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Sustainable
Construction
in Rural and Fragile Areas
for Energy efficiency

COMPONENT 4:

**Fostering innovative energy-efficient and sustainable
construction standards in fragile coastal and rural areas**

Subcomponent 4.1:

**Guidelines for energy-efficient housing policies and territorial
planning**

Deliverable 4.1:

Survey of MED level regulations

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INTRODUCTION

Despite the fact that regulations are viewed by many constructors and building designers as a burden for further innovation in the building sector, they have to respect them in order to serve the objectives set by the European Union as far as climate change is concerned.

In the section below there is a summary of the Energy Performance of Buildings Directive 2002/91 EC, the Greek Law 3661 that refers to measures to reduce energy consumption in buildings, the Greek Regulation for Buildings Energy Performance (KENAK), as well as other regulations that concern energy performance in the construction sector.

Without doubt, regulations should take into consideration the different climate characteristics of each region, the behavior of the buildings' users, special building tradition and quality assurance, elements that influence to a great extent the legislative framework, the procedure used for calculation and the final energy performance of the buildings.

1. Energy Performance of Buildings Directive 2002/91 EC (EPBD)

The Directive 2002/91/EC (EPBD) was accepted by the European Parliament in 2003 and referred to the Energy Performance of Buildings. The main goals that are promoted through the Directive is the improvement of the energy performance of the buildings in Europe, by using economically efficient measures and the convergence of building standards towards those of Member States that already have high levels of requirements. This Directive has four main aspects:

- The implementation of a calculation methodology for the energy efficiency of the examined buildings that is based on the factors which affects energy consumption.
- The introduction of regulations that set the minimum standards in energy performance not only for new but also for existing renovated buildings.
- The issue of Energy Performance Certificate, which is mandatory in cases purchasing, selling and renting a building.
- The inspection of boilers and air-conditioning systems regarding their efficiency and their proper operation.

The above mentioned objectives are promoted to European countries and it is the individual responsibility of each member state to implement the measures that corresponds to its needs and situation. Undoubtedly, a key factor for the best results is the collaboration and the experience exchange, through which the members will have the opportunity to evaluate the results that other members had regarding the methods used for buildings' energy performance.

According to the 3rd Article of EPBD, in order to calculate energy performance, buildings should be classified into the following categories:

1. different types of family houses
2. blocks of apartments
3. offices
4. education buildings
5. hospitals
6. hotels and restaurants
7. sports facilities
8. service buildings
9. other types of energy consuming buildings

The implementation of the Directive 2002/91/EC is supported by a number of standards that were introduced by the European Committee for Standardization (CEN) and their aim is to constitute a basis for the procedures that each member state follows concerning energy performance of buildings. The major role of these standards is to create a common concept in order to facilitate the implementation of the measures proposed and to prepare energy performance certificates and energy inspections.

2. Law 3661/2008 - Measures to reduce energy consumption in buildings

According to Law 3661/2008 - “Measures to reduce energy consumption in buildings”, Greek legislation lines with the Directive 2002/91/EC of the European Parliament and Council of the 16th December 2002 “For the energy efficiency of the buildings” (EE L1 4.1.2003). Law 3661 incorporates all the provisions of the Directive, provides a Regulation for the energy performance of buildings and identifies five main thematic sections concerning:

- the minimum requirements for energy efficiency and the method for calculating energy performance (Article 3)
- of new and older buildings (Articles 4 and 5)
- the Energy Efficiency Certification (Article 6)
- inspections of boilers and air-conditioning units (Articles 7 and 8)
- the introduction of qualified and accredited energy inspectors (Article 9)

The above mentioned sections are analyzed in the following part:

Article 3

1. The Regulation defines the method for the calculation of the buildings’ energy efficiency, the minimum requirements for their energy efficiency, the type and content of the study for energy efficient buildings, the responsible persons for the implementation of the control, the process and frequency of conducting

energy audits of the buildings, boilers, heating and air conditioning systems, the type and content of energy performance certificate mentioned in the 6th Article, the issue process, the competent bodies for the audit, the cost of the certification and its calculation, any provision of incentives to implement additional measures for energy efficiency improvement and any other specific issue or necessary detail.

2. The calculation method for the buildings' energy efficiency concerns at least:

- a) the thermal characteristics of the building elements, including airtightness,
- b) heating installation and hot water supply, including the respective insulation characteristics
- c) installation of air conditioning units
- d) ventilation and natural airing
- e) built-in lighting installation of buildings with uses other than housing the residents.
- f) location and orientation of the buildings, including the external climatic conditions,
- g) passive solar systems, according to Article 1 paragraph 7a of the General Building Regulation and solar protection
- h) the prevailing internal climatic conditions, including the targeted ones.

3. When calculating the energy performance of buildings the positive effect – at case– of the following is taken into account:

- a) active solar systems, according to Article 1, paragraph 7b of the Γ.O.K. and other heating, cooling and electricity production systems, based on renewable energy sources
- b) electricity produced by co-generation of electricity and heating
- c) heating and cooling, in regional or building square scale (district heating or cooling) and
- d) natural lighting.

