CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

Implementation of the EPBD Portugal

Status in 2020

AUTHORS
Rui Fragoso, Nuno Baptista, *ADENE*

NATIONAL WEBSITES
www.adene.pt, www.sce.pt, www.portalcasamais.pt

1. Introduction

This report presents an overview of the current status of the implementation of the EPBD in Portugal as well as plans for its evolution. It mainly focuses on energy performance requirements and EPCs, including quality control mechanisms, training of qualified experts and information campaigns.

The EPBD field implementation started in 2007, based on three decrees published in 2006. The legislation was revised in 2013 to transpose the new requirements of Directive 2010/31/EU. The revision process included contributions from nearly 100 different stakeholder institutions that resulted in the actual revision being aimed at, among other things, the improvement of methodologies and the certification process, based on extensive experience gained over a four-year period. Additional years have passed since, and after a period of adaptation, the changes have now been adopted by the market. The requirement to display an EPC in property advertisements was a major change that contributed to the increase in the number of EPCs issued monthly. This increase was not only due to changes in legislation; ADENE (the Portuguese national energy agency) has developed a strategy to upgrade the National Building Energy Certification System (SCE), and this included the development of a new online platform to issue EPCs, a new EPC layout, a new website and the publication of support documentation and guidelines for experts. The main goal was to realign the SCE with the market needs. During the years 2019 and 2020, the Portuguese government is revising the existing legislation in order to adapt it to Directive (EU) 2018/844.

2. Current Status of Implementation of the EPBD

In recent years, the implementation of the EPBD in Portugal was focused on updates and minor adjustments to improve what had already been implemented from 2013 onwards.

Certain topics of the current regulations had to be revised in order to fully comply with the EPBD. This included namely adjustments regarding requirements for renovated building elements. Until September 2014, only buildings that were going through major renovations had to comply with those requirements, while now every building element that is renovated must also comply with those requirements. From 1 January 2016, stricter requirements came into force. This tightening was foreseen in the 2013 regulation, aiming for NZEB levels in 2020, and focusing on U-values of building elements as well as minimum

performance requirements for technical building systems. The revision was also supported by cost-optimal studies that showed a certain margin for improvement of the regulations. These necessary adjustments allowed Portugal to have the EPBD transposed into national regulation.

A big step forward was achieved by connecting external and EPC databases[1]. This allowed for more precise and coherent information, mainly because the data is now validated by different entities and information can be used in a more purposeful way.
Another improvement was the importance given to the EPC as a tool for providing access to funding schemes and incentives. The EPC is now key to providing direct access to specific incentives for building renovations and reducing building taxes depending on the energy label (typically A or A+), or when a building's performance improves by two (2) labels after renovation.

2.I. Energy performance requirements: NEW BUILDINGS

This chapter presents an outline for transposing and implementing the EPBD requirements in Portugal. It also describes the cost-optimal procedure for setting requirements, the action plan towards NZEB and plans for implementing Articles 4 and 5 from the Energy Efficiency Directive.

2.I.i. Progress and current status of new buildings (regulation overall performance)

The Portuguese legislation focuses heavily on new buildings, both residential and non-residential, with the primary objective of setting the pace for more efficient buildings to come. This objective considers the substantial share of energy consumption spread across buildings throughout Europe, with Portugal being no exception. To achieve this goal, a stepped tightening of requirements of the 2013 regulations has been implemented, focusing on the building envelope and the building's technical systems. The first level of tightened requirements was defined to be applicable until the end of 2015, after which a stricter level of requirements came to force in the beginning of 2019, preparing the path towards NZEB.

This significantly strengthened regulation[2] brings new challenges to building design in order to fulfil a robust level of minimum requirements and an important contribution from RES.

2.I.ii. Format of national transposition and implementation of existing regulations

The current building energy performance legislation, which applies for both residential and non-residential buildings, bases the calculation methodologies on comparisons with reference buildings and includes the parameters presented in Table 1. The reference building is considered the same building as the one being evaluated, but with reference values for the building components and technical building systems, and without the contributions of RES and energy efficient solutions (heat recovery, etc.). Typically, these reference values reflect the minimum performance requirements of the building if it were constructed 'today'.

Building	Main legislation requirements	Requirements included in calculations
Residential and non-residential	Thermal behaviour, energy and indoor air quality	Thermal comfort
		Minimum requirements for U-values, including thermal bridges
		Windows solar factor and shading devices
		Ventilation Indoor air quality Infiltration
		Maximum energy needs and primary energy consumption
	Systems efficiency	Minimum efficiency for HVAC systems Renewable energy systems Lighting (only for non-residential)
Non residential	Ventilation and indoor air quality	Minimum outdoor air supply Indoor air quality Infiltration
	Installation and maintenance	(Not relevant for calculations)

Table 1: Requirements included in calculations.

The energy performance requirements established for residential buildings are set in terms of the useful energy demand needs for heating and cooling. The total primary energy for heating, cooling and domestic hot water is also limited to a maximum value. There is a minimum RES contribution required for domestic hot water based on a minimum solar thermal panel area for each building occupant.
Non-residential buildings have a minimum energy performance requirement, which limits the maximum primary energy for heating, cooling, domestic hot water, and lighting.

