

5. Approach to the regulation in Spain for sustainable constructions and eco-efficient solutions

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Resumen

Is there any law related to sustainable buildings and eco-efficient solutions in Spain? How harmful effects on the environment caused by the building industry are regulated? The emergence of concepts such as sustainability or eco-efficiency in the mid-twentieth century has caused a deep impact in the building industry, changing traditional techniques, systems and procedures that have promoted research for the use of materials more efficient. All aimed at lessening the harmful effects on the environment.

In order to have a better comprehension of the impact caused by the regulation in the construction model we have prepared a comprehensive inventory of the existing regulations in Europe, Spain and Andalusia on sustainable buildings and eco-efficient solutions.

All of this allows us to shape the current legal framework and its impact on the eco-efficient building model with the prospect of advancing in the achievement of sustainability objectives and therefore it is crucial to have a fair regulation on this field, adapted to the progress and in the same line with the sustainability objectives established in the European framework.

Keywords: Legislation, Building, Sustainable, Eco-Efficient, environmental.

0 Objectives

The main goals of our work, is to prepare a brief introduction on this topic and make an approach to the concept of eco-efficiency in construction; To elaborate an updated inventory of the regulation applicable to sustainable building and eco-efficient at European, national and Andalusian level in order to show an actual view on this topic; and reflect on the constructive evolution in Europe and in our country based on: Verification Items verification of eco-efficient construction and alternative energy, energy efficiency, materials and construction techniques eco-efficient and waste treatment; and mandatory certifications; and conclude, with a section of conclusion based on our analysis.

1 Introduction

Nowadays nobody disputes the important impact of construction on the environment and precisely with the aim of advancing to a new construction model, a great deal of laws and regulations have been approved to mitigate this impact, From the point of view of the urban planning, the environmental impact assessment is widely legally established. In this way the European Union on its European Spatial Development Perspective (ESDP) and the European Commission on its Communication entitled "On Thematic Strategy on the Urban Environment" have insisted on the environmental dimension of the new city model. The European institutions have also encouraged developing new instruments of sustainable urban planning and supporting of sustainable constructions, which was followed in Spain by our Land Law.

Regarding the construction, aim of our study, the sustainability has reached all the construction process stages, design, construction and demolition.

It is a matter of establishing a model of sustainable building based on the adaptation and respect to the environment which contributes to the improvement of the quality of life an environment, acting on the main inputs linked to construction, the management resource consumption, wastes and emissions, water and energy.

Precisely for this, the model is based on the promotion of the use of renewable energy and achievement of energy efficiency in order to reduce gradually reduction CO₂ emissions to the atmosphere, and reduce energy dependence, maintaining as final objective the protection of the environment.

2 Approach to the concept of eco-efficiency in building industry

On the 2020 horizon the sustainable construction is taking a main role. In fact sustainable construction has become becomes a core of housing public. Eco-efficient buildings are made following parameters of sustainability and environmental protection. In this context new concepts such as sustainable consumption, eco-efficiency, ecological or sustainable construction and even bioclimatic architecture has arisen. The main feature of this type of construction is the reduction of energy consumption, a new energy model which discard the inefficient use of fossil fuels that generate significant amounts of CO₂ and other polluting gases, improving energy efficiency and the use of renewable energy that contributes to a reduction of pollution and the consumption of water, not only in construction but also in the extraction processes or while manufacturing materials, all of this, with the clear aim of minimizing the direct and indirect impacts on the environment. However, we are aware that the sustainable development in the field of construction is still far from achieving its objectives, especially considering the difficulties of interacting on such a heterogeneous sector.

3 European regulation

Our study must begin with the European Union (UE) Regulation, which sets the framework that should be subject to transposition by Member States. Regarding CO₂ emissions, the UE is aware that building sector is responsible for over 40% of electricity consumption, surpassing the calculation of 36% of CO₂ emissions into the atmosphere, resulting imperatively necessary to reduce this percentage in order to comply with the Kyoto Protocol "20-20-20%" targets, based on a 20% reduction of greenhouse gases (GHG), get 20% of EU energy from renewables and a saving of 20% improvement of energy efficiency.