Article 4 - New buildings

1. New buildings must meet the minimum energy efficiency rules as defined in the Regulation.
2. For new buildings of total surface area over one thousand (1,000) square meters, prior the construction, a study must be conducted and submitted to the responsible City Plan Service, which accompanies the study based on paragraph 1 of Article 3, which includes technical, environmental and economic feasibility of the installation of at least one of the alternative energy supply systems, like decentralized energy supply systems based on renewable energy sources, cogeneration of heating and electricity, cooling or heating systems in regional or building square scale, and heat pumps.

Article 5 - Existing buildings

In buildings of total surface area of over one thousand (1,000) sqm undergoing major renovation, their energy performance is upgraded as far as it is technically,

functionally and economically feasible in order to meet minimum energy efficiency requirements, as defined in the Regulation.

These requirements are set either for the renovated building as a whole or only for the renovated installation or its building components, in case they constitute part of the renovation procedure that needs to be completed within a limited time frame so as to improve the overall efficiency of the building.

Article 6 – Energy Performance Certificate

Once the construction of a new building or the major renovation of an existing building - as in Article 5- is completed, the owner must apply for a certificate of energy efficiency. Upon sale or rental of the building such an energy performance certificate is available by the owner for the buyer or the lessee.

The provisions of the preceding paragraphs cannot be excluded by agreement of the parties. By joint decision of the Ministers of Economy and Finance, Development and Environment, Planning and Public Works, the specific terms of issue and distribution of the above certificate is defined, as well as the administrative sanctions against the debtor in case of failure to obtain or dispose of it. By the same decision, the recovery procedure and all the necessary details- in case a fine is imposed- are defined.

The energy performance certificate of a building is issued by special inspectors of Article 9, as defined in the Regulation, and it is in force, at maximum, for ten (10) years. If the building is radically renovated or extended in a way that affects the total energy efficiency, the force of the energy performance certificate expires at the year that the renovation or the extension is completed, before the expiration of the ten (10) years period.

The energy performance certificate of a buildings, includes, among many, reference values, like legal requirements in effect and comparative evaluation criteria, so as to enable the consumers to compare and to evaluate the energy efficiency of a building. The certificate is accompanied by recommendations for the improvement of the energy efficiency, concerning the cost that these improvements involve.

The energy certification of horizontal properties as described in Article 1 of the 3741/1929(GG 4 A) law and property as described within Article 1 of the 1024/1971 (GG 232 A) law is based on a common certification for the whole building, in case of a building complex with a single communal heating system. The cost for issuing the building's energy efficiency certificate burdens the owner or the co-owners of the whole building based on the respective ownership percentages.

In buildings used by public sector's agencies and institutions of the wider public sector, as defined at a time, the energy performance certificate (in force for not more than ten (10) years) for the building is placed in a distinct position. In these category of buildings a board can be mounted where the recommended and the prevailing interior temperatures -and any climatic factors affecting these temperatures- will be presented.

Article 7 – Boiler Inspection

1. For the reduction of energy consumption and the restriction of the carbon dioxide emissions, the energy inspectors conduct inspections of the buildings' boilers heated by conventional fossil fuels, as follows: a) at least every five (5) years for the boilers with an effective rated output, from

twenty (20) up to one hundred (100) kW, b) at least every two (2) years, for the boilers with an effective rated output of more than a hundred (100) kW and, if these boilers are heated with gas fuel, at least every four (4) years. The inspectors compose a report, in which the efficiency of the boiler is evaluated and directives and recommendations for the tuning, maintenance, repair or the replacement of the boiler(s), if necessary.

2. Heating installations with boilers older than fifteen (15) years and effective rated output greater than twenty (20) kW are inspected in their entirety, from energy inspectors only once, in time and in accordance with the procedure described in the Regulation. The inspectors conduct a report assessing the efficiency of the boiler and its size in relation to the energy needs of the building and instructions and recommendations are formulated for possible replacement of the boiler, heating system modifications and other alternatives solutions.

Article 8 – Air-conditioning systems

1. To reduce the energy consumption and to reduce the carbon dioxide emissions inspections are taking place by the energy inspectors on the buildings air-conditioning installations, with an effective rated output of more than twelve (12) kW, at least every five (5) years. The inspectors conduct a report, assessing the efficiency and size of the air-conditioning installations in relation to the building's energy needs proposing appropriate guidelines and recommendations for improving or replacing the abovementioned installations.

2. By joint decision of the Ministers of Economy and Finance, Development and Environment, Planning and Public Works, set the administrative sanctions for non conformity with the obligations arising from the provisions of Articles 7 and 8.

