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Authors: Belén Chirivella Viña (AIDICO), Álvaro Pastor Peral (AIDICO), Alejandro García Tremps (AIDICO), Juan Vicente Sabater (AIDICO)

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1. INTRODUCTION

The ee-WiSE Project has been approved in the 2012 FP7 call, within the Theme: *Methodologies for Knowledge Transfer within the Value Chain and particularly to SMEs* and counts with an international consortium of 13 partners that include research institutes, companies (also SMEs), universities and public entities from 7 different countries in the Mediterranean area.

The main purpose of ee-WiSE project is to develop a Framework for knowledge Management and Transfer within the value chain of EE sector in building retrofitting in the Mediterranean, and with special attention to SMEs.

The achievement of the objectives of the projects needs the creation of a solid knowledge base about the current situation of the Energy Efficiency sector in building retrofitting. This deliverable has the objective to create the knowledge base and the knowledge base flow analysis. Both will establish the current situation of the EE sector in building retrofitting in the Mediterranean.

This is the document of the final deliverable 2.1 of ee-WISE Work Package 2 which will compile and study the current situation off all EE practices in building retrofitting through research processes among different issues that include: *Business Models, Building Stock Characterization, EE Solutions and Techniques, Market Up-Taken Measures, EE Encouragement and Promotion Measures, Cross-sectorial Cooperation and Certification Processes.*

1.1 Scope

In general, the Mediterranean climate is characterised by mild wet winters and by warm to hot, dry summers and may occur on the West Side of continents between about 30° and 40° latitude. The particular climate of the Mediterranean region makes building´s energy performance an important issue. Maximum temperature in summer easily reaches 35°C and winters may allow temperatures beyond 0°C.

Considering this particular climate, the Mediterranean Basin, Bulgaria and the south of Portugal has been considered and distributed into South, Central & East and North & West. This division has been done to assist in the research for data, since there is a climate variation in the characteristics of each country thus giving rise to non-standard comparisons

The ee-Wise project is focused on energy refurbishment of the existing building stock. The Potential Impact Evaluation required a great deal of data at national and regional level, most of which had been previously compiled, included the following countries with similar climatology. Shown in the following figure and tale:

Figure 1: Mediterranean basin

MEDITERRANEAN	
South	**CY** CYPRUS, **GR** GREECE, **ES** SPAIN, **IT** ITALY, **MT** MALTA, **PT** PORTUGAL
Central & East	**BG** BULGARIA, **CRO** CROATIA, **SI** SLOVENIA, **TUR** TURKEY
North & West	**FR** FRANCE

Table 1: Mediterranean scope

2. EE BUSINESS MODELS

This section describes the different business models identified through the study of the Energy services Companies, which are the most, complete and common model in the Mediterranean. Together with the explanation of the ESCOs, all the business phases will be explained and also some other detected business models will be included.

2.1 Services and products

Dismembering the services and products of the Energy Services Companies (ESCOs), are known the potential and main energy services within the energy efficiency in building retrofitting that can be offered by the different agents involved in the value chain. We describe those phases and concepts then.

Energy service company (ESCO): a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria. (Defined in the DIRECTIVE 2006/32/EC, and actually repealed and included in DIRECTIVE 2012/ 27/UE)

Through the use of ESCO services, the customer has the possibility to get a financial benefit from the optimization of energy consumption while reducing the risk to changes in energy prices, all this without having to make any investment. The flow of actions provided by the ESCOs is (figure 2):

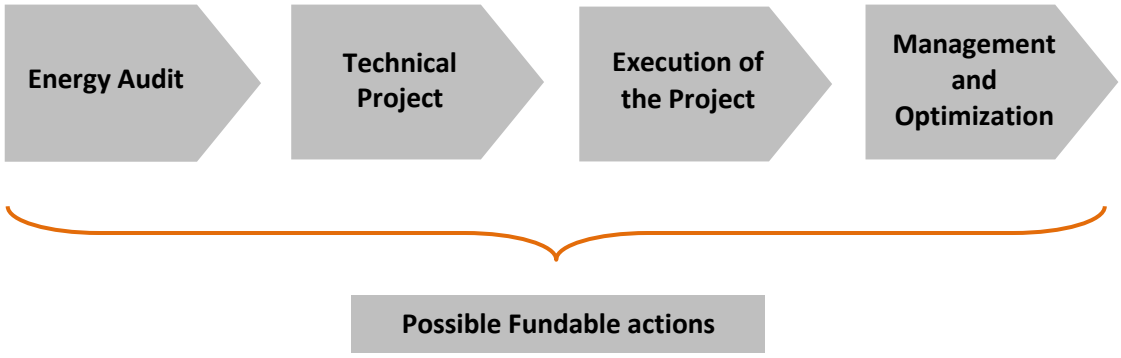


Figure 2: Sequence of ESCOs Services

There is a wide variety of services provided by an ESCO, those services ranging from the simplest, such as temperature control of a building, to other more complex and technological measures that require greater investment, such as the installation of renewable energy sources. The main services offered by the ESCOs in building retrofitting, are:

- Engineering feasibility studies,
- Energy Audits and design of the project
- Purchase, installation and delivery of equipment
- Supply and marketing of energy efficient measures

- Management of electricity and water installations
- Risk management related to EE installations
- Operation and maintenance of EE equipment
- Meter reading
- Air quality services
- Energy information management
- Formation and awareness services
- Measurement and verification to determinate the real savings
- Savings guaranties and equipment performance

The following scheme gives a visual interpretation of a project developed with ESCO and another developed without (figure 3):

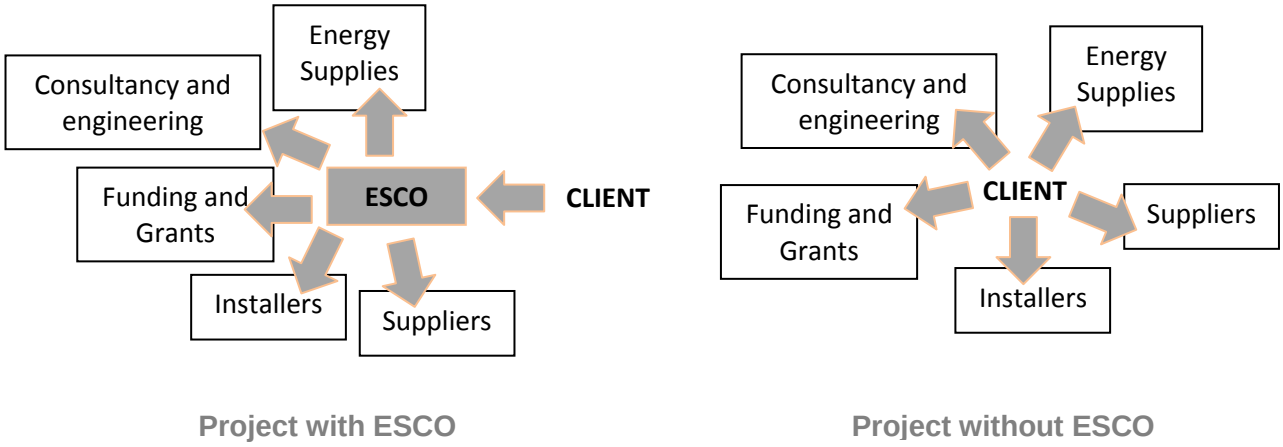


Figure 3: Project with or without ESCO

2.2 Legislation involved

The main legislation involve in energy efficiency on building retrofitting, is the Directive 2012/27/UE of 25 October 2012, on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC:

- At European level include Directive 2006/32/EC, of 5 April 2006 on energy end-use efficiency and energy services. This Directive establishes a framework for the promotion of energy saving and energy efficiency measures through the development of the activity of the ESCO. The Directive establishes objectives for the members states that are oriented to achieve 9% energy saving for 2006 through energy efficiency measurement and providing energy services, in addition, the legislation emphasizes and encourages the change in strategy that energy supply companies are beginning to carry out and by which they would be redirected toward maximizing energy savings rather than focusing on maximizing energy sales (Kwh). It also defines the ESCO oriented energy efficiency and the risks adoption, specifying that the payment of the services delivered is based (in part or totally) achieving improvements in

energy efficiency and in compliance with other requirements agreed. The directive also includes a number of 'financial instruments' to be used; these are performance contracts, third party financing, tax credits, loans, credits and grants. In this sense, it also mentions that Member States should provide model contracts that will be made available to the EE value chain.

- In addition, the passed Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings, aims to promote energy efficiency in buildings, taking into account outdoor climatic and local conditions as well as indoor climate requirements and cost-effectiveness in terms of cost-savings. Amongst other things, Article 12 of the Directive provides that Member States shall ensure to issue an energy efficiency certificate for buildings or units thereof which are constructed, sold or rented to a new tenant, and for buildings where a public authority occupies a total useful floor area over 500 m^2 and are frequently visited by the public. On July 9, 2015, this threshold will be reduced from 500 m^2 to 250 m^2.

- Moreover, Directive 2004/8/EC, on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EC, aims to increase energy efficiency and improve security of supply by creating a framework for promotion and development of high efficiency cogeneration of heat and power based on useful heat demand and primary energy savings in the internal energy market.

- Finally, Directive 2009/125/EC of Eco design requirements for energy-related products, offers a framework for the setting of Community Eco design requirements applicable to energy-related products. These products must be placed on the market or put into service, with the aim of increasing energy efficiency and security of energy supply.

2.3 Opportunity of the business model in the market

Again analyzing the ESCOS business models will be known the opportunities in energy efficiency retrofitting market. The implementation of energy efficiency policies by adoption of rules, strategies, plans and programs and other measures is increasing in momentum, both in Europe (such as the European green package with the aim energy savings of 20%, the 2011 Action Plan for Energy Efficiency or the proposed Directive on Energy Efficiency) and on a national level (being different in each country, for example in Spain, the Sustainable Economy Act, the future Law on Energy Efficiency and Renewable Energy and savings plans and national energy efficiency).

The market development will furthermore be driven by a number of factors that will promote the demand for energy services. Factors such as the upward trend in energy prices, the CO2 price increases and the expansion of the European system of emission trading to new sectors (chemical industry, aviation, etc..) and greater awareness of the issues of energy efficiency and the environment in general.

The services offered by the ESCO and the projects they carry out involve a financial investment that should also be funded through the savings achieved. Thus, generally, facilities that are large consumers of energy services often have large and significant energy consumption allowing a large return on investment. The potential customers, whether public or private, and internationally implemented primarily are the following;

- Buildings such as hospitals, shopping centres, universities and colleges, sports facilities, business centres or large office buildings.

- Other facilities of the public administration, such as prisons, barracks and residences.

- Residential, gathering a housing to unite the efforts and investments in various facilities at the same time so as to achieve a return on investment with the energy savings achieved.

2.4 Procurements and Economical aids

The Energy Service Companies has been analyzed in order to know the following three basic business models:

-Guaranteed savings
-Shared savings and
-Energy supply contracting

In all the three agreements, the ESCO provides a wide range of services and generates energy and cost savings. The differences are in the manner in which the project is financed, payments are made by the host facility to the ESCO, and energy and cost savings are allocated between the ESCO and the customer. The main characteristics of the three business models are:

- **Guaranteed savings business model**

  Under a Guaranteed Savings contract, the ESCO assumes the entire design, installation and savings performance risk, but not the credit risk. The project is financed by the customer, who can be supported by a financing entity (such as banks).

  The customer takes the loan on its own balance sheet, taking an assumption of the investment risk. Within this business model, the ESCO guarantees certain performance parameters, such as energy efficiency or energy savings and the cost of the service is based on the energy performance level achieved.

  The payments are made at the point when the performance criteria are met.

- **Shared savings business model**

  In this model the ESCO performs the technical design, executes the implementation and takes the performance savings risk. Since the project is financed by the ESCO (or partly financed by the client and partly by the ESCO) it also assumes the credit risk.

  Thereby, when a loan agreement is done with a financial institution, the ESCO is responsible for repaying the debt and assuring the project security.

  In this business model, the contract specifies the sharing of the cost savings between both ESCO and customer, throughout the lifetime of the contract.

  In this case, the payment is based on the cost of energy saved over a certain period of time.

- **Supply contracting business model**

The Supply Contracting business model, also known as "chauffage" or BOOT (Build-Own-Operate-Transfer), is very frequently used in Europe. This corresponds to an extreme type of energy management outsourcing, where the ESCO takes over operations and maintenance of the energy using equipment in the customer's facility and sells the energy output at an agreed price.

In this business model, the two parties sign a contract that specifies the energy services to be supplied and the price to be paid for those services throughout the lifetime of the contract. Therefore, the rate paid by the customer is based on its current energy bill minus a percentage saving, i.e. the customer is guaranteed an immediate saving relative to its current bill.

The following table shows a resume of the main characteristics of the ESCOs (table 1):

Characteristics	Guaranteed savings	Shared savings	Supply contracting
Services Performance guarantee	Related to the level of energy saved (throughout the contract life)	Related to the cost of energy saved (throughout the contract life)	Savings compared to current energy bill (throughout the contract life)
Payment	Directly related to the energy savings achieved	Value is linked to energy prices, because it is related to the cost savings	Fixed (or previously defined) rate; ESCO income depends on both performance and energy prices
Financing	Project is financed by the client (who can be supported by a third-party)	Project is financed (entirely or partly) by the ESCO	Project is financed by the ESCO

Table 2: Summary of ESCOs main characteristics

The three business models describe for ESCOs, can be applied to different agents of the value chain, such as architectural studios, engineering, consultancies, etc.

2.5 Other Business Models in the Mediterranean

Environmental Certification of Buildings

Other Business Models can be considered the Environmental Certification of Buildings, which are tools that permit, at first, to know the environmental impact that the building will produce, secondly, to identify more effective actions to reduce the impacts previously detected and finally, obtain the certification by an independent agency in order to certify the achievement of reduction.

There are different certifications, provided by different entities, but the following table lists the main environmental certificates which have developed their own certification scheme in the

Mediterranean regions, focusing on those which specifics procedures for refurbishment of buildings (table 2):

Environmental certificate	Mediterranean Countries where exist registered / certified buildings
Green Building Council (national certifications)	France Italy Spain
BREEAM	Bulgaria, France, Greece, Italy, Malta, Portugal, Slovenia, Spain, Turkey
LEED	Bulgaria France Spain Turkey
HQE	France

Table 3: Summary of Environmental Certificates for buildings within the Mediterranean

Breakdown of ESCO Organization

Each part of the ESCOs components can be offered individually by technical freelancers and SMEs:

- **Architectural Services**: Architectural Study, Bioclimatic Design, Renovations, Consulting, Energy Efficiency Studies, Energy Certification Study, etc.

- **Energy Certification Consultancies:** Education of energy assessors, Evaluation of new projects and existing buildings' energy performance, Simulation of energy efficiency measures.

- **Suppliers and Maintenance:** Financing, design, supply, installation, operation and maintenance of photovoltaic systems on public buildings.

3. BUILDING STOCK CHARACTERIZATION

While new buildings can be constructed with high performance levels, it is the older buildings, representing the vast majority of the building stock, which are predominantly of low energy performance and subsequently in need of renovation work. With their potential to deliver high energy and CO2 savings as well as many societal benefits, energy efficient buildings can have a pivotal role in a sustainable future.

Effective polices and incentive schemes to reduce the CO2 footprint of buildings require a solid understanding about the current building stock. The EE-WISE project intends to contribute to an improved understanding through this report; gathering facts and figures about the Mediterranean building stock and aggregating the findings to allow meaningful analysis.

The existing building stock in the Mediterranean will be defined according to building type, constructive typology, location, form factor, building use, and energy consumption (heating, cooling, hot water and lighting). Thereby the section is subdivided in two parts, which identify the building stock type and the characterization of the building stock:

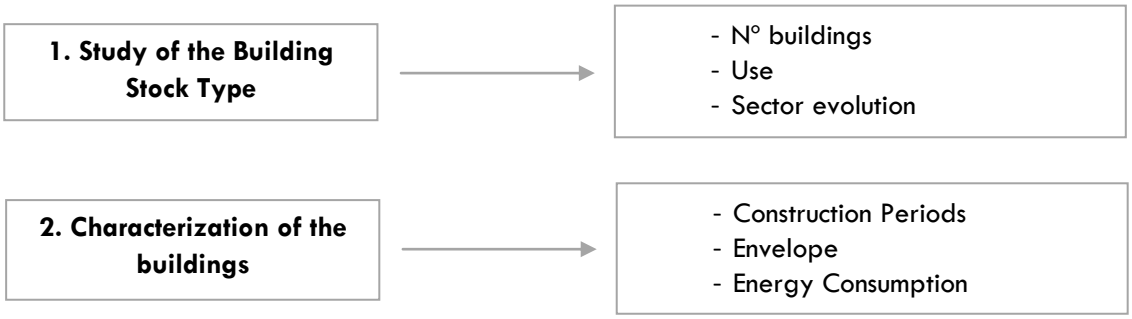


Figure 4: Diagram of the section 3

3.1 Building type identification

It is estimated that there are almost 2 billion m^2 of useful floor space in the Mediterranean countries. Annual growth rates in the residential sector are around 1% while most countries encountered a decrease in the rate of new buildings in the recent years, reflecting the impact of the current financial crisis on the construction sector.

During recent decades the northern shores of the Mediterranean have experienced a rapid transformation; mainly due to touristic development. At present, more than 25 % of the world's hotel accommodation is found in the Mediterranean. In fact, for example, in Spain, the total consumption of homes located in the Mediterranean area is, approximately, the same as the total consumption of those located in the continental climate zone.

From offices to single family houses, buildings in the countries of the Mediterranean vary remarkably in terms of their function type. They can be broadly divided into:

-Residential buildings
-Non-Residential buildings

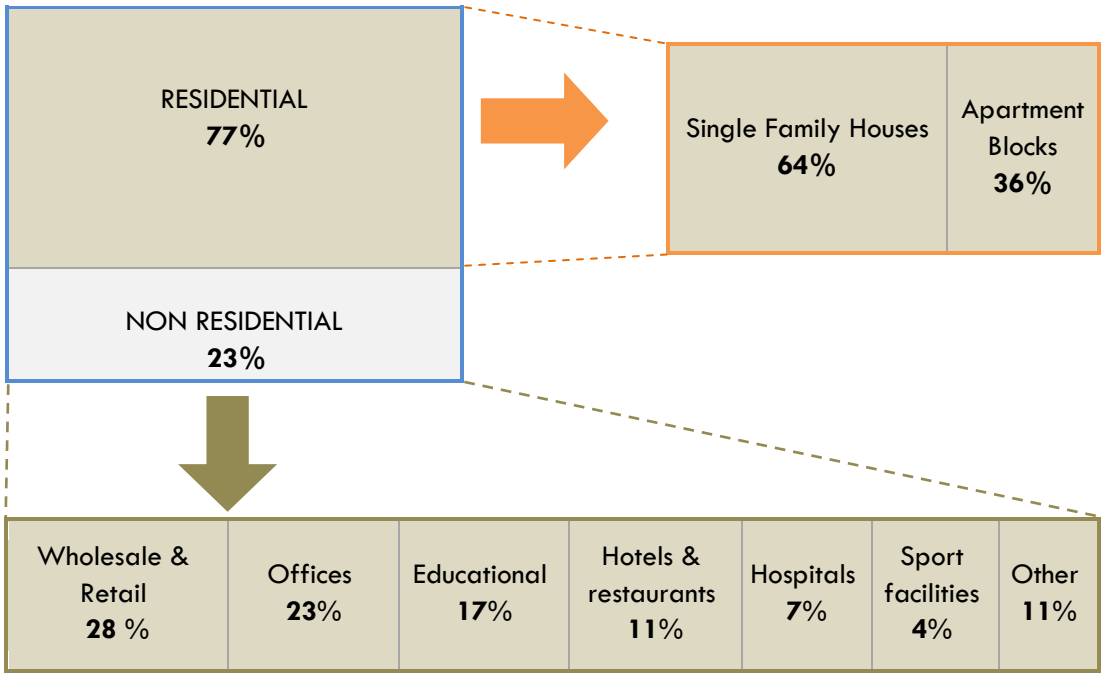


Figure 5: Approximation t Mediterranean area (Source BPIE) (14)

The **Residential stock** represents the biggest segment of the Mediterranean floor space of the building stock. Within the residential sector, different types of single family houses and apartment blocks can be found; 64% being residential building floor area associated to single family housing and 36% to Apartment blocks (Figure 04). Within the Mediterranean countries, the division between the types of residential buildings varies from country to country but in general, the most part of the Mediterranean regions have more single family houses than apartments:

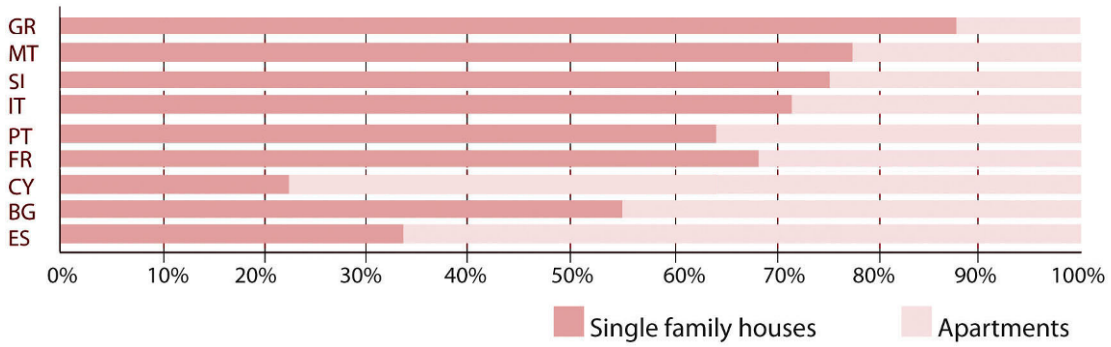


Figure 6: Approximation to Mediterranean residential types by country (Source: BPIE, 2011) (14)

The structure of ownership and occupancy also has a significant relevance on the ability to renovate the building stock. In general, the largest share of the residential stock is held in private ownership while 20% is allocated to public ownership. Social housing is typically fully owned by the public sector but there is an increasing trend towards private involvement. Moreover, at least 50% of residential buildings are owner occupied in all countries. The ownership profile in the non-residential sector is more heterogeneous and private ownership can span from 20% to up to 90% from country to country. Furthermore, other countries included in our scope such as Bulgaria,

have the 97,5 % of the household property being privately owned. Some residential ownership percentages within the Mediterranean:

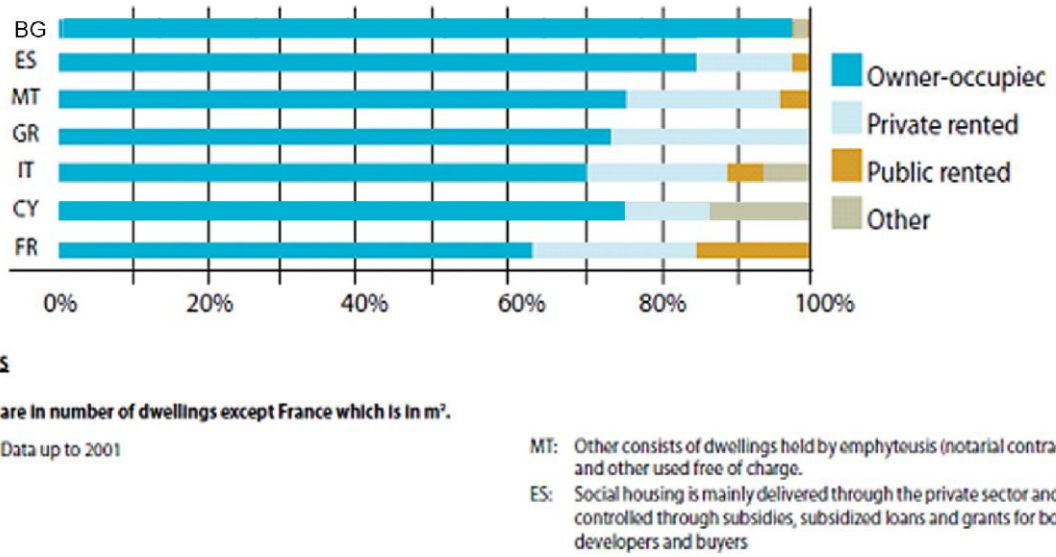


Figure 7: Approximation to Mediterranean ownership and occupancy by country (Source: BPIE, 2011) (14)

The general tendency is to seek larger floor spaces over time, especially under favorable economic conditions. With increasing trends in floor space, the energy demand associated with our buildings is also increasing, which in turn highlights the need for improving the energy efficiency of our current stock, especially the older one. Improving the energy efficiency of our buildings not only reduces energy consumption and subsequently energy bills but also increases the value of the asset and provides healthier conditions for the occupants.

Non-residential buildings account for 25% of the total building stock in Europe and comprise a more complex and heterogeneous sector compared to the residential sector. The retail and wholesale buildings include the largest portion of the non-residential stock while office buildings are the second biggest category with a floor space corresponding to one quarter of the total non-residential floor space. The following non-residential includes following broad categories are considered:

NON- RESIDENTIAL	
Wholesale & Retail 28 %	Detached shops, shopping centers, department stores, large and small retail, food and non-food shops, bakeries, car sales and maintenance, hair dresser, laundries, service stations (in gas stations), fair and congress buildings and other wholesale and retail.
Offices 23%	Offices in private companies and offices in all state, municipal and other administrative buildings, post offices.
Educational 17%	Primary and secondary schools, high schools and universities, research laboratories, professional training activities and others.
Hotels & restaurants 11%	Hotels, restaurants, pubs and cafes, canteens or cafeterias in businesses, catering and others.
Hospitals 7%	Public and private hospitals, medical care, homes for handicapped, day nurseries and others.
Sport facilities 4%	Sport halls, swimming pools, gyms etc.
Other 11%	Warehousing, transportation and garage buildings, agricultural (farms, greenhouses) buildings, garden buildings.

Table 4: Approximation to Non-Residential Buildings (Source: BPIE) (14)

The non-residential sector is associated with higher uncertainty levels due to the difficulties in tracking the existing stock of all different non-residential types and developing an appropriate statistical database. The division between the non-residential building categories varies significantly from country to country as seen in the figure below:

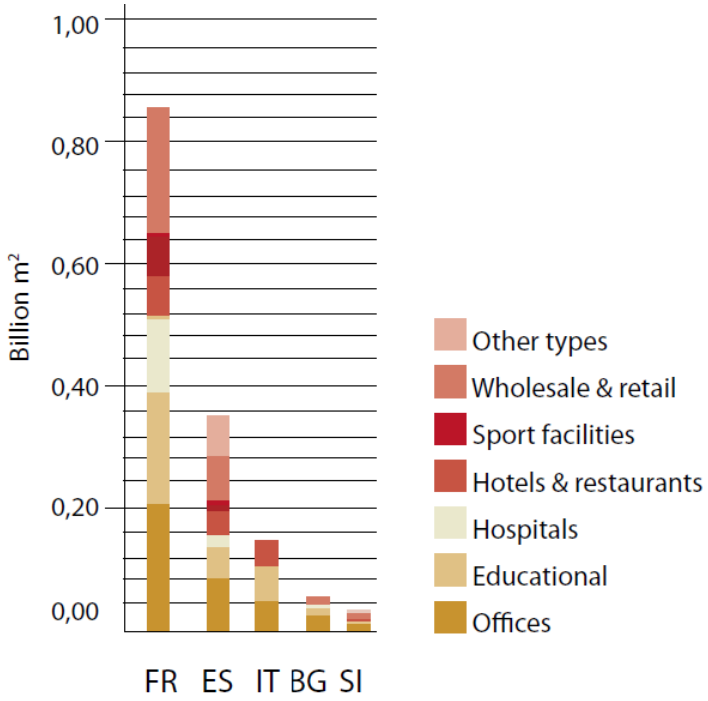


Figure 8: Approximation to Mediterranean non-residential distribution stock (Source: BPIE, 2011) (14)

Type *(number of buildings)*	Greece	Malta	Cyprus
Wholesale & Retail	28.400.000	1.040.000	21791
Offices	26.200.000	958.000	
Educational	43.600.000	765.000	6617
Hotels & restaurants	26.100.000	462.000	9261
Hospitals	1.960.000	268.000	1972
Sport facilities	4.190.000	153.000	-
Other	9.570.000	350.000	38298

Table 5: Approximation to some Mediterranean non-residential distribution stock (Source: Build Up Skills, and Building Performance Institute Europe, 2011) (26) (14)

Within the context of the European region, the Mediterranean plays a vital role in international tourism. In fact, out of the 456.9 million tourists Europe received during 2006, 163, 7 million reached the Mediterranean region. Amongst the Euro-Mediterranean countries there are three of the major tourist destinations in the world: France, Spain and Italy, representing 70% of total arrivals in the Mediterranean region. Croatia and Turkey are added as countries that have chosen tourism as an economic engine.

International tourists arrivals (thousands)		
STATE	**2000**	**2006**
Bulgaria	4.100	6.000
Croatia	5.831	8.693
Cyprus	2.686	2.413
France	77.190	74.785
Greece	13.096	13.763
Italy	41.181	40.164
Malta	1.216	1.127
Portugal	5.599	6.349
Slovenia	1.090	1.586
Spain	47.898	58.134
Turkey	9.586	18.916

Table 6: International tourist's arrivals (Source: Housing statistics in European Union 2010) (21)

Observing the evolution of international arrivals in other nations, it can be noted that certain countries, such as Turkey, have experienced a dramatic growth in recent years.

3.1 Sector Evolution

It is necessary to know the number of dwellings belonging to each building type. This allows determining the influence and the importance of every type on the total energy demand of the building stock. Knowing this number of dwellings allows us to have an idea of the potential of refurbishment in each country of the Mediterranean:

STATE	Year	Total Dwellings Stock
Bulgaria	2011	3.899.750
Croatia	2011	2.257.515
Cyprus	2011	430.000
France	2009	2.784.000
Greece	2009	6.630.000
Italy	2001	27.268.880
Malta	2005	188.000
Portugal	2001	5.019.425
Slovenia	2004	1.554.000
Spain	2009	25.129.000
Turkey	2011	16.200.000

Table 7: Dwelling stock (Source: Housing statistics in European Union 2010) (21) (28) (29)

In order to have a picture of the evolution of the building sector in the Mediterranean, the distribution and number of dwellings by age of the Mediterranean countries will be useful, in order to know the state of the buildings within the stock:

STATE	<1946	1946-1970	1971-1990	>1990
Bulgaria	-	64,2	25,3	10,4
Croatia	16,5	31,0	40,3	12,2
Cyprus	5,5	12,4	42,7	39,4
France	30,2	17,4	35,4	17
Greece	10,3	31,8	43,6	14,3
Italy	24,1	36,8	31,0	8,1
Malta	22,2	22,1	35,3	20,4
Portugal	17,4	31,9	34,9	25,8
Slovenia	22,9	27,7	39,2	10,2
Spain	13,1	33,5	37,7	15,7
Turkey	6,11	15,62	47,2	30,12
AVERAGE	*18,5*	*27,2*	*38,1*	*17,32*

Table 8: Percentage distribution of buildings (Source: Housing statistics in European Union 2010) (21) (28) (29) (30)

With the building permits we approximate the increase in number of dwellings by year:

STATE	1990	2000	2001	2002	2003	2005	2006	2007	2008	2009
Bulgaria	-	-	-	42,156	45,095	59,384	43,747	43,796		37,319
Croatia	1,555,053	1,651,946	1,660,649	1,660,649	1,678,193					
Cyprus	-	6,087	6,895	8,127	11,955	18,770	18,915	20,486	20,082	16,688
France	-	308,400	298,600	309,000	318,400	389,700	435,100	462,300	462,300	-
Greece	120,240	89,389	108,021	128,296	127,051	195,207	125,387	103,85	79,601	61,490
Italy	-	184,424	189,025	209,228	229,526	278,602	261,455	250,271	-	-
Malta	-	-	-	5,100	6,000	9,000	10,200	11,200	6,836	5,298[1]
Portugal				95,731	81,207	73,552	71,685	65,103	5,366	-
Slovenia	-	-	-	-	-	-	-	-	-	-
Spain		366,776	387,075	615,072	641,419	524,479	496,785	458,683	416,683	365,663
Turkey	-	-	-	161,491	162,908	249,816	295,389	326,484	357,286	404,058

Table 9: Building Permits (Source: National Statistics Institutes) (21) (28) (29) (30) (50)

3.2 Characterization of buildings

In order to estimate the building stock demand for heating and cooling, it is important to characterize the construction, in terms of envelope (roof, walls and windows), and define general construction periods for each region.