The revised 2013 requirements (both for residential[3] and non-residential[4] buildings) were established considering the comparative methodology framework for calculating cost-optimal levels published by the European Commission. A first cost-optimal study report[5] issued in 2013, which addressed new residential buildings, concluded that legislation requirements were close to the cost-optimal levels and recommended not to change them. The cost-optimal study on non-residential buildings focused only on office buildings, which is considered the most representative building typology. The relevant report concluded that legislation requirements were significantly far from cost-optimal levels and recommended an update of the reference building characteristics to create legislation requirements which would fall within the range of the cost-optimal levels.

Most of the requirements were tightened again in 2016 following the planned update of the national legislation[3,4]. These changes focused essentially on the improvement of the U-values for the whole building envelope and for the minimum efficiency regarding heating, cooling and domestic hot water systems.

2.I.iii. Action plan for progression to NZEB for new buildings

Since 2014, the national action plan for the progression to NZEB is supported by the revised legislation. The adopted preliminary definition of NZEB establishes a relationship with cost-optimal evaluations. NZEBs are defined as buildings that cumulatively offer:

i) very low energy demand with building components compatible with the upper levels (most efficient) of the cost-optimal evaluations;

ii) implementation of RES that covers a very significant fraction of the remaining building energy demand;

iii) RES to be produced on site (whenever possible) and/or adjacent to the building. When local production is insufficient, the remaining production must be supplied as nearby as possible.

The full definition of NZEB was only concluded in the end of 2018. According to its requirements, a NZEB building must comply with the following, when compared to a reference building:

i) Residential buildings:

a) Heating energy needs ≤ 75% of the reference heating needs (includes heating, cooling, domestic hot water and ventilation)
b) RES contribution ≥ 50% of total primary energy needs
c) Energy label A or A+

ii) Non-residential buildings:

a) Primary energy needs of regulated energy use ≤ 75% of the reference primary energy needs of regulated energy use (includes heating, cooling, domestic hot water, ventilation and lighting)
b) Energy label A or A+

Since the NZEB definition is still very recent, it is not yet possible to present information on how many NZEBs are built in Portugal, although buildings considering NZEB principles have been designed long before the NZEB definition came into force. Built in 2006, the Solar Building XXI, presented in Figure 1, is an example of a low-energy building using passive systems for both heating and cooling (ground cooling) to achieve NZEB. The main façade has a PV system with heat recovery which assists the heating in winter. In summer, a ground cooling system (earth tubes) is used to cool the building, together with night cooling strategies. The integration of RES in the Solar Building XXI design was one of the main objectives of the project. The last monitoring analysis, performed in 2011, has shown a total amount of electric energy consumption of 36 MWh, versus an amount of electricity produced by the three PV systems of almost 38 MWh.

Figure 1. Solar Building XXI, a low-energy building using passive systems for both heating and cooling (ground cooling) to achieve NZEB, even before the legislation came into force.

2.I.iv. Requirements for building components for new buildings

Since 2014, new buildings must comply with stricter requirements[6], imposed by the roadmap defined in the national regulation[2]. This roadmap was set with the goal of having all new buildings as NZEB by 2020; thus, a tightening of the requirements was planned via a stepped enforcement (2013, 2016).

The requirements are focused on U-values for walls, roofs, pavements, and windows, as well as the solar factor (g-value) and shading when looking at building components. When it comes to technical building systems, the requirements are focused on the minimum efficiency of equipment (water heater, heat pumps, boilers, etc.) and also on the minimum RES contribution, specifically solar thermal collectors. Additional requirements exist for air exchange rates and minimum indoor air quality.

The evolution of requirements for the building envelope, as well as for ventilation and RES in residential buildings is shown in Table 2.

Time interval		**1990-2006**		**2006-2012**		**2012-2016**		**After 2016**	
		Lisbon	Bragança	Lisbon	Bragança	Lisbon	Bragança	Lisbon	Bragança
U-value [W/(m^2.K]	External **walls**	1.40	0.95	0.70	0.50	0.50	0.35	0.50	0.35
	External **roof / floor**	1.10	0.75	0.50	0.40	0.40	0.30	0.40	0.30
	External **window**	4.20	4.20	4.20	3.30	2.90	2.40	2.80	2.20
	Flat thermal bridges	none		2 x U-value (closest element)					
Maximum window solar gain factor **g-value**	Light inertia	0.15					0.1	0.15	0.1
	Medium and heavy inertia	0.56							
Ventilation (air changes per hour)		none		≥ 0.6		≥ 0.4			
Renewable energy systems		none		Minimum solar energy contribution for domestic hot water (reference value 0,65m^2 /occupant)					

Table 2: Minimum requirements evolution for residential buildings, envelope, ventilation and RES.

Table 3 shows the evolution of requirements for technical building systems in residential buildings.