The European regulation has evolved steadily with the adoption of new rules and agreements between European Parliament and European Council, one of their latest agreements establishing zero energy consumption for new public buildings from 2018. In this paper, we pretend to offer a global inventory of the European, national and regional regulation in order to evaluate their influence on the building industry.

The chronological inventory of European legislation we can see in Table 1 below.

Tabla. 1 Inventory of European regulations

<i>European regulations</i>	
Directive 2008/98/EC of 19 de March 2008.	UE
Directive 2009/28/EC, of 23 de April on the promotion of the use of energy from renewable sources. Modified by Directive 2015/1513 of the European Parliament and of the Council of 9 September 2015.	UE
Directive 2010/31 / EU of 19 May on the energy efficiency of buildings which replaces EU Directive 2002/91.	UE
Directive 2012/27 / EU of 25 October, on energy efficiency	UE

4 Spanish national regulation

While Spanish national regulation initially focuses on issues of quality and safety of users of housing, as we could clearly see on the Law on Building Ordinance

(LOE), environmental concern has been slowly integrating in the legislation Spanish regulation, in fact, the CTE, which develops the content of the law constitutes the greatest advance in this area in the past 30 years.

The Spanish regulation is in general the product of the transposition into national laws the content of European Directives. Similarly, to comply with its international commitments have also developed various sectoral plans at national level.

The chronological inventory of European legislation we can see in Table 2 below.

Tabla. 2 Inventory of Spanish legislations

<i>Spanish legislations</i>	
Law 38/1999 on Building Ordinances, of November 5.	ES
Royal Decree 1481/2001, amended by RD 1304/2009, by which the disposal of waste by dumping is regulated	ES
Technical Building Code (in Spanish CTE). Royal Decree 314/2006, of 17 March.	ES
Royal Decree 1027/2007, of 20 July, which adopted the Regulations for thermal installations in buildings (in Spanish, RITE).	ES
Royal Decree 105/2008 of February 2008 that regulates the production and management of demolition and construction waste.	ES
Savings Action Plan and Energy Efficiency 2011-2020, of 29 July 2011.	ES
Renewable Energy Plan 2011-2020 (in Spanish PER), of 11 November 2011.	ES
Law 22/2011 on Waste and Contaminated soil, of July 28.	ES
Royal Decree 235/2013, of 5 April, approving the basic procedure for certifying the Energy Efficiency of Buildings.	ES
Law 8/2013, of 26 June, on rehabilitation, regeneration and urban renovation	ES
National Framework Plan on Construction Waste Management for the years 2016-2022.	ES

5 Regulation in Andalusia

Within the framework of the competences of the Andalusian Autonomous Community, one of the major features of the Andalusian regional public policies is the promotion of renewable energy. In the same vein, the Andalusian Urban Planning Act handles concepts such as the sustainable development and quality of life in order to improve improved existing cities, as a roadmap for the development of a new construction model in Andalusia.

Environmental concerns regarding building has been further strengthened by establishing a program of incentives for sustainable buildings co-financed with FEDER funds that promotes energy savings, improve energy efficiency and encourage the use of renewable energy in rehabilitation, reform and adaptation of building and facilities. However, recent significant budgetary adjustments have limited the scope of measures, initially much more ambitious than those established at European level.

The concern about giving a normative development of the right to housing, an eminently sustainable housing, has been in recent times the basis of Andalusian policies, so that the Andalusian Housing and Rehabilitation Plan for 2016-2020 is articulated in the framework of Law 1/2010 of 8 March, on the Right to Housing in Andalusia, with the aim of facilitating the change towards a model of sustainable and accessible city. Precisely in order to develop these goals has been recently approved the Decree 141/2016, of 2 August, regulating the Housing and Rehabilitation Plan of Andalusia 2016-2020.

The chronological inventory of the Andalusian regional regulation is as follows in Table 3 below.