3.3.1 Form Factor

Classifying the main buildings types involves performing a classification of the parameters affecting a building. In order to establish the building characterization, the concept of building form is defined. The concept of the building form is defined as the relation between external surface and volume of the building. The exterior surface is an indicator of energy gains and losses regards to the environment, while the volume is about the amount or stored energy in the building. Therefore, two basic systems that identify the building type globally are defined as:

- **ATTACHED VOLUMES**
  Within this concept are the following types:
  - Terrace Building
  - Paired Building
  - Closed and open building block

- **ISOLATED VOLUMES**
  The volume and type isolated urban subdivision allows three categories corresponding to isolated:

- Block
- Tower
- Detached house

Different building types scheme:

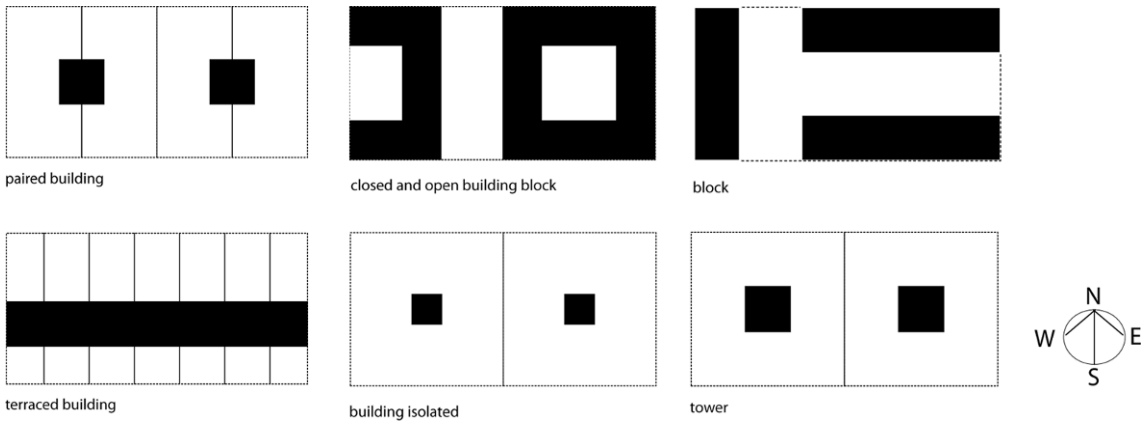
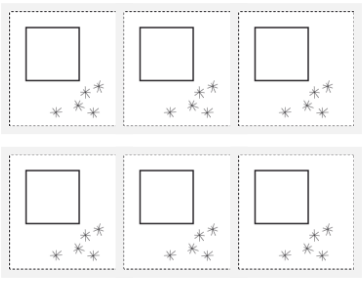
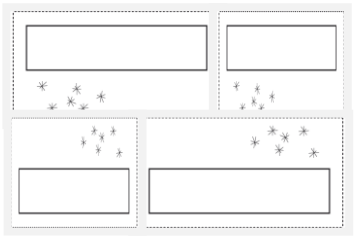
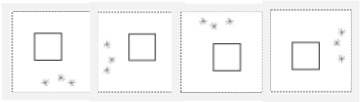


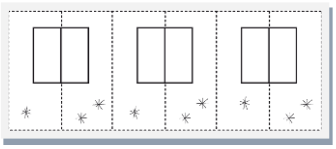
Figure 9: Buildings ground floor scheme (Source: AIDICO survey)

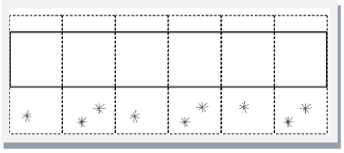
Developing each type we have the following energetic considerations:

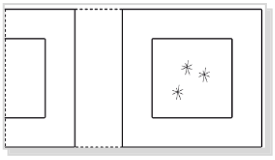
SINGLE FAMILY HOUSE	
Description: The family home is usually a single family house, with a person or group of persons who live in similar conditions in a building usually of one or two floors. It is an isolated building, which is characterized by the free contour without physical contact with other constructions. Therefore, the whole building envelope has treatment enclosure in contact with the exterior. Access to housing is precise and individual from the public highway.	
Outstanding energy: * Freedom of orientation to the sun and wind. * Supports any design. * Ability to design the most appropriate way to meet the demands of a home. * Presence of numerous green areas that improve the microclimate. * Energy refurbishment of the building envelope, valuing the four orientations with the consequent economic growth. * Detached building. Heat Loss: 100%	

BLOCK	
Description: A block´s horizontal length prevails over any other container length and hosts many houses in a multi-storey building. It is an isolated building block which has a contour that is free of physical contact with other constructions. Access to the individual housing units can be directly from the block perimeter or through access paths (corridors) within the block. In both cases the housing present double orientation. Both orientations would be facades without further conditioning than climate, and in the case of access by corridor, one of the facades will be conditioned by circulation corridor itself.	
Outstanding energy: * Ability to self-direct the housing blocks and the best directions. * The elongated shapes adapt well to any climatic region, with particularity, as *Victor Olgyay*, that the optimal way is one that orients the facades in to north-south direction. * Poor design of the blocks by not considering the path of the sun when designing differentiated facades. * Free building. Heat Loss: 100%	

TOWER	
Description: A tower's vertical length dimension prevails over any other dimension and is a building that contains more homes usually characterized by less floor surface. The towers are designed to be isolated buildings and are exposed to all orientations, although it may be that being in a clogged city, part of the base is attached to another building. Since it is isolated, the whole building envelope will be treated as an enclosure in contact with the exterior. Access to tower is directly and collectively from the street.	
Outstanding energy: * Ability to target housing blocks and the best directions. * Absence of obstructions due to the height of the building. * Optimal land use, resource to be controlled. * The towers generate wind currents. * Free building. Heat Loss: 100%	

SEMIDETACHED BUILDING	
Description: This building type comprises two semi-detached houses that are in contact by a median, but have freedom of interior layout with separate access from the street. The building has three main facades and therefore the possibility of using three orientations to meet the energy demands of a home.	
Outstanding energy: * Ability to target housing blocks and the best directions. * Three main facades. * Approximate heat loss: 80%	

BUILDING IN ROW	
Description: The row house has each building in contact with two adjacent buildings, leaving free the rest of the outer perimeter. Each house has separate entrance from the street. The building has two main façades and therefore the restriction of having two orientations to meet the demands of a home.	
Outstanding energy: * Give special attention to the orientation. * It has two main and opposite exposed façade walls. * Approximate heat loss: 60%	

CLOSED AND OPEN BUILDING BLOCK	
Description: The closed and open building block supposed to have a facade facing the street and a secondary facing the courtyard, both usable to meet the demands of housing. The homes have collective access from the street.	
Outstanding energy: * Permit the creation of microclimates within the city. * Give special attention to the orientation of the grid. * Creating wing channels.	

* The optimal energy typology takes into account the climatic conditions of the place and can be defined as one that shows the minimum amount of KWh in winter and minimum absorbing KWh during summer.

3.3.2 Construction Periods

Construction techniques and building regulations, such as building codes imposed at the design phase, have a great influence on the energy performance of a building built in a specific period. In the residential sector, the age of a building is likely to be strongly linked to the level of energy use for the majority of buildings that have not undergone renovation to improve energy performance.

Therefore, in order to have a general overview of the categorization of the housing stock by age, the floor area data for each country has been consolidated into three representative periods:

- OLD: Before 1960
- MODERN: Between 1961 and 1990
- RECENT: Between 1991 and 2010

Graphically, the categorization of the building stock in Europe under those periods is approximately the following:

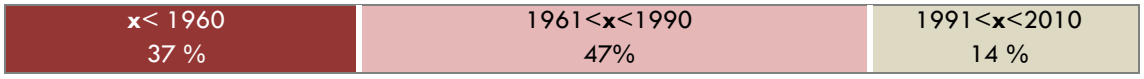


Figure 10: General age categorization of housing stock (Source: BPIE) (14)

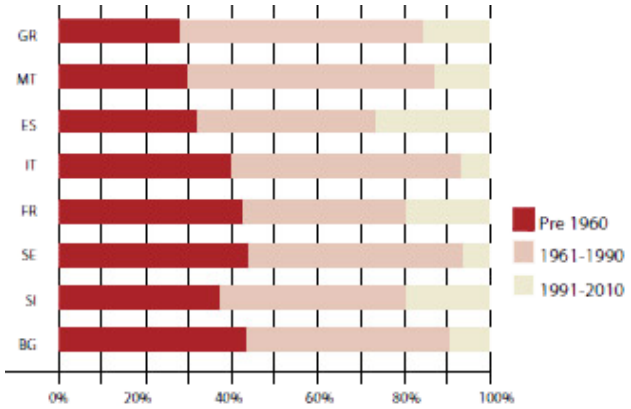


Figure 11: Some Mediterranean countries age categorization of housing stock (Source: BPIE)

Over the years, construction techniques and materials have changed, and so has the unitary energy demand of dwellings. In terms of thermal envelope, the change mechanisms are basically the implementation of the building codes. One of the most important parameters to calculate the heating and cooling load is the envelope of the building. For this reason, codes on envelope requirements have been the basic criterion for type definition:

BULGARIA				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Comments**
2004	Ordinance № 7 of 15 December 2004 on energy efficiency, heat and energy saving in buildings (Title amends. SG. 85 of 2009) (promulgated, SG. 5 2005, as amended. and supplemented. No. 85 of 2009, amended. No. 88 and 92 of 2009, as amended, and supplemented. No. 2 of 2010)	It shall be done for new buildings and when retrofitting of old ones. There is huge variety of U values as concerns the roof, the foundations the walls and windows. In general the value has to be below 0.5 to have Class A EE building.	U < 0,5 W/m²K Real U compared to the standard.	Class A in this case
2009	Regulation № RD-16-1058 / 10.12.2009 on the indicators for energy consumption and energy performance of buildings		U < 0,5 W/m²K Compared to standard U	Class A in this case

CROATIA				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Comments**
2010	EPBD Croatia New Buildings	Both	YES	The Energy certification of buildings started in April 2010, with new residential and non-residential buildings
The EPBD for existing buildings will be implemented whith its incorporation in the EU.				

CYPRUS				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Comments**
1959	Streets and Buildings Law (Ch 96)		NO	-
2000	Compulsory supervision (PI 67/2000)		NO	-
2003, 2004, 2005, 2006	Promotion of Energy Conservation and Utilization of RES Law	Thermal installations	NO	The law is a basis for support (subsidies) to RES promotion, as well as installation of equipment
2006	Regulation for the submission of an electromechanical study for the purposes of obtaining a building permit (PI 111/2006)	Thermal installations	YES	Requirement for a study of central heating, air-conditioning and ventilation systems
2006, 2009	Regulation of the Energy Performance of Buildings Law of 2006 N.142(I)/2006 and 2009 (amendment)	Both	YES	Together with the application for building permit for a new building or a major renovation of a building over 1000 m2, it is required to submit calculations of energy efficiency, energy performance certificate and a declaration that the

				building meets the minimum energy efficiency requirements.
2007	Minimum Building Energy Efficiency Decree (PI 568/2007)	Building envelope	YES	Minimum energy performance requirements
2009	HVAC Systems Decree	Thermal installations	YES/ NO	Mandatory inspection of air conditioning systems with an effective rated output of more than 12kW or installed systems that cumulatively exceed 50 kW in one building. There are no requirements that the air conditioning systems must meet in terms of performance, size and install.
2010	Minimum Energy Performance of Buildings Decree (PI 446/2009)	Both	YES	Minimum energy performance requirements as in 2007 decree + addition al requirements: requirements for a maximum mean U-value of the building envelope, requirement to issue an Energy Performance Certificate (EPC) of Class B or higher; compulsory installation of solar hot water systems in new buildings used as dwellings; compulsory installation of a provision for the use of electricity generation systems utilizing RES, which mainly concerns photovoltaic systems
2013	Regulation of thermal installations in buildings	BOTH	YES	Maximum requirements for energy performance of thermal equipment's. For new and existing buildings.

FRANCE				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency cri teria?**	**Comments**
2005	Thermal Regulation	Thermal installations	YES	Establishes requirements for thermal installations.
2006	Decree 2006: "Diagnostic de Performance Energétique" (DPE)	Both	YES	Establishes minimum requirements for new buildings: -Energy consumption of the dwelling or Building. -Impact of this consumption on greenhouse effect.
2007	Decree2007	Both	YES	Sets the minimum requirements of existing buildings. Comes into force on November 1, 2007.

GREECE				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficienc y criteria?**	**Comments**
< 1979	Thermal Insulation Regulation	Building envelope	NO	-
>1994	Construction Products Directive (89/106/EEC) contributed to a slow but steady improvement of the	Building envelope	YES	Minimum requirements for enclosures of building envelope

	performance of building materials and elements, like thermal insulation materials, windows and glazing, boilers etc.			
2002	The Energy Performance of Buildings' Directive (2002/91/EC) in the Greek legislation, which was carried out	Building envelope	YES	Minimum requirements of energy performance of heat recoveries
2008	KENAK and the Respective laws were introduced	Thermal installations	YES	Minimum requirements of energy performance of heat recoveries
2010	Technical Directives (TOTEE) were introduced in 2010.	Building shell and electromagnetic installations	YES	Minimum requirements of energy performance Minimum requirements for building design Minimum requirements for U- values of building envelope Minimum requirements for energy performance of electromagnetic installations Certification Process of the energy performance of buildings
2010	Technical Directives (TOTEE) were introduced in 2010. Republished in 2012-expected to be published new directives	Additions for the implementation of Directive on the energy performance of buildings		
2010	New European Directive (2010/31/EC)	Revision of the Directive (2002/91/EC) with stricter conditions – Requirements for nearly zero consumptions for the buildings		

ITALY				
Year	**Building Regulation**	**Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Comments**
< 1976	NO			
1976	*Law 373/1976 - Norme per il contenimento del consumo energetico per usi termici negli edifici* - Regulations for the reduction of energy consumption for heating in buildings	Building envelope	NO	Minimum requirements of building envelope
1991	*Law 10/1991 Norme per l'attuazione del Piano energetico nazionale in materia di uso razionale dell'energia, di risparmio energetico e di sviluppo delle fonti rinnovabili di energia* - Rules for the implementation of the national energy plan in the area of the rational use of energy, energy conservation and new sources development	Both	YES	Maximum requirements of energy consumption Facilitation of the use of renewable resources
2005	*D. Lgs. 192/2005 – Attuazione della direttiva 2002/91/CE relative al rendimento energetic nell'edilizia* – Implementation of the Energy Performance Building Directive 2002/91/EC	Both	YES	Maximum requirements for U-values of building envelope Minimum requirements of energy performance index for winter heating Limit values on medium global performance of the heating system
2006	*D. Lgs. 311/2006 – Disposiziioni correttive ed integrative al D. Lgs. 192/2005* – Corrections and additions to D.Lgs. 192/2005	Both	YES	Maximum requirements for U-values of building envelope Minimum requirements of energy performance index for winter heating Limit values on medium global performance of the heating system

2008	*D.Lgs. 115/2008 - Attuazione della direttiva 2006/32/CE relativa all'efficienza degli usi finali dell'energia e i servizi energetici e abrogazione della direttiva 93/76/CEE* – Implementation of Directive 2006/32/EC on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC	Both	YES	Requirements and performance of Energy Performance Contracting Use of UNI TS 11300 (based on the collection of European Technical Standards) to calculate energy performance of buildings
2009	DPR 59/2009	Both	YES	Maximum requirements for U-values of building envelope Limit values on medium global performance of the heating system Minimum requirements of energy performance index for winter heating Minimum requirements of energy performance index for summer cooling Obligation to promote the connection to district heating networks Obligation to cover from renewable sources the 50% of annual primary energy for the production of domestic hot water
	DM 26/06/2009 - Linee guida nazionali per la certificazione energetica degli edifice - National guidelines for energy certification of buildings	Both	YES	
2011	*D.Lgs 28/2011 - Attuazione della direttiva 2009/28/CE sulla promozione dell'uso dell'energia da fonti rinnovabili* – Implementation of the Directive 2009/28/EC on use of renewable energy	Thermal installations	YES	Minimum requirements on use of renewable energy Minimum requirements of energy performance index

MALTA				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Comments**
2006	Technical Guidance Document F - Conservation of Fuel, Energy and Natural Resources	Building envelope	YES	Maximum U values of exposed walls / exposed & non-exposed floors / roofs, for all building categories. Maximum percentage area of windows and roof lights allowed in any building type with corresponding U values of the glazing.
2011	Malta's Energy Efficiency Action Plans (NEEAP)	BOTH	YES	To tighten the existing requirements set in Doc F by 30% to 50% as from 2013 for all new buildings and buildings undergoing major renovation. This minimum requirement will be upgraded by a further tightening of 20% to 30% as from 2017. Allocation of 50% of roof space in new buildings for renewable energy sources that will provide between 70% and 90% of the energy needs for cooling and heating of spaces and hot water as from 2013.

PORTUGAL				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Energy Requirements**
2006	(SCE) Decree 78/2006	Energy and air installations	YES	Creates and defines the rules of operation for the Energy System and Indoor Air Quality Certification of Buildings
2006	(RSECE) Decree 79/2006	Thermal installations	YES	Establishes the new revision of the Rules of the HVAC systems of buildings, including the requirements for regular inspection of boilers and air conditioners
2006	(RCCTE) Decree 80/2006	Both	YES	Establishes the new revision of the Rules of Thermal Performance of Buildings

SPAIN				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Energy Requirements**
< 1979	Technical regulation	Building envelope	NO	-
1979	NBE – CT – 79 (Spanish Basic Normative) – Building envelope	Building envelope	YES	Minimum requirements for enclosures of building envelope
1980	Heating, Cooling and domestic hot water Regulation	Thermal installations	YES	Minimum requirements of energy performance of heat recoveries
1998	Heating, Cooling and domestic hot water Regulation Review	Thermal installations	YES	Minimum requirements of energy performance of heat recoveries
2000	Construction Planning Law	Both	NO	-
2006	Technical Building Code	Building envelope	YES	Minimum requirements for U-values of building envelope
2007	Regulation of thermal installations in buildings	Thermal installations	YES	Minimum requirements for energy performance of thermal equipment's

TURKEY				
Year	**Building Regulation**	**Building envelope / Thermal installations / Both**	**¿Energy Efficiency criteria?**	**Energy Requirements**
< 1976	Heating System Application Rules TS 2192	Thermal installations	NO	Minimum requirements for heating systems
1983	Heating System Planning Rules TS 2164	Thermal installations	NO	Minimum requirements for planning of heating systems
1999	Thermal Insulation Requirements for Buildings - TS 825	Building Envelope	YES	Maximum requirements for U- values of building envelope, heating demand calculation for buildings
2007	Energy Efficiency Code- 5627	Both	YES	General requirements for energy efficiency, energy certification for existing

				buildings to be compulsory after year 2011.
2008	Thermal Insulation Regulation for Buildings – TS 825 Revision	Both	YES	Maximum requirements for U- values of building envelope; heating demand calculation for buildings; four different climate zone classification of Turkey.
2008	Buildings Energy Performance Regulation (BEP)	Both	YES	Maximum requirements for energy performance of thermal equipment's, energy ID certification for new buildings became compulsory

Within the existing European building stock, a large number of buildings (more than 40%) were built before 1960s where there were only few or any requirements for energy efficiency and only a small part of these have undertaken some energy performance conditions, meaning that, these have low insulation levels and their systems are old and inefficient. The oldest part of the building stock contributes greatly to the high energy consumption in the building sector. Older buildings tend to consume more due to their low performance levels.

It is therefore clear that the largest energy saving potential is associated with the older building stock. This is a trend observed in all countries where in some cases buildings from the 1960s have worse than buildings constructed in the years before that.

3.3.3 Envelope

Sufficient thermal insulation of the building envelope is in fact essential for shielding the interior of the building from the exterior environment and minimizing thermal transfer (heat losses or gains) through the envelope during winter and summer periods. In addition to the lack of sufficient thermal insulation, gaps at connection points between different elements of a building envelope (e.g. window frame and surrounding wall) can lead to considerable energy wastage.

From the retrofitting point of view, it is very important to act on the building envelope to reduce energy demand in both winter and summer. In case of the Mediterranean, some regions within some countries are consuming much more energy than the rest of the country. That is for example the case of Spain where the total consumption of the homes located in the Mediterranean area is, approximately, the same as the total consumption of those located in the continental climate zone, as you can see in the following image:

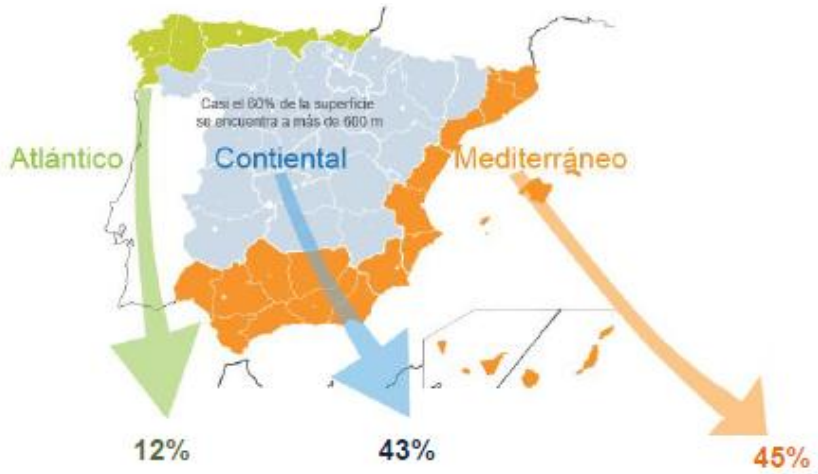


Figure 12: Spain Energy consumes (Source: Build Up Skills) (26)

Classification of most common constructive solutions in the envelope of the building:

In relation to the characterization of the envelope, we have decided to use an approximation for all the Mediterranean taking the base from the European project E4R, Assessment tools for buildings energy efficiency, which include the following classification:

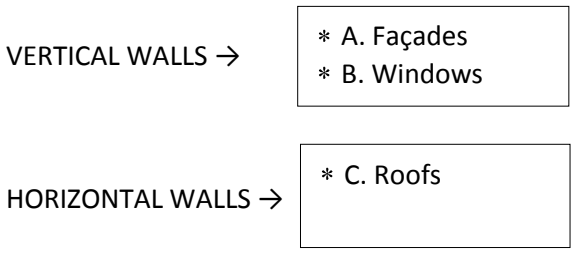


Figure 13: Diagram of content

A. FAÇADE

The material of the façade varies by region, construction period of buildings and their thermal behavior. The necessary specifications to determine the thermal performance of the building systems are:

* Thickness "e" [m]
* Thermal conductivity "λ" [W / m ° C]
* Thermal transmittance "U" [W / m2.K]
* Thermal resistance [m2.K/ W]
* Density "ρ" [kg / m3]
* Specific Heat "Ce" [J / kg K]

Another factor influencing the thermal performance of buildings is the thermal inertia. This property determines the amount of thermal energy an object is capable of storing and the speed with which it loses and absorbs energy from the surroundings. This parameter depends on the mass, the materials specific heat and their thermal conductivity.

Depending on the composition and the materials the facades have different energetic qualities and the classification we have done comes basically from the European project E4R. The different compositions are:

* **Single leaf Façade "F.HS":** Those kinds of façades are constructed by one leaf.
* **Double sheet façade "F.HD":** those façades have two sheets, the principal which is the support and the secondary.
* **Ventilated façade "FV":** This kind of façade presents one ventilated air on the exterior

At the same time, each façade is differentiated by the layers that can be found creating the envelope. Those and its nomenclature are:

Nom.	Description
AT	Thermal insulation
C	Air chamber
CV	Ventilated air chamber
Enl	Plastering
HP	Main sheet
HSe	Secondary sheet
LI	Waterproof membrane
RE	Cladding
RM	Intermediate cladding
YL	Lattice. Plasterboard plate

The different façade compositions are:

Nom.	Description
F.HS	Façade Simple Leaf
F.HS.AT	Simple leaf façade with insulation sheet
F.HS.AT.C	Simple leaf façade with thermal insulation and air chamber
F.HS.C.AT	Simple leaf façade with air chamber and thermal insulation
F.HD.AT.C	Double leaf façade with thermal insulation and air chamber
F.HD.AT.CV	Double leaf façade with thermal insulation and ventilated air chamber
F.HD.AT	Double leaf façade with thermal insulation
F.HD.C	Double leaf façade with air chamber
F.HD.CV	Double leaf façade with ventilated air chamber
F.V.	Ventilated façade

Using different materials for each layer we can find multiple combinations of construction façades that are included in **annex A.** One example reproduced below:

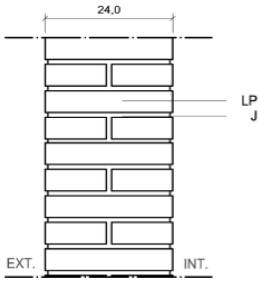
F.HS.1	**Single leaf façade**	<1949
Description: Single leaf façade of perforated ceramic brick, facing, 24cm thick		
		**Characterizes:** **Total thickness** (m)=0,24 **U** (W/m2K)=1,83

Table 10: Example of existing façade in the Mediterranean (Source: E4R project) (54)

B. WINDOW

The window, as part of the building envelope, has an important role within the buildings retrofitting sector with the aim of reducing the energy demand of the building. The "hole" in the building envelope is a semitransparent vertical enclosure having different functions: solar gain, ventilation and psychological wellbeing. The most influential factors of windows in energy refurbishment of buildings are thermal behavior and tightness. Therefore the following terms are interested:

* Materials (affecting energy transmission between the interior and exterior).
* Opening system (influences the tightness of the enclosure).

* Configuration of the glasses (influences the energy transmission between the interior and exterior).

The characterization of the holes is done by defining the elements that compose it:

* Frame
* Glass
* External protection

Frame

The frames are characterized by exterior color (absorptivity) and the thermal transmittance (U). The frames that can be found in the building sector are wood, metallic and PVC frames, and are generally characterized by in the following table:

FRAME		
Type	**Thermal transmittance** U (W/m²K)	**Absorptivity** α
METAL without thermal break 4mm	5,7	0,7
WOOD High average density	2,2	0,7
PVC two cameras	2,2	0,7

Table 11: Frame characteristics by material (Source: LIDER data base)

Glass

Within the composition of the gap, the glazing is the basic element of the window. From the thermal point of view, the glass acts as a thermal gain element and at the same time as a thermal barrier against external environmental conditions:

* The thermal gain is based in the utilization of solar radiation which varies according to its composition and is expressed with the solar factor (g). The solar factor is the percentage of energy coming in the local in relation with the incident solar energy. The lower solar factor, the lower is the solar input.
* Thermal barrier function is related to its thermal resistance and is expressed with the thermal transmittance, which varies depending on the configuration of the glazing system.

GLASS		
Type	**Thermal transmittance** U (W/m²K)	**Solar Factor** g
Monolithic Glazing 4mm	6	0,83
Monolithic Glazing 6mm	5,7	0,83
Double Glazing 6-12 - 6mm	2,8	0,72

Double glazing with low-emissivity coating 6- 12 - 6mm	1,7-2	0,52

The standard glazing thermal transmittance exceeds 3W/m²k values, while those provided with

Table 12: Glass characteristics by material (Source: Data obtained by different manufacturers)

low emissivity coating, reduce the transmittance values W/m²K to 1.4 depending on the thickness of the air chamber

External Protections

One of the most important problems in the design of windows is overheating during the warm season. The most effective way is to reduce heat gain by blocking the effect of solar radiation, for which there are numerous products on the market, such as, blinds, shutters, louvers, overhangs or protective outer layers. The effect of shading depends on several factors:

* Reflection of solar radiation in the material
* Sunscreen location

Surface	Solar reflection %
Polished aluminium	85
White paint	71
Bright Green Paint	50
Grey paint	25
Black paint	3

Table 13: Surface material solar reflection (Source: "Architecture and climate" Victor Olgyay) (23)

C. ROOF

This is the element that receives the most solar radiation in summer and is more exposed to frost in winter. The roof supports different configurations depending on the weather outside and the structural configuration of the same:

* FLAT: conventional, inverted, light, heavy, isolated, non-isolated, ventilated and not ventilated.
* Steep slope greater than 5%: conventional, inverted, light, heavy, isolated, non-isolated, ventilated and not ventilated.

Due to the diverse roof compositions, thermal transmittance may vary. Therefore, this transmittance is estimated depending on the composition and characteristics of the materials forming the cover:

FLAT ROOFS

* **CP.sA.T.nV.sF** Flat roof, no insulation, passable, not ventilated with fixed flooring
* **CP.sA.TVsF** Flat roof, no insulation, passable, airy with fixed flooring
* **CP.sA.nT.VA** Flat roof, no insulation, not passable, ventilated, self-protected
* **CP.sA.nT.nV.A** Flat roof, no insulation, not passable, not ventilated, self-protected
* **CP.AC.T.sF** Flat roof with insulation, conventional, passable, fixed screed
* **CP.AC.TVsFL** Flat roof with insulation, conventional, passable, airy, floating screed
* **CP.AI.TVsFL** Flat roof with insulation, inverted, walkable, airy, floating screed
* **CP.AC.T.nV.sF** Flat roof with insulation, conventional, passable, not ventilated, fixed screed
* **CP.AI.T.nV.sF** Flat roof with insulation, inverted, passable, not ventilated, fixed screed
* **CP.AC.nT.nV.sG** Flat roof with insulation, conventional, not passable, not ventilated, gravel finish
* **CP.AI.nT.nV.sG** Flat roof with insulation, inverted, not passable, not ventilated, gravel finish
* **CP.AC.nT.nV.A** Flat roof with insulation, conventional, not passable, not ventilated, self-protected

INCLINATED ROOFS

* **CI.sA.FI.VT** pitched roof, no insulation, inclined slab, ventilated roof
* **CI.sA.FH.VT** pitched roof, no insulation, forged horizontal, ventilated roof
* **CI.sA.FI.nV.T** pitched roof, no insulation, inclined slab, unventilated roof
* **CI.sA.FI.nV.A** pitched roof, no insulation, inclined slab, not ventilated, self-protected
* **CI.A.FI.VT** pitched roof, with insulation, inclined slab, ventilated roof
* **CI.A.FH.VT** pitched roof, with insulation, forged horizontal, ventilated roof
* **CI.A.FI.nV.T** pitched roof, with insulation, inclined slab, unventilated roof
* **CI.A.FI.VA** pitched roof, with insulation, inclined slab, not ventilated, self-protected

As an example of the catalog included in the Annex A, the following roof typology in the Mediterranean is reproduced:

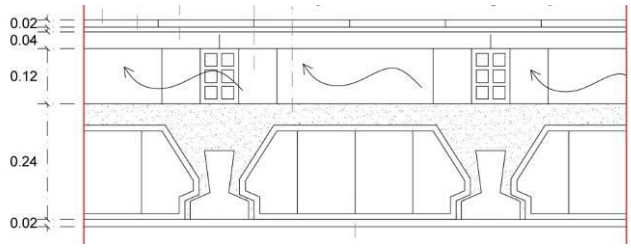
FR.1	**Flat roof, no insulation, passable, not ventilated with fixed flooring**	< 1949
Description: Conventional flat roof, walkable pedestrian, air chamber. Finishing ceramic tiles together by cement mortar and resting on popcorn partitions to form an air chamber and to slope slightly ventilated. The partitions rely on the resilient support is formed by a unidirectional fabric infill elements ceramic, plaster on its inner face.		
		**Characterizes:** **Total thickness** (m)= 0,46 **U** (W/m2K)= 1,29

Table 14: Example of existing flat roof in the Mediterranean (Source: E4R project) (54)

3.2.4 Energy Performance

A. Energy consumption evolution

Understanding energy consumption in buildings requires an insight into the energy levels consumed over the years and the mix of fuels used. The consumption is made up of two main trends: a 50% increase in electricity and gas use and a decrease in use of oil and solid fuels by 27% and 75%, respectively from 1990 to 2009. Historical final energy consumption in the building sector since 1990s in Europe:

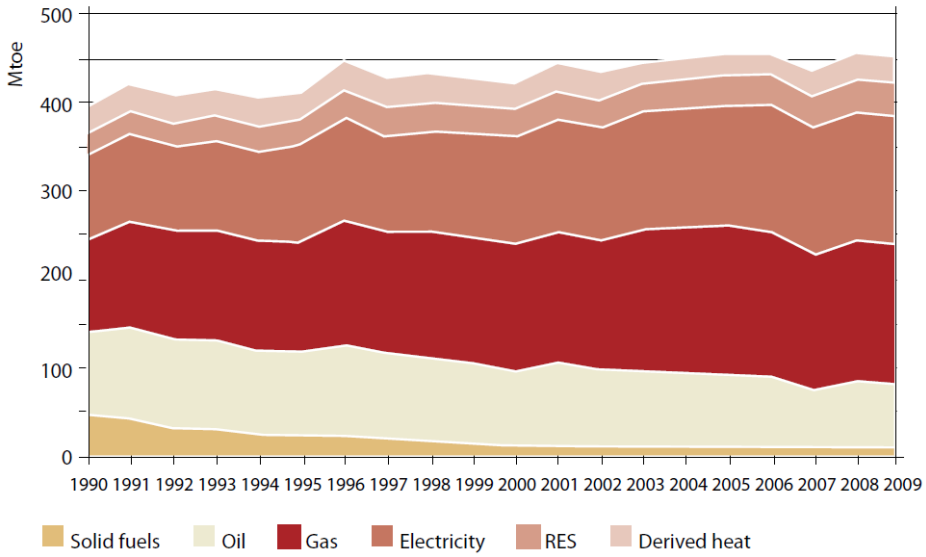


Figure 14: Historical energy consumption in Europe (Source: BPIE) (14)

The building sector is one of the key consumers of energy in Europe where energy use in buildings has seen overall a rising trend over the past 20 years. In 2009, European households were responsible for 68% of the total final energy use in buildings (Source: Eurostat):

- Energy in households is mainly consumed by heating, cooling, hot water, cooking and appliances where the dominant energy end- use (responsible for around 70%) in homes is space heating.

- Gas is the most common fuel used in buildings while oil use is highest in the North and West Europe (France).

- The highest use of coal in the residential sector is in Central & Eastern Europe where also district heating has the highest share of all regions (Slovenia, Bulgaria).

- Renewable energy sources (solar heat, biomass, geothermal and wastes) have a share of 21%, 12% and 9% in total final consumption in Central & Eastern (Slovenia, Bulgaria), South and North & West regions (Croatia, Cyprus, Greece, Italy, Malta, Spain, Turkey) respectively.