Building type	Technical system		Requirement evolution			Standard
			Before 2013	**2013-2015**	**After 2016**	
Residential and non-residential buildings	Heat pumps	cooling	none	Eurovent Label C (Example: Chiller COP ≥ 2.8; EER ≥ 2.7)	Eurovent Label B (Example: Chiller COP ≥ 3.0; EER ≥ 2.9)	EN 14511
		heating				EN 14825
		Domestic hot water		COP ≥ 2.3		EN 16147
	Boilers			Minimum nominal efficiency 86%	Minimum nominal efficiency 92%	
	DHW Gas heater	Power ≤ 10kW		Efficiency ≥ 82 %		
		Power > 10kW		Efficiency ≥ 84 %		
Residential	Domestic Electric Storage Water Heaters			Maximum stand-by heat loss		EN 60379
Non-residential	Air handling unit			Eurovent Label D Efficiency ≥ 47% Velocity ≤ 2.5 m/s Δp ≥ 125 Pa	Eurovent Label D Efficiency ≥ 57% Velocity ≤ 2.2 m/s Δp ≥ 170 Pa	EN 13053
	Pumps		Minimum EFF2 label	Minimum IE2 or IE3 class		IEC60034-30
	FANs			Minimum IE2 or IE3 class Minimum SFP 4 or 5 (W/m^3/s)		IEC60034-30 EN 13779
	Lighting		None	Maximum power (W/m^2)/100lux Example: Offices 2.5 (W/m^2)/100lux for 500lux		EN 12464-1 EN 15193
	Lifts			Minimum C	Minimum B	VDI 4707
	Central building management system		Mandatory if HVAC thermal power > 250 kW			EN15232

Table 3: Minimum requirements for technical systems.

2.I.v. Enforcement systems new buildings

The Portuguese legislation prescribes an urbanistic operation, meaning the construction of new buildings or the renovation of existing ones, where buildings must go through a licensing process to check compliance with national and local regulations in the corresponding local authority (typically the municipality). Within this process, all design plans must be executed by an approved designer (architect and engineer) and submitted to the municipality which is checking the project's compliance mainly at an administrative level.

It is up to the designer to guarantee that the design plan reflects correctly and fulfils the requirements which are laid down in the legislation. The designer issues a responsibility statement that accompanies the design plan (which can include potential constrains when fulfilling a certain requirement – typically renovations). All these are evaluated by the local authority that can accept or refuse the design plans, making it necessary to introduce changes in the process for the later.

Whenever the urbanistic operation targets the construction of a new building or a major renovation an EPC must be issued. The qualified expert issues the EPC for the design phase (which serves as a pre-certification), and also checks compliance of the design plans with the minimum energy performance requirements. This provides an added layer of compliance assessment from the experts, which can also include improvements to be implemented during the construction phase. If the building is not compliant, the expert does not issue an EPC, thereby making it impossible to get a building construction permit.

A similar process occurs upon completion of the construction. The engineer or architect responsible for the construction issues a responsibility statement assuring that the construction is completed according to the design plans, and the qualified expert performs an on-site visit to check the necessary information to issue the EPC, reflecting eventual changes implemented during the construction phase. If everything is compliant, the municipality issues the building use permit.

Qualified experts typically are architects or engineers with more than 5 years' experience, and their contacts are available on the EPC web portal[7].

2.II. Energy performance requirements: EXISTING BUILDINGS

Unsurprisingly, existing buildings in Portugal account for the largest share in the current building stock and their energy performance is rated in the bottom half of the energy scale. Initiatives undertaken to improve the performance of this part of the building stock include improvements in the legislation[2], e.g. detailing specific requirements for existing buildings, introducing requirements for building elements and overall performance, raising awareness among building owners and making financial incentives available.

2.II.i. Progress and current status of existing buildings (regulation overall performance)

Existing buildings are the main target for improving the energy performance of the building stock. They comprise the vast majority of buildings with the poorest performance, and therefore they are the ones with the largest potential for improvement.

For many decades, Portugal was lacking in terms of energy performance regulations. It was not until 1990 that the first energy efficiency regulation was introduced, but with limited impact on building performance. At that time, preventing building pathologies such as mould growth was one of the most important aspects. Nevertheless, requirements relating to insulation and double-glazing were also introduced.

With the transposition of the EPBD, attention was given to technical building systems and RES, but also on reinforcing the building envelope. When comparing the heating and cooling energy needs of existing residential buildings over the last 100 years, it is possible to discern a clear evolution, especially regarding heating needs (Figure 2).