Tabla. 3 Inventory of Andalusian regulations

<i>Regional Regulations in Andalusia</i>	
Act 7/2002, of 17 December, Andalusian Urban Planning Act.	<i>And.</i>
Act 2/2007, Law for the Development of Renewable Energy and Energy Efficiency in Andalusia developed by Decree 169/2011, of 31 May, and amended by Decree 2/2013, of January 15.	<i>And.</i>
Regional Director Plan of Hazardous wastes in Andalusia (2010-2019) approved by Decree 397/2010, of 2 November.	<i>And.</i>
Plan for Prevention and Hazardous Waste Management, approved by Decree 7/2012 of 17 February.	<i>And.</i>
Decree-Law 1/2014, of 18 March, which approves the incentive Program for Sustainable Construction in Andalusia.	<i>And.</i>
Energy Strategy for Andalusia 2020, approved 27 October 2015.	<i>And.</i>
Comprehensive Development Plan for the Construction Sector and Sustainable Rehabilitation of Andalusia, approved by Governing Council Agreement of 27 January 2015.	<i>And.</i>
Decree 141/2016, of 2 August, approving the Housing and Rehabilitation Plan of Andalusia 2016-2020.	<i>And.</i>

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6 Reflections.

Based on the above made inventory on laws and regulation of sustainable buildings and eco-efficient solutions, we could point out the main items in order to verify the degree of implementation of eco-efficiency measurements and specify the legal concept of eco-efficient construction.

6.1 Items verification of eco-efficient construction

We can understand as an eco-efficient construction one capable of integrating architecture and landscape, water, local weather conditions, social and economy aspects, transport and energy efficiency.

It is understood that a building is eco-efficient if it balances the needs of the user and the environment, consuming less energy resources and reducing pollution by not using toxic products and reducing waste generated.

The concept of eco-efficiency is related to a number of key parameters such as the use of alternative energy, energy efficiency -especially the change of fuel, equipment management, energetic savings, water conservation, indoor air quality - related to the presence of hazardous elements such as asbestos, mold, radon, legionella, lead and some chemicals compounds, and waste treatment – and reduction of soil and groundwater pollution.

6.1.1 Alternative energy

Both, Directive 2012/27/EU, of 25 October 2012 and Directive 2009/28/EC states that each Member State shall establish a National Action Plan on Renewable Energy (NREAP) to achieve the Directives target in this topic.

For these purposes, a clear objective have been set, a 20% of gross final energy consumption in renewable energies, with a percentage for the transport of 10%, in 2020. The same target was included in the aforementioned Law 2/2011 on Sustainable Economy. Nevertheless according to expert analysis this goal will not be fulfilled in our country, especially after the adoption of Royal Decree-Law 1/2012 of 27 January, which was a major setback to the photovoltaic installations in our country. The Basic Document HE included in the Spanish CTE has carried out the detailed regulation of this topic. The PER, Renewable Energy Plan 2011-2020, has carried out promotion policy.

6.1.2 Energy Efficiency

Energy efficiency and energy savings are key concepts. Factors as building orientation, location, design, landscaping, natural lighting, thermal inertia, insulation, and natural ventilation are especially related to this topic.

The Energy Efficiency Directive (Directive 2010/31/EU of European Parliament and of the Council, of 19 May 2010), in relation to the certification of energy efficiency of buildings poses a common framework of measures to promote energy efficiency that will ensure that the countries of the European Union will achieve the 20% energy savings already committed in the 20-20-20 Directive and also requires to Member States a renewal of at least 3% public buildings of more than five hundred square meters.

In Spain, the Royal Decree 235/2013, of 5 April, has approved the basic procedure for certification of energy efficiency of buildings and the Royal Decree 1027/2007, amended by Royal Decree 238/2013 approved the Regulation of Thermal Installations in Buildings (in Spanish RITE), which establishes the technical conditions to be met by heating systems, air conditioning and hot water. These measures are deeply detailed in in the technical HE DB document included in the CTE.

The Royal Decree 235/2013 establishes the obligation to make available to the purchasers/users a certificate of energy efficiency, which must include all relevant information regarding energy efficiency of the building and reference values.

The promotion policy has been set out in the Savings and Energy Efficiency Action Plan 2011-2020, of July 29, 2011.

6.1.3 Materials and eco-efficient construction techniques

Regarding this topic, the eco-efficient solutions can be defined as the construction techniques based on the use of renewable and sustainable materials with reduced environmental and economic cost. These new techniques facilitate the substitution non-recyclable materials and contribute to the sustainability of buildings and structures, which have a lower environmental and ecological impact. The ideal is to use materials with environmental certifications and avoid toxic or contaminant material. The use of PVC and lead free materials is nowadays essential.