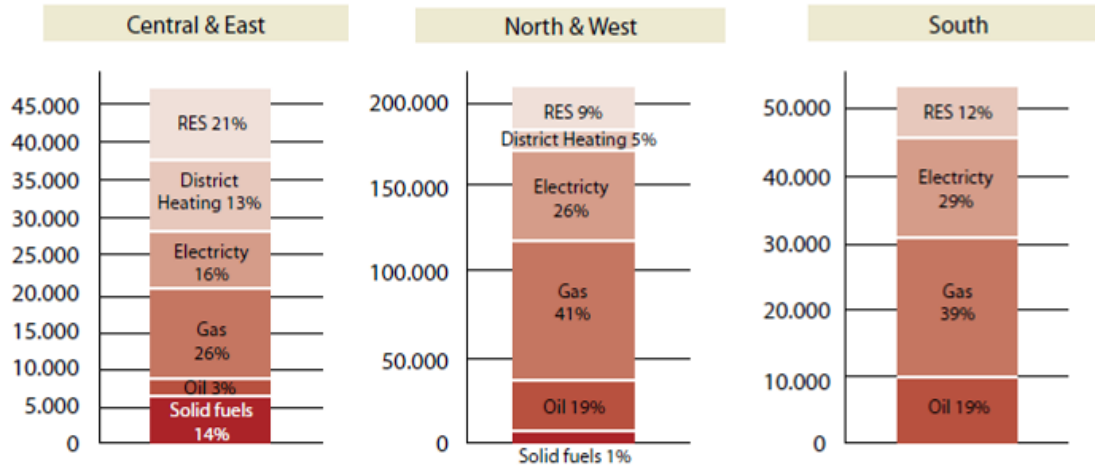


Figure 15: Final energy mix in residential buildings. Units: thousand toe (Source: BPIE) (14)

B. Energy dependence of the Mediterranean

Mediterranean countries present extremely contrasted energy profiles: fossil energies exporting countries alongside with wholly importation dependent countries, as well as countries that are aware about and advanced in terms of development of renewable energies and energy efficiency. For all that, and irrespective of the national contexts, an observation is due: energy and power demand in the Mediterranean has been constantly on the increase over the past few years, and this trend is unlikely to be reversed in the coming years.

Generally the energy dependence of Europe is still growing, reaching the 53, 8 % during 2006, which is a very high level. A similar situation also exists in the Mediterranean area with the following evolution:

Country %	2000	2004	2006
Bulgaria	46,6	48,4	46,6
Croatia	-	-	** 61
* **Cyprus**	98,8	96,4	100
France	51,1	50,8	51,4
Greece	69,4	72,7	71,9
* **Italy**	87,3	84,6	86,8
* **Malta**	100,0	100,0	100,0
* **Portugal**	85,0	83,7	83,1
Slovenia	52,6	52,2	51,1
***Spain**	76,7	77,6	81,4
Turkey	-	-	** 76

*The most dependent, ** 2007

Figure 16: Energy dependence of Mediterranean countries (Source: Eurostat) (24)

C. Energy consumption by sectors. Overview

Buildings consume about 40% of the total final energy consumption in Europe. Therefore the final energy use across the sectors is:

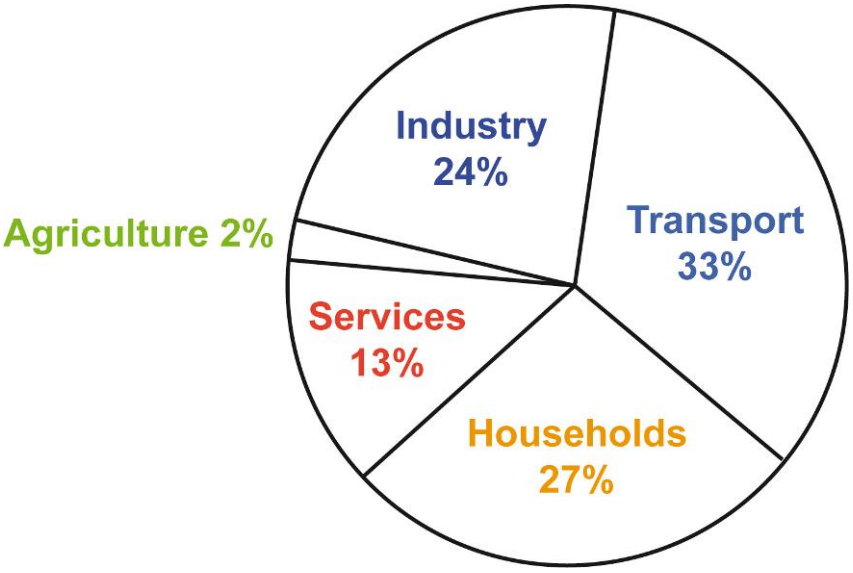


Figure 17: Different sectors Energy consume in Europe. (Source DG-Ener, via: BPIE, 2009) (14)

The evolution of the energy consumption:

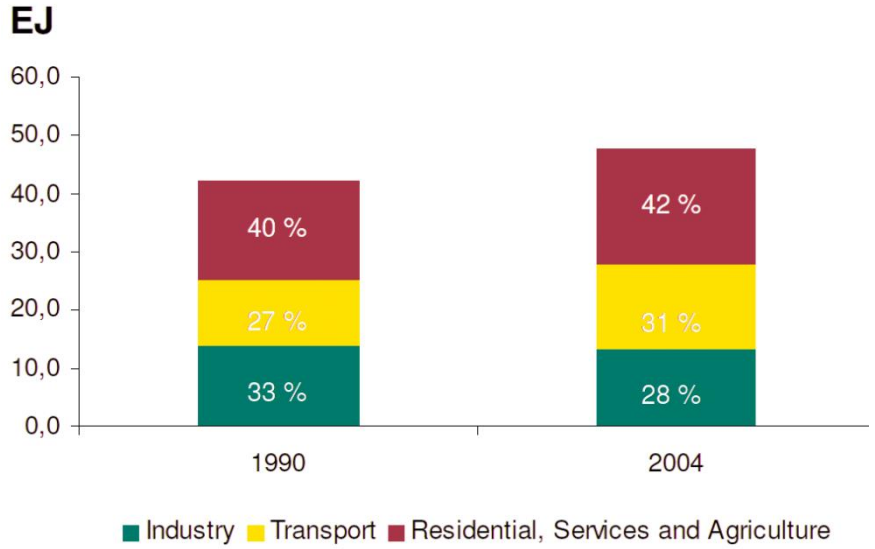


Figure 18: Final energy consumption evolution. (Source: Odyssee indicators) (65)

D. Residential and Non-Residential sector within the Mediterranean

Residential Sector

Almost half of the housing stock has been built in times of very limited economic resources, high demographic pressure and non-existing energetic or environmental legislation. Therefore the existing buildings' envelopes (thermal insulation, air-tightness, etc.) are deficient when compared to current minimum standards.

Total energy consumption for the European residential sector compared, from the energy Balances of Odyssee (FP7 project energy efficiency indicators in Europe), IEA (International Energy Agency) and Eurostat (European statistics) for 2004:

2004/ktoe	Odyssee	IEA	Eurostat
Bulgaria	2100	2085	2104
Croatia	-	1892	1884
Cyprus	-	-	**2215
France	47860	48520	41862
Greece	*5360	5441	5366
Italy	28760	30187	30052
Malta	-	-	
Portugal	3150	3217	3032
Slovenia	1240	1248	1237
Spain	16280	14684	14365
Turkey	-	17894	17186

* 2003, **2003 World Bank Source

Table 15: Kilotons of Oil Equivalent during the 2004, Source: CHALMERS UNIVERSITY OF TECHNOLOGY (22)

* 2003, **2003 World Bank Source

Energy consumption in the residential sector in Ktoe from 1971 till 2007:

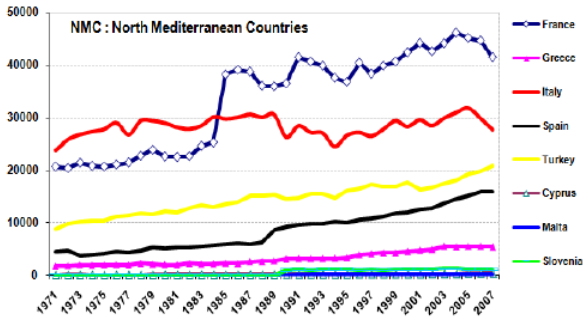


Figure 19: Kilotons of Oil Equivalent evolution in some countries if the Mediterranean (Source: CHALMERS UNIVERSITY OF TECHNOLOGY) (22)

Residential buildings comprise the biggest segment of the Mediterranean building stock and are responsible for the majority of the sector's energy consumption. In 2009, European households were responsible for 68% of the total final energy use in buildings. Energy in households is mainly consumed by heating, cooling, hot water, cooking and appliances where the dominant energy end-use in homes is space heating.

The performance of households depends on a number of factors such as the performance of the installed heating system and building envelope, climatic conditions, behavioural characteristics (e.g. typical indoor temperatures) and social conditions (e.g. fuel poverty meaning that not all buildings are used at maximum capacity). Despite different improvements in, for instance, heating systems, there is still a large saving potential associated with residential buildings that has not been exploited. These technologies are easily implemented in new buildings, but the challenge is mostly linked to our existing stock which forms the vast majority of our buildings.

Average heating consumption levels in terms of final energy use (kWh/(m2a) of single family homes by construction year in some countries of the study scope:

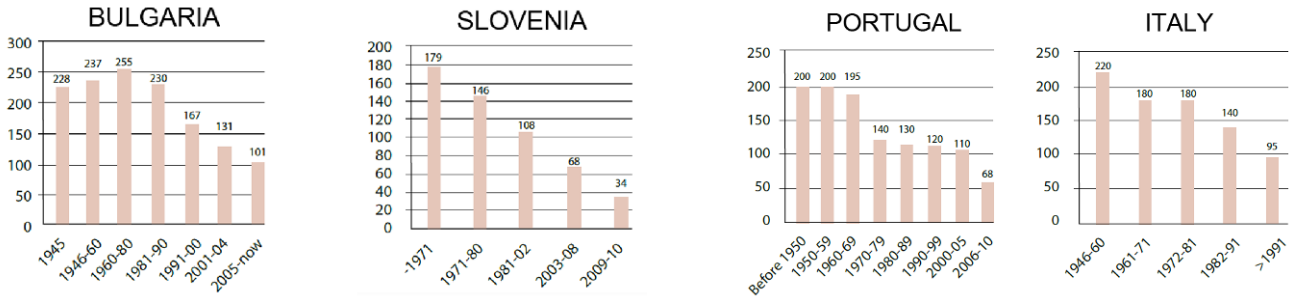


Figure 20: Heating consumption in terms of final energy use (Source: BPIE) (14)

Although heating needs in Southern countries such as Portugal and Italy are lower due to milder winters, the energy use in these countries is relatively high, which can be an indication of lack of sufficient thermal envelope insulation in the building stocks. For those countries, cooling becomes an important contributor to the overall consumption, where homes are, in many cases, equipped with air-conditioning systems.

Within the existing European stock, a large share (more than 40%) is built before 1960s where there were only few or no requirements for energy efficiency and only a small part of these have undergone major energy retrofits, meaning that, these have low insulation levels and their systems are old and inefficient. The oldest part of the building stock contributes greatly to the high energy consumption in the building sector. Older buildings tend to consume more due to their low performance levels.

Non-Residential Sector

Over the last 20 years in Europe, electricity consumptions have increase by around 74%. This is due to technological advances and is shown in the following figure:

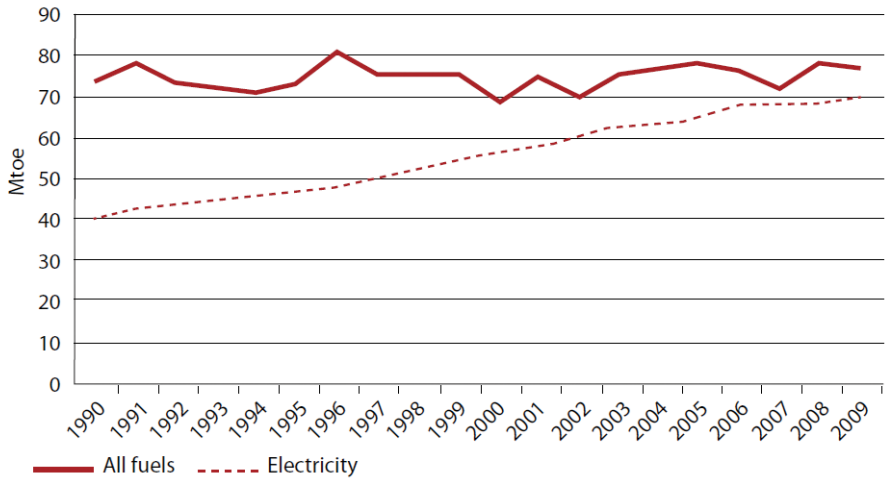


Figure 21: Historical final energy use in the non-residential sector in Europe (Source: BPIE) (14)

As shown before, the share of total energy used by building type within the non-residential sector is:

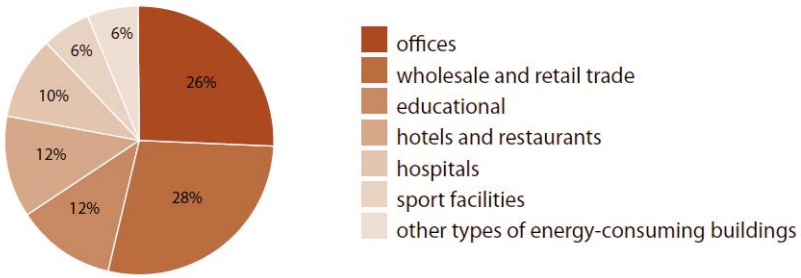


Figure 22: Energy used by non-residential sector per type (Source: BPIE) (14)

E. Environmental Impact

In terms of CO2 emissions, buildings are responsible for around 36% in Europe:

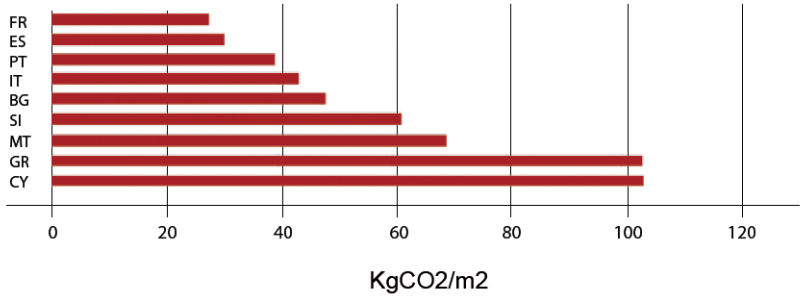
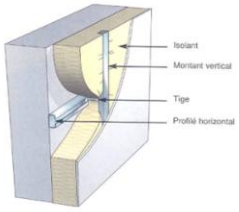
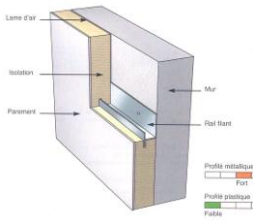


Figure 23 CO2 emissions in different countries of the Mediterranean (Source: BPIE) (14)

4. EE SOLUTIONS AND TECHNIQUES

4.1 Building Envelope

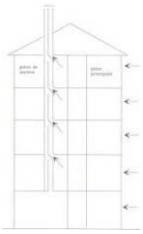
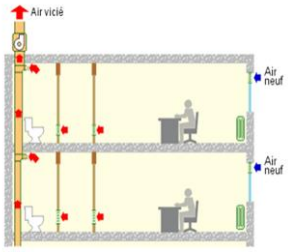
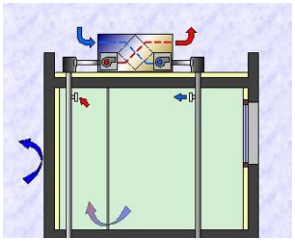
INSULATION OF THE VERTICAL WALLS		
Insulation situation	Interior Insulation 	Exterior insulation 
Uses	All(Choice depends on the building type and is not related to use)	All(Choice depends on the building type and is not related to use)
Energy saving	Accentuate the thermal bridges (especially if there are many floors) Loss of thermal inertia (less comfort in summer)	Reduction of thermal bridges. Thermal inertia is retained
Installation Difficulty	Requires intervention into the walls. It may require modification of heating networks, grid, decor ... Decrease in the living area.	Does not change the living area. It must provide the perimeter insulation around the window frame to avoid thermal bridges at these points.
	inevitable solution in the case of protected architectural facade	Solution adapted to the facades without architectural complexity. Great improvement if plaster is necessary.
Maintenance	It depends on the chosen material to installation technique.	
Applicability on buildings of Mediterranean area	Both systems could be used. To choose the best option it's necessary to consider the building characteristics. (Inner space, kind of façade, protected build…). In addition, both installations of thermal isolation can be supported with a solution of ventilate facade, executing an external constructive layer which are located in order to create a high ventilated air chamber. This strategy provides solar protection and a certain level of ventilation which produces a reduction of cooling demand, the most important energy needs in Mediterranean climate.	

<table>
<tr><th colspan="3">SOLAR PROTECTION</th></tr>
<tr><td colspan="3">Among the multiple strategies of bioclimatic architecture to reduce solar gain in summer is the use of sunscreens both indoors and outdoors. The choice of the most suitable types of protection depends on the location of the building and the orientation of each of the facades.
For orientation to the south, fixed or semi-fixed protections such as roof eaves, horizontal flight are recommended.
For orientation to the west and northeast, guidelines recommend the use of mobile sunscreens with vertical or horizontal slats.
For orientation to the east and west, it is recommended to use mobile sunscreens that will allow for cold or warm entry of sunlight at dawn and dusk.
The following table shows different types of shading and energy savings that can be achieved with each of them:</td></tr>
<tr><th>Types</th><th>INSIDE</th><th>OUTSIDE</th></tr>
<tr><td></td><td>Textile
 
 
 
Movable internal venetian blinds
  </td><td>Fixed slats
 
Movable slats
 
External Textile
 
Movable External venetian blinds
 
Big awning
 
window awning</td></tr>
</table>

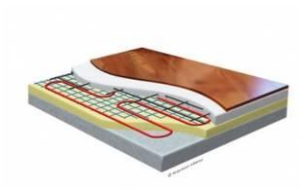
<table>
<tr><td></td><td></td><td> 
guided Awning
  </td></tr>
<tr><td>saving Uses</td><td>All</td><td>All (Choice depends on the building type and not is related to use)</td></tr>
<tr><td>Energy</td><td colspan="2">Estimation for several types of shading:
<table>
<tr><th>Kind</th><th>Energy saving</th></tr>
<tr><td>dark blind</td><td>25%</td></tr>
<tr><td>medium dark blind</td><td>25-29%</td></tr>
<tr><td>soft color blind</td><td>29-44%</td></tr>
<tr><td>plastic cover</td><td>40-50%</td></tr>
<tr><td>dark glass</td><td>40%</td></tr>
<tr><td>Blind + absorbent glass</td><td>47%</td></tr>
<tr><td>dark curtain</td><td>42%</td></tr>
<tr><td>medium dark curtain</td><td>53%</td></tr>
<tr><td>soft color curtain</td><td>60%</td></tr>
<tr><td>translucent plastic</td><td>35%</td></tr>
<tr><td>Awning</td><td>85%</td></tr>
<tr><td>white blind</td><td>85-90%</td></tr>
<tr><td>slats</td><td>85-90%</td></tr>
<tr><td>polarized glass</td><td>48%</td></tr>
</table></td></tr>
<tr><td>Installation Difficulty</td><td>EASY</td><td>Awning and Movable External venetian blinds: EASY (without taking into account esthetical rules)
Movable and fixed slats: more difficult</td></tr>
<tr><td>Maintenance</td><td>Without maintenance</td><td>Depend on system and materials</td></tr>
<tr><td>Applicability on buildings of Mediterranean area</td><td>Recommended in all kind of buildings</td><td>Textile Solutions in all cases without esthetics limitations.
Movable and fixed slats in new buildings</td></tr>
</table>

WINDOWS (Frame & Glass)				
FRAMES				
Types of frame	PVC	Wood	Aluminum	wood/Aluminum
				
Uses	All	All, except stores	Mainly in office, stores, schools and housing retrofitting	Rather in homes, hotels,
Energy saving	Smallest losses in comparison with the other materials	Low losses	Although the current metallic frames have a thermal break system, the losses are more important than the other frames	Low losses
Maintenance	Good durability	More frequent maintenance	Good durability	Low maintenance
GLAZING				
Types of glazing	DOUBLE / TRIPLE	LOW EMISSION	REFLECTIVE (Solar Control)	SPECIALS ("Smart" Glass)
Uses	All	All	Not for orientation to the north	Depends of the thermal properties of materials
Energy saving	Composed of two/three glasses, with one/two intermediate air chamber(s) and a sealed with butyl and polysulfide or silicone, which give good insulation. The enhanced thermal glazing replaces the air in the chambers by heavy gasses, like argon.	Developed to reduce the internal heat losses and get the maximum use of natural light in double glazing. A layer of low emissivity is installed on the face of the glass which is in contact with the air / gas chamber, improving its ability to insulate.	Over the surface of the glass, metal oxide (colorless or tinted) is deposited. Thus, a reflective layer is obtained. This solar control glass allows limit solar energy gain and brightness.	This types are able to regulate their solar factor and, thus, solar energy gain and heat loads: Thermochromic: Use materials which can adapt with sunlight intensity. Electrochromic: Can change their solar gains because of an electrical signal. Photochromic: Use materials which can adapt with brightness.
Maintenance	Low maintenance	Low maintenance	Low maintenance	Medium maintenance
Applicability on buildings of Mediterranean area	Sometimes, a good strategy can be the installation of double windows, principally in cold areas from Mediterranean climate. Thus, tilt opening is a considerable increase of energy efficiency. The opening type can be an important parameter to take in account.			

4.2 Thermal Installations

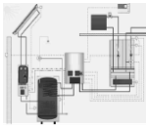
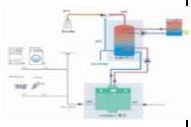
VENTILATION			
Type	**Assisted Natural Ventilation**	**Simple mechanical ventilation flow**	**Double flow ventilation**
			
Uses	Homes, offices, teaching, EPHAD, hotels	Homes, offices, teaching, EPHAD, nurseries, hotels, shops	Offices, schools, hospitals, shops
Energy Consumption	Direct energy consumption is zero. However, an uncontrolled air renewal could lead to significant heating consumption.	Direct energy consumption is low. However, an uncontrolled air renewal could lead to significant heating consumption	The extracted air heat preheats the incoming air flow, and it allows an improvement of energy consumption. The flows in the input and output are well controlled. However you should pay attention to the consumption of the fans. If housing is required a high airtight of the envelope.

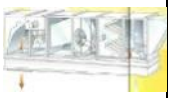
MAIN HEATING SYSTEMS				
Type	**Electrical heating (Joule effect)**	**Boilers (gas, fuel, biomass)**	**Heat Pumps (electric, gas)**	**District Heating**
Uses	All	All	All	All (more dependent on proximity to a network and building thermal needs for this choice is justified)
Comfort, hygiene and health	Well spread heat with radiant emitters.	Comfort enhanced with the use of under floor heating. Great comfort of users, heat is better distributed.	Most heat pumps used refrigerants, implying a risk to the environment, taking account of the volume of fluid directed and possible leaks.	Comfort enhanced with the use of under floor heating.
Maintenance	Systems that require no maintenance.	Annual maintenance of the boiler by a professional is necessary and indispensable.	Regular maintenance of heat pumps indispensable.	low Maintaining season to be introduced

HEATING: TERMINAL ELEMENTS			
type	**Convection Heating**	**Radiant panels**	**Radiant Floor (water) Hot thread (electric energy)**
Picture			
Uses	All	All	All
Comfort, hygiene and health	Comfort satisfactory.	Comfort satisfactory.	Great comfort of users, since heat is better distributed. Hot thread has very high energy consumption. It is not recommended
Operation	Modern units have an integrated Thermostat (Regulation). Important operating cost for poorly insulated constructions and not airtight or with strong air renewal.	Management by means of a programmer device	Difficult to intervene in the case of a rupture (system enclosed in a concrete)

HEATING: THERMAL ENERGY GENERATORS BY FUELS					
Type	**Class 3 Biomass boiler**	**Low temperature boiler (gas, fuel, biomass)**	**Condensing boiler / "low temperature" gas / fuel**	**Cogeneration**	**heat pumps (gas)**
Image					
Applications	All	All	All	Houses, hotels, EHPAD, nurseries (micro-cogeneration) office, retail, education, health (small, medium and large cogeneration)	Hotels, apartment buildings, EHPAD, tertiary industry for high-power gas engine.

ELECTRIC HEAT PUMPS				
Type	**Water/water (geothermal)**	**water / water**	**air / water**	**air / air (divided): Split, Multi-split**
Applications	Individual housing Whole buildings	Rather on individual housing	Rather on individual housing	Individual housing Whole buildings
Power Consumption	The COP through a geothermal heat pump can be more than 4. (Taken to cause a temperature of -5 ° C).	COP near of 4.5 (to cause a temperature taken to 10 ° C).	The COP is around 2.6.	Seasonal COP can be a high value in inverter or variable refrigerant systems
	You do not need a supplement. The hot water is possible.	You do not need a supplement. The hot water is possible.	Supplement always integrated in the system, little or no use as a result of the CAP	Supplement always necessary.
Comfort, hygiene and health	It should be noted the acoustic contamination	It should be noted the acoustic contamination	High level of noise by the exterior module	High level of noise by the exterior module

DOMESTIC HOT WATER SYSTEMS						
Type	**Electric storage water heater**	**Gas room heater**	**Caldera mixed (Gas, fuel, Biomass)**	**Solar hot water**	**Thermodynamic water heater**	**Heat recovery from wastewater**
Image						
Applications	Homes, offices, school, kindergartens.	Homes, offices, school, kindergartens.	Everyone.	Housing, EHPAD, hospitals, hotels.	Housing with heating.	Housing, EHPAD, hospitals, hotels (depend more separation system of wastewater that the existing uses of the building).

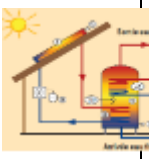
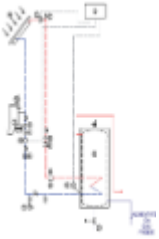
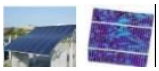
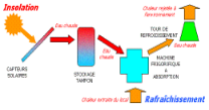
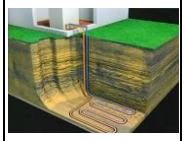
AIR CONDITIONING SYSTEMS					
Type	**Refrigeration cycle**	**Thermal treatment with water**			**District Cooling**
Sub-type/ Image		**Air-air** 	**Water-water** 	**Water-air** 	
Applications	All. More recommended in low energy installations	All sectors	Tertiary sectors.	Rather commercially (heating and cooling of large volumes, max height of 6m). Condensing by water, a cooling tower is needed	All (depends more on the building's proximity to a network and needs to make this choice is justified).
Energy Consumption	Very good energy efficiency according to the size of the exchangers and compressors powerful resource	Attention to important consumption of auxiliary equipment (fans and pumps)	Good regulation is very important. When no occupancy network, reducing energy consumption.	Best performance, important maintenance.	It all depends on the energy provided by the network.

4.3 Lighting

LIGHTING			
Type	Compact fluorescent lamps	Fluorescent Tubes	LEDs.
Image			
Applications	Houses, hotels, EHPAD, sanitary facilities in all sectors tertiaries	tertiary sector	Current products are well suited for accent or display lighting, whatever the type of building

Saving Energy	Compact fluorescent lamps have good energy efficiency and long service life.	With an electronic ballast with preheating of the electrodes, the life length of the tubes of 26 mm diameter and class 1B reaches about 16,000 h in the other cases (electromagnetic or electronic ballast without preheating) is about 10,000 hr. The switching frequency decreases the length of life (0.02 h by loss of ignition). The light from fluorescent tubes is often considered cold and unpleasant. This observation is valid only for the older generation tubes (with a CRI near 65), current tubes have a CRI> 85.	LEDs (light emitting diodes elected) are small and allow currently reach about close to 100 lumens / watt. They exhibit a wide range of IRC.
Maintenance	Selective Attention during recycling as these lamps contains mercury.	Selective Attention during recycling as these lamps contains mercury.	The problem arises more maintenance in terms of maintenance of luminous results of the mortality of the lamps.

4.4 Renewable Energy

RENEWABLE ENERGY						
Type	Individual Solar Thermal	Solar thermal collective	Photovoltaic panels	Absorption system: solar cooling	Geothermal pumps (land-fluid exchange: cooling in summer and heating in winter)	Provence Well or Canadian Well (land air exchange/ low power geothermal)
Image		 				
Applications	Individual Housing	Collective dwellings, EHPAD, Hotels	Any use	Hospitals, offices, shops, hotels ...	Hospitals, offices, shops, hotels ...	Individual housing, education, offices ...

5. MARKET UP-TAKEN MEASURE

The purpose of this section is to identify the current financial instruments to support the improvement of the energy performance of building in the Mediterranean regions. Many potential areas of improvement to existing buildings remain outside formal legislative or regulatory requirements. To address these shortcomings, a variety of financial programmes are available throughout Europe:

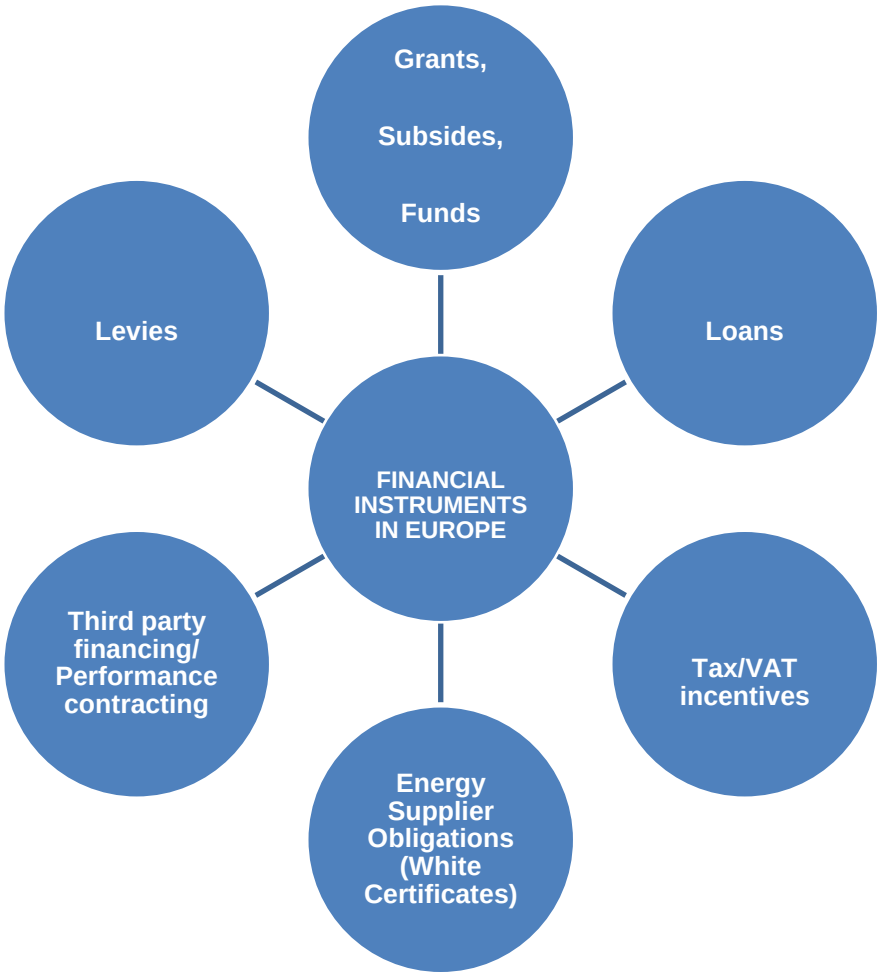


Figure 24: Types of financial instruments supporting the energy performance of buildings (Source: BPIE) (14)

There are many types of financial instruments used in Europe. For this report, these financial instruments can be divided into two broad categories:

- Financial incentives: Grants/Subsidies, Funds, Preferential loans
- Fiscal measures: Tax Reduction, Tax Credit, Reduced VAT

The definitions for each instrument are:

- **Subsidies** allow prices to be kept low. They may be provided, for example, to manufacturers of energy efficient equipment such as compact fluorescent light bulbs.

- **Grants** are targeted at households, industrial or other energy consumers to pay for part or all of the cost of introducing energy efficient processes – such as enhanced building insulation.

- **Grants or subsidies** may be financed directly through the state or local authority budget or hypothecated taxes (also known as ring-fenced or ear-marked tax).

- **Preferential Loan schemes** encourage energy efficient practices can be introduced with subsidised interest rates or credit risk support. Subsidies provided by the local authority or state budget to banks offering low interest rates are a fiscal policy.

- **Differential VAT rates** can be used to influence the choice of energy efficient technology by householders. Value Added Tax (VAT) normally affects the final consumer but not the producer – who passes the cost onto the consumer.

- **Levies** on consumption or production may be used to create a fund (e.g. a levy on electricity sales to fund renewable energy schemes).

The following figure represents the number of identified programmes by type of instrument and country.