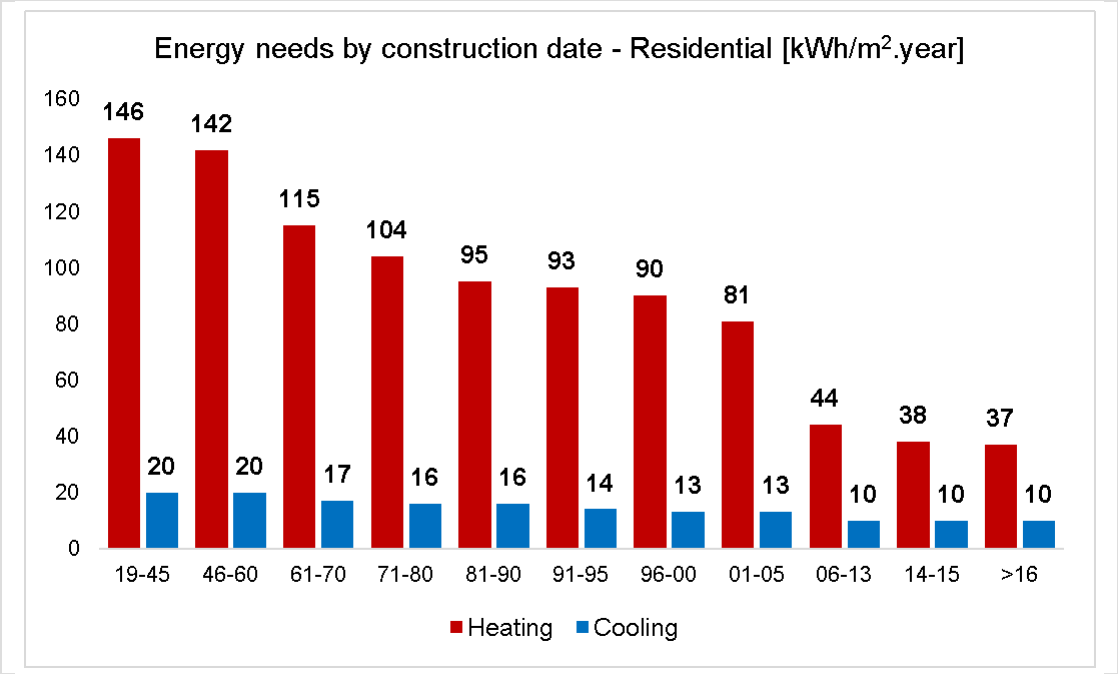

Figure 2: Energy needs by construction period - Residential [kWh/m^2.year].

Currently, when a specific building component (building envelope or technical building system) is renovated, minimum requirements apply. In these cases, the energy efficiency is improved 'part-by-part', meaning that each new component of the building performs as well as it would in a new building. If a building is to undergo major renovations, then an overall assessment has to be made, and a minimum performance for the whole building has to be achieved; in these cases, it might be necessary to replace or improve certain additional elements in order to reach that minimum threshold.

Independently of being renovated, existing non-residential buildings that have an energy consumption of over 2.5 GWh, or at an energy label C or worse, are obliged to present and put into action an Energy Rationalisation Plan (PRE). This plan refers to a set of measures to be implemented in the building, in order to make it more efficient (resulting in label C or better). For buildings consuming more than 2.5 GWh of energy, this means reducing the final energy consumption by 2.5%, and for those consuming more than 5 GWh, it means reducing the final energy consumption by 5%. The measures and reduction in final energy consumption are to be completed during the time set for implementing the PRE, which is six (6) years. Further information about the PRE can be found in the relevant legislation[8].

2.II.ii. Regulation of individual parts, distinct from whole building performance

An improvement seen is the stepped requirements (2013 level, 2016 level) that are applicable to building components. Technical buildings systems are, without exception, covered by these improvements, and the minimum efficiency of equipment is now higher than it was in 2013.

Existing residential buildings are only obliged to comply with these stricter requirements when they undergo renovations. The building component to be renovated must adhere to the minimum performance levels defined in the regulation.

2.II.iii. Initiatives/plans to improve the existing building stock

Building renovation has been a government priority since the transposition of the recast EPBD, which came into force in 2013. In order to promote renovations, the new legislation allowed a certain degree of flexibility in respect to relevant requirements so that, according to the building characteristics, different cost-optimal solutions could be considered. On top of that, a strategy was submitted which plans to boost the rate of retrofitting and stimulate the economy. This strategy was based on different topics that range from simplifying mechanisms and facilitating necessary changes in the existing building sector to possibly using national and European sources for financing.

Regarding public buildings, an Energy Efficiency Programme for Public Administration (ECO.AP[9]) was launched, back in 2011. This programme aimed to achieve a 30% improvement in energy efficiency in public services and the various bodies of public administration by 2020. Eco.AP is an evolving programme that endeavours to establish energy efficiency measures to be implemented into services, agencies and public equipment and to change behaviour and promote the rational management of energy services, notably by hiring Energy Services Companies (ESCO) to sign an energy efficiency management contract.

2.II.iv. Long Term Renovation Strategies, status

The Portuguese Long-Term Renovation Strategy (LTRS) aims to transform the current building stock into buildings with almost zero energy needs while also considering other priority challenges relevant to the Portuguese context that go beyond the energy consumption and emissions. The three main objectives are:

i) The improvement of living conditions in buildings, with a priority on mitigating energy poverty, improving thermal comfort and indoor air quality and promoting occupants' health and well-being;

ii) The opportunity for an economic growth through the co-benefits associated with the renovation of the existing building stock, e.g. promoting labour productivity, the reduction of health expenses, the valorisation of heritage buildings and the empowerment of the construction sector and associated employment;

iii) Compliance with and alignment between the LTRS assumptions and results and the environmental and energy goals defined in the Roadmap for Carbon Neutrality and in the National Energy and Climate Plan.

