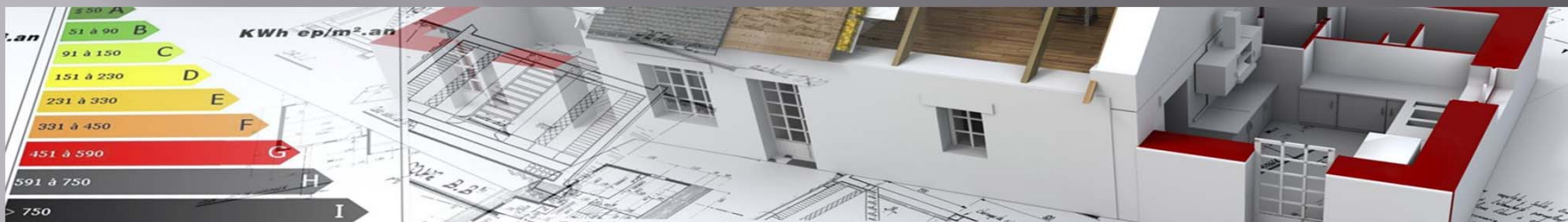
 The program will subsidize up to 70% of the total renovation energy cost (depending on income and marital status)



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## Energy Efficiency at Household buildings II

Eligible households for participating in the program:

- Detached houses
- Multi-family houses
- Single-family houses

Eligible energy efficiency interventions

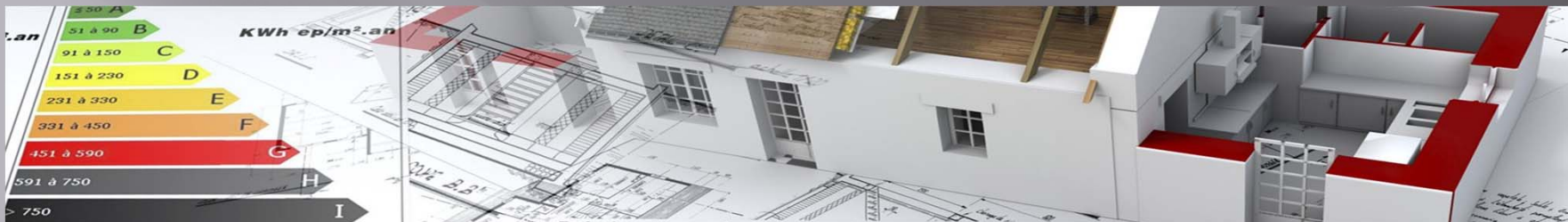
- 🏠 Thermal insulation
- 🏠 Window frames, shading systems, glass pane
- 🏠 Central heating systems
- 🏠 Heat pumps, BEMS, RES



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Thanks you for your attention!!

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