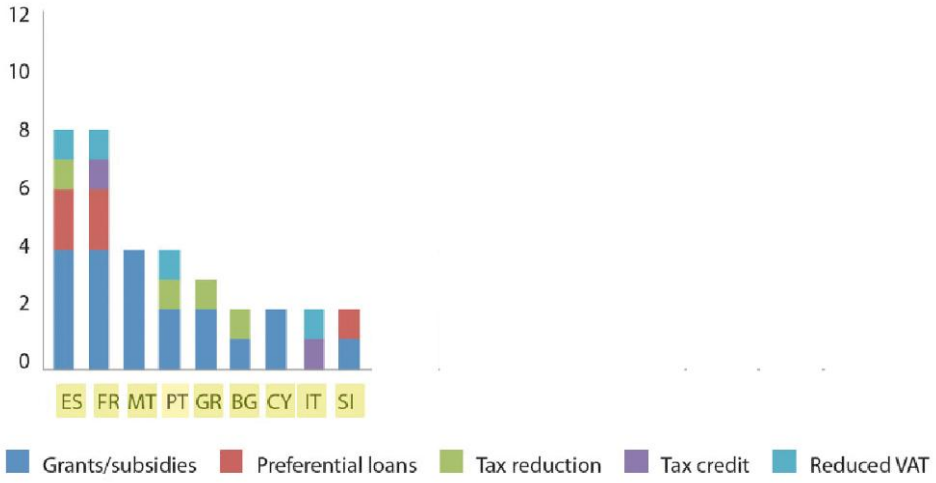


Figure 25: Financial instrument in 2012 by country (Source: BPIE) (14) (15)

5.1 Financial and Fiscal incentives current state

During 2011, The Member States had on-going financial incentives specifically designed for works and investments for increasing energy efficiency in existing buildings by using grants and subsidies as the primary type of financial incentive. In addition, residential buildings are the target for most financial incentives while the non-residential sector has received much less support. This could be explained by the fact that non-residential buildings account for 25% of the floor space whereas the residential stock represents 75% of the floor space. In addition, it is generally agreed that individual homeowners need more financial support to undertake the necessary measures because they have less access to financing than commercial enterprises or public entities. We can appreciate that in the following figure:

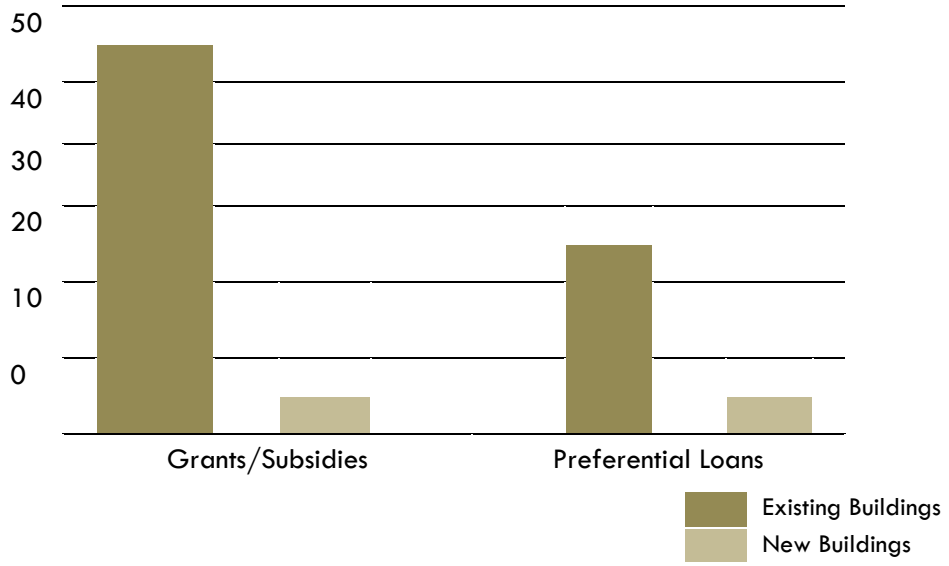


Figure 26: financial instruments in 2012 used by European members by type of building (Source: BPIE) (15)

In parallel, the fiscal incentives for the energy efficiency in buildings include several measures to lower the taxes paid by consumers investing in the energy efficiency of buildings. Measures include tax reductions (individual, corporate and on properties), tax credit and reduced VAT. During 2011, as well as before, the majority of fiscal incentives was focused on existing buildings, especially tax reduction and reduced VAT.

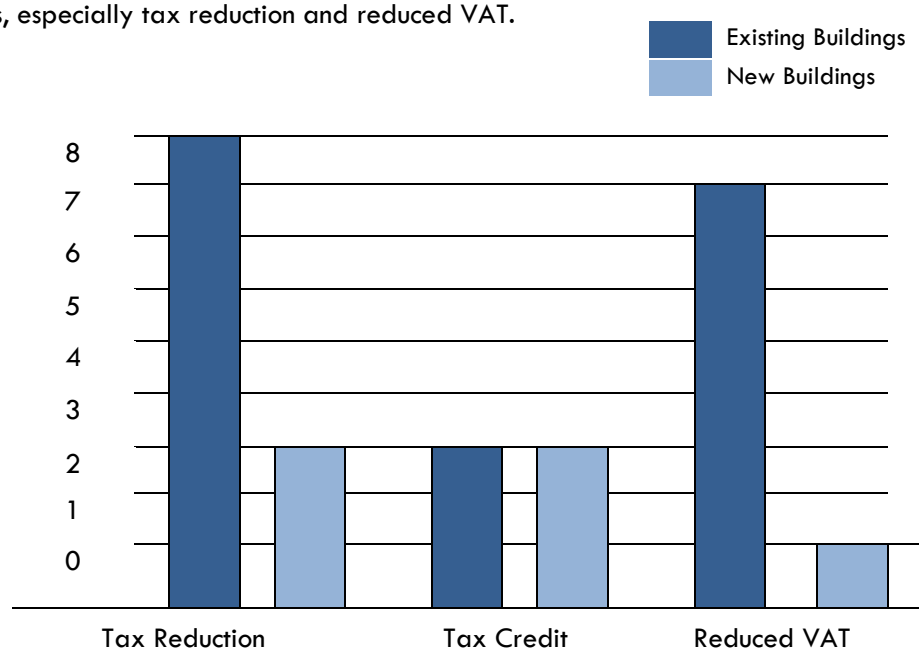


Figure 27: financial instruments in 2011 by type of building (Source: BPIE) (15)

Envelope and equipment investments are mainly supported by fiscal incentives, representing more than half (52%) of the total support share. Equipment itself also receives significant attention (24%). Envelope and other measures are less supported (8%).

5.2 Available Budget for building refurbishment

The available budget for building refurbishment and R&D of new technologies altogether is €15 billion. This includes:

- Cohesion Policy
- 7th Framework Program (FP7)
- European Energy Efficiency Fund (EEEF)
- Intelligent Energy European program (IEE)

The Cohesion Policy (EU, 2006)

The budget amounts to €347 billion in the 2007-2013 period, which is more than one third of the budget of the European Union, and it is used to increase the social, economic and territorial cohesion among the different regions in Europe.

The budget is divided in three funds:

- The European Regional Development Fund (ERDF) targeted at the less developed regions, and may be targeted at building refurbishment

- The European Social Fund (ESF) can be received by all Member States, but does not cover building refurbishment

- The European Cohesion Fund (ECF) that finances the infrastructure and environmental projects of the EU12

Member States can access these funds by creating their own operational programs and/or by using dedicated EU financial instruments (e.g. JESSICA, JEREMIE and JASPERS). Recently, Member States have also been given the opportunity to use more of their total ERDF endowment for housing projects, so that now up to 6% of the total ERDF budget may be used for building refurbishment.

The 7th Framework Program (FP7)

This program has a budget of €50 billion to foster the research activity, cooperation and research capacities of Europe in the time period 2007-2013.

Of this endowment, €2.35 billion may be committed for supporting energy-related research. About half of the budget for energy, €1 billion, is devoted to the Energy Efficient Buildings Public Private Partnership project that supports the development of innovative technologies for the construction sector.

European Energy Efficiency Fund (EEEF)

The fund was launched in 2011, with a total budget of €286 million. Half of the budget came from the European Economic Recovery Program, and the other half from financial institutions in the private sector. The fund is for projects that achieve at least 20% energy savings or greenhouse gas emission reduction in urban areas. Note also that part of the money serves as technical assistance.

The Intelligent Energy European program (IEE)

This program with a total budget €735 million for the period 2007-2013 was set up to ensure sustainable energy and enhance competitiveness. This includes projects on energy efficiency in all areas except transport (SAVE); use of renewable and alternative sources of energy (Altener); energy efficiency in transport (STEER); or the combination of them (Integrated Initiatives). Note that this program also financed five technical assistance facilities.

In summary, the total amount of EU funding for building refurbishment is almost €15 billion. Most of this money is to support the implementation of projects (around 85% of the total budget), but there is also money for research, development and demonstration activities (around 15% of the total budget), and for the preparation of projects, and to help them apply for EU funding, i.e. technical assistance (around 1% of the total budget).

In the Mediterranean, there are several financial and fiscal initiatives to support the improvement of the energy performance of buildings of countries and regions included in this area. The entire budget for retrofitting of buildings and main related measures are compiled in Annex B. As an example the following table is reproduced:

COUNTRY (REGION)	BULGARIA
HELP	Construction of buildings with categories A and B certificates
SOURCE OF FOUNDS	Public initiative
ORGANIZATION AND CONTEXT	Bulgarian Government: National incentives. There is not a budget related with this initiative.
OBJECTIVE	Promote the construction of high level of energy efficiency buildings trough exemption of taxes. Promote renewable sources in buildings.
BENEFICIARIES	Owners of buildings.
KIND OF HELP AND RATE OF ASSISTANCE	Buildings which were put into use prior to the 1st of January 2005 and with a categories A or B certificate, are exempted for the property taxes for a period of 7 years following the issue of the certificate and for 10 years if they use RES for the building´ energy consumption. The owners of buildings that were put into use prior to the 1st of January 2005 with other type of certificates have more reduced periods for exemption of property taxes.

Table 16: Example of the information collected. (Source: different sources by partner)

6. ENERGY EFFICIENCY ENCOURAGEMENT AND PROMOTION MEASURES

6.1 European scope

Through Directive 2010/31/EU, the EU took a first step in building energy efficiency since it required all Member States to submit a plan on how to overcome the difference between the current energy performance and the minimum requirements established by the directive. Furthermore, the list of different measures in order to encourage and promote the energy efficiency sector and not only from the financial point of view must be realized.

The Directive 2012/27/EU, established a common framework to promote the energy efficiency inside the EU through concrete measures which could be included on Energy Efficiency Plan 2011.

In this Plan, proposals are related to:

- Improvement of energy efficiency towards low energy consuming buildings.
- Overcoming legal obstacles.
- Training, in order to apply the best energy efficient building solutions correctly.
- Renovation of public buildings
- Energy performance contracting.
- Sustainable and renewable energy

Therefore, policies, strategies, plans, projects, training, technical advices or similar initiatives involve all the implied agents on energy refurbishment in buildings too.

6.2 Mediterranean scope

Public authorities and other institutions in the Mediterranean area which promote them may link energy efficiency tools, (like energy performance certificates or based on National Energy Efficiency Plans) with these measures in order to support the energy efficiency retrofitting sector:

MEDITERRANEAN SCOPE	
South	**CY** CYPRUS, **GR** GREECE, **ES** SPAIN, **IT** ITALY, **MT** MALTA, **PT** PORTUGAL
Central & East	**BG** BULGARIA, **CRO** CROATIA, **SI** SLOVENIA, **TUR** TURKEY
North & West	**FR** FRANCE

Every country will be analyzed and their main actions to encourage and promote will be exposed with different items: Building retrofitting, renewable energy, training, etc. All this information is collected in Annex B, and as an example about the kind of information used, the following table:

COUNTRY (REGION)	MALTA
ENERGY EFFICIENCY PROMOTION MEASURE	National information and promotion of energy certification
PUBLIC / PRIVATE INITIATIVE	Public initiative
DESCRIPTION	Realize advertising campaigns, focusing on public awareness in energy savings, efficient measures and EPCs.
PUBLIC OBJECTIVE	- Maltese citizens.
PROGRAM / ACTIONS / TRAINING DETAILS	- Weekly information sessions. - Several seminars and presentations. - Brochures and videos. - Web information.

Table 17 Example of the information collected. (Source: different sources by country)

Information about promotional measures in which eeWise partners has participate, as also collected in Annex B. As an example:

ENERGY EFFICIENCY MEASURE	**I E4R CONGRESS: Practices of energy efficiency retrofitting of buildings**	**ee-WiSE PARTNER: AIDICO**
DESCRIPTION	Framework for sharing experiences, successful and innovate stories about energy refurbishment of buildings	
PUBLIC OBJECTIVE	Agents involve in energy building retrofitting: Administrations, promoters, constructors, installers, designers, product developers, customers and building owners…	
SCOPE	SUDOE Space (South-eastern of Europe)	
PROGRAM / TRAINING DETAILS	Refurbishment Policies Energy Retrofitting on urban scale Tools and design methodologies: certification and verification. Simulation tools and monitoring. Rehabilitation of the thermal envelope Rehabilitation of active systems: HVAC, renewable energy, lighting. Retrofitting and Business Model Social Impact of Refurbishment	
CONSORTIUM / ANOTHER PARTICIPANS	ITG - Spain INEGI - Portugal Government of Extremadura - SPAIN EIGSI - France	

Table 18: Example of the information collected. (Source: different sources by partner)

7. CROSS-SECTORIAL COOPERATION

Cooperation through different energy efficiency agents and, more concretely, related to energy retrofitting of buildings, is an important starting point to establish the level of common knowledge and how we are sharing experiences.

This information is focused on the knowledge produced by different cooperation activities, such as R&D projects, workshops and other cooperation experiences, from European scope to national level. Initiatives which involve Mediterranean States have been prioritized. The information collected in Annex B. Find an example of each part of the information managed:

7.1 European projects

Programme	Med Programme
Acronym / Name	**ELIH-Med** Energy Efficiency in Low Income Households in the Mediterranean
Main subject	Low cost energy efficient investments and retrofitting
Objectives / Results	The general objective of ELIH-MED project is to identify and implement innovative technical solutions and financing mechanisms to improve energy efficiency in low-income housings in the Mediterranean area. The project results include analysis (Typology of LIH building stock in the Med area, potential energy savings, territorial and national public policies on EE, gap analysis between existing products and needs), Good practices of energy retrofitting in LIH, etc.
Mediterranean countries/regions involved	Cyprus, France, Greece, Italy, Malta, Slovenia, Spain
Agents in the value chain involved	All
Website / Further information	http://www.elih-med.eu

Table 19: Example of the information collected. (Source: different sources by partner)

Table 20: Example of the information collected. (Source: different sources by partner)

7.2 National projects

Country (Region)	MALTA
Programme	National R&I Programme 2006
Acronym / Name	R&I-2006-009: Development of an Innovative Wastewater Recycling Process for Hotels / Large Commercial Buildings / Isolated Communities for Environmental Protection and Cost Recovery[2]
Main subject	Waste water reuse
Objectives / Results	Development of an innovative water recycling process to maximize reuse of water and minimise discharge in non-residential buildings
Agents in the value chain involved	Owners of non-residential buildings (e.g. hotels)

Table 20: Example of the information collected. (Source: different sources by partner)

7.3 Platforms and sectorial clusters

Name	PTEC - Spanish technological Platform of construction
Scope	National
Main subject	Construction
Objectives / Results	Meeting the demands of the Spanish construction companies and social aspirations, to raise the competitiveness of the Spanish construction industry through the investigation.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	Enterprises and professionals of construction sector.
Website / Further information	http://www.construccion2030.org

Table 21: Example of the information collected. (Source: different sources by partner)

7.4 Associations

Name	OME - Observatoire Méditerranéen de l'Energie
Scope	Mediterranean / International
Main subject	Promotion of cooperation and collaboration between organisations and enterprises in the energy sector, within the framework of the Euro-Mediterranean partnership.
Objectives / Results	The main objective of the Association is to promote cooperation and collaboration with major energy companies operating in the Mediterranean region, making of energy an element for regional integration.
Mediterranean countries/regions involved	France, Greece, Italy, Slovenia, Spain, Turkey Non European countries: Austria, Egypte, Lebanon, Libya, Morocco, Palestine, Tunisia.
Agents in the value chain involved	Big energy producers.
Website / Further information	http://www.ome.org

Table 22: Example of the information collected. (Source: different sources by partner)

7.5 Workshops and Meeting Points

Name	CLIMAMED Mediterranean Congress of Air Conditioning
Scope	Mediterranean
Main subject	Energy efficiency in HVAC systems
Objectives / Results	Achieving sustainable energy consumption is one of the major goals of developed societies around the world. Likewise, research on Net-Zero Energy Buildings has become increasingly popular and highly supported by many governments. This issue only contributes further to the importance of energy consumption, especially its relation to air conditioning, since it is so vital for the Mediterranean climate. CLIMAMED provides a forum to exchange knowledge and experiences

	about it.
Mediterranean countries/regions involved	France, Italy, Portugal, Spain, Turkey
Agents in the value chain involved	Designers, manufacturers, contractors, and end-users
Website / Further information	http://www.climamed.org

Table 23: Example of the information collected. (Source: different sources by partner)

7.6 Other cooperation experience

Name	**Networking of Renewable Energies**
Scope	Mediterranean
Main subject	Renewable Energies
Objectives / Results	Promote the sustainable energy sector and identify business opportunities between Spanish and Portuguese entities. Have the opportunity to present the interests and find participations for renewable energy.
Mediterranean countries/regions involved	Portugal Spain
Agents in the value chain involved	Companies, research organizations and public administrations

Table 24: Example of the information collected. (Source: different sources by partner)

8. CERTIFICATION PROCESSES

8.1 Regulative Framework

According to the Directive 2002/91/EC (EPBD) and Directive 2010/31/EU (EPBD recast, operative at present), Member States must implement mandatory certification of new and existing buildings, along with periodic certification of public buildings. Certification schemes are addressed in Articles 11 (Energy performance certificates), 12 (Issue of energy performance certificates), and 13 (Display of energy performance certificates) of the Directive in force.

The energy performance certificate has a key role in achieving the goal of the EPBD, which is to support the transition of the real estate sector towards energy efficiency. In this respect, it is paramount to increase energy efficiency in the building stock. In addition, Article 11 states that "the energy performance certificate shall include recommendations for the cost-optimal or cost-effective improvement of the energy performance of a building or building unit ….". This Core Theme facilitates discussions on how to implement the respective articles of the EPBD recast effectively.

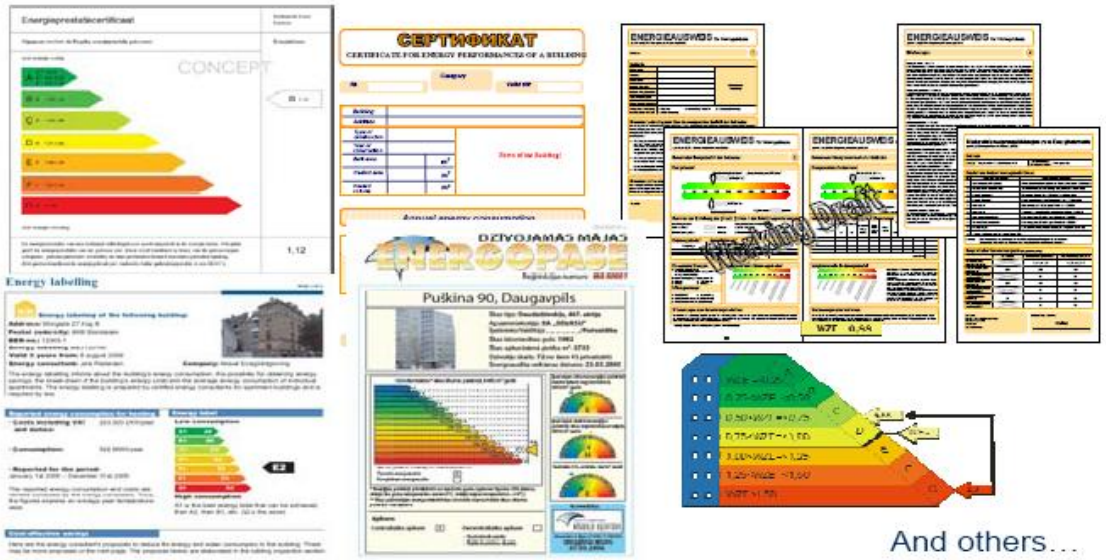


Figure 28: Different types of energy performance certificates (EPC) in the Member States

The energy efficiency of buildings should be calculated with a methodology that can be differentiated at national and regional levels. It includes not only the thermal characteristics, but also other factors that play an increasingly important role, such as heating and air conditioning, the use of energy from renewable sources, the passive elements of heating and cooling, shading, indoor air quality, adequate natural lighting and building design. The methodology for calculating the energy efficiency must be based not only on the season in which it is necessary to use heat, but should cover the annual energy performance of a building over year. This methodology should take into account European standards.

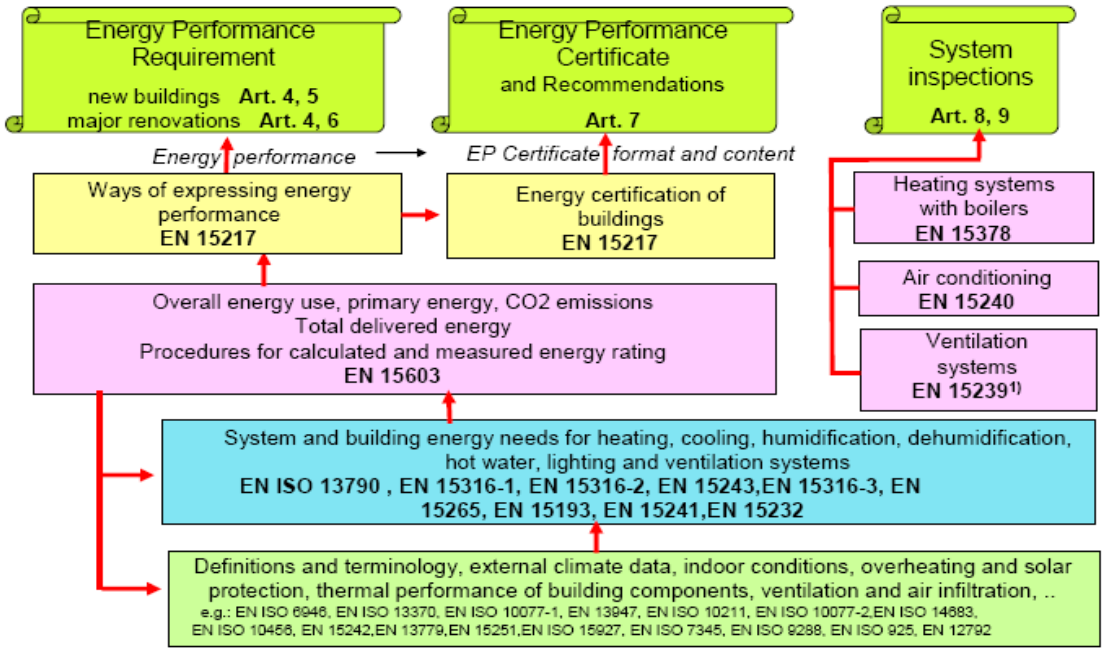
The European Commission and the European Free Trade Association sent to CEN (European Committee for Standardization) (Mandate M/343 - 2004) develop a set of regulations for the purpose of European standardization of the methodology for calculating the energy

performance of buildings and to assist Member Countries to implement the European Directives in a consistent manner. Following the mandate M343, CEN reviewed existing regulations and prepared many new ones, resulting in more than 40 documents listed in the "Umbrella Document" (CEN / TR 15615:2008). These include 28 new EN Standards, 4 new Standards EN ISO standards and more than 15 have been revised.

Most important standards are:

- EN 15603: "Energy performance of buildings - Overall energy use and definition of criteria"
- EN 15217: "Eficiencia energética de los edificios – Métodos para expresar la eficiencia energética y para la certificación energética de los edificios"
- EN 13790: ""Energy efficiency of buildings - Calculation of energy use for heating and cooling of spaces"
- Some standards about HVAC and lighting systems.

Relationship between legislation, certification process and calculation methodology is exposed on the following flowchart:



1): Not explicitly mentioned in the Directive

At present, the Committee CEN / TC 371 (Project Committee Energy performance of buildings) is working on the second generation of rules to implement the new EPBD. Is a very ambitious legislative plan to be put in more consistent standards and in line with the specifications of the Member States. It is expected to be available in 2014 or 2015.

The new rules will have to be modular and unambiguous with a clear division of the common methods and selected by the member states (for example, climate data, primary energy factors, the expression of ventilation and other legal requirements). Also calculation programs must be consistent.

8.2 Energy Efficiency Requirements

Member States are required to establish, in accordance with the aforementioned calculation methodology, minimum requirements for energy efficiency, according to the EPBD recast, to reach optimum levels in terms of cost.

Following a major refurbishment work, the existing buildings should benefit from improved energy efficiency in a way that can also fulfil the minimum requirements set by the directives. When preparing the replacement or improvement of building elements that integrate the building envelope the directive shall set a minimum energy requirement. Similarly, Thermal, domestic hot water or lighting facilities which could be installed or refurbished shall also comply with the energy efficiency requirements.

Following the renovation of a building, this Directive encourages the introduction of intelligent energy consumption metering, through the common rules for the internal electricity market.

The stringent requirement levels are still nationally set, so that the implementation of the Directive is very different in each country.

Analysis and comparison of the energy consumption of buildings in different countries is not directly feasible due to differences in absolute levels of energy consumption.

Breaking down the calculation procedure gives rise to some of these differences:

- The number of processes that are included in the calculations of different energy rating varies depending on the country being analyzed.
- The procedure of calculating energy consumption depends on the country.
- The surfaces considered when making the calculation of consumption vary per country. (Heated floor surface, area, floor area).

Comparison of certification processes in Mediterranean States

This part of State of Art compiles the different certification processes and their main aspects. Taking account that the objective of this project is energy efficiency in building retrofitting, themes are specifically based on existing buildings and their renovations, in order to permit their comparison for the Mediterranean:

ITEMS	BULGARIA
Application of Certification Process	Since December 2009: Energy performance certificates are only required for existing buildings over 1000m^2. For all new buildings, is necessary to get an energy passport (is not a certificate).
Minimum Energy Certification Requirements	For new buildings at the design and construction stage, the specific energy consumption shall correspond to class B of the energy consumption scale. For existing buildings built in the period 1991-2009, the specific energy consumption shall correspond at least to class C. For existing buildings built before 1990, the specific energy consumption shall correspond at least to class D.
Methodology and Certification Tools: Complexity and constraints	The calculation method is based on the EN ISO 13790 in calculation of the annual energy consumption for heating, ventilation, cooling and hot water. This method provides a quantitative evaluation of parameters which determines energy demand.
Main Information in EPC	Energy rating scale [A to G] is based on annual energy consumption For heating, cooling, ventilation, hot water and lighting
Qualification of certifiers and Quality Assurance	External control of residential and non-residential buildings with a floor area above 1000 m^2. External control on independent experts and companies who can conduct energy audits and to issue certificates for buildings.
Registers	Public register of persons executing certification. These certificates were issued after and auditing process.
Further Information	www.seea.government.bg - Sustainable Energy Development Agency www.bregio.eu

ITEMS	CROATIA
Application of Certification Process	Since April 2010: New buildings
Minimum Energy Certification Requirements	Starting from July, 1st 2013: Existing buildings which are being sold or rent. Voluntary certification process before this date.
Methodology and Certification Tools: Complexity and constraints	New buildings must achieve, at least, a C rating.
Main Information in EPC	For existing buildings, energy certificate is calculated on a basis of the carried out energy audit.
Qualification of certifiers and Quality Assurance	Cooling and domestic hot water are not included in the calculations.
Registers	Energy rating scale [A+ to G] is based on annual energy need for heating [kWh/m^2.ear]
Further Information	For existing buildings, EPC includes proposals on economically feasible measures for the improvement of the energy performance of the building, including a calculation of the period of return.

ITEMS	CYPRUS
Application of Certification Process	Mandatory since January, 1st 2010: New and existing residential buildings, when last of them are sold or rented Since September, 1st 2010: New and existing non-residential buildings, when last of them are sold or rented. Renovations of buildings with a net floor area larger than 1000m^2 must get an EPC.
Minimum Energy Certification Requirements	As part of minimum requirements, the buildings that apply for a building permit have to be at least class B.
Methodology and Certification Tools: Complexity and constraints	Certification method includes CEN standards. They are mandatory to be used to calculate the EPC, for new and existing buildings. This methodology is simulated by the software SBEMcy.
Main Information in EPC	Energy rating scale [A to G] is based on calculated of primary energy consumption [kWh/m^2.ear] The EPC also provides information about CO_2 emissions and the calculated energy that comes from renewable sources.
Qualification of certifiers and Quality Assurance	EPC and recommendations report can be only issued by the Qualified Experts. They must have a technical degree (Architecture or Engineering), work experience. A Check system exists to evaluate the quality of EPC which have been issued.
Registers	Central of calculation file of the EPC registry on the Energy Service A Qualified Experts´ registry exists on the Ministry
Further Information	For existing buildings, EPC includes proposals on economically feasible measures for the improvement of the energy performance of the building, including a calculation of the period of return. www.mcit.goc.cy – Ministry of Commerce, Industry and Tourism

ITEMS	FRANCE
Application of Certification Process	Since November 2006: Existing buildings for sale Since July 2007: Housing for rent Since January 2008: Public buildings
Minimum Energy Certification Requirements	Conventional Consumption Calculation in Housing (3CL Tool). This methodology is the minimum required. The certificate is produced based on measured consumption but experts also have the choice of using a dynamic simulation method, in order to get accurate results.
Methodology and Certification Tools: Complexity and constraints	Certification tools are based on 3CL methodology. The Ministry provides it but, to be used, an interface has to be added to include all the legal texts. In function of type of building and year of construction, input data can be provided by invoices or calculation.
Main Information in EPC	Energy rating scale [A to G] is based on primary energy-consuming services rates (heating, cooling and sanitary hot water) [kWh/m^2.ear] which can be estimated or measured Scale function CO2 global emissions rate [kg CO2/m^2.ear]
Qualification of certifiers and Quality Assurance	To deliver EPC, experts have to be certified by an accredited body. No educational or experience background is required. A Certification body takes care to these experts comply the

	certification process correctly.
Registers	A central archive is under development.
Further Information	EPC includes suggested improvements with a short description, estimates of costs, savings and paybacks.

ITEMS	GREECE
Application of Certification Process	Since October, 1st 2010: New buildings and existing buildings undergoing major renovations.
Minimum Energy Certification Requirements	New buildings and existing buildings undergoing major renovations have to be, at least, class B.
Methodology and Certification Tools: Complexity and constraints	Reference building method. Features of Thermal envelope Properties of thermal installations and lighting for tertiary buildings Operational conditions (for tertiary buildings). A software tool was developed, based on the methodology of EN 13790. (TEE-KENAK Software)
Main Information in EPC	Energy rating scale [A+ to H] is based on total primary energy consumption for heating [kWh/m^2.ear] Total primary energy consumption. Energy consumption by final use (heating, refrigeration, hot water for use and lightning) CO2 emission Recommend improvements on the energy performance of buildings
Qualification of certifiers and Quality Assurance	Presidential Decree 100/2010 Energy Auditors Body formed the implementation and quality control. They should be engineers or architects with at least, 3 years of experience. There are random checks of EPCs by inspectors
Registers	Energy auditors are listed in the official a registry. There is a central electronic registry of Energy Certificates
Further Information	After July, 9th 2011, issue of a certificate will be required when renting a part or a building. www.cres.gr - Centre for Renewable Energy Sources and Saving http://portal.tee.gr/portal/page/portal/SCIENTIFIC_WORK/GR_ENERGEIAS/kenak/tee_kenak - Link to software download site From 1-1-2014 requirement for issuing Energy Performance Certificates is the inspection of heating system or air condition. From 1-1-2016 is mandatory the issuing Energy Performance Certificates for buildings <50m2.

ITEMS	ITALY
Application of Certification Process	AS of July of 2009, all existing residential and non-residential buildings need to be certified when they are sold. Is not mandatory to certify them when they are rented at national level but in some regions this obligations exists.
Minimum Energy Certification Requirements	The national Energy certification is divided into classes, from A to G. For new buildings, the minimum class is C. There is not a minimum class for existing buildings. In some Italian regions, G class is not considered.

Methodology and Certification Tools: Complexity and constraints	Methodology of calculation based on national rules and several CEN standards. The select method is monthly calculation of primary energy and renewable energies. The legislation should follow the UNI-TS 11300 (CEN standards) The software on the market are those validated (must fit with minimal tolerance with results of UNI TS 11300).
Main Information in EPC	Energy rating scale [A+ to G] is based on primary energy-consuming services rates (heating, cooling and sanitary hot water , and lighting for tertiary buildings) [kWh/m2.Year] for residential buildings; kWh/m^3year for tertiary buildings] Shows the partial energy consumptions too, the CO_2 emission and the share of energy produced by renewable energy sources
Qualification of certifiers and Quality Assurance	The regions can legislate in the field In some of them exists a quality system for experts. After the EPC is issued, two types of verification are realized: Visual and a random check
Registers	From 2006 to 2009, Different regions have estimated that more than 2 million of EPC have been issued, more than 8% are existing buildings.
Further Information	There is a strong regionalisation of the certification process in Italy. http://www.docet.itc.cnr.it – Software for small residential houses and for non-residential buildings. www.agenziacasaclima.it – EPC system in Bolzano province

ITEMS	MALTA
Application of Certification Process	After the 2nd of January 2007: All new buildings and existing building that undergo major renovations have to get the EPC Starting from the 2nd of January 2009: EPCs had to be used on all residential buildings (dwellings) that were being newly designed, sold or rented out Starting from the 2nd of January 2009: EPCs had to be used on all non-residential buildings that were being newly designed, sold or rented out.
Minimum Energy Certification Requirements	There are no minimum requirements for energy class.
Methodology and Certification Tools: Complexity and constraints	The calculation procedure for dwellings takes account climatology, energy needs and calculates the annual values of delivered energy consumption (energy use), primary energy consumption and CO_2. Specific software is available (EPRDM). Non-residential calculation method is based on UK´s national calculation tool (SBEM).
Main Information in EPC	The EPC shows the calculated primary energy use [A to G] and CO_2 emissions by heating, cooling, domestic hot water and lighting systems.
Qualification of certifiers and Quality Assurance	Qualified energy performance assessors. EPB assessors have to be an architects or engineers or professional with equivalent degrees. They have to undertake a period of training. The list of these experts is public and available. There is a department of verification, which realize a visual inspection and check the results of EPC.