Within the LTRS, a range of cost-effective approaches to building renovations were identified, which resulted in a set of improvement measures to be applied depending on the type of building and climate zone. These packages will be implemented progressively and cumulatively until 2050, prioritising the worst-performing segments of the building stock and considering the following measures:

i) The rehabilitation of the passive buildings' components (windows, walls and roof), ensuring acceptable levels of thermal comfort without an increase in energy consumption;
ii) The replacement of existing electrical equipment, AC systems and lighting systems with more efficient systems;
iii) The integration of local RES production systems (solar thermal and photovoltaic panels) and storage systems (batteries);
iv) The installation of highly efficient AC systems in buildings that do not have this type of systems but, after being rehabilitated, still need them to guarantee an adequate thermal comfort (more severe climatic zones).

2.II.v. Financial instruments and incentives for existing buildings

In more recent years, there's been a special focus on providing different financial instruments to support building renovation. These instruments vary for residential and non-residential to public buildings, and address not only the rehabilitation of the building envelope (mostly for residential) but also the installation/replacement of different technical building systems or the promotion of RES (especially solar thermal collectors or PV).

Below is a list of the most relevant and recently implemented instruments that support the renovation of buildings which include, among others, energy efficiency and/or RES in buildings:

Name	Policy Type	Target sectors	Period	Budget
Energy Efficiency Fund (FEE) [10]	Grants Subsidies	Residential, Commercial, Public	Since 2010	Initial allocation of 1.5 million (periodically reviewed)
Financial Instrument for Urban Rehabilitation and Revitalisation (IFRRU2020) [11]	Soft Loans	Residential, Commercial, Public (and urban area)	2017 - 2023	1,400 million
Casa Eficiente 2020 [12]	Soft Loans	Residential (building, building unit and condominiums)	2018 - 2021	200 million
Fundo Nacional de Reabilitação do Edificado (FNRE) [13]	Fund Tax exemptions	Residential, Commercial, Public	Since 2016	N/A
1 Direito [14]	Soft Loans Tax exemptions	Residential (in precarious conditions)	2019 - 2024	700 million
Reabilitar para Arrendar - Habitação Acessível (Renovate to Rent - Accessible Housing) [15]	Soft Loans	Residential	Since 2015	50 million
PO SEUR - Operational Programme for Sustainability and Efficient Use of Resources [16]	Grants Subsidies	Residential, Public (central)	2014-2020	400 million

Additional information can be found in the website "Portugal 2020"[17]. Some reports, e.g. the Joint Research Centre 'Accelerating energy renovation investments in buildings'[18] report, also present detailed information.

Another type of incentive that currently exists focuses specifically on tax reduction, namely concerning municipality taxation of real estate and building renovations. Some municipalities provide tax reductions for better labelled buildings, typically A and A+, or buildings whose renovation improves the energy performance by two (2) labels.

2.II.vi. Information campaigns / complementary policies

A marketing campaign specifically focusing on EPC recommendations was drafted and put into practice in 2016. After analysing all issued EPCs, and particularly the almost two (2) million proposed recommendations, the top ten (10) measures were identified, five (5) of which relate to the building envelope – wall insulation, roof insulation, windows, solar shading and ventilation, and five (5) to technical building systems – solar thermal collectors, wood stoves, boilers, heat pumps and PV, and a set of small brochures were designed (around ten (10) pages each[16]).

These brochures were designed to provide the building owner with a better understanding of the building features that can be improved to achieve energy reduction or costs savings. Each of the brochures follows the same structure and has a coherent design which allows homeowners to understand the impact of that specific recommendation as well as any possible constraints or difficulties in implementing it. Figure 3 presents the covers of the brochures for roof insulation and solar thermal collectors.

Figure 3: Covers of the brochures for roof insulation and for solar thermal collectors.

In 2018, and after a submission to POSEUR funding, ADENE was able to put into practice a communication campaign, titled 'To certify is to value' (Certificar é Valorizar), which mostly targeted residential buildings. The campaign was designed to communicate the advantages of having an EPC, namely by addressing the detailed information about a dwelling, as well as the possibility to access funding or fiscal benefits from having an EPC.

Complementing those messages, a simulator[19] was developed in order to engage home users to understand the home survey and energy analysis. This tool was not designed to substitute the work and analysis of the qualified expert, nor to effectively issue an EPC, but nonetheless, the results are not expected to diverge more than one energy label, for average buildings.

As for the media supporting the campaign and among different actions, a TV advertisement[20] was specifically created and focused on the necessary home survey, with a humorous approach for viewers to retain the message.

2.III. Energy performance certificate requirements

Since 2009, when it became mandatory for rent or sales transactions, the EPC has become widely available to the public. In great part thanks to a refreshment of its layout in 2013 (Figure 4), which made the EPC friendlier and more user-oriented, it is currently used as a decision-support tool to differentiate between buildings in market transactions and is also considered an important source of information.