Article 9 – Building Inspectors and Boiler and air-conditioning systems Inspectors

1. The energy efficiency certification of buildings and the inspection of the boilers and air-conditioning installations are carried out by specially trained and accredited for this purpose inspectors.
2. By decree issued upon proposal of the Ministers of Development and Environment, Planning and Public Works, within six (6) months from the commencement of the validity of the specific law, the required qualifications of the buildings' inspectors and inspectors of the boilers and air-conditioning installations of the buildings, the rules and principles of project implementation, the process of accreditation and granting of the permit, the properties that are incompatible with their work, issues related to the their enrollment in the respective registers, their remuneration and how it is defined, the administrative penalties against them, the institutions that impose such administrative appeals against penalties, the deadlines to exercise them, and any other specific issue or necessary detail.

By the same decree the establishment of a committee for offering its specialist opinion on matters relating to the granting or withdrawal of the energy inspector's license and recommending to the Minister of

Development any necessary action or regulation related to the energy inspectors and the scope of energy audits.

The responsible Department of Ministry of Development is keeping, in electronic form, an Archive of Buildings Inspection in which are recorded, in separate parts: a) the energy efficiency certificates of the buildings, b) the reports of the buildings' boilers inspection and g) the respective reports of the inspections of the air-conditioning installations.

3. Regulation for Buildings Energy Performance (KENAK)

With the Regulation for Buildings Energy Performance (KENAK), which has been recently adopted within national legislation, the integrated energy design in building sector is legislated, in order to improve energy performance of the buildings, energy saving and environmental protection, through concrete actions:

- Study of the Energy Performance of Buildings
- Establishing minimum requirements for energy efficiency in buildings
- Building Energy Rating (Energy Performance Certificate)
- Energy audits in buildings, boilers, heating and air conditioning systems

The Study of Energy Performance of buildings replaces the study of thermal insulation and will be implemented in each buildings (over 50 square meters), new or older ones which is radically renovated and is based on a specific methodology that is related to:

- a. The requirement for minimum standards regarding the design of the building, the building's envelope and its electromechanical installations
- b. Its comparison with a reference building that has the same geometric characteristics, orientation, use and operation with the examined building, which meets minimum standards and has defined technical characteristics.

The Energy Performance Certificate has a ten-year validity and refers to:

- every new or existing building that its total area exceeds 50 square meters and is totally renovated

- existing buildings that their area exceeds 50 square meters, or parts of these buildings, when they are sold or rent
- every public or broader public building

The Energy Performance Certificate is mandatory in the case of purchasing, selling or renting a building since the January of 2011.

The Energy Performance Certificate includes the results of the evaluation of the energy inspector as well as recommendations for improving the energy efficiency of the building, so that consumers are able to compare and evaluate their actual consumption and any opportunities for improving energy performance.

The energy audit is an important diagnostic tool for the energy status of existing buildings and the possibility for improving it, as well as the implementation of legislation concerning energy efficiency of new buildings. The energy inspector, who will join the Register of Energy Inspectors of the Ministry of Environment, Energy and Climate Change, inspects the building and ranks it in an energy category, regarding the ratio of consumption of the building to the consumption of the reference building.

The control for the proper application of the legislative framework will be applied by the Special Agency of Energy Inspectors, established in the Special Secretariat for Inspection & Energy of the Ministry of Environment, Energy and Climate Change and is composed of employees of public and broader public sector.

The benefits from the buildings' energy performance Regulation are economic, social and environmental. The economic benefits are mainly relate to the reduction of operating costs and maintenance costs of buildings, and the revival of building sector. The social benefits refer to new jobs and the improvement of the quality of life and environmental benefits are related to the reduction of

emissions, especially carbon dioxide, with a significant contribution to combating climate change and energy waste.

4. Construction Product Directive 89/106/EEC (CPD)

The Construction Product Directive 89/102/EEC of the 21st of December 1988 aims at ensuring the free movement of construction materials within the European Union and the harmonization of the national legislative framework concerning a set of minimum standards that these products must respect.

The main requirements of this Directive are the following:

- Mechanical resistance and stability
- Fire Protection
- Hygiene, health and environment
- Safety in use
- Protection against noise
- Energy saving and heat storage

Compliance with the Directive follows several systems and procedures such as the following:

- Certification for the conformity of the product through testing inspection
- Certification for the conformity of the product without testing inspection
- Certificate of the factory production with continuous monitoring
- Certificate without constant supervision
- Initial- type testing by the notified bodies
- No involvement of certified organizations

The constructor needs a control system for the factory production. The initial-type testing and the control of production systems are implemented by a certified operator and the responsible of all the other phases of the production process is the constructor.

It is mandatory for the products which comply with the Directive and respect its technical specifications to bear the CE label. According to an amendment introduced by Directive 93/68/EEC the requirements related to its use are harmonized for a whole range of products that are likely to be introduced within the scope of various Directives which had previously promoted different label systems.

Among the above mentioned products are:

- construction products
- simple pressure vessels
- personal protective equipment
- hot-water boilers
- electrical equipment, etc.

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