Registers	The Building Regulation Office developed a central national electronic registry and database. EPB assessors have to introduce information of the building by web.
Further Information	EPC includes recommendations to improve the energy performance.

ITEMS	PORTUGAL
Application of Certification Process	Since January 2009: New and major renovations, public, residential and non-residential existing buildings (which are sold or rented) must have an energy certification.
Minimum Energy Certification Requirements	- New buildings and major renovations: Minimum energy class required is "B-". - Existing buildings: There are not minimum requirements of EPC.
Methodology and Certification Tools: Complexity and constraints	Calculation methodology includes heating, cooling and DHW needs. For non-residential buildings, lighting is included. This methodology is based on ISO and EN Standards. There is an automatic system which allows introducing data input and checking EPC.
Main Information in EPC	Energy rating scale [A+ to G] is based on 9 levels (A+, A, B, B-, C, D, E, F y G) and calculations are realized in terms of primary energy. Nominal CO2 emissions are also listed on the front page of the certificate. Recommendations are provided to the owner.
Qualification of certifiers and Quality Assurance	Certificates can only be issued by qualified experts (engineers and architects). Is mandatory to pass a specific training course. There are two types of quality assurance processes. A simply quality check and a detailed check.
Registers	A national database is available and is classified in Portuguese regions. This register is very useful to support administration for realizing checks on EPC and monitoring the quality assurance system and energy requirements of buildings.
Further Information	www.adene.pt www.dgge.pt www.apambiente.pt

ITEMS	SLOVENIA
Application of Certification Process	Certificates for new and public buildings are obligatory since the 1st of January 2008. All existing building and non-residential buildings need to be certified when they are sold or rented.
Minimum Energy Certification Requirements	There are not minimum requirements for energy certification. However, public and private investor are trending the process to design and construct B1, B2 or A class buildings. A building renovations is considered if refurbishment is more than 25% of the building envelope
Methodology and Certification Tools: Complexity and constraints	The calculation procedure is based on EN ISO 13790 and the other respective CEN EPBD standards Certificates for existing residential buildings always use calculated energy ratings.

	Certificates for non-residential buildings use measured ratings. Is considered HVAC systems, domestic hot water preparation and lighting systems (PURES Software)
Main Information in EPC	Energy rating scale [A1 to G] is based on annual energy need for heating [kWh/m².ear] Shows energy consumption [kWh/m².ear] and CO_2 emissions too
Qualification of certifiers and Quality Assurance	Obligatory qualification of assessors (technical degree like architecture or engineering) Regular training is necessary to maintain the license. Software for checking the input data before to get the EPC. Additional checks: data reviews or energy audits.
Registers	Electronic database of energy certificate which use the data and indicators collected.
Further Information	In case of existing buildings planed for sale, EPC must contain recommendations and measures to improve the energy efficiency. These strategies can be generic. www.gi-zrmk.si – National website projects related to EPC

ITEMS	SPAIN
Application of Certification Process	Available from the 12th of April 2013. Since November 2007: Renovations of buildings with a net floor area larger than 1000m² and a renovation of, at least, 25% of their enclosures.
Minimum Energy Certification Requirements	Existing buildings: It will be mandatory to get the EPC when they will be sold or rented Minimum level of energy rating scale: New Buildings: E Existing buildings: G Is mandatory to issue 2 types of EPC: In phase of project and when the building has just been finished.
Methodology and Certification Tools: Complexity and constraints	Features of Thermal envelope Properties of thermal installations and lighting for tertiary buildings Operational conditions (for tertiary buildings). Different free certification software has been appearing, with different levels of complexity. Difficult implementation of renewable and some innovative constructive solutions. For new buildings: CALENER, CERMA, Ce2, CES, Justification tables from Ministry (are not a software). For existing buildings: CALENER, CE3, CE3X
Main Information in EPC	Energy rating scale [A to G] is based on CO_2 global emissions rate [kg CO_2/m².ear] energy-consuming services rates (heating, cooling, sanitary hot water, and lighting for tertiary buildings) [kWh/m².ear] Shows the partial energy consumptions and CO_2 emissions too
Qualification of certifiers and Quality Assurance	Certifiers of Existing buildings: Designers of the buildings, the thermal installations or specialized technicians of energy certification External control must be realized by authorised companies or

	qualified independent technicians.
Registers	There is not a national register. Some Autonomous Communities have regional registers
Further Information	Nowadays, qualification of "specialized technicians of energy certification" are not still been defined by Administration. EPC of existing buildings will include recommendations and good practices in order to improve EE. Thus will imply viable measures of renovation from technical and economic point of view. http://gcee.aven.es – Register of EPC in Valencia Community.

ITEMS	TURKEY
Application of Certification Process	Energy Performance Certificate is compulsory for new and existing buildings which are over 1000 m^2 since January 2011.
Minimum Energy Certification Requirements	Energy certification is based on EP (kWh-m^2.year) values as shown below; minimum of class C is required; RG (reference point) is given in kWh/m^3.year For class A: EP < 0.4 RG For class B: 0.4 RG < EP < 0.8 RG For class C: 0.8 RG< EP < RG
Methodology and Certification Tools: Complexity and constraints	Calculation method will be used to evaluate building energy performance of buildings. National calculation method for Turkey (BEP-TR) has been developed to evaluate the impacts of all parameters that affects building energy consuming on building energy efficiency
Main Information in EPC	Final energy consumption need for heating and cooling of the building [A to G in kWh/m^2.ear] And CO_2 emissions [Kg CO_2/m^2.ear]
Qualification of certifiers and Quality Assurance	Obligatory qualification of assessors (technical degree like architecture or engineering) Regular training is necessary to maintain the license.
Registers	Electronic submission system is available, the submission is sent to Ministry of Energy, after the evaluation, the certificate is given.
Further Information	This certificate includes the information about isolation properties, heating and/or cooling systems of the buildings too. http://www.csb.gov.tr/db/samsun/webmenu/webmenu4379.pdf www.bep.gov.tr

8.3 Other certification processes related to energy efficiency in buildings:

White Certification

This type of certification affects energy providers and distributors in order to obtain a certain level of energy savings in a specific period of time. These savings can get through energy efficiency projects in different sectors, which include residential and tertiary buildings.

According to the European Directive 2006/32/EC, currently repealed, a number of Member States of the European Union introduced market-based policy portfolios based on quantified energy savings obligations on energy distributors or suppliers, possibly coupled with certification of project-based energy savings; Projects savings verified by the regulator and certified by means of the so-called "white" certificates (certificates for energy savings).

United Kingdom, Denmark and Belgium (Flemish region) implanted this certification scheme. In Mediterranean area, France and Italy did it and set these obligations to their electricity and gas suppliers.

In French case, when an energy supplier implements energy savings measures for energy consumers, it receives a white certificate. From 2006 to 2009, 91% of energy savings were carried out through energy refurbishment in residential buildings.

In Italy, distributors with more than 100,000 clients must have a white certificate. They measure their energy savings in primary energy. Distributors are regulated organizations, which are regional monopolies. Projects were executed by ESCOs.

However, experiences about this white certificate have been studied by EU in order to analyse its implantation on the rest of Europe. The European Directive 2012/27/EU show the main conclusions and new advices for the State Members: "An assessment of the possibility of establishing a 'white certificate' scheme at Union level has shown that, in the current situation, such a system would create excessive administrative costs and that there is a risk that energy savings would be concentrated in a number of Member States and not introduced across the Union. The objective of such a Union-level scheme could be better achieved, at least at this stage, by means of national energy efficiency obligation schemes for energy utilities or other alternative policy measures that achieve the same amount of energy savings. It is appropriate for the level of ambition of such schemes to be established in a common framework at Union level while providing significant flexibility to Member States to take fully into account the national organisation of market actors, the specific context of the energy sector and final customers' habits. The common framework should give energy utilities the option of offering energy services to all final customers, not only to those to whom they sell energy. This increases competition in the energy market because energy utilities can differentiate their product by providing complementary energy services. The common framework should allow Member States to include requirements in their national scheme that pursue a social aim, in particular in order to ensure that vulnerable customers have access to the benefits of higher energy efficiency. Member States should determine, on the basis of objective and non-discriminatory criteria, which energy distributors or retail energy sales companies should be obliged to achieve the end-use energy savings target laid down in this Directive".

Environmental certification of buildings

In the last decade, different public and private associations around the world have carried out a remarkable effort in the elaboration of tools that predict the impact produced by buildings. They incorporate several evaluation criteria, including energy aspects.

This kind of certification schemes are voluntary and try to respond to different needs of the building industry and final users:

- Guaranteeing the achieved savings and results.
- Giving Visibility of good practices in construction. Accomplishment of national normative frameworks where certification process is implanted.
- Improving the image of building companies and owners. Social Corporative Responsibility.
- Differentiation of the final product: Buildings with an environmental certificate can reduce their energy consumption from 30% to 50% and waste of water around 40%.

The environmental certification process is different in function depending on the type of certificate or association which is promoting it. In most of cases, qualified professionals are needed to certify a building as external experts. They must verify the level of accomplishment of standards in every certificate.

The following table lists the main environmental certificates which have developed their own certification scheme in the Mediterranean regions, focusing on those which specifics procedures for refurbishment of buildings:

Environmental certificate	Mediterranean Countries where exist registered / certified buildings
Green Building Council (national certifications)	France Italy Spain
BREEAM	Bulgaria, France, Greece, Italy, Malta, Portugal, Slovenia, Spain, Turkey
LEED	Bulgaria France Spain Turkey Italy
HQE	France

Table 3: Summary of Environmental Certificates for buildings within the Mediterranean

9. REFERENCES

Section 2 (Business Models)

(1) Energy Service Companies Market in Europe (Status report 2010). JRC- Institute of Energy - European Commission. 2010.

(2) Promoting Energy Efficiency in Buildings: Lessons learned from international Experience (United Nations Development Programme)

(3) Energy Service Companies, ESCOs: New business model. Energylab – Spanish Platform of Energy Eficiency. 2011.

(4) Promotion Manual of ESCO. Spanish association of agencies of energy management. 2011.

(5) Energy Service models (ESCO): Business opportunities. Industrial observatory of the capital goods sector.

(6) How to refurbish all buildings by 2050 (THINK. Seventh Framework Program). 2012.

(7) Regional Benchmark Analysis for the Supply Side, within MARIE project, *Mediterranean Building rethinking for Energy Efficiency Improvement*. (Med, Europe in the Mediterranean). 2012.

Links:

(8) http://web.greengrowth.eu/

(9) http://www.energysequel.com/

(10) http://www.atiraenergy.com/esco

(11) TURKEY: http://www.izoder.org.tr/

Section 3 (Building Stock Characterization)

(12) Residential buildings refurbishment guide (Madrid energy foundation - Ministry of Economy and Consumption, DG organization Industry, Energy and Mines). 2008.

(13) MARIE project, *Mediterranean Building rethinking for Energy Efficiency Improvement*. (Med, Europe in the Mediterranean). 2012.

(14) Europe Buildings under the Microscope by Buildings Performance Institute Europe (BPIE). 2011.

(15) Energy Efficiency policies in buildings-The use of finaltial instruments at member state level, by Buildings Performance Institute Europe (BPIE). 2012.

(16) Housing Building Review, the nuts and bolts of European social housing systems by CECODHAS Housing Europe's Observatory, Brussels (Belgium). 2011.

(17) Energy, Climate change and the Building sector in the Mediterranea Regional Prospects. Coordinated by El Habib El Andaloussi (Plan Bleu) and Stéphane Pouffary (ADEME). Financed under the FEMIP Trust Fund. 2011.

(18) TABULA, Typology Approach for Building Stock Energy Assessment (Intelligent Energy Europe). 2012.

(19) Regular National Report on Housing Developments in European Countries. Department of the Environment, Heritage and Local Government Ireland. 2004.

(20) Environmental improvement Potentials of Residential Buildings (IPRO-Building). European commission – Joint Research Centre (JRC). 2008.

(21) Housing Statistics in the European Union 2010. The Hague: Ministry of the Interior and Kingdom Relations, OTB Research Institute for the Built Environment, Delft University of Technology. 2010.

(22) Energy demands in European of European Buildings: A Mapping of Available data, Indicators and Models. CHALMERS UNIVERSITY OF TECHNOLOGY. 2007.

(23) Design with Climate: An Approach to Bioclimatic Regionalism, Victor Olgyay. 1963

Links:

(24) http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

(25) www.ine.es

(26) http://www.buildupskills.eu/

(27) http://www.cea.org.cy/TOPICS/Buildings/BuildingstypologyCyprus.pdf

(28) (National Statistical Institute, NSI, BG, Bulgaria
http://www.nsi.bg/otrasalen.php?otr=45&a1=1902&a2=1903#cont

(29) Total Dwellings Stock: Malta Census of Population and Housing 2005,
http://www.nso.gov.mt/statdoc/document_file.aspx?id=2096

(30) TÜİK 2000 Building Census http://www.tuik.gov.tr

(31) http://www.globalquakemodel.org/system/files/doc/Meetings/BuildingInventory_workshop/NERA-GEM_Building_Workshop-Erdik_Turkey.pdf

(32) http://www.portal-eficienciaenergetica.com.pt/nacional.html

(33) http://www.etek.org.cy

(34) http://www.businessincyprus.gov.cy

(35) https://intweb.tse.org.tr/TSEIntWeb/Standard/Standard/Standard.aspx?0811180511151080511041191101040550471051021200881110431131040730870840490700511050521210750900 54

(36) https://intweb.tse.org.tr/TSEIntWeb/Standard/Standard/Standard.aspx?0811180511151080511041191101040550471051021200881110431131040731011091060790481120481220521170 48

(37) http://www.mmo.org.tr/resimler/dosya_ekler/cf3e258fbdf3eb7_ek.pdf?tipi=68&turu=X&sube=1

(38) http://www.izoder.org.tr/isiyalitimi/mevzuat/isiyalitimyonetmeligi.pdf

(39) http://www.enerji.gov.tr/mevzuat/5627/Binalarda_Enerji_Performansi_Yonetmeligi.pdf

(40) http://www.enerji.gov.tr/tr/dokuman/Enerji_Kaynaklarinin_ve_Enerjinin_Kullanimin da_Verimliligin_Artirilmasina_Dair_Yonetmelik.pdf

(41) http://mevzuat.dpt.gov.tr/kanun/5627.htm

(42) http://www.sevbcsd.org.gr/article/168/energy-efficiency-buildings-business-opportunity-greece-eufores-24112012

References about construction systems over the years:

Spain

(43) http://www.building-typology.eu/country/typology-es.html
(44) www.renov.proyectoedea.com (in near future)

Malta

(45) Doc F - Min Requirements on the EPB regulations, Building Regulations Office,
(46) Malta's Energy Efficiency Action Plans (NEEAP)

Italy

(47) http://www.sviluppoeconomico.gov.it/
(48) http://www.enea.it/it
(49) http://www.ance.it/

Cyprus

(50) "BUILD UP Skills – Cyprus. Analysis of the National Status Quo" (2012)

Turkey

(51) Tapping the Potential for Energy Savings in Turkey. Sustainable Development Department (ECSSD). 2011
(52) Europe and
(53) Central Asia Region (ECA)

Section 4 (EE solutions and Techniques)

(54) E4R project, *Assessment tools building energy efficiency, Refurbishment in SUDOE space*. 2012. Supported by Interreg IV SUDOE. 2010-2012 (www.e4rprject.eu)

Section 5 (Market Up-Taken Measures)

(55) Energy Efficiency Policies in Buildings –The use of Financial instruments at Members State level. Buildings Performance Institute Europe (BPIE). 2012.

Links:

(56) http://www.five.es/component/content/article/90-el-ive-participa-en-el-proyecto-europeo-elih-med-energy-efficiency-in-low-income-housing-in-the-mediterranean.html

(57) http://www.buildup.eu/publications/20799

Bulgaria:

(58) CA EPBD PROJECT: The Concerted Action Energy Performance of Buildings, supported by Energy Intelligent Europe within the EU's Competitiveness and Innovation Programme.

Croatia:

(59) CA EPBD PROJECT: The Concerted Action Energy Performance of Buildings, supported by Energy Intelligent Europe within the EU's Competitiveness and Innovation Programme.

(60) www.fzoeu.hr

Cyprus:

(61) Energy Service of the Ministry of Commerce, Industry and Tourism of Cyprus. 2nd National Energy Efficiency Action Plan for Cyprus (2011) http://www.buildup.eu/publications/20799

(62) CIE: Cyprus Institute of energy

(63) http://www.cie.org.cy

France

(64) E4R PROJECT: Evaluation of Energy Efficiency Tools. Retrofitting in SUDOE Space, supported by Interreg IV SUDOE (2010-2012)

Greece:

(65) ODISEE-MURE 2010 PROJECT: Energy Efficiency Policies and Measures in Greece in 2012, supported by Energy Intelligent Europe Programme.

Italy:
(66) Law 296/2006 – 2007
(67) DM 25/11/2008
(68) DM 05/07/2012
(69) DM 06/07/2012
(70) Circ. 16/02/2012
(71) DM 28/12/2012.
(72) Circ. 18/01/2013

Malta:
(73) Malta Resources Authority http://mra.org.mt/
(74) Malta's Energy Efficiency Action Plans (NEEAP)

Portugal:
(75) E4R PROJECT: Evaluation of Energy Efficiency Tools. Retrofitting in SUDOE Space, supported by Interreg IV SUDOE (2010-2012)

Slovenia:
(76) National eco fund: www.ekosklad.si

Spain:
(77) Royal/Decree Law 6/2010

(78) www.idae.es

(79) E4R PROJECT: Evaluation of Energy Efficiency Tools. Retrofitting in SUDOE Space, supported by Interreg IV SUDOE (2010-2012)

Section 6 (energy efficiency encouragement and promotion measures)

(80) http://www.buildup.eu/publications/20799

(81) http://www.mrrb.government.bg/index.php?lang=bg&do=ispa

(82) www.construction21.eu/italia

(83) www.spineciudad.net

Section 7 (cross-sectorial cooperation)

(84) Projects related to building retrofitting funded under the Intelligent Energy Europe Programme (IEE):

(85) "promoting renovation of schools in a mediterranean climate up to nearly zero-energy buildings" (zemeds)

(86) Power houses nearly zero challenge! (power house nzc)

(87) Enhancing efficient implementation of sustainable energy action plans in European islands through reinforcement of smart multilevel governance (SMILEGOV)

(88) Tool-Kit for "Passive House Retrofit" (E-RETROFIT-KIT)

(89) Marketable Passive Homes for Winter and Summer Comfort (PASSIVE-ON)

(90) Techno-economical assessment of the production and use of biofuels for heating and cooling applications in South Europe (BIO-SOUTH)

(91) http://www.mcst.gov.mt/national-funding/ri-programme/funded-ri-projects/ri-2006-009-development-innovative-wastewater

(92) http://www.architecture.org.cy

(93) http://www.etek.org.cy

Section 8 (Certification Processes)

(94) Directive 2002/91/EC of the European Parliament and of the Council of 16 December2002 on the energy performance of buildings.

(95) Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

(96) Directive 2012/21/EU commission implementing directive 2012/21/eu of 2 august 2012 amending, for the purpose of adaptation to technical progress, annexes ii and iii to Council Directive 76/768/EEC relating to cosmetic products.

(97) E4R PROJECT: Evaluation of Energy Efficiency Tools. Retrofitting in SUDOE Space, supported by Interreg IV SUDOE (2010-2012)

(98) CA EPBD PROJECT: The Concerted Action Energy Performance of Buildings, supported by Energy Intelligent Europe within the EU's Competitiveness and Innovation Programme.

(99) ASIEPI PROJECT: Assessment and Improvement of the EPBD Impact, supported by Energy Intelligent Europe Project (2007 – 2010).

(100) ENFORCE PROJECT, supported by Intelligent Energy Europe. IEE project number IEE/08/599

(101) CEN / TR 15615:2008. Explanation of the general relationship between various European standards and the Directive on the Energy Performance of Buildings (EPBD) - Umbrella Document.

(102) "Assessment and Experience of White Certificate Schemes in the European Union" - Paolo Bertoldi

(103) European Commission, Directorate General JRC

(104) BREEAM building list
http://www.greenbooklive.com/search/scheme.jsp?id=202

(105) LEED building list
https://www.usgbc.org

(106) Green building council
http://www.worldgbc.org

ANNEX **A**

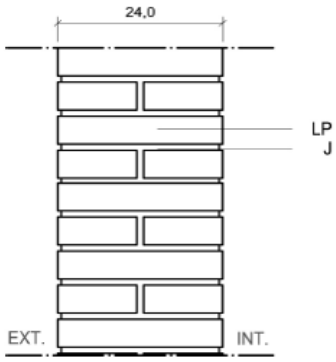
1. FACADES

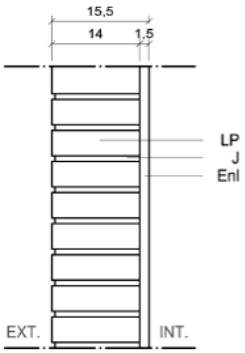
Depending on the composition and the materials the facades have different energetic qualities and the classification we have done comes basically from the European project E4R. The different compositions are:

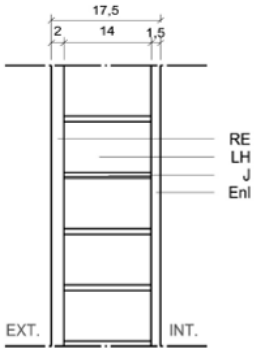
* **Single leaf Façade "F.HS":** Those kinds of FACADES are constructed by one leaf.
* **Double sheet façade "F.HD":** those FACADES have two sheets, the principal which is the support and the secondary.
* **Ventilated façade "FV":** This kind of façade presents one ventilated air on the exterior

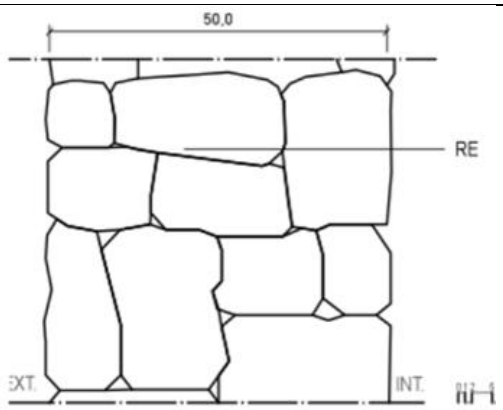
The abbreviations table:

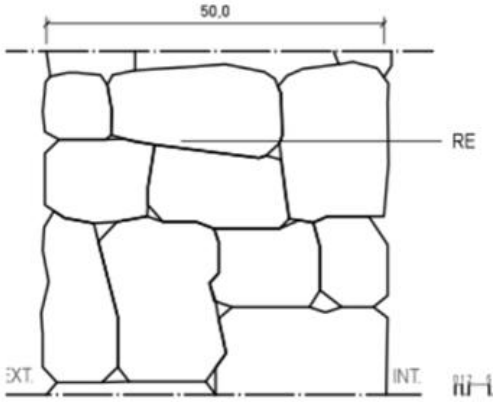
Abr.	Composition
AT	Thermal Insulation (fibber glass)
	Agglomerated cork
AD	Adobe Block
BA	Waterproofing
BC	Lightweight ceramic block tongued
BG	Granite block
BH	Concrete block
BH AD	Concrete block dense aggregated
BH AL-H	Hollow concrete block aggregated lightweight
BH AL-M	Solid concrete block aggregated lightweight
BH AL-P	Perforated concrete block aggregated lightweight
BP	Cinder Block
BPC	Limestone block
BPP	Porous stone block
BV	Vapour barrier
C	Air chamber
CI	Non-ventilated air chamber
CV	Ventilated air chamber
Enl	Plastering
GRC	GRC precast panel
H-M	Solid concrete
H-AL	Lightweight concrete
LH	Hollow ceramic brick
LHO	Perforated concrete brick
LM	Solid ceramic brick
LP	Perforated ceramic brick
LGF	Large ceramic brick
RE	Continuous Cladding (plaster) or discontinuous (veneer glued or fixed
	Exterior coating with cement mortar
	Exterior marble cladding type
RM	Intermediate coat. For example, a plaster on the interior face of the sheet
SP	Gap with the base: 10mm
YL	Gypsum plasterboard
T	Waterproof board or panel
Tm	Wooden partition
PS	Sandwich panel
PH	Concrete panel

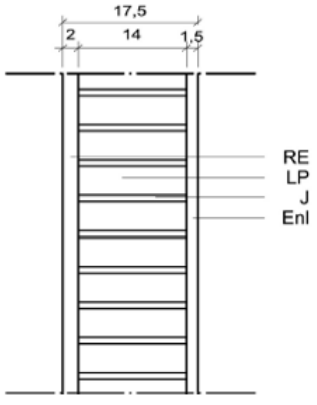
F.HS.1	**Single leaf façade**	<1949
Description: Single leaf façade of perforated ceramic brick, facing, 24cm thick		
		**Characterizes:** **Total thickness** (m)=0,24 **U** (W/m2K)=1,83

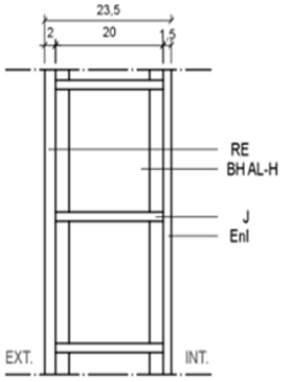
F.HS.2	**Single leaf façade**	<1949
Description: Single sheet façade of perforated ceramic brick of 14 cm thick with cement mortar joints and lining trim and plaster.		
		**Characterizes:** **Total thickness** (m)=0,16 **U** (W/m2K)=2,41

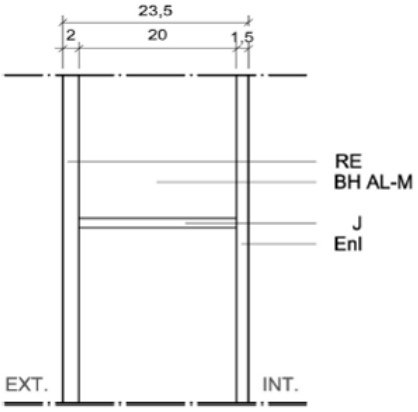
F.HS.3	**Single leaf façade**	<1949
Description: Single sheet façade of hollow ceramic brick with continuous outer coating, 14 cm thick with cement mortar joints and inner lining of plaster.		
		**Characterizes:** **Total thickness** (m)=0,18 **U** (W/m2K)=1,90

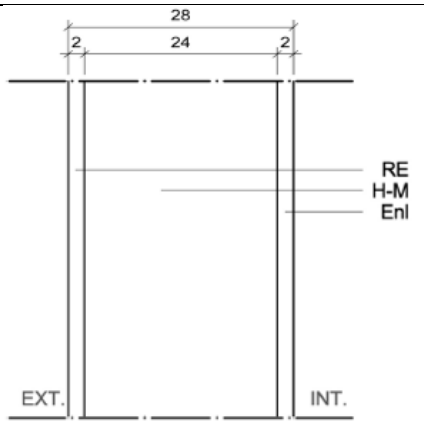
F.HS.4	**Single leaf façade**	<1949
Description: Single sheet façade of limestone masonry factory, 50 cm thick, with mortar.		
		**Characterizes:** **Total thickness** (m)=0,50 **U** (W/m2K)=2,58

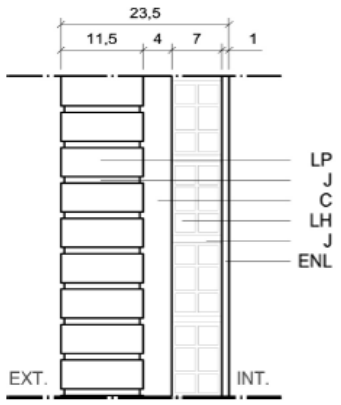
F.HS.5	**Single leaf façade**	<1949
Description: Single sheet façade of granite masonry factory, 50 cm thick, with mortar.		
		**Characterizes:** **Total thickness** (m)=0,50 **U** (W/m2K)=2,87

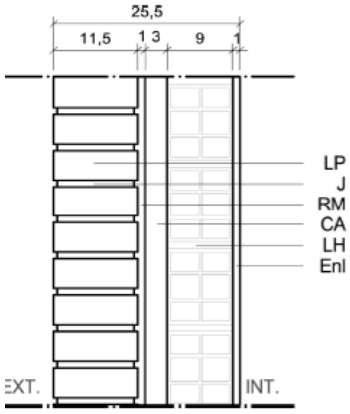
F.HS.6	**Single leaf façade**	1950-1959
Description: Single sheet façade of perforated ceramic brick with continuous outer coating, 14 cm thick, with cement mortar joints and inner lining of plaster.		
		**Characterizes:** **Total thickness** (m)= 0,18 **U** (W/m2K)= 2,34

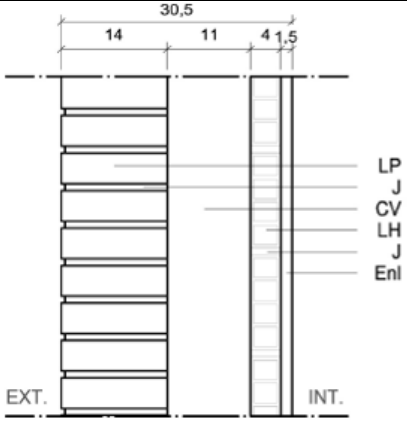
F.HS.7	**Single leaf façade**	1950-1959
Description: Single sheet façade of masonry wall of perforated lightweight concrete block of 20cm thick, with continuous outer coating, with continuous outer coating, cement mortar joints and inner lining trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,24 **U** (W/m2K)= 1,03

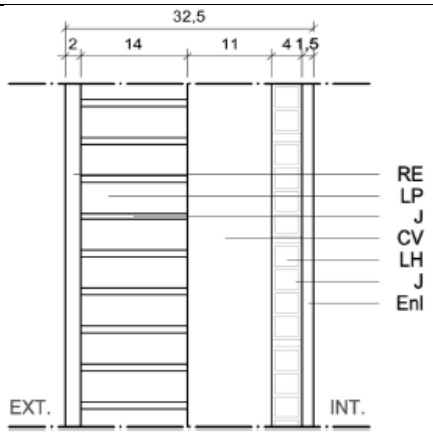
F.HS.8	**Single leaf façade**	1950-1959
Description: Single sheet façade of masonry wall of solid lightweight concrete block of 20cm thick, with continuous outer coating, with continuous outer coating, cement mortar joints and inner lining trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,24 **U** (W/m2K)= 1,11

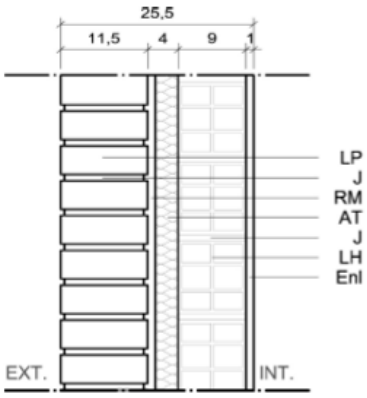
F.HS.9	**Single leaf façade**	1950-1959
Description: Single sheet façade of single sheet of reinforced concrete in situ dense aggregate of 24cm thick, with continuous outer coating, with continuous outer coating, cement mortar joints and inner lining trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,24 **U** (W/m2K)= 1,10

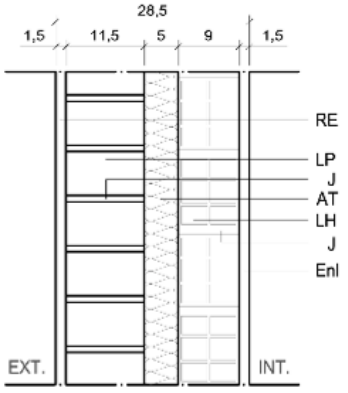
F.HD.10	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of ceramic perforated brick, facing of 11,5cm thick, with cement mortar joints and non-ventilated air space. Cladding freestanding masonry double hollow ceramic brick 7cm thick, with lined trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,24 **U** (W/m2K)= 1,45

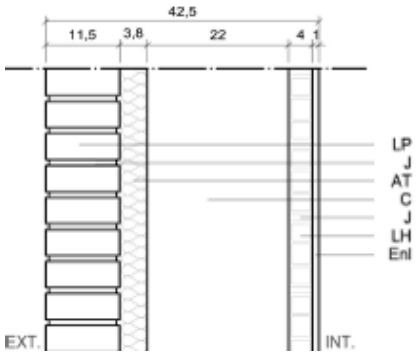
F.HD.11	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of ceramic perforated brick, facing of 11,5cm thick, with cement mortar joints and ventilated air space with intermediate cated. Cladding freestanding masonry double hollow ceramic brick 9cm thick, with lined trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,26 **U** (W/m2K)= 1,18