Certificação Energética e Ar Interior EDIFÍCIOS

Certificado Energético
Edifício de Habitação

SCE1234567890
Válido até 01/12/2013

IDENTIFICAÇÃO POSTAL
Morada AVª FONTES PEREIRA DE MELO, Nº51 A 51-G
Localidade LISBOA
Freguesia S. SEBASTIÃO DA PEDREIRA
Concelho LISBOA
GPS 39.7329, -7.0000

IDENTIFICAÇÃO PREDIAL/FISCAL
5ª Conservatória do Registo Predial de LISBOA
Nº de Inscrição na Conservatória 816
Artigo Matricial nº 898
Fração Autónoma K

INFORMAÇÃO ADICIONAL
Área interior útil de Pavimento 320 m²

Este certificado apresenta a classificação energética deste edifício ou fração. Esta classificação é calculada comparando o desempenho energético deste edifício nas condições atuais, com o desempenho que este obteria nas condições mínimas (com base em valores de referência) a que estão obrigados os edifícios novos. Obtenha mais informação sobre a certificação energética no site da ADENE em www.adene.pt.

INDICADORES DE DESEMPENHO

Determinam a classe energética do edifício e a eficiência na utilização de energia, incluindo o contributo de fontes renováveis. São apresentados comparativamente a um valor de referência e calculados em condições padrão.

Aquecimento Ambiente
Referência: 200 kWh/m².ano
Edifício: 70 kWh/m².ano
Renovável: 50 %
65% MAIS eficiente que a referência

Arrefecimento Ambiente
Referência: 20 kWh/m².ano
Edifício: 21 kWh/m².ano
Renovável: 50 %
5% MENOS eficiente que a referência

Água Quente Sanitária
Referência: 30 kWh/m².ano
Edifício: 30 kWh/m².ano
Renovável: 0 %
0% IGUAL à referência

CLASSE ENERGÉTICA

Mais eficiente
A+ 0% a 25%
A 26% a 50%
B 51% a 75%
B- 76% a 100%
Mínimo: Edifícios Novos
C 101% a 150%
Mínimo: Grandes Intervenções
D 151% a 200%
E 201% a 250%
F Mais de 251%
Menos eficiente
D 173%

ENERGIA RENOVÁVEL
Contributo de energia renovável no consumo de energia deste edifício.
15%

EMISSÕES DE CO_2
Emissões de CO_2 estimadas devido ao consumo de energia.
0,8 toneladas/ano

Entidade Gestora
ADENE AGÊNCIA PARA A ENERGIA

Entidade Fiscalizadora
Direcção Geral de Energia e Geologia

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Figure 4: EPC in two different sizes - First page and smaller display versions.

Apart from providing information, EPCs are now an important tool to enable access to funding schemes or tax benefits. With the transposition of Directive (EU) 2018/844, the development and launch of the third edition of the EPC layout is being planned.

2.III.i. Progress and current status on EPCs at sale or rental of buildings

Following the recast EPBD, a small boost in the real estate sector could be seen, and of course, the numbers of issued EPCs followed this trend. The EPC database is increasing each year, providing a better definition and representation of the building stock. At the beginning of 2020, there were a total of 1.8 million EPCs, with 90% of them issued for the residential sector and 10% for non-residential buildings.

As mentioned, a very important aspect closely related to this increase is the obligatory advertisement of the EPC label before the building is rented or sold and when offered to the market; this is a responsibility of both the building owner and the real estate agent. Cases of non-compliance are now being addressed on a more regular basis, mostly because notaries, as stated in the regulation, are obliged to report whenever a transaction occurs without the existence of an EPC. In such cases, building owners or real estate agents are asked to minimise the fault by issuing the EPC and providing it, free of charge, to the new owner. As a result, the real estate market has almost fully adopted the EPC as a mandatory document and advertisements in general include the necessary information on the building's energy performance.

Certain ongoing studies, in particular run by the National Institute of Statistics (INE), aim to ascertain if better-labelled buildings are sold faster, or if a premium exists in the sale price. These studies will be important, as they can establish additional relevance for the EPC. The positive 'discrimination' for energy performance in buildings already exists, mainly when it comes to tax benefits for which reduced municipal real estate taxes are just an example. Private studies performed for the city centre of Lisbon also showed a clear relationship between energy classes and the transaction price[21].

2.III.ii. Quality Assurance of EPCs

In 2015, a specific regulation[22] regarding quality assessment of EPCs came into force. This regulation clearly states the criteria, rules and error tolerance, as well as the criteria required to reissue the EPC.

Two types of EPC quality assessment exist: a short assessment, and a detailed assessment. The short quality assessment involves the qualified expert uploading all EPC-related documents and information into the database, whilst the detailed one is a complete duplication of the necessary calculations that support the EPC, including a second site-visit. The detailed assessment can be triggered at random or whenever needed to better support the quality assessment.