The objective is also to bet by a policy of green spaces - Plants on the cover and inside of the building- in order to CO₂ absorption and create oxygen and manage the sunny and shady zones in different areas of the building.

The use of windows and skylights allows the necessary natural lighting, ventilation and heat and allows the thermal control of the building with the use of double woodwork with solar films.

The Technical Building Code (in Spanish CTE) is the regulatory framework, which details all the safety and habitability requirements established in the LOE

(Law 38/1999 of 5 November, on the Building Ordinances), but we can say that is not especially ambitious.

6.1.4 Waste Treatment

Among the different types of waste related to the construction process, we can distinguish between waste generated by the building and resulting from demolition (in Spanish RCD) and municipal solid waste (in Spanish RSU) wastes residential and commercial, fundamentally.

In the European Union more than 40% of the total waste are generated by construction, and therefore it is essential to manage them adequately, to re-use and recycle them.

Royal Decree 105/2008, of 1 February, production and management of construction, establishes Spanish State regulation regarding to demolition waste. The regulation is based on three main pillars: Producer responsibility, waste prevention and co-responsibility among all sector actors (promoter, designer, technical direction: In this standard the three major principles governing this matter are presented, builder, manager).

In order to minimize waste and promote appropriate management of them was approved the State Plan Management Framework Waste Construction for the years 2016-2022

In Andalusia the regulation is included in Decree 73/2012, of 20 March, which approves the Regulation on Waste.

6.2 Certifications

Although European legislation has a limited scope, the real estate sector has established new standards that exceeded the legal ones. Numerous voluntary certificates are nowadays commonly used, such as: BREEAM, Leed, Minergie, Passivhaus, Green (GBCe), Energy-plus Building, AENOR: ISO 14001 environmental management; eco-design; domotic certification; UNE-EN 16001 Energy Management.

Anyway Energy Certification of Buildings is a statutory obligation derived from the Directive 2002/91/EC. This and Directive 2010/31/EU, of 19 May, on energy efficiency, has been partially transposed into Spanish regulation by the aforementioned Royal Decree 235/2013 of 5 April. According to its First Transitory Provision, an efficiency certificate will be issued previously to any sale, or rental concluded from June 1, 2013.

In this certificate, and through energy efficiency label, each building is assigned an energy efficiency class, which will vary from class A, for more energy efficient, to class G for the least efficient.

7 Conclusions.

We can draw a number of conclusions of relevance:

- Legal regulation of eco-efficient buildings has been circumscribed to general rules or simply minimal. The constructive paradigm change is intended to settle on a people-to heterogeneous binding rules which constitute a mere starting point that can be strengthened with unequal shares unequal promotion measures outlining an absolutely unbalanced European scene.

- At European Union level, the Directives have approved a range of rules that must be transposed into member countries regulation, but waiving the possibility of establishing binding rules.

- Taking into account the lack of binding rules a wide range of voluntary standards have emerged, stricter than the current legislation, which have a positive impact on the reduction of CO₂ emissions, and report evident improvement in quality of life improving air quality, exterior views or reducing light and noise pollution, contributing to more comfortable and safe buildings, respectful with the environment and increasing the value of properties.

- In general, the laws related to the sustainable buildings and eco-efficient solutions in Spain are insufficient to meet European targets, especially as the reduction of Public Budget has reduced the range of incentives to support sustainable construction. We consider as crucial to achieve the European objectives to reactivate this kind of public policy, which will clearly stimulate this sector.

- We also understand as necessary to promote a deep analysis which will generate strategies and proposals in the Spanish legal field, in order to promote the systematic use of alternative and more efficient energies, and stimulate research in research to provide more eco-efficient solutions and increase the competitiveness of this sector.

- There is no clear definition of mechanisms to ensure the participation of civil society in accordance with the new model of "governance" in order to ensure a better balance between rights and general interest.

- Despite major progress in this area, the exemplary work of the government, a major effort in diffusion and awareness among stakeholders will be recommendable, to advance in a real commitment with sustainable construction. Nowadays sustainable building is not just a necessity but also an obligation.

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