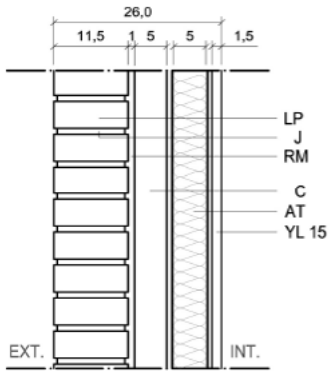
F.HD.12	**Double leaf façade**	1960-1979
Description: Double sheet façade of exterior masonry wall of solid ceramic brick, facing of 14cm thick, with cement mortar joints and ventilated air space. Cladding freestanding masonry double hollow ceramic brick 9cm thick, with lined trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,31 **U** (W/m2K)= 1,87

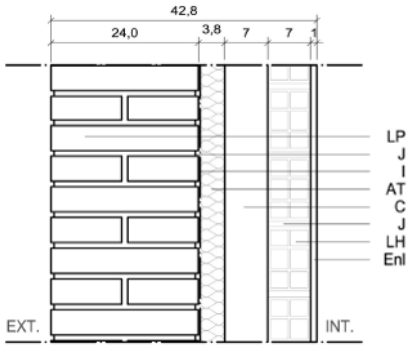
F.HD.13	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of perforated ceramic brick, with continuous coating, facing of 14cm thick, with cement mortar joints and ventilated air space. Cladding freestanding masonry hollow ceramic brick of 4cm thick, with lined trim.		
		**Characterizes:** **Total thickness** (m)= 0,33 **U** (W/m2K)= 1,62

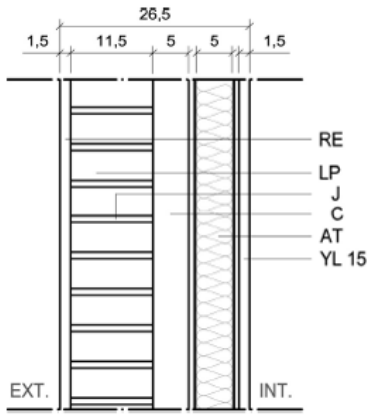
F.HD.14	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of perforated ceramic brick, facing of 14cm thick, with intermediate coated, cement mortar joints and glass fiber thermal insulation of 3cm thick. Cladding freestanding masonry double hollow ceramic brick of 9cm thick, with lined trim.		
		**Characterizes:** **Total thickness** (m)= 0,26 **U** (W/m2K)= 0,67

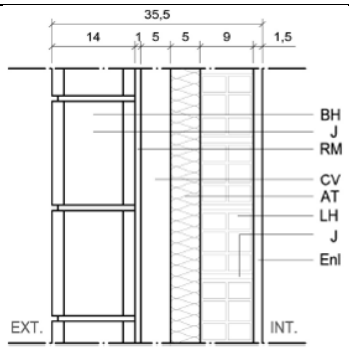
F.HD.15	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of perforated ceramic brick, facing of 11,5cm thick, with continuous exterior coated and thermal insulation of 5cm thick, cement mortar joints. Cladding freestanding masonry double hollow ceramic brick of 9cm thick, with lined trim.		
		**Characterizes:** **Total thickness** (m)= 0,29 **U** (W/m2K)= 0,52

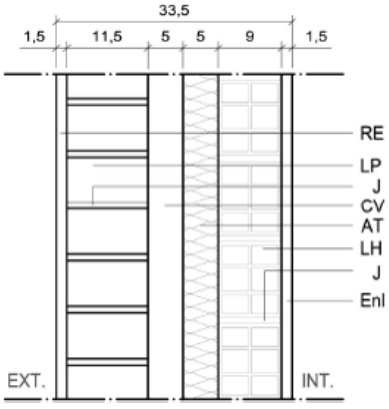
F.HD.16	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of perforated ceramic brick, facing of 11,5cm thick, with continuous exterior coated and thermal insulation of agglomerated cork 3,8cm thick, cement mortar joints. Cladding freestanding masonry simple hollow ceramic brick of 4cm thick, with lined trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,43 **U** (W/m2K)= 0,65

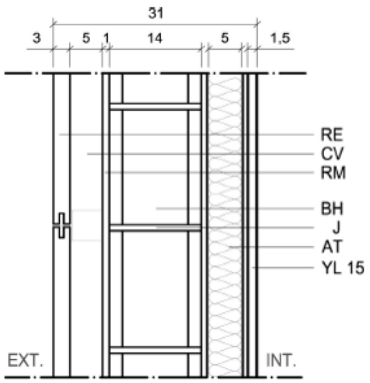
F.HD.17	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of perforated ceramic brick, facing of 11,5cm thick, with cement mortar joints and non-ventilated air chamber. Cladding formed by self-supporting lattice of U of galvanized steel, intermediate insulation thermal conductivity 0,033W/mk and plasterboard mechanically fixed to the grid.		
		**Characterizes:** **Total thickness** (m)= 0,24 **U** (W/m2K)= 0,47

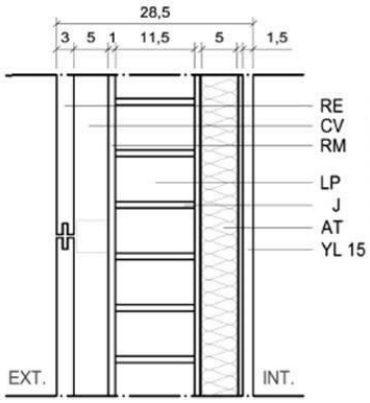
F.HD.18	**Double leaf façade**	1960-1979
Description: Double sheet façade of single sheet of exterior masonry wall of perforated ceramic brick, facing of 24cm thick, with cement mortar joints, with a primer hot applied, agglomerated cork insulation thickness of 3,8cm, non-ventilated air chamber 7cm thick. Cladding freestanding masonry double hollow ceramic brick of 7cm thick, with lined trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,44 **U** (W/m2K)= 0,56

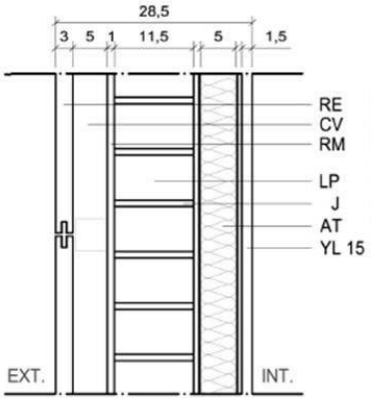
F.HD.19	**Double leaf façade**	1980-2007
Description: Double sheet façade of single sheet of exterior masonry wall of perforated ceramic brick of 11,5cm, with cement mortar joints and continuous exterior coating and non-ventilated air space. Cladding formed by self-supporting lattice of U of galvanized steel, intermediate insulation thermal conductivity 0,033W/mk and plasterboard mechanically fixed to the grid.		
		**Characterizes:** **Total thickness** (m)= 0,25 **U** (W/m2K)= 0,48

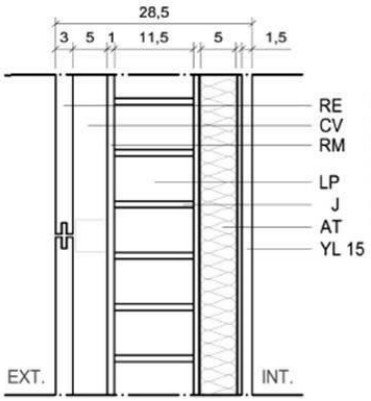
F.HD.20	**Double leaf façade**	1980-2007
Description: Double sheet façade of single sheet of exterior masonry wall concrete block of 14cm, with cement mortar joints and ventilated air space and thermal insulation of conductivity 0,033W/mK. Cladding freestanding masonry double hollow ceramic brick of 9cm thick, with lined trim.		
		**Characterizes:** **Total thickness** (m)= 0,36 **U** (W/m2K)= 0,45

F.HD.21	**Double leaf façade**	1980-2007
Description: Double sheet façade of single sheet of exterior masonry wall of perforated brick of 11,5cm, with exterior continuous coating, cement mortar joints and thermal insulation of conductivity 0,033W/mK. Ventilated air chamber and cladding freestanding masonry double hollow ceramic brick of 9cm thick, with lined trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,34 **U** (W/m2K)= 0,46

F.V.22	**Ventilated façade**	1980-2007
Description: Ventilated façade of masonry concrete hollow block of 14cm thick, cement mortar joints and outer discontinuous coating of marble pieces mechanically fastened and ventilated air chamber at the outside side of the façade. Mixed mortar coating on the outer face of the block factory. Cladding formed by self-supporting lattice of U of galvanized steel, intermediate insulation thermal conductivity 0,033W/mk and plasterboard mechanically fixed to the grid.		
		**Characterizes:** **Total thickness** (m)= 0,30 **U** (W/m2K)= 0,49

F.V.23	**Ventilated façade**	1980-2007
Description: Ventilated façade of masonry perforated ceramic brick of 11,5cm thick, cement mortar joints and outer discontinuous coating of marble pieces mechanically fastened and ventilated air chamber at the outside side of the façade. Mixed mortar coating on the outer face of the block factory. Cladding formed by self-supporting lattice of U of galvanized steel, intermediate insulation thermal conductivity 0,033W/mk and plasterboard mechanically fixed to the grid.		
		**Characterizes:** **Total thickness** (m)= 0,27 **U** (W/m2K)= 0,49

F.V.24	**Ventilated façade**	1980-2007
Description: Ventilated façade of masonry hollow concrete block of 14cm thick, cement mortar joints and outer discontinuous coating of marble pieces mechanically fastened and ventilated air chamber at the outside side of the façade. High resistance barrier to leakage formed by very ventilated and thermal insulation non hydrophilic, conductivity 0,033W/mk on the outside of the façade and inner lining and trim and plaster.		
		**Characterizes:** **Total thickness** (m)= 0,30 **U** (W/m2K)= 0,49

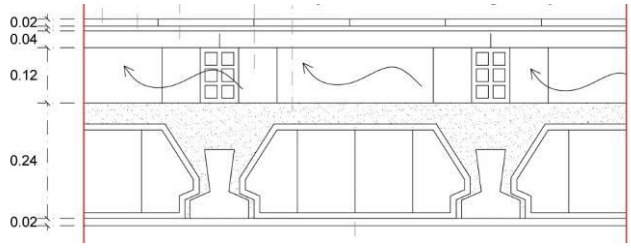
F.V.25	**Ventilated façade**	1980-2007
Description: Ventilated façade of masonry wall of perforated ceramic brick of 11,5cm thick, cement mortar joints and outer discontinuous coating of marble pieces mechanically fastened and ventilated air chamber at the outside side of the façade. High resistance barrier to leakage formed by very ventilated and thermal insulation non hydrophilic, conductivity 0,033W/mk on the outside of the façade. Self-supporting lattice cladding and plasterboard plates (plate thickness 1.5 cm)		
		**Characterizes:** **Total thickness** (m)= 0,30 **U** (W/m2K)= 0,49

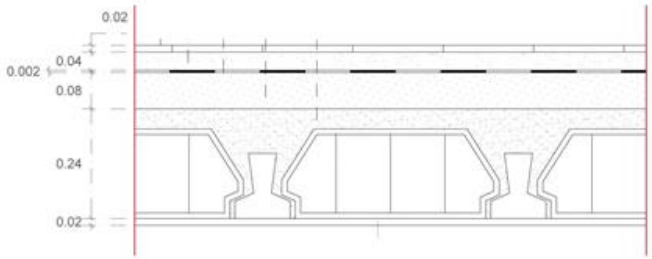
2. ROOFS

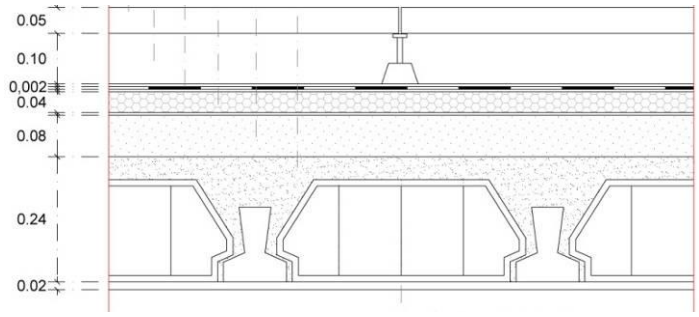
This is the element that receives more solar radiation in summer and more exposed to frost in winter. The roof supports different configurations depending on the weather outside and the structural configuration of the same:

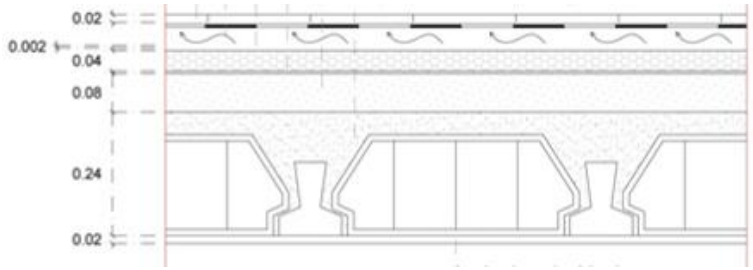
* FLAT: conventional, inverted, light, heavy, isolated, non-isolated, ventilated and not ventilated.
* Steep slope greater than 5%: conventional, inverted, light, heavy, isolated, non-isolated, ventilated and not ventilated.

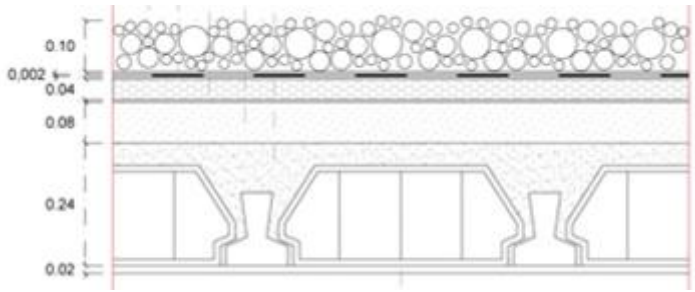
-FLAT ROOFS-

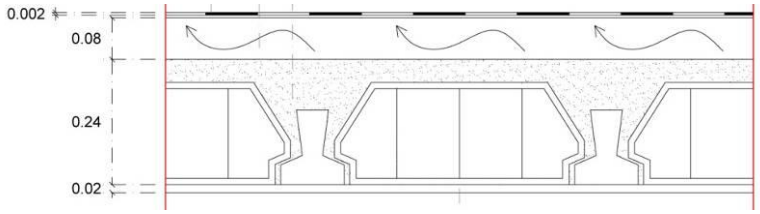
FR.1	**Flat roof, no insulation, passable, ventilated with fixed flooring**	< 1949
Description: Conventional flat roof, walkable pedestrian, air chamber. Ventilated ceramic wall under ceramic tiles. The partitions rely on the resilient support is formed by a unidirectional fabric infill elements ceramic, plaster on its inner face.		
		**Characterizes:** **Total thickness** (m)= 0,46 **U** (W/m2K)= 1,29

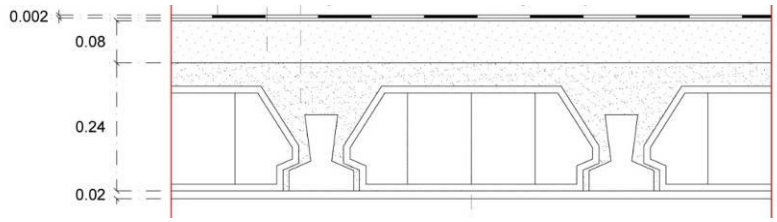
FR.2	**Flat roof, no insulation, passable, not ventilated with fixed flooring**	1949-1981
Description: Conventional flat roof, walkable pedestrian, air chamber. Finishing ceramic tiles together by cement mortar and resting on the resilient support is formed by a unidirectional fabric infill elements ceramic, plaster on its inner face.		
		**Characterizes:** **Total thickness** (m)= 0,42 **U** (W/m2K)= 0,67

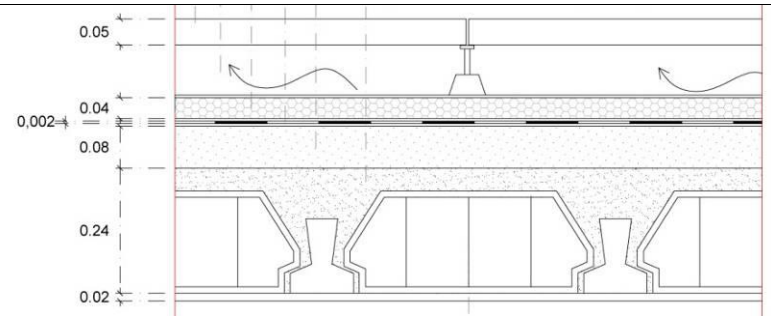
FR.3	**Flat roof with insulation, conventional, passable, airy, floating screed**	1949-1981
Description: Conventional flat roof, walkable pedestrian, air chamber. Pavement floating on stilts with the waterproofing layer above the insulation, lightweight concrete resting on the formation of earrings. The whole rests on a resilient support base of a unidirectional forging infill with ceramic elements, and plaster by its inner face.		
		**Characterizes:** **Total thickness** (m)= 0,56 **U** (W/m2K)= 0,59

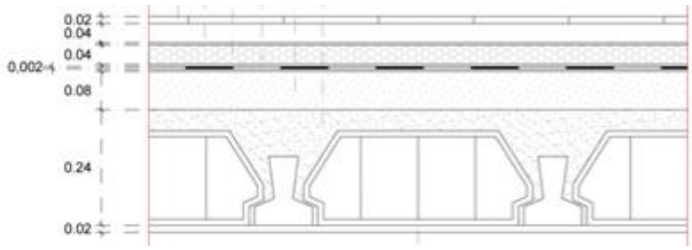
FR.4	**Flat roof with insulation, conventional, passable, ventilated, fixed screed**	1949-1981
Description: Conventional flat roof, walkable pedestrian, air chamber. Ceramic finish, the waterproof sheet is placed above the insulation; it rests on lightweight aggregate concrete with pending. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)= 0,52 **U** (W/m2K)=0,60

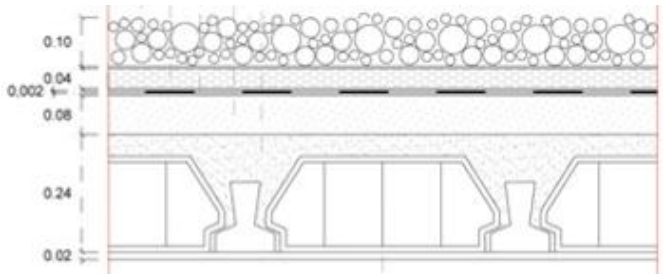
FR.5	**Flat roof with insulation, conventional, no-passable, no-ventilated, fixed screed**	1949-1981
Description: Conventional flat roof, no-walkable pedestrian, air chamber. Finishing gravel separating layer, the waterproof sheet is placed above the insulation, it rests on lightweight aggregate concrete with pending. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)= 0,46 **U** (W/m2K)=0,62

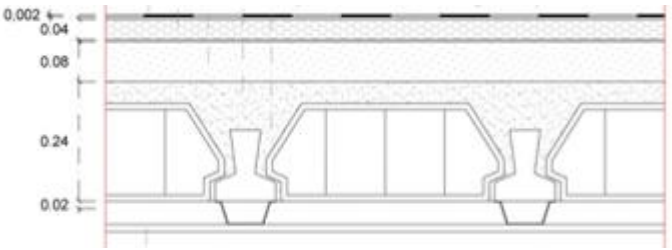
FR.6	**Conventional flat roof, no insulation, not passable, ventilated, self-protected**	1949-1981
Description: Conventional flat roof, without isolation, not passable, with air chamber. Surface finish of bitumen sheet waterproofing. Construction of slopes with aerated concrete. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)= 0,37 **U** (W/m2K)= 1,83

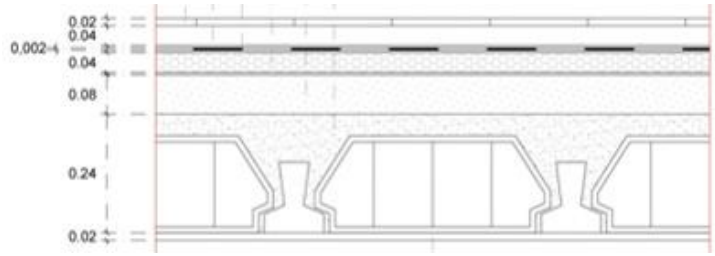
FR.7	**Conventional Flat roof, no insulation, not passable, not ventilated, self-protected**	1949-1981
Description: Conventional flat roof, without isolation, not passable, without air chamber. Surface finish PVC foil. Construction of slopes with aerated concrete. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)= 0,37 **U** (W/m2K)= 1,92

FR.8	**Flat roof with insulation, inverted, walkable, airy, floating screed**	>1981
Description: Inverted roof, insulated, passable, with air chamber. Pavement floating on supports, with waterproofing sheet below the insulation that rests on lightweight aggregate concrete with pending. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)= 0,56 **U** (W/m2K)= 0,59

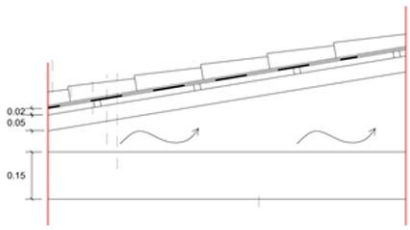
FR.9	**Flat roof with insulation, inverted, passable, not ventilated, fixed screed**	>1981
Description: Inverted roof, insulated, passable, without air chamber. Ceramic finish, the waterproof sheet is placed below the thermal insulation; it rests on lightweight aggregate concrete with pending. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)=0,42 **U** (W/m2K)=0,64

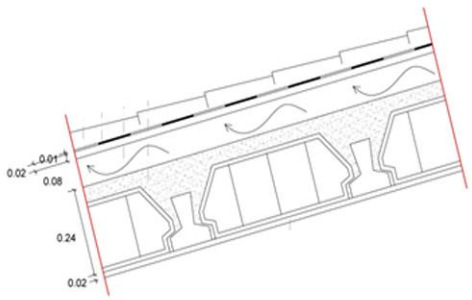
FR.10	**Flat roof with insulation, inverted, not passable, not ventilated, gravel finish**	>1981
Description: Inverted roof, insulated, not passable, tubeless. Finishing gravel separating layer, the waterproof sheet is placed below the thermal insulation, it rests on lightweight aggregate concrete with pending. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)= 0,46 **U** (W/m2K)= 0,62

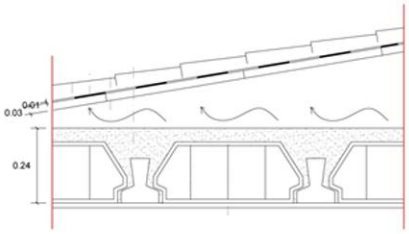
FR.11	**Flat roof with insulation, conventional, not passable, not ventilated, self-protected**	>1981
Description: Conventional flat roof, with insulation, not passable, tubeless. Surface finish waterproofing bitumen sheet placed over the thermal insulation. Construction of slopes with aerated concrete. Sturdy support forged based on a unidirectional ceramic elements infill. With ceiling of plasterboard plate without insulation adhered.		
		**Characterizes:** **Total thickness** (m)= 0,41 **U** (W/m2K)= 0,63

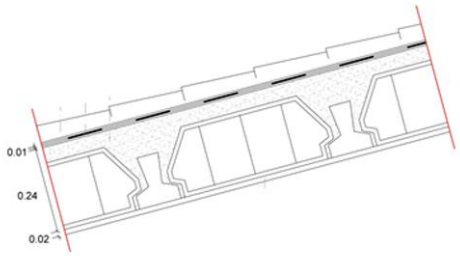
FR.12	**Flat roof with insulation, conventional, passable, unventilated fixed screed**	>1981
Description: Conventional flat roof, with insulation, walkable, tubeless. Finishing of ceramic tiles bonded using cement mortar. Construction of slopes with aerated concrete. Sturdy support forged based on a unidirectional ceramic elements infill and plaster on inside.		
		**Characterizes:** **Total thickness** (m)= 0,42 **U** (W/m2K)= 0,65

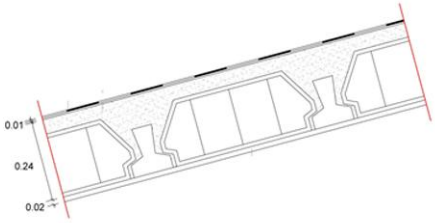
-PITCHED ROOFS-

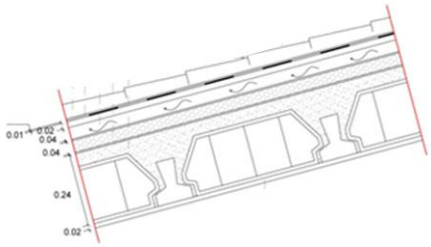
PR.13	**Pitched roof, no insulation, forged horizontal house, ventilated roof**	<1949
Description: The sloping surface is made by with ceramic tiles on wooden boards supported on inclined beams. Under the sloping surface and in horizontal, there is a slab with wood beams and plaster as filler. The lower termination is achieved by a plaster applied on a hurdle.		
		**Characterizes:** **Total thickness** (m)= 0,17 **U** (W/m2K)= 1,66

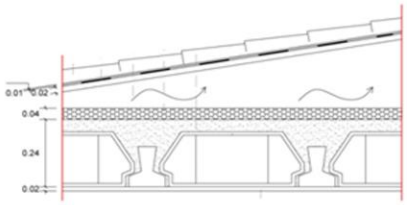
PR.14	**Pitched roof, no insulation, inclined slab, ventilated roof**	1949 - 1981
Description: Pitched roof, no insulation, with a ventilated chamber. The skirt is made with ceramic tiles on wooden boards supported on inclined beams. There is a living space under the deck tilt stand. Finishing ceramic tiles above wood battens.		
		**Characterizes:** **Total thickness** (m)= 0,38 **U** (W/m2K)= 1,76

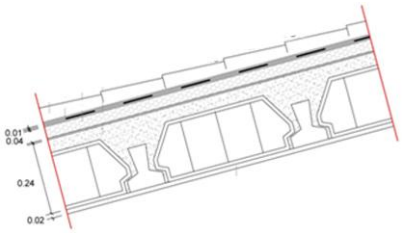
PR.15	**Pitched roof, no insulation, flat slab, ventilated roof**	1949 - 1981
Description: Pitched roof, no insulation, with ventilated cavity between the sloping and the horizontal support. It is the most common in Spain. The skirt is made with ceramic tiles on walls of clay on the slab supporting horizontal.		
		**Characterizes:** **Total thickness** (m)= 0,38 **U** (W/m2K)= 1,76

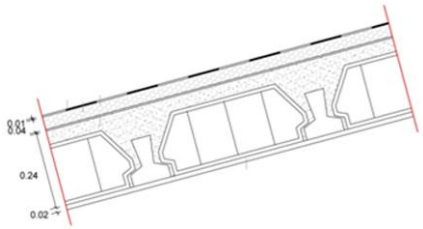
PR.16	**Pitched roof, no insulation, inclined slab, non ventilated roof**	1949 - 1981
Description: Pitched roof, no insulation, no ventilated chamber. The sloping surface is made with ceramic clay tiles on a floor joist inclined infill concrete and ceramic. Interior finish plaster.		
		**Characterizes:** **Total thickness** (m)= 0,28 **U** (W/m2K)= 2,14

PR.17	**Pitched roof without insulation, inclined slab, not-ventilated roof**	1949 - 1981
Description: Conventional pitched roof, no insulation, not ventilated and sturdy support inclined. Exterior finish comprised of self-protected waterproofing and vapor barrier. Lining plaster.		
		**Characterizes:** **Total thickness** (m)= 0,27 **U** (W/m2K)= 2,09

PR.18	**Pitched roof with insulation, inclined slab, ventilated roof**	1949 - 1981
Description: Pitched roof with insulation, with a ventilated chamber. The sloping surface is made with ceramic tiles and slabs supported on battens XPS rigid. All this rests on forged inclined of infill concrete joists and ceramic.		
		**Characterizes:** **Total thickness** (m)= 0,42 **U** (W/m2K)= 0,63

PR.19	**Pitched Roof with insulation, inclined slab, ventilated roof**	1949 - 1981
Description: Pitched roof conventional ventilated resistant horizontal support base of a unidirectional forging ceramic infill elements. The sloping surface is made of coated tiles, waterproofing, slope formation based ceramic board supported on single hollow brick walls and large format thermal insulation. Lining plaster.		
		**Characterizes:** **Total thickness** (m)= 0,46 **U** (W/m2K)= 0,56

PR.20	**Pitched roof with insulation, inclined slab, unventilated roof**	>1981
Description: Conventional pitched roof, tubeless and inclined sturdy support. Shingle siding, waterproofing, insulation and vapor barrier. Lining plaster.		
		**Characterizes:** **Total thickness** (m)= 0,33 **U** (W/m2K)= 0,66

PR.20	**Pitched roof with insulation, inclined slab, not ventilated, self-protected**	>1981
Description: Conventional pitched roof, tubeless and inclined sturdy support. Exterior finish comprised of self-protected waterproofing, thermal insulation and vapor barrier. Lining plaster.		
		**Characterizes:** **Total thickness** (m)= 0,31 **U** (W/m2K)= 0,67

The almost entire construction catalog has been extract from the European project E4R, "*Assessment tools building energy efficiency, Refurbishment of the SUDOE space*". E4R is a European project that aims to develop and promote energy rehabilitation of buildings in the southwestern Europe, through the realization of practical tools that help establish criteria both energy efficient and economically. (www.e4rproject.eu)

ANNEX **B**

MARKET UP-TAKEN MEASURE

In the Mediterranean, there are several financial and fiscal initiatives to support the improvement of the energy performance of buildings of countries and regions included in this area. Budget for retrofitting of buildings and main related measures are compiled below:

COUNTRY (REGION)	BULGARIA
HELP	Construction of buildings with categories A and B certificates
SOURCE OF FOUNDS	Public initiative
ORGANIZATION AND CONTEXT	Bulgarian Government: National incentives. There is not a budget related with this initiative.
OBJECTIVE	Promote the construction of high level of energy efficiency buildings trough exemption of taxes. Promote renewable sources in buildings.
BENEFICIARIES	Owners of buildings.
KIND OF HELP AND RATE OF ASSISTANCE	Buildings which were put into use prior to the 1st of January 2005 and with a categories A or B certificate, are exempted for the property taxes for a period of 7 years following the issue of the certificate and for 10 years if they use RES for the building´ energy consumption. The owners of buildings that were put into use prior to the 1st of January 2005 with other type of certificates have more reduced periods for exemption of property taxes.

COUNTRY (REGION)	BULGARIA
HELP	Energy efficiency audits
SOURCE OF FOUNDS	Public initiative
ORGANIZATION AND CONTEXT	The Bulgarian government authorised the EE Agency to manage the execution of these programmes.
OBJECTIVE	Promote the construction of high level of energy efficiency buildings trough exemption of taxes. Promote renewable sources in buildings.
BENEFICIARIES	Owners of public and municipal buildings.
KIND OF HELP AND RATE OF ASSISTANCE	Budget: 3,5 M€. Energy audits were financed 100% by this amount.

COUNTRY (REGION)	BULGARIA
HELP	Implementation of energy saving measures
SOURCE OF FOUNDS	Private initiative
ORGANIZATION AND CONTEXT	The European Bank for Reconstruction and Development (EBRD) were granting loans via 6 nominated Bulgarian banks
OBJECTIVE	Implementation of EE projects and energy saving measures in buildings
BENEFICIARIES	Bulgarian households.
KIND OF HELP AND RATE OF ASSISTANCE	Line credit about 45M€, and 20% subsidy offered by the International Decommissioning.

COUNTRY (REGION)	CROATIA
HELP	Act of efficient energy in direct consumption
SOURCE OF FOUNDS	Public initiative
ORGANIZATION AND CONTEXT	Government of Croatia established the Environmental Protection and Energy Efficiency Fund, in order to provide funds for financing projects. These budget is additional to National Energy Efficiency Programme 2008-2016, the frist national plan of energy efficiency.
OBJECTIVE	Implementation of EE projects and energy saving measures in buildings: - Lighting and heating systems. - Control and measurement equipment in existing buildings. - Energy efficient hot sanitary water systems. - Construction and refurbishment of energy efficient building envelopes.
BENEFICIARIES	Households, buildings of public sector,
KIND OF HELP AND RATE OF ASSISTANCE	More than 3,2 M€ have been disbursed for these projects

COUNTRY (REGION)	CYPRUS
HELP	Support to thermal insulation for existing buildings
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Government of Cyprus: Grants Scheme for energy savings in the residential sector (existing dwellings) for the period 2011-2020.
OBJECTIVE	To provide financial incentives to ensure that thermal insulation is installed in as many existing dwellings which were constructed before laws entry in force and regulate the installation of thermal insulation in new dwellings as possible.
BENEFICIARIES	Households/ owners of residential buildings
KIND OF HELP AND RATE OF ASSISTANCE	30% of the total eligible cost with maximum amount of grant €1,708.60 In areas with altitude more than 600 m - 100% for the first €1,367, 30% for the rest with maximum amount of grant €2,563.