Tolerances and out-of-range values are defined in the regulation and are used to quantify the number and severity of errors or mistakes that can exist in an EPC. As a consequence of these analyses, and if the EPC is to be considered invalid based on deviations from a set of parameters, a reissue by the expert is necessary. Additional penalties might be applicable to the expert if no action is taken to minimise the impact of the errors made.

2.III.iii. Progress and current status of EPCs on public and large buildings visited by the public

Since 2014, the Portuguese definition of a public building includes every non-residential building as well as private buildings owned by government bodies. Non-residential buildings larger than 500 or 1,000 m² (depending on the type) are required to display an EPC at the main entrance. Currently, there are more than 2,500 certified public buildings and many more in the process of being certified. The low number of EPCs issued for public buildings shows that this building typology faces many challenges in implementing the EPBD requirements in Portugal, but a clear increase in the number of certified buildings can now be observed.

2.III.iv. Implementation of mandatory advertising requirement – status

Since December 2013, when Directive 2010/31/EU was transposed into national regulation, any building or apartment advertisement needs to present the energy label. ADENE (the EPC management entity) provides guidelines for advertisements that are followed by the vast majority of real estate agents. It also provides specific web services for real estate agents to collect specific data from the EPC database to use for their advertising. An example of models to be used in advertisements is shown in Figures 5 and 6.

Figure 5: Example of advertisement including the energy label.

Figure 6: Model to be used in advertisements for the energy efficiency label.

The real estate sector was informed of these two mechanisms back in 2013. After a slow start, a steady pace has been set, and it is almost impossible nowadays to see real estate advertisements without a clear reference to the energy performance of the building, in particular the energy label. It has become commonplace for real estate websites to have a specific filter for the energy label and it is often possible to sort the properties according to their energy performance.

2.IV. Smart buildings and building systems

2.IV.i Status and plans on smart buildings

Smart buildings play an important role in Portugal, as they take advantage of the many solutions continuously developed by the market, and the potential boost from the measures highlighted in the Long-Term Renovation Strategy (LTRS). These solutions will boost the interconnection among the buildings, the electric grid, vehicles and others connection points. With the implementation of the Smart Readiness Indicator (SRI), also prescribed in the LTRS, special focus will also be given to the user and its role.

2.IV.ii Regulation of system performance

Current legislation[4] provides requirements for different technical buildings systems regarding system regulation and control. These are individual requirements that must be observed whenever technical buildings systems are installed in new or renovated buildings with thermal power for cooling or heating below 100 kW.

2.IV.iii Building Automation and Controls (BACs)

Although not mandatory in Directive 2010/31/EU, BACs were introduced in the current legislation as a type of technical building systems. BACs are mandatory for every building with thermal power for cooling or heating above 100 kW. These systems must be integrated with the individual systems for regulation and control and allow for centralised control. Whenever the previous reference value exceeds 250 kW, additional requirements are imposed, among which mandatory metering at certain building points, reporting capabilities about building use, energy consumption, among others or a minimum C class according to the EN 15232 standard (changed to B class in 2019).

2.IV.iv. Status and encouragement of intelligent metering

Since 2014, it is mandatory for non-residential buildings to have energy consumption monitoring for heating, ventilation and AC systems equipment with electric power above 25 kW. The same is applicable also for boilers with a thermal power above 100 kW.

Buildings with thermal power above 25 kW must have an installation and maintenance technician (TIM) that guarantees proper system installation and maintenance. This technician must also supervise the specific activities and manage all relevant technical information. One of their tasks is to promote the installation of energy metering systems in the buildings.

The requirements are to encourage the installation of building management systems in non-residential buildings with more than 250 kW of heating, ventilation and AC systems power output.

2.IV.v. Progress and current status on heating systems (Inspection / Equivalence)

In 2006, Portugal officially adopted option a) of Article 8 of the EPBD, establishing a regular inspection of boilers. The inspection of boilers, as well as of AC systems was, however, a challenging issue due to the specific climate characteristics of the country. In Portugal, boilers and AC only operate for relatively short periods during the year; the real energy consumption is very low, and this makes regular cost-effective inspections a difficult strategy. Considering these difficulties, the transposition of the EPBD for Portugal did not impose regular inspections, and existing provisions should be changed so that advice should be given instead of those inspections.

A first step regarding the advice given to building users was introduced in the new EPC layout in December 2013. A specific section focuses on the importance of maintenance for heating, cooling and domestic hot water systems. It also recommends regular inspections of related equipment. Furthermore, it addresses how to properly select and size the equipment. As an additional measure, buildings with a thermal power above 25 kW are required to have systems installed and maintained by a TIM to guarantee the proper installation and maintenance. This technician supervises the above activities and manages all relevant technical information. Additional tasks include the design of a maintenance plan, which is mandatory for systems above 250 kW and done according to a layout provided by law.

2.IV.vi. Progress and current status on AC systems (Inspection / Equivalence)

The information provided for heating systems should also be considered for AC systems given that there is currently no distinction to the approach.

2.IV.vii. Enforcement and impact assessment of inspections

Enforcement and penalties

No specific action has occurred regarding this topic.