COUNTRY (REGION)	CYPRUS
HELP	Support to energy saving in tertiary sector
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Government of Cyprus: Special Fund for Renewable Energy Sources and Energy Savings. Grants Scheme for (end-use) energy savings in the tertiary sector (existing buildings).
OBJECTIVE	Providing economic incentives for realising energy savings. The purpose of this measure is, on the one hand, to increase energy saving awareness among businessmen and, on the other hand, ensuring that this sector also contributes towards the achievement of savings targets. - Purchase/installation of new equipment for the recovery of wasted energy, by recovery/recycling of discarded materials, products or employed media. - Purchase/integration of new materials and equipment to reduce

	unproductive energy consumption and energy losses. - Purchase/integration of new equipment for the production, transmission, distribution and use of energy. - Purchase/installation of a new energy management IT system and/or integration of automated direct energy regulation/switch-off devices - Replacement of existing materials and/or equipment connected with the above subcategories.
BENEFICIARIES	Tertiary sector
KIND OF HELP AND RATE OF ASSISTANCE	The Scheme covers investments relating to purchase and installing new equipment and/or materials. It also covers the cost of designs, where necessary. Energy savings investment means an investment in systems, equipment and materials whose installation achieves at least 10% energy savings in a specific application. The maximum grant amount, in accordance with the type of investment and the form of the eligible grant is up to € 250 000 per unit.

COUNTRY (REGION)	NICOSIA / CYPRUS
HELP	Energy conservation and use of RES
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Cyprus Institute of Energy (CIE): CIE is funded by the Republic of Cyprus and other Semi Governmental and International Organizations.
OBJECTIVE	The main objectives are: - Promotion of Energy Conservation and Rational Use of Energy - Development and promotion of Renewable Energy Sources (wind, solar, biomass, hydro, geothermal or any other form of known renewable energy, or may prove worthy of consideration in the future) in Cyprus. - Activities with the scope of promotion of both of the above issues with the scope of and further utilization of financially feasible Energy Technologies.
BENEFICIARIES	Open to individuals or legal entities, public or private, depending on the provisions of each of the performances.
KIND OF HELP AND RATE OF ASSISTANCE	Approximately 50% grant for renewable energy sources applications

COUNTRY (REGION)	CYPRUS
HELP	Support to investments in RES
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Government of Cyprus: 3 parallel schemes. The revenues of this fund come from the consumers paying an additional tax of 0.50 €/kWh
OBJECTIVE	To provide financial incentives for the promotion of investments in the field of energy conservation and RES: - Promotion of electricity production from large commercial wind farms, solar thermal and PV systems, utilisation of biomass - Promotion of energy conservation and the RES for individuals (natural persons) and organisations that do not exercise economic activity - Promotion of energy conservation and the RES for individuals and

	legal entities as well as public sector entities that exercise economic activity.
BENEFICIARIES	Owners of commercial RES systems. Individuals/ Owners of residential buildings
KIND OF HELP AND RATE OF ASSISTANCE	- Grant subsidy (15-55% of capital investment) - Feed in tariff policy: For small residential PV systems up to 7 kW- 0,28 eur/kWh for 15 years For commercial PV systems up to 150 kW – 0,25 eur/ (price reduced to 0,17 eur in 2013) kWh for 20 years For large-scale PV systems of 150 kW – 10 MW – max 0,21 eur/ kWh for 20 years Wind systems – 0,166 eur/ kWh Solar thermal – 0,26 eur/ kWh 2% compensatory benefits to neighbouring communities for wind systems, solar thermal, biomass & biogas

COUNTRY (REGION)	FRANCE
HELP	Renovate of buildings
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	French Government set up fiscal benefits
OBJECTIVE	The establishment of tax credit to encourage people to build and renovate buildings.
BENEFICIARIES	- Owners of buildings. - Energy consumers.
KIND OF HELP AND RATE OF ASSISTANCE	The sustainable development tax credit permits reimburses from 8.000€ to 16.000€. The Zero Percent Eco-Loan aims to financing energy renovations. If people order two or three type of works, can receive 20.000€ or 30.000€. Reduction the tax for energy renovation in existing buildings from 19,6% to 5,5%.

COUNTRY (REGION)	GREECE
HELP	Major energy saving programmes for buildings
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Greek Government (Ministry of Environment, Energy and Climate Change) have provided the implementation of energy efficient measures.
OBJECTIVE	Energy saving at home, energy saving addressed to municipalities, improvement of energy performance of public buildings and, more specifically, in schools.
BENEFICIARIES	All citizens / consumers in whole Greece.
KIND OF HELP AND RATE OF ASSISTANCE	The programme covers 100% of costs, with the exception of house/flat owners (up to 30%).

COUNTRY (REGION)	GREECE
HELP	Refurbishment of air-conditioning systems
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Greek Government set up grant for replacing and recycling of old energy-intensive household air conditioners.
OBJECTIVE	Aim at who had old house-hold air conditioners in operation and wished to replaced them.
BENEFICIARIES	All citizens / consumers in whole Greece.
KIND OF HELP AND RATE OF ASSISTANCE	The subsidy was 35% of the retail price of each new device, with a maximum grant of 500 €.

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COUNTRY (REGION)	ITALY
HELP	Energy refurbishment of buildings
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Italian Government: Deduction for energy renovation. Law 296/2006 – 2007 (Budget Law)
OBJECTIVE	Promote energy efficiency and sustainable economic development in the Italian real estate system: - Renovation of existing buildings that achieve an annual primary energy demand for winter heating. - For interventions on existing buildings, or their parts, on opaque envelope or windows including fixtures, which comply with certain requirements on U-value. - Installation of solar panels to produce hot water for domestic or industrial uses and to cover the hot water demand. - Replacements of winter heating systems with condensing boilers and the simultaneous development of the distribution system. - Replacement of winter heating systems with high efficiency heat pumps and low enthalpy geothermal systems.
BENEFICIARIES	Open to the owner of the building subject of the interventions: - Natural persons who hold a right in the property - Taxpayers who achieve business income (individuals, partnership, corporation) - Professional and associations.
KIND OF HELP AND	It has established a deduction from gross tax for a share of 55% of

RATE OF ASSISTANCE	the amounts to be divided into at least three equal annual amounts. There are maximum deductions in function of the type of intervention.

COUNTRY (REGION)	ITALY
HELP	Production of electricity with PV systems
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Italian Government: Quinto Conto Energia - DM 05/07/2012.
OBJECTIVE	Promotion of the production of electricity from photovoltaic: - Photovoltaic systems. - Integrated photovoltaic systems with innovative features concentration plants.
BENEFICIARIES	Open to natural persons, public entities and residents of housings or buildings.
KIND OF HELP AND RATE OF ASSISTANCE	The incentive payable is that applicable on the date of entry into force of the facility, it is recognized for a period of twenty years and it is in constant currency

COUNTRY (REGION)	ITALY
HELP	Production of electricity with renewable sources (not PV systems)
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Italian Government: Quinto Conto Energia - DM 06/07/2012.
OBJECTIVE	Incentives for the production of electricity from new, fully rebuilt or re-activated renewable sources different from photovoltaic. Object of interventions of restoration or enhancement, with power not exceeding 1 kW
BENEFICIARIES	Open to holders of concession, with financial and economic strength appropriate to the initiatives for which the incentive is asked.
KIND OF HELP AND RATE OF ASSISTANCE	The incentive is for renewable energy plants

COUNTRY (REGION)	ITALY
HELP	Production of thermal energy with renewable sources
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Italian Government: Conto Energia Termico DM 28/12/2012.
OBJECTIVE	Incentives for the production of thermal energy from renewable sources and small energy efficiency measures: - Replacement of existing winter air conditioning equipment with winter heating systems, power up to 1000 kW, which use electric heat pumps or gas, including geothermal - Replacement of winter air conditioning and heating systems of existing greenhouses and rural buildings with winter heating systems, power up to 1000 kW, with biomass heat generator - Installation of solar thermal systems, also combined with solar cooling

	systems, with a gross floor area less than 1000 square meters of collectors - Replacement of electric water heaters with heat pump water heaters - Envelope interventions (Public entities)
BENEFICIARIES	Open to private and public entities.. All recipients may use the instrument of third-party financing or an energy performance contract, or an energy service, including the involvement of an ESCO.
KIND OF HELP AND RATE OF ASSISTANCE	For interventions made by private, the annual incentive is proportional to the estimate production of thermal energy in a year for the specific plant, through a coefficient of energy enhancement. The incentive will be paid in equal annual instalments for a period, defined for each type of intervention, which may be from 2 to 5 years.

COUNTRY (REGION)	ITALY
HELP	Reduction of Greenhouse Gas Emissions
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Italian Government: Fondo Kyoto Law 296/2006 – 2007 (Budget Law) DM 25/11/2008 Circ. 16/02/2012 Circ. 18/01/2013
OBJECTIVE	Effectively contribute to the reduction of greenhouse gas emissions into the atmosphere trough strategies like: - Protection of land and prevention of landslide and seismic risk, - Research, Development and production of II and III generation biofuels. - Research, development, production and installation of solar thermal, concentration, thermodynamic, photovoltaic, biomass, biogas and geothermal technologies. - Increasing efficiency in energy end-use in the residential, industrial and commercial sectors, including social housing. - Production processes or development of products, processes or organizational or services resulting in a reduction of pollution and use of resources throughout the life cycle. - Interventions for direct air conditioning with district heating from cogeneration plants (natural gas, biomass, biogas, etc) up to 500 kW. - Installation of micro-cogeneration systems with high electrical and thermal efficiency. - Installation of small plants for the use of renewable energy sources in order to generate electricity and heat. - Increasing of efficiency of end-use energy in residential and commercial sectors. - Replacement of industrial electric motors with power greater than 45 kW with high-efficiency motors. - Elimination of nitrous oxide emissions from industrial processes. - Pilot R&D projects about new technologies and new energy sources with low or zero emissions. - Sustainable forest management implemented through interventions aimed at reducing the depletion of the carbon stock in forest and forest soils.
BENEFICIARIES	Open to companies (including ESCOs – Energy Services Companies), public and private entities (Associations and foundations), with at least 3 young people aged up to 35 years entered into for an indefinite

	period.
KIND OF HELP AND RATE OF ASSISTANCE	Low-interest loans (0.5%) are granted, for periods lasting up to 6 years, to public or private entities which implement these type of interventions. 200 million per year for 3 years are allocated.

COUNTRY (REGION)	MALTA
HELP	Refurbishment of building envelope in residential buildings
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Malta Resources Authority (MRA) scheme for the domestic building sector. Support scheme for roof thermal insulation and double glazed windows or doors for domestic use. The scheme was launched in 2012
OBJECTIVE	To improve the thermal properties of private dwellings.
BENEFICIARIES	Open to all individuals bearing proof of residence in Malta.
KIND OF HELP AND RATE OF ASSISTANCE	A grant percentage of 15.25% of the total eligible cost up to a maximum of 1.000€.

COUNTRY (REGION)	MALTA
HELP	Renovation of solar water heaters
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Malta Resources Authority (MRA) scheme for the domestic building sector. Promotion of Solar Water Heaters. Scheme started in 2005 and is still ongoing.
OBJECTIVE	An expected energy savings of 11.5GWh by 2010 and 28GWh by 2016 assuming an average solar water heater area of 2.5m2 and each solar water heater saves 1600kWh/year. To reduce household expenditure on energy and increase accessibility to sustainable technology.
BENEFICIARIES	Open to all individuals bearing proof of residence in Malta.
KIND OF HELP AND RATE OF ASSISTANCE	This Scheme applies to the expenditure that is incurred on the purchase of a solar water heating system or solar collector purchased for domestic use and installed in Malta. The grant is a once-only investment subsidy of 20% on the purchase price capped at a maximum of €116.48 (2005), €232.94(2006) and €460(2009).

COUNTRY (REGION)	MALTA
HELP	Installation of PV systems
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Malta Resources Authority (MRA) scheme for the domestic building sector. Incentives for the uptake of PV systems. Scheme started in 2006 and is still ongoing.
OBJECTIVE	An expected energy savings of 5.6GWh by 2010 and 36GWh by 2016, assuming PV systems continue to be promoted at the rate of 2000kWp per year.
BENEFICIARIES	Open to all individuals bearing proof of residence in Malta.

KIND OF HELP AND RATE OF ASSISTANCE	The first scheme started in 2006 with a capital grant of around €1 for the first kWp installed, going down to €700 for the next kWp and further down to €465 for the remaining capacity up to a total maximum capacity of 3.7 kWp. In 2009, this was changed and a 50% grant was given up to a maximum of €3k. A total of 200 families benefited from the scheme. The scheme was repeated yearly in 2010 and 2011, with the number of beneficiaries increased to 400 families per year. Furthermore, electricity generated by domestic PV installations and exported to the distribution system are paid a FIT of 25c/kWh for each unit exported (rate guaranteed for 8 years)

COUNTRY (REGION)	MALTA
HELP	Renovation of lighting
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Malta Resources Authority (MRA) scheme for the domestic building sector. Distribution of energy saving lamps. This was a one-time exercise performed in 2009-10.
OBJECTIVE	An expected energy savings of 40.8GWh by 2010 through efficient lighting.
BENEFICIARIES	All Maltese households.
KIND OF HELP AND RATE OF ASSISTANCE	Free provision of CFL light bulbs to every household in Malta depending on the number of residents. A total of 867,164 bulbs were distributed.

COUNTRY (REGION)	MALTA
HELP	Renovation of domestic appliances
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Malta Resources Authority (MRA) scheme for the building sector providing rebates of energy efficient domestic appliances. This scheme was active from Nov 2006 to July 2008.
OBJECTIVE	An expected energy savings of 2.4GWh by 2010 through the reduced consumption of domestic appliances.
BENEFICIARIES	Open to all individuals bearing proof of residence in Malta.
KIND OF HELP AND RATE OF ASSISTANCE	A subsidy of 20% (up to a maximum limit) off the selling price of energy efficient domestic appliances including dishwashers, refrigerators, air conditioning units, washing machines and tumble dryers.

COUNTRY (REGION)	MALTA
HELP	Refurbishment of buildings, installations and equipment.
SOURCE OF FOUNDS	Private funding
ORGANIZATION AND CONTEXT	The 4 major financial banks in Malta are offering competitive rates and conditions for loans for investments in renewable energy. The main banks are: - APS Bank Ltd: EcoPlus – Finance for Renewable Energy Sources

	- Banif Bank (Malta) plc : Green Energy Loan - Bank of Valletta plc: BOV Eco Personal Loan - HSBC Bank Malta plc: Green Loan
OBJECTIVE	To promote the investment in: - Renewable energy sources - Energy efficient appliances - Thermal insulation - Shading - Energy audits - Energy management systems
BENEFICIARIES	Open to all Maltese residents with a valid work permit.
KIND OF HELP AND RATE OF ASSISTANCE	Financing rates vary amongst banks.

COUNTRY (REGION)	PORTUGAL
HELP	Fiscal benefits to improve energy efficiency and promote high level of energy classes in buildings.
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Portuguese Government implanted the National Action Plan for Energy Efficiency.
OBJECTIVE	It has established the general framework to financial support toward specific measures: - Reduction related to the Individual Income Tax for A+/A class level homes. - Reduction related to the Individual Income Tax for RES and Domestic Hot Water Systems.
BENEFICIARIES	Open to Portuguese citizens.
KIND OF HELP AND RATE OF ASSISTANCE	Reduction of 10% in A+/A building construction. Reduction of 30% in RES and 50% in DHW installations.

COUNTRY (REGION)	SLOVENIA
HELP	Energy efficiency in buildings and use of RES
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Sustainable use of energy is a priority in Slovenia. Non returnable founds are available for the Operational Programme for Developing Environmental and Transport Infrastructure.
OBJECTIVE	The financial incentives currently available are: - Energy refurbishment of existing buildings and sustainable new buildings in public sector. - Innovative systems for energy supply. District heating system by RES. - Demonstration projects.
BENEFICIARIES	Open to all Maltese residents with a valid work permit.
KIND OF HELP AND RATE OF ASSISTANCE	The greatest share of subsides to obtain electricity from RES will be used for biomass. A Slovenian environmental public fund is majorly addressed to energy renovation of existing buildings and construction of very low energy new residential buildings.

COUNTRY (REGION)	SPAIN
HELP	Tax deduction for improvement on residential housing
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Spanish Government, trough Royal/Decree Law 6/2010, includes reduction of taxes rates for renovation works in residential housings.
OBJECTIVE	Promote the refurbishment of residential existing buildings.
BENEFICIARIES	Building owners.
KIND OF HELP AND RATE OF ASSISTANCE	Deduction of Tax Revenue. Reduction of Spanish Value Added Tax for renewal and repair works of the main residence.

COUNTRY (REGION)	SPAIN
HELP	Refurbishment of state existing buildings towards energy rating "A", "B" or "C"
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	Ministry of Housing, trough the State´s Housing and Rehabilitation Plan 2009-2012, established subsides to renovation of state buildings.
OBJECTIVE	Promote the state buildings with high level of energy efficiency.
BENEFICIARIES	Owners of buildings.
KIND OF HELP AND RATE OF ASSISTANCE	Subsidy per building with "A" energy rating: 3,5 €/home. Subsidy per building with "B" energy rating: 2,8 €/home. Subsidy per building with "C" energy rating: 2 €/home.

COUNTRY (REGION)	SPAIN
HELP	Integrate thermal renewable energy in buildings
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	The Institute for Diversification and Saving of Energy (IDAE), articulated low-interest credit lines to finance and promote.
OBJECTIVE	Promote the integration of RES in buildings trough financial measures.
BENEFICIARIES	SMEs established like ESCOs are beneficiaries of these credit lines.
KIND OF HELP AND RATE OF ASSISTANCE	- Biomass: Interest rate composed by EURIBOR+1,5%, with a total budget of 5M€ - Geothermal: Interest rate composed by EURIBOR+2,2%, with a total budget of 3M€ - Solar energy: Interest rate composed by EURIBOR+2,2%, with a total budget of 5M€.

COUNTRY (REGION)	SPAIN (some Autonomy Communities)
HELP	Construction of new buildings with high energy rating
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	This program has the support of the Institute for Diversification and Saving of Energy (IDAE), as stipulated in the terms of the agreement signed with the some Regional Energy Agencies, in order to facilitate the achievement of the objectives set at national level, in 2008-2012 Action Plan for the Strategy of Energy Saving and Efficiency in Spain (E4) and regional scale in the Saving Plans.

OBJECTIVE	Promote the construction of new buildings with high level of energy efficiency.
BENEFICIARIES	Owners of buildings.
KIND OF HELP AND RATE OF ASSISTANCE	New single family house with "A" energy class: 50€/m^2. New tertiary building with "A" energy class: 15€/m^2.

COUNTRY (REGION)	SPAIN (Valencian Community)
HELP	Energy Audits in Buildings
SOURCE OF FOUNDS	Public funding
ORGANIZATION AND CONTEXT	This program has the support of the Institute for Diversification and Saving of Energy (IDAE), as stipulated in the terms of the agreement signed with the AVEN, in order to facilitate the achievement of the objectives set at national level, in 2008-2012 Action Plan for the Strategy of Energy Saving and Efficiency in Spain (E4) and regional scale in the Savings Plan and Energy Efficiency of Valencia.
OBJECTIVE	Determine the energy saving potential in tertiary use buildings (offices, hotels, hospitals, sports facilities, shopping centres, schools, etc.). Facilitating decision making for investment in energy saving projects.
BENEFICIARIES	Open to individuals or legal entities, public or private, depending on the provisions of each of the performances. Recipients must have their domicile, headquarters or production in Valencia, and aided projects must be located in that territory.
KIND OF HELP AND RATE OF ASSISTANCE	Outright grant, with the limits and characteristics stated in each of the performances. The maximum amount of aid will, in general, 75% of the cost of the audit, with a maximum based on the audited area: the first 10,000 m2 € 0.68 / m2, the following to 100,000 m2 0.45 €/m2, and the rest 0.30 €/m2.

COUNTRY (REGION)	TURKEY
HELP	Energy efficiency retrofitting
SOURCE OF FOUNDS	Private funding
ORGANIZATION AND CONTEXT	This program has the support of a Bank (Şekerbank) in order to facilitate the building owners easily provide financial support with a long term loan system with low interest rates.
OBJECTIVE	Support building owners for taking energy efficient retrofitting measures.
BENEFICIARIES	Open to individuals and/or private entities
KIND OF HELP AND RATE OF ASSISTANCE	Starting from 0% interest rates, up to 60 months prompt and IZODER consultancy included

COUNTRY (REGION)	TURKEY (IZMIR)
HELP	R&D projects related to RES and environmental technologies
SOURCE OF FOUNDS	Private funding

ORGANIZATION AND CONTEXT	This program has the support of a Bank (Şekerbank) in order to facilitate the building owners easily provide financial support with a long term loan system with low interest rates.
OBJECTIVE	To support R&D for increasing the competitiveness and environmental performance. To reach the aim of utilization of renewable energy sources for heating/cooling and drying.
BENEFICIARIES	Open to participants who aim to renewable energy sources and unlicensed electricity production of more than a capacity 50 kW (SMEs, Associations, Corporations, Municipalities, Universities, Industry, Local authorities)
KIND OF HELP AND RATE OF ASSISTANCE	Minimum funding of 100.000 TL to maximum 1.000.000 TL. Total funding amount; For non-profit oriented companies; 10.000.000 TL For profit-oriented companies; 15.000.000 TL

ENERGY EFFICIENCY ENCOUREGMENT AND PROMOTION MEASURES

Every country will be analyzed and their main actions to encourage and promote will be exposed with different items: Building retrofitting, renewable energy, training, etc. All this information is collected bellow:

COUNTRY (REGION)	BULGARIA
ENERGY EFFICIENCY PROMOTION MEASURE	Communication campaign: Less Energy, more Light
PUBLIC / PRIVATE INITIATIVE	BOTH: Bulgarian electricity company, Energy Efficiency Agency and Eco-Society
DESCRIPTION	Popularise the energy efficiency in the society´s daily round in order to decrease their electricity bills, promoting a more economical use of resources.
PUBLIC OBJECTIVE	Every level of society, focusing on 5-12 years old kids and teenagers.
PROGRAM / ACTIONS / TRAINING DETAILS	- Development of a website providing useful advices for energy savings. - Workshops for kids. - Educational seminars explaining the energy Laws.

COUNTRY (REGION)	CROATIA
ENERGY EFFICIENCY PROMOTION MEASURE	Communication campaign: Promoting energy efficiency in Croatia
PUBLIC / PRIVATE INITIATIVE	Public initiative
DESCRIPTION	This promotional campaign have the aim of rising awareness on energy efficiency and readiness for changes in behaviour with regard to the implementation of the available energy efficiency measures.
PUBLIC OBJECTIVE	Every level of society, general public.
PROGRAM / ACTIONS / TRAINING DETAILS	- Brochures, posters, video spots and manuals. - Lectures, forums and seminars. - Website where are allocated further information, such us local and national information centres.

COUNTRY (REGION)	CYPRUS
ENERGY EFFICIENCY PROMOTION MEASURE	Informing citizens of energy certification
PUBLIC / PRIVATE INITIATIVE	Public initiative
DESCRIPTION	Ministry of Commerce, Industry and Tourism promote an informing campaign about EPC and inspectors.
PUBLIC OBJECTIVE	- Authorities. - Building industry. - Professional associations. - Citizens.
PROGRAM / ACTIONS / TRAINING DETAILS	- Training sessions for public authorities. - Technical guides. - Seminars and presentations to promote the EPC. - Informing flayers.

COUNTRY (REGION)	FRANCE
ENERGY EFFICIENCY PROMOTION MEASURE	National communication campaigns
PUBLIC / PRIVATE INITIATIVE	Public initiative
DESCRIPTION	The Ministry and ADEME (French Energy Agency) are disseminating information of several issues related to energy efficiency and promoting national communication campaigns: - Thermal regulation. - Informing campaign about EPC. - Provisions regarding the maintenance of boilers. - Information about efficient boilers. - Information about the improvement of energy performance of buildings and financial incentives.
PUBLIC OBJECTIVE	- Professionals. - Citizens.
PROGRAM / ACTIONS / TRAINING DETAILS	- Guides for professionals. - Network to inform and advice. - Directory of persons who can issue EPCs.

COUNTRY (REGION)	GREECE
ENERGY EFFICIENCY PROMOTION MEASURE	Communication campaign related to energy performance certificate and Energy Building Code
PUBLIC / PRIVATE INITIATIVE	BOTH: Private initiative trough the banks and the Greek Ministry
DESCRIPTION	The general public was launched from the banks that were implied in this programme, providing information about EPC.
PUBLIC OBJECTIVE	- Professionals. - Citizens.
PROGRAM / ACTIONS / TRAINING DETAILS	- Brochures. - Radio and TV commercials.

COUNTRY (REGION)	ITALY (RAVENNA)
ENERGY EFFICIENCY PROMOTION MEASURE	Service of free energy audits in buildings
PUBLIC / PRIVATE INITIATIVE	BOTH: Private initiative with local administration
DESCRIPTION	Development of free energy audits and certification as a promotional tool for offering building and systems renovation works.
PUBLIC OBJECTIVE	- Citizens and owners of multifamily buildings.
PROGRAM / ACTIONS / TRAINING DETAILS	- Commercials.

COUNTRY (REGION)	MALTA
ENERGY EFFICIENCY PROMOTION MEASURE	National information and promotion of energy certification
PUBLIC / PRIVATE INITIATIVE	Public initiative
DESCRIPTION	Realize advertising campaigns, focusing on public awareness in energy savings, efficient measures and EPCs.
PUBLIC OBJECTIVE	- Maltese citizens.
PROGRAM / ACTIONS / TRAINING DETAILS	- Weekly information sessions. - Several seminars and presentations. - Brochures and videos. - Web information.

COUNTRY (REGION)	PORTUGAL
ENERGY EFFICIENCY PROMOTION MEASURE	National information and promotion of energy certification
PUBLIC / PRIVATE INITIATIVE	Public initiative
DESCRIPTION	Realize advertising campaigns, focusing on the added value of building certificates. Offering clear and reliable information on the thermal quality performance of houses.
PUBLIC OBJECTIVE	- Portuguese citizens. - Municipalities. - Professionals of the building sector.
PROGRAM / ACTIONS / TRAINING DETAILS	- Training meetings. - Workshops. - Promotional campaign in TV, radio and internet. - Detailed brochures. - Web information.

COUNTRY (REGION)	SPAIN
ENERGY EFFICIENCY PROMOTION MEASURE	National information rational energy use
PUBLIC / PRIVATE INITIATIVE	Public initiative
DESCRIPTION	Ministry of Industry, Energy and Tourism provide information to all citizens in several issues related to energy efficiency, energy certification and how to raise awareness on energy saving.
PUBLIC OBJECTIVE	- Spanish citizens. - Professionals of the building sector.
PROGRAM / ACTIONS / TRAINING DETAILS	- Technical and promotional guides. - Support campaign in TV, radio and internet.

The following tables describe different promotion measures in which partners of ee-WiSE Project have taken part in, all of them related to encourage actions for energy refurbishment:

ENERGY EFFICIENCY MEASURE	**I E4R CONGRESS: Practices of energy efficiency retrofitting of buildings**	**ee-WiSE PARTNER: AIDICO**
DESCRIPTION	Framework for sharing experiences, successful and innovate stories about energy refurbishment of buildings	
PUBLIC OBJECTIVE	Agents involve in energy building retrofitting: Administrations, promoters, constructors, installers, designers, product developers, customers and building owners…	
SCOPE	SUDOE Space (South-eastern of Europe)	
PROGRAM / TRAINING DETAILS	Refurbishment Policies Energy Retrofitting on urban scale Tools and design methodologies: certification and verification. Simulation tools and monitoring. Rehabilitation of the thermal envelope Rehabilitation of active systems: HVAC, renewable energy, lighting. Retrofitting and Business Model Social Impact of Refurbishment	
CONSORTIUM / ANOTHER PARTICIPANS	ITG - Spain INEGI - Portugal Government of Extremadura - SPAIN EIGSI - France	

ENERGY EFFICIENCY MEASURE	**PROJECT „ENERGY RENOVATION OF THE BULGARIAN RESIDENCES“PROGRAM, Operative program Regional development Governing body: Ministry of Regional Development and Public Works Project** BG161PO001-1.2.01-0001	**ee-WiSE PARTNER: BCC, BG**
DESCRIPTION	For every building the owners will receive up to 50 % grant Grant is envisaged for the following activities: - Technical surveillance of the building, incl. technical passport elaboration; - Project management	
PUBLIC OBJECTIVE	Agents involve in energy building retrofitting: Administrations, promoters, constructors, installers, designers, product developers, customers and building owners…	
SCOPE	**36 towns, 3 years duration**	
PROGRAM / TRAINING DETAILS	Refurbishment measures will be undertaken	
CONSORTIUM / ANOTHER PARTICIPANS	Tenders are open for the Condominiums, registered as legal bodies under the respective Law	

ENERGY EFFICIENCY MEASURE	**NZB2021 'Doors Open Days' – sharing experiences from low energy buildings to meet nearly zero building standards by 2021 (NZB2021)**	**ee-WiSE PARTNER: PiM**
DESCRIPTION		
PUBLIC OBJECTIVE	Public authorities and candidate builders have a unique chance of visiting and getting non-commercial information on nearly-zero energy buildings (NZB). The barriers to start a NZB are lower.	
SCOPE	EU	
PROGRAM / TRAINING DETAILS	Social Impact of Refurbishment/Retrofit actions	
CONSORTIUM / ANOTHER PARTICIPANS	Bond Beter Leefmilieu Vlaanderen vzw, Belgium O.Ö Energiesparverband (ESV), Austria PRIORITERRE, France B.&S.U. Beratungs- und Service Gesellschaft Umwelt mbH (B&SU), Germany GreenDependent Sustainable Solutions Association (Green Dependent), Hungary Projects in Motion Ltd., Malta Krajowa Agencja Poszanowania Energii S.A. (KAPE), Poland Building and Civil Engineering Institute ZRMK (BCEI ZRMK), Slovenia Energikontor Sydost AB (ESS), Sweden	

ENERGY EFFICIENCY MEASURE	**European Sustainable Energy Award for Prisons (E-seaP)**	**ee-WiSE PARTNER: PiM**
DESCRIPTION	The E-seaP concept is informed by a pilot and close collaboration with the prison service in the UK. This has clearly identified how a holistic approach can effectively improve the performance on energy sustainability through increased awareness, a structure for progression, practical action and access to expert advice and support. Addressing education and training issues the project also seeks to support prisons in reducing reoffending and tackling fuel poverty	
PUBLIC OBJECTIVE	The main objective is to establish an award scheme that acts as the framework for the adoption of intelligent energy usage patterns in multi-residential buildings (prison institutions) and their communities.	
SCOPE	EU	
PROGRAM / TRAINING DETAILS	Social Impact of Refurbishment/Retrofit actions	
CONSORTIUM / ANOTHER PARTICIPANS	Severn Wye Energy Agency Limited, United Kingdom Sveuciliste u Zagrebu,Fakultet strojarstva i brodogradnje (UniZag FSB), Croatia Aristotle University of Thesssaloniki (AUTH), Greece Ekodoma, Latvia Projects in Motion (PIM), Malta Building and Civil Engineering Institute ZRMK (BCEI ZRMK), Slovenia Severn Wye Energy Agency Limited (SWEA), United Kingdom	

ENERGY EFFICIENCY MEASURE	**Distributed Combined Heat and Power Generation from Small Size Concentrated Solar Power (DIGESPO)**	**ee-WiSE PARTNER: PiM**
DESCRIPTION	The DiGeSPo project concept is a modular 1-3 kWe, 3-9 kWth micro Combined Heat and Power (m-CHP) system based on innovative Concentrated Solar Power (CSP) and Stirling engine technology.	
PUBLIC OBJECTIVE	CSP m-CHP will provide electrical power, heating and cooling for single and multiple domestic dwellings and other small commercial, industrial and public buildings	
SCOPE	EU	
PROGRAM / TRAINING DETAILS	Rehabilitation of active systems: HVAC, renewable energy, electricity. Retrofitting and Business Model	
CONSORTIUM / ANOTHER PARTICIPANS	MALTA: PROJECTS IN MOTION LIMITED SVERIGE: UPPSALA UNIVERSITET ITALIA: ELECTRONIC MACHINING SRL DEUTSCHLAND: NARVA LICHTQUELLEN GMBH + CO; KG ITALIA: POLITECNICO DI MILANO UNITED KINGDOM: SUSTAINABLE ENGINE SYSTEMS LTD	

ENERGY EFFICIENCY MEASURE	**CONSTRUCTION21**	**ee-WiSE PARTNER: ANCE**
DESCRIPTION	An European exchange platform on sustainability and energy performance in buildings	
PUBLIC OBJECTIVE	Academic bodies, Local authorities, Experts, Professionals, Governmental organizations, Building owners, Local, national and international Association	
SCOPE	Create a functioning European platform for the exchange of operational information and cost/performance analysis in energy-efficient rehabilitation and construction.	
PROGRAM / TRAINING DETAILS	A strong bottom-up network building activity backs this concept-proof collective intelligence process and manages positive competition on good building case studies. It brings transparency in the European market: practices, prices, eco-design and energy efficient devices can be compared. This radically shifts industry and consumer behaviour by linking best-practice assessment to decision-making.	
CONSORTIUM / ANOTHER PARTICIPANS	IFPEB – France CIRIDD – France ESCI – Spain ROGBC – Romania DGNB – Germany PE – Germany VGTU – Lituania UCV – Italy	

ENERGY EFFICIENCY MEASURE	**BUILD UP SKILLS ITALY**	**ee-WiSE PARTNER: ANCE**
DESCRIPTION	The WISE roadmap project will identify a national qualified training system able to improve the competences of workers needed to reach the “nearly zero emission buildings” objective	
PUBLIC OBJECTIVE	Universities, Training Centres, Professional Schools, Consumer Associations, Accreditation bodies, Chambers of commerce, Trade Unions, Professional	

	Associations, Public Regional Administrations	
SCOPE	Identification of the main requirements to obtain a national roadmap for the qualification of the workforce in the building efficiency sector Set up of different tools to face off the different targets involved in the process of the communication platform construction.	
PROGRAM / TRAINING DETAILS	The project will focus not only on the continuing education of workers in the field of buildings /blue collar, but also on the development of new training curricula aligned with the European Qualification Framework and the European Credit system for Vocational Education and Training. To achieve these ambitious objectives the stakeholders have been divided in two "levels" consisting of partners directly involved in the roadmap definition, and "associated partners" involved in the roadmap validation and implementation.	
CONSORTIUM / ANOTHER PARTICIPANS	ENEA, CNA-ECIPA, ASSISTAL, RENAEL, TOSCANA REGION, UNIVERSUS - Italy	
ENERGY EFFICIENCY MEASURE	**INNOVANCE**	**ee-WiSE PARTNER: ISTEDIL, ANCE**
DESCRIPTION	The project is based on the computerization of the phases of the building process and concerns the creation of the first national building database	
PUBLIC OBJECTIVE	All the subjects involved in the building supply chain	
SCOPE	To network all players in the sector, identifying, explaining and making available for each phase the most advanced knowledge, the appropriate technologies, in order to promote the growth and the transfer of knowledge and the innovation skill, for a more efficient supply chain in every stage of the building process.	
PROGRAM / TRAINING DETAILS		
CONSORTIUM / ANOTHER PARTICIPANS	ISPREDIL Istituto promozionale per l'edilizia S.p.A. ISTEDIL Istituto Sperimentale per l'Edilizia S.p.A. ENEA Ente per le Nuove tecnologie, l'Energia e l'Ambiente ITC - CNR Istituto per le Tecnologie della Costruzione – Consiglio Nazionale delle Ricerche UNI Ente Nazionale Italiano di Unificazione UNI-CTI Comitato Termotecnico Italiano - Energia e Ambiente ANDIL Assolaterizi Associazione Nazionale degli Industriali del Laterizio ASSISTAL Associazione Nazionale Costruttori di Impianti Federlegno - Arredo UNCSSAL Unione Nazionale Costruttori Serramenti Alluminio Leghe Politecnico di Milano – Dipartimento BEST Politecnico di Torino ITACA Istituto per l'innovazione e trasparenza degli appalti e compatibilità ambientale	

ENERGY EFFICIENCY MEASURE	**Architectural Services**	**ee-WiSE PARTNER: IMA**
DESCRIPTION	Knowledge transfer framework for energy retrofitting of buildings	
PUBLIC OBJECTIVE	Agents involve in energy building retrofitting: Students of Architecture, Buildings Engineers, Constructors, Installers, Product Developers, customers and building owners…	

SCOPE	Mediterranean
PROGRAM / TRAINING DETAILS	Energy Retrofitting on architectural scale Tools and design methodologies Simulation tools and monitoring. Rehabilitation of the thermal envelope Bioclimatic Architectural Design. Energy Efficiency Architectural Design
CONSORTIUM / ANOTHER PARTICIPANS	Cyprus Energy Agency Local Universities Nicosia Municipality Cyprus Architects Association Cyprus Scientific and Technical Chamber

ENERGY EFFICIENCY MEASURE	**SPINE-Energy Efficiency & Urban Development Planning**	**ee-WiSE PARTNER: Ege University**
DESCRIPTION	To promote and facilitate, at EU and third country level, the process of integrating energy efficiency in urban planning and sustainable urban rehabilitation with the aim of saving resources, improve comfort and air quality in town centres by reducing emissions.	
PUBLIC OBJECTIVE	• To improve planning and integration of EE and RES technologies In historic buildings and city centres • To promote the development of a local policy, regulatory framework and expertise.	
SCOPE	The assessment of the state of the art, priority and feasibility in Russian Federation and Ukraine, drawing also from experiences and practices of Serbia, Croatia and Turkey will be supported in particular by the Italian partners who will transfer the knowledge developed in the countries of the European Union.	
PROGRAM / TRAINING DETAILS	• Stakeholders informed about experiences, regulations, policy processes and practices in partner countries relating to EE/RES in buildings In historic town centres. • Policy guidelines and restoration protocols are developed. • One priority policy proposal Is developed In each beneficiary city. • Two pilot actions are implemented in the cities of Vladimir and Cherkassy • Agreements are reached among local authorities and stakeholders and permanent committees and authorising bodies are set up. • Databases of buildings of historical value are assessed and Improved.	
CONSORTIUM / ANOTHER PARTICIPANS	• Unioncamere Eurosportello Veneto (Italy) • Vladimir State University (Russian Federation) • Cherkasy Chamber of Commerce and Industry (Ukraine) • Municipality of Cappella Maggiore (Italy) • EBILTEM EGE University Science and Technology Centre Izmir (Turkey) • Kulturni Front (Serbia) • City of Labin (Croatia).	

ENERGY EFFICIENCY MEASURE	**VISITS TO EDEA EXPERIMENTAL DWELLINGS** **Visits to experimental dwellings situated in Cáceres that promote EE knowledge**	**ee-WiSE PARTNER: INTROMAC is a partner of EDEA Project too. ENERCYA is a collaborator.**
DESCRIPTION	Framework for knowing innovate systems and facilities about energy construction and retrofitting of residential buildings	
PUBLIC OBJECTIVE	- Students of technical professions and school students. - Agents involve in building retrofitting: Public administrations, promoters, constructors, installers, designers, etc.	
SCOPE	Europe	
PROGRAM / TRAINING DETAILS	Passive strategies in new social dwellings Energy simulation tools Monitoring and control systems Renewable energies in buildings High performance HVAC facilities in dwellings Energy Retrofitting in social dwellings Very low consumption lighting Environmental Impact of Retrofitting Good practices for users	
CONSORTIUM / ANOTHER PARTICIPANS	Government of Extremadura, Coordinator - Spain Agency of Energy in Extremadura, Partner - Spain GOP Architecture – Spain Valladares Engineering - Spain	

CROSS-SECTORIAL COOPERATION

Cooperation through different energy efficiency agents and, more concretely, related to energy retrofitting of buildings, is an important starting point to establish the level of common knowledge and how we are sharing experiences.

This information is focused on the knowledge produced by different cooperation activities, such as R&D projects, workshops and other cooperation experiences, from European scope to national level. Initiatives which involve Mediterranean States have been prioritized.

7.1 European projects

Programme	Med Programme
Acronym / Name	**ELIH-Med** Energy Efficiency in Low Income Households in the Mediterranean
Main subject	Low cost energy efficient investments and retrofitting
Objectives / Results	The general objective of ELIH-MED project is to identify and implement innovative technical solutions and financing mechanisms to improve energy efficiency in low-income housings in the Mediterranean area. The project results include analysis (Typology of LIH building stock in the Med area, potential energy savings, territorial and national public policies on EE, gap analysis between existing products and needs), Good practices of energy retrofitting in LIH, etc.
Mediterranean countries/regions involved	Cyprus France Greece Italy Malta Slovenia Spain
Agents in the value chain involved	All
Website / Further information	http://www.elih-med.eu

Programme	Med Programme
Acronym / Name	**MEDEEA**
Main subject	Improvement of the local governance of energy issues in MED area
Objectives / Results	The project promotes cooperation among municipalities in MED regions in the area of energy efficiency and promotes the European Energy Award – eea®". 16 new ee-advisors will be trained and 72 municipalities involved: http://www.interregmedeea.eu
Mediterranean countries/regions involved	Cyprus Greece Italy Malta Portugal Slovenia Spain
Agents in the value chain involved	Public administration and authorities, energy service companies, non-profit NGOs
Website / Further information	http://www.interregmedeea.eu

Programme	INTERREG IVC
Acronym / Name	SERPENTE
Main subject	Energy efficiency in different typologies of publicly owned or managed buildings.
Objectives / Results	The overall objective is improvement of energy efficiency in different typologies of publicly owned or managed buildings through improved public policies. The project aims to promote understanding and application of EE initiatives, promote responsible energy consumption among public building users, identify good practices and exchange them among 10 EU regions, design and implement 5 pilot actions, etc.
Mediterranean countries/regions involved	Cyprus France Greece Italy Spain 6 non-MED regions
Agents in the value chain involved	R&D institutes, public administration and authorities, non-profit NGOs
Website / Further information	www.serpente-project.eu

Programme	INTERREG IV B SUDOE
Acronym / Name	E4R
Main subject	Energy retrofitting of buildings.
Objectives / Results	E4R is a European project that aims to develop and promote energy rehabilitation in buildings in the southwest of Europe, through the realization of practical tools that help establish criteria both energy efficient as well as economically.
Mediterranean countries/regions involved	France Spain Portugal
Agents in the value chain involved	All
Website / Further information	http://www.e4rproject.eu

Programme	Intelligent Energy Europe
Acronym / Name	TRAINREBUILD
Main subject	Training property owners and local authorities on building retrofitting
Objectives / Results	The objective is to design a comprehensive value chain strategy to generate change in thinking of public and private housing owners regarding the link between energy efficiency and value related to building ownership. The project aims to train property owners and local authorities – the demand side of the buildings value chain - and encourage retrofitting in a wide range of residential buildings, spanning from individual to multi-family houses and from private to social housing.
Mediterranean countries/regions involved	France Greece Italy Spain

	Portugal
Agents in the value chain involved	R&D institutes, public administration and authorities, architecture and engineering companies, financial agents, property owners, building managers, economists, non-profit NGOs.
Website / Further information	http://trainrebuild.eu/

Programme	**Intelligent Energy Europe**
Acronym / Name	**ZEMEDS**
Main subject	Promoting renovation of schools in a mediterranean climate up to nearly zero-energy buildings
Objectives / Results	ZEMEDS responds to EU objectives by assisting public sector on going beyond the proposed 3% renovation target and bringing together industry elements to provide packaged solutions. The action focuses on renovating schools from EU regions on the Mediterranean region. Schools represent an important part of the building stock in the Mediterranean regions.
Mediterranean countries/regions involved	France Greece Italy Spain
Agents in the value chain involved	Building industry and public sector.
Website / Further information	http://eaci-projects.eu/iee/page/inc/Popup_PDF.jsp?prid=2642

Programme	**Intelligent Energy Europe**
Acronym / Name	**POWER HOUSE NZC**
Main subject	Develop NZEB capacity-building programmes delivered at local level
Objectives / Results	Build capacity and confidence among Europe's social, cooperative and public housing providers ahead of NZEB obligations. Showcase exemplary financing and organisational solutions used to reach nearly zero standards in existing housing in divided ownership.
Mediterranean countries/regions involved	Bulgaria France Italy Spain Non Mediterranean countries: Austria, Belgium, Estonia, Germany, Sweden, UK.
Agents in the value chain involved	Building providers and public sector.
Website / Further information	http://eaci-projects.eu/iee/page/inc/Popup_PDF.jsp?prid=2542

Programme	**Intelligent Energy Europe**
Acronym / Name	**SMILEGOV**
Main subject	Enhancing efficient implementation of sustainable energy action plans in European islands through reinforcement of smart multilevel governance.
Objectives / Results	look after the finding and the setting up of the best combination and share of responsibilities among the different actors to maximise

	the efficiency of actions undertaken or to be undertaken under collective voluntary schemes
Mediterranean countries/regions involved	Cyprus France Malta Spain Portugal Non Mediterranean countries: Denmark, Estonia, Sweden, UK.
Agents in the value chain involved	Regional Governments.
Website / Further information	http://europeansmallislands.com/smilegov

Programme	**Intelligent Energy Europe**
Acronym / Name	**PASSIVE-ON** Marketable Passive Homes for Winter and Summer Comfort
Main subject	Design guidelines and policy support for comfortable, very low energy homes in warm and temperate climates in Europe.
Objectives / Results	PASSIVE-ON aimed to build on the success of the Passivhaus concept by spreading the good word (and appropriate practice) towards southern and more moderate climates of Europe.
Mediterranean countries/regions involved	France Italy Portugal Spain Non Mediterranean countries: UK.
Agents in the value chain involved	Decision markets, public bodies, architects and designers.
Website / Further information	http://www.passive-on.org/es/

Programme	**Intelligent Energy Europe**
Acronym / Name	**BIO-SOUTH** Techno-economical assessment of the production and use of biofuels for heating and cooling applications in South Europe.
Main subject	Carry out a techno-economical assessment of the whole biofuel utilization cycle, from collection to heat production, in two pilot regions of southern Europe with an important potential for solid biofuels, in order to identify the barriers for bio-heat development and to propose efficient measures to overcome them by using and adapting the experiences of countries where biofuels have reached a significant market share.
Objectives / Results	Creation, in the regions under study, of organised collection and distribution paths for solid biofuels. Contribution to the creation of new and stable rural employment in the forestry land for the collection of forest residues in southern Europe; To contribute to gender equality with regard to rural employment through the mechanisation of forestry work for woody residues collection in southern Europe; To contribute to the reduction of carbon dioxide emissions
Mediterranean countries/regions involved	Italy Slovenia Spain

	Non Mediterranean countries: Belgium, Finland, Sweden, UK.
Agents in the value chain involved	Energy producers.
Website / Further information	http://www.iniciativas-innovadoras.es/en/experiencia/casos-de-exito/proyectos-europeos/bio-south-valoracion-tecno-economica-de-la-produccion-y-uso-de-biocombustibles-para-aplicaciones-de-calefaccion-y-refrigeracion

Programme	**Intelligent Energy Europe**
Acronym / Name	**TRAINENERGY**
Main subject	Training in energy efficiency in buildings.
Objectives / Results	Continuous, practice-oriented implementation and dissemination of the EPBD 2002 and energy end-use efficiency and energy services 2006 by training craftsmen and trainers in the construction trade.
Mediterranean countries/regions involved	France Spain Non Mediterranean countries: Denmark, Ireland, Poland, UK.
Agents in the value chain involved	Architects, engineers, trainers and users.
Website / Further information	http://www.trainenergy-iee.eu/

Programme	**Intelligent Energy Europe**
Acronym / Name	**REGEOCITIES**
Main subject	Promotion of a common normative framework for production of thermal energy by geothermal systems.
Objectives / Results	The objective of REGEOCITIES is the creation of a local and regional task force and the achievement of National Renewable Energy Action Plans in geothermal targets.
Mediterranean countries/regions involved	France Greece Italy Spain Non Mediterranean countries: Belgium, Denmark, Germany, Hungary, Ireland, Netherlands, Romania, Sweden, UK.
Agents in the value chain involved	Policy makers, developers of geothermal systems, designers, installers.
Website / Further information	http://regeocities.eu/regeocities-project/

Programme	**Intelligent Energy Europe**
Acronym / Name	**Build-up Skills**
Main subject	Increase the number of qualified workers across Europe to deliver renovations offering a high energy performance as well as new, nearly zero-energy buildings.
Objectives / Results	Development and endorsement of a National Qualifications Roadmap / continuing education and vocational training of the workforce in the building sector
Mediterranean countries/regions involved	30 European countries. Mediterranean countries are involved.
Agents in the value	Policy makers, trainers, craftsmen.

chain involved	
Website / Further information	http://www.buildupskills.eu/en/national_projects

Programme	**LIFE+07**
Acronym / Name	**EDEA**
Main subject	Energy efficiency in design and construction of social housings
Objectives / Results	To develop a design and building methodology for social housing in Extremadura, in order to obtain houses under sustainability criteria, with a better energy performance and using new renewable energy resources, in addition to ensure the improvement of building quality.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	All
Website / Further information	http://www.proyectoedea.com

Programme	**LIFE+09**
Acronym / Name	**EDEA Renov**
Main subject	Energy efficiency in retrofitting of social housings and neighbourhoods
Objectives / Results	To develop an energy retrofitting methodology for social housings and neighbourhoods in Extremadura, in order to obtain energy improvements in existing housings. Several energy studies will be carrying on in existing dwellings.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	All
Website / Further information	http://www.renov.proyectoedea.com

Programme	**FP7**
Acronym / Name	**SportE2**
Main subject	Improvement of energy efficiency in sport facilities
Objectives / Results	The aim is to develop an integrated, modular, and scalable ICT system to manage energy consumption, generation, and exchange locally and within the larger context of the smart grid/neighbourhood.
Mediterranean countries/regions involved	Greece Italy Portugal Spain
Agents in the value chain involved	Technical solution developers, software developers, architecture and engineering companies, R&D institutes, universities, property owners.
Website / Further information	http://www.sporte2.eu

Programme	FP7
Acronym / Name	**COOL-Coverings**
Main subject	Development of cost-effective nanotech-enabled insulation materials to improve building envelope energy efficiency in retrofitting or new constructions
Objectives / Results	The project will develop a set of outdoor covering materials to achieve the following objectives: • External walls – NIR reflecting paints enabled by new Nano crystalline metal oxides • Facades – ceramics using a new Nano technological-based NIR reflecting inorganic coating • Roof – an already existing 3D textile membrane incorporating a Nano technological-based NIR reflecting coating • Internal walls – NIR-Reflecting Nano crystalline oxides so that a reflection range may cover the radiation from indoor heating systems
Mediterranean countries/regions involved	Greece Italy Spain 4 non-MED regions
Agents in the value chain involved	Manufacturers, R&D institutes, universities.
Website / Further information	http://www.coolcoverings.org

Programme	FP7
Acronym / Name	**Training courses for passive cooling application in building design for Mediterranean countries architects**
Main subject	Prepare and test an educational package directed to disseminate - via training courses - and transfer to the end-users the knowledge on the integrated effects of the most appropriate solar passive techniques in Mediterranean countries, emphasising the cooling needs.
Objectives / Results	The final products consist of a Guide-Book on passive cooling design and new powerful educational software, called Mather. The Guide-Book comes from a preliminary introduction on fundamentals, physics insight, terminology and phenomenology of the interaction between energy and buildings. Afterwards, a survey on passive solar applications to Space Heating is done. Then, all the topics related to summer comfort are developed.
Mediterranean countries/regions involved	Greece Italy
Agents in the value chain involved	Owners, final users of buildings.
Website / Further information	http://cordis.europa.eu/search/index.cfm?fuseaction=proj.printdocument&q=57F24203FFB3C3496B6EF75CC25158DE&PJ_LANG=EN&pid=146&type=pro&PJ_RCN=2254524

Programme	FP7
Acronym / Name	**MESSIB** Multi-source energy storage system integrated in buildings
Main subject	Storage of energy in buildings.
Objectives / Results	The overall objective of MESSIB project is the development,

	evaluation and demonstration of an affordable multi-source energy storage system (MESS) integrated in building, based on new materials, technologies and control systems, for significant reduction of its energy consumption and active management of the building energy demand.
Mediterranean countries/regions involved	France Greece Italy Slovenia Spain Non Mediterranean countries: Finland, Germany, Netherlands, Poland.
Agents in the value chain involved	Architects, policy makers.
Website / Further information	http://www.messib.eu/

Programme	**Lifelong Learning Programme, Leonardo Da Vinci**
Acronym / Name	**EnEf**
Main subject	Energy Training and capacity in construction sector.
Objectives / Results	The EnEf project aims at designing energy training modules and contents. These trainings will focus on energy efficiency in buildings. This project will contribute to cost effective energy efficiency, reduction of emissions bringing significant emissions reductions and cost savings to Member States.
Mediterranean countries/regions involved	Italy Spain Greece Bulgaria. Non Mediterranean countries: Germany, Ireland, Slovakia
Agents in the value chain involved	Technical professionals without knowledge about energy buildings. Especially for entrepreneur and managers of building industry.
Website / Further information	http://www.enef-project.eu

Programme	**CIP-ICT-PSP Programme**
Acronym / Name	**eSESH**
Main subject	Saving Energy in Social Housings with ICTs.
Objectives / Results	Aims to design, develop and pilot new solutions to enable sustained reductions in energy consumption across European social housing. This is to be accomplished by providing usable ICT-based services for Energy Management (EMS) and Energy Awareness (EAS) directly to tenants. By providing effective ICT monitoring and control of local generation of power and heat and by providing social housing providers, regional and national government with the data they need to optimize their energy-related policy and investment decisions at national, regional and organizational level. The project will help Europe to meet emission targets by achieving a significant reduction of energy consumption in European social housing.
Mediterranean countries/regions involved	France, Spain, Italy. Non Mediterranean countries: Germany, Austria, Belgium.
Agents in the value	Users.

chain involved	
Website / Further information	http://www.esesh.eu

Programme	**POCTEP**
Acronym / Name	**Promoeener-A**
Main subject	Promotion of energy efficiency and renewable energies in public administration buildings.
Objectives / Results	The objective is to promote the installation of efficient HVAC equipment and renewable energies in public buildings studying the energy behaviour in 115 public building. The best energy strategies, passive and active, will be identified.
Mediterranean countries/regions involved	Spain Portugal
Agents in the value chain involved	Technicians and public administrations
Website / Further information	http://promoeener-a.com/

The above information significantly represents the current level of cooperation in efficiency and energy refurbishment of buildings around Europe and, more specially, in the Mediterranean area. eeWiSE Project developers have taken part in most of the activities detailed.

7.2 National projects

Country (Region)	**MALTA**
Programme	National R&I Programme 2006
Acronym / Name	R&I-2006-009: Development of an Innovative Wastewater Recycling Process for Hotels / Large Commercial Buildings / Isolated Communities for Environmental Protection and Cost Recovery[1]
Main subject	Waste water reuse
Objectives / Results	Development of an innovative water recycling process to maximize reuse of water and minimise discharge in non-residential buildings
Agents in the value chain involved	Owners of non-residential buildings (e.g. hotels)

Country (Region)	**MALTA**
Programme	National R&I Programme 2008
Acronym / Name	R&I-2008-026: Solar Hot Water Controller so as to Automatically Control the Use of Electrical Energy Through the Use of Back-up Heater in Inclement Weather, Thereby Reducing Energy Consumption and CO2 Release
Main subject	Solar thermal
Objectives / Results	Development of an intelligent, innovative and autonomous electronic controller which will reduce the electrical energy consumption of solar water heaters when the temperature of the water is bolstered by the electric heater

Agents in the value chain involved	University of Malta / RES industry

Country (Region)	**SPAIN (Extremadura)**
Programme	Emplea Verde Programme
Acronym / Name	REPEX
Main subject	Energy retrofitting buildings: opportunity of employment in Extremadura, a solution for energy poverty.
Objectives / Results	To promote the generation of employment in building sector by means of change to energy retrofitting in existing dwellings.
Agents in the value chain involved	Professionals, small and medium enterprises in construction sector.

Country (Region)	**SPAIN (Valencian Community)**
Programme	IMPIVA R&D Programme
Acronym / Name	CESCON
Main subject	Energy Efficiency in thermal envelope
Objectives / Results	Study the energy performance buildings solutions in order to improve the energy efficiency in buildings.
Agents in the value chain involved	Building agents: products providers, architects and engineers

Country (Region)	**SPAIN (Valencian Community)**
Programme	IMPIVA R&D Programme
Acronym / Name	CESCON 2
Main subject	Energy Efficiency and improvement of comfort
Objectives / Results	Improvement the energy efficiency in buildings through the analysis and optimization of construction solutions and operational conditions that meet the needs of user comfort
Agents in the value chain involved	Building agents: products providers, architects and engineers. Users.

Country (Region)	**SPAIN (Valencian Community)**
Programme	IMPIVA R&D Programme
Acronym / Name	APLICONS
Main subject	Energy Efficiency software
Objectives / Results	Development of support applications for energy performance certification of buildings.
Agents in the value chain involved	Architects and engineers.

Country (Region)	**SPAIN (Valencian Community)**
Programme	IMPIVA R&D Programme
Acronym / Name	RENEFI
Main subject	Studies of energy efficiency measures and feasibility of renewable energies in building
Objectives / Results	Provide construction companies the knowledge to achieve the reduction of energy consumption in buildings. IT will help to reduce emissions of

	greenhouse gases that cause climate change.
Agents in the value chain involved	Building professionals.

Country (Region)	**SPAIN (Valencian Community)**
Programme	IMPIVA R&D Programme
Acronym / Name	REHATICA
Main subject	Energy refurbishment of buildings software.
Objectives / Results	Development of an application to calculate and quantify the reduction in energy demand (heating and cooling) due to a energy refurbishment of the thermal envelope of existing buildings.
Agents in the value chain involved	Architects and engineers.

Country (Region)	**SPAIN (Valencian Community)**
Programme	IMPIVA R&D Programme
Acronym / Name	REHATICA
Main subject	Energy refurbishment of buildings software.
Objectives / Results	Development of an application to calculate and quantify the reduction in energy demand (heating and cooling) due to a energy refurbishment of the thermal envelope of existing buildings.
Agents in the value chain involved	Architects and engineers.

7.3 Platforms and sectorial clusters

Name	**RHC - Platform**
Scope	European technology platform
Main subject	Renewable heating and cooling
Objectives / Results	Brings stakeholders from the biomass, geothermal and solar thermal sector (including the related industries) to define a common strategy for increasing the use of renewable energy technologies for heating and cooling.
Mediterranean countries/regions involved	European countries. Mediterranean countries are involved.
Agents in the value chain involved	Building industry companies, R&D organisations, public authorities.
Website / Further information	http://www.rhc-platform.org

Name	**GreenBuild Malta**
Scope	Mediterranean
Main subject	Building Industry networking
Objectives / Results	The event aims to assess the current situation of the Maltese construction industry and to address the opportunities available to improve sustainability and direct skills through exchange with Italian counterparts

Mediterranean countries/regions involved	Italy Malta
Agents in the value chain involved	Enterprise Europe Network
Website / Further information	http://www.buildupskills.eu/en/national_projects

Name	**PTEC - Spanish technological Platform of construction**
Scope	National
Main subject	Construction
Objectives / Results	Meeting the demands of the Spanish construction companies and social aspirations, to raise the competitiveness of the Spanish construction industry through the investigation.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	Enterprises and professionals of construction sector.
Website / Further information	http://www.construccion2030.org

Name	**Cluster of Energy**
Scope	National
Main subject	Energy
Objectives / Results	Promote the integration, creation and strengthening of the companies and institutions that are within the value chain of the energy sector. Defend the interests of energy business, promote the enterprises exchanges, to increase the competitiveness of companies in the energy sector and encourage cooperation.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	Enterprises and professionals of energy sector.

7.4 Associations

Name	**OME - Observatoire Méditerranéen de l'Energie**
Scope	Mediterranean / International
Main subject	Promotion of cooperation and collaboration between organisations and enterprises in the energy sector, within the framework of the Euro-Mediterranean partnership.
Objectives / Results	The main objective of the Association is to promote cooperation and collaboration with major energy companies operating in the Mediterranean region, making of energy an element for regional integration.
Mediterranean countries/regions involved	France Greece Italy

	Slovenia Spain Turkey Non European countries: Austria, Egypte, Lebanon, Libya, Morocco, Palestine, Tunisia.
Agents in the value chain involved	Big energy producers.
Website / Further information	http://www.ome.org

Name	**MEDENER - Mediterranean Association of National Agencies of Energy Conservation**
Scope	Mediterranean / International
Main subject	Brings together 12 organizations from both shores of the Mediterranean in charge of energy efficiency and renewable energy development policies.
Objectives / Results	Exchange of experiences, know-how and best practices in energy policies
Mediterranean countries/regions involved	France Greece Italy Portugal Spain Non European countries.
Agents in the value chain involved	Energy consumers. Local communities. Actors in the field of research and development. Universities

Name	**E2B EI**
Scope	European
Main subject	Energy efficiency in European buildings
Objectives / Results	To deliver, implement and optimise building and district concepts that have the technical, economic and societal potential to drastically decrease energy consumption and reduce CO_2 emissions in both new and existing buildings across the European Union. The E2B EI will increase the level of research into key technologies and develop a competitive industry in the fields of energy efficient construction processes, products and services.
Mediterranean countries/regions involved	Croatia France Greece Italy Portugal Slovenia Spain Turkey
Agents in the value chain involved	Big companies, R&D organisations, SMEs and public promoters and agencies.
Website / Further information	http://www.e2b-ei.eu

Name	Cyprus Architects Association
Scope	National
Main subject	Energy efficiency retrofitting
Objectives / Results	Study the renewable energy applications on existing buildings
Mediterranean countries/regions involved	Cyprus
Agents in the value chain involved	Engineers, architects, researchers, students.
Website / Further information	http://www.architecture.org.cy

Name	ANERR
Scope	National
Main subject	Refurbishment of buildings
Objectives / Results	From the energy point of view, dialogue and cooperation with the government in development of energy efficiency plans and use of renewable energy. Support promotion and revitalization of the refurbishment sector.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	Rehabilitation building sector companies. Public authorities.
Website / Further information	http://www.anerr.es

Name	AETIR
Scope	National
Main subject	Infrared thermography.
Objectives / Results	To impulse the use of thermography in a professional level. To increase the capacity and training in infrared thermography and collaborate in develop of regulations.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	Technicians with interests in thermography.
Website / Further information	http://www.aetir.com

Name	ATECYR
Scope	National
Main subject	HVAC systems
Objectives / Results	To promote the quality in HVAC installations. To increase the capacity and training in HVAC and collaborate in develop of regulations.
Mediterranean countries/regions involved	Spain
Agents in the value	Designers, technicians and installers of HVAC systems.

chain involved	
Website / Further information	http://www.atecyr.org

7.5 Workshops and Meeting Points

Name	**EME3** **I World meeting in energy efficiency in buildings**
Scope	International
Main subject	Energy efficiency in buildings
Objectives / Results	To facilitate communication and meetings between companies involved in building sector and transfer of knowledge and experiences in national energy targets around Europe.
Mediterranean countries/regions involved	All Mediterranean countries are involved.
Agents in the value chain involved	Policy makers, professional consulting, engineering, construction and trade, industrial energy users, equipment manufacturers and distributors, installers and maintenance companies, energy project developers, universities and research centres.
Website / Further information	http://www.encuentroeme3.com

Name	**GENERA**
Scope	International
Main subject	Energy and environment
Objectives / Results	The main goal is to facilitate communication and meetings between companies, research centres and universities (technology, renewable energies and environment sectors) in Europe.
Mediterranean countries/regions involved	All Mediterranean countries are involved.
Agents in the value chain involved	Professional consulting, engineering, construction and trade, industrial energy users, equipment manufacturers and distributors, installers and maintenance companies, energy project developers, universities and research centres.
Website / Further information	http://www.ifema.es/web/ferias/genera/default.html

Name	**CLIMAMED** **Mediterranean Congress of Air Conditioning**
Scope	Mediterranean
Main subject	Energy efficiency in HVAC systems
Objectives / Results	Achieving sustainable energy consumption is one of the major goals of developed societies around the world. Likewise, research on Net-Zero Energy Buildings has become increasingly popular and highly supported by many governments. This issue only contributes further to the importance of energy consumption, especially its relation to air conditioning, since it is so vital for the Mediterranean climate. CLIMAMED provides a forum to exchange knowledge and experiences

	about it.
Mediterranean countries/regions involved	France Italy Portugal Spain Turkey
Agents in the value chain involved	Designers, manufacturers, contractors, and end-users
Website / Further information	http://www.climamed.org

Name	**FICON**
Scope	National
Main subject	Iberian Workshop of Construction in Extremadura
Objectives / Results	Give a vision of new funding, the transformation to adapt to the new legislative framework and the business opportunities that arise for construction businesses Extremadura in a changing market.
Mediterranean countries/regions involved	Spain
Agents in the value chain involved	Engineers, architects, construction professionals, equipment manufacturers and distributors, installers companies.
Website / Further information	http://www.feval.com/lenya/feval/live/ferias/ficon.html

Name	**Ecological Design**
Scope	National
Main subject	Energy efficient design
Objectives / Results	How to design new energy efficient buildings.
Mediterranean countries/regions involved	Turkey
Agents in the value chain involved	Architects, designers, researchers, students.

Name	**Energy efficient retrofitting of a house**
Scope	National
Main subject	Energy efficient design
Objectives / Results	How to realize energy efficient refurbishment in existing buildings.
Mediterranean countries/regions involved	Turkey
Agents in the value chain involved	Architects, designers, researchers, students.

7.6 Other cooperation experience

Name	IPEEC International partnership for energy efficiency cooperation
Scope	International
Main subject	Energy efficiency.
Objectives / Results	High level international forum that provides global leadership on energy efficiency by identifying and facilitating government implementation of policies and programs that yield high energy-efficiency gains.
Mediterranean countries/regions involved	France Italy
Agents in the value chain involved	National Governments and policy makers

Name	Networking of Renewable Energies
Scope	Mediterranean
Main subject	Renewable Energies
Objectives / Results	Promote the sustainable energy sector and identify business opportunities between Spanish and Portuguese entities. Have the opportunity to present the interests and find participations for renewable energy.
Mediterranean countries/regions involved	Portugal Spain
Agents in the value chain involved	Companies, research organizations and public administrations

Name	SAVE and REDUCE: Eco-Gozo Home Consultancy Visits
Scope	National
Main subject	Energy and water conservation. Renewable energy
Objectives / Results	To inform the Gozitan community on how to reduce the carbon and water footprints of their household. Encouraging energy savings in line with the government's target to transform Gozo into an ecological island by 2020.
Mediterranean countries/regions involved	Malta
Agents in the value chain involved	Institute for Sustainable Energy within the University of Malta (R&D organisation), Ministry for Gozo (National Autorithy), architects, engineers as qualified auditors and citizens of Gozo (Malta).
Website / Further information	http://www.ecogozo.com/index.php?option=com_content&view=article&id=228&Itemid=38&lang=en

The almost entire construction catalog has been extract from the European project E4R, "A*ssessment tools building energy efficiency, Refurbishment of the SUDOE space*". E4R is a European project that aims to develop and promote energy rehabilitation of buildings in the southwestern Europe, through the realization of practical tools that help establish criteria both energy efficient and economically. (www.e4rproject.eu)