Quality control of inspection reports

No specific action has occurred regarding this topic.

Impact assessment, costs and benefits

No specific action has occurred regarding this topic.

3. A success story in EPBD implementation

Portugal has managed to create a link between funding schemes/incentives and the EPC.

Funding schemes that are currently in operation were designed using information that was made available by the national EPC database. This database holds information on roughly 1.8 million buildings/building units. The data contributes to a better understanding of the building stock, and it is increasing at a steady pace of approximately 160,000 EPCs per year.

In Portugal, the EPC is a tool that provides access to funding schemes and is also used as a validation mechanism (by the qualified expert) regarding the effectiveness of the implemented recommendations supported by those incentives. In order for the validation to occur, the EPC is issued at the beginning of the

process and aims to assess the current status (baseline) of the building. It clearly identifies which building component has to be replaced or renovated, in order to evaluate the future performance of the building and the resulting associated savings, in terms of either energy consumption or monetary value. Because of this, the EPC is a mandatory document for the funding application process. After the construction/renovation phase, a final EPC is issued and is used as a validation and conformity check of the works that were carried out, and also to evaluate new energy indicators and improvements.

Since all information is stored in a central database, it is easier to establish connections with other databases to better operate the funding schemes. Having a single EPC ID number that not only identifies the EPC (with around 150 variables per certificate) but also the building in question, allows for several public and private bodies that are not necessarily familiar with technical data to gain easy access to the relevant information.

Current funding schemes are based on two types: 'green taxes' and an energy efficiency fund. The former consists of a series of tax benefits or exemptions when a building's energy performance rating (as stated in its energy label) is improved by at least two (2) labels. The latter is a fund specifically designed to aid the renovation of certain building elements. In recent years, the requests targeted specific building components, i.e., windows, walls and roof insulation, or solar thermal collectors, and were based on the EPC as a tool to better facilitate the specific renovation measure. When EPCs are issued during a period in which funding has been made available in this way, an icon representing financing is displayed next to the specific measure in the EPC. This highlights the fact that financial support was made available, and it also includes a link to further information, as shown in Figure 7.

Certificação Energética e Ar Interior EDIFÍCIOS

Certificado Energético

Edifício de Habitação

SCE1234567890

C

PROPOSTAS DE MEDIDAS DE MELHORIA

As medidas propostas foram identificadas pelo Perito Qualificado e têm como objectivo a melhoria do desempenho energético do edifício. A implementação destas medidas, para além de reduzir a fatura energética anual, poderá contribuir para uma melhoria na classificação energética.

Nº da Medida	Aplicação	Descrição da Medida de Melhoria Proposta	Custo Estimado do Investimento	Redução Anual Estimada da Fatura Energética	Classe Energética (após medida)
1		Isolamento térmico em paredes exteriores – aplicação pelo exterior com revestimento aplicado sobre o isolante	3.500€	até 150€	B⁻
2		Substituição de vãos envidraçados existentes por novos vãos envidraçados de classe energética A (classificação SEEP)	1.800€	até 200€	B
3		Instalação de sistema solar térmico individual – sistema de circulação forçada	2.500€	até 300€	B
4		Efetuar manutenção do equipamento de produção de águas quentes sanitárias	150€	até 0€	C
5		Isolamento térmico de cobertura plana - aplicação sobre a laje	4.500€	até 300€	B

Saiba mais sobre estas medidas de melhoria nas restantes páginas deste certificado. Incentivos financeiros – Saiba mais em www.adene.pt/incentivos

Figure 7: EPC indicating available funding mechanisms.

Other types of benefits currently available are those related to municipal taxes indexed on EPC labels. For example, buildings with the highest ratings (typically A and A+) and buildings undergoing renovations that improve their EPC rating by at least two (2) labels benefit from reduced taxes.

4. Conclusions, future plans

In 2017, the Portuguese National Building Energy Certification System (SCE) celebrated ten years of existence. The system is now well established and further steps are being considered for the upcoming years.

One of the most relevant aspects of the change in the SCE was the shift made regarding the way EPCs are registered in the national database. Instead of having EPCs registered without any external reference, they are now cross-referenced with other databases. These interconnections between databases allow for a more precise and clearer identification of each building. As an example, the EPC database is currently linked with the National Institute of Statistics (INE) as well as the electricity provider, Energias de Portugal (EDP). Additionally, tax administration and notary information is also collected, albeit manually, and plans are being drawn in order to collect this information in real time. Besides the previous information, the EPC database also stores the INSPIRE ID[23], ensuring that Portuguese EPCs will be compatible with other systems across the EU. This will allow the EPC database to serve as a central hub to connect with external entities, and as an additional advantage, improve the quality of stored information. Future connections with local and central government agencies might be implemented in the future[24].

The geographical location data is now present in the EPC database, enabling buildings to be precisely located on a map, and this is a very important step towards having a better understanding of the building stock. This knowledge is essential when policies that promote building renovations are to be implemented, giving the EPC a key role in effectively putting the strategy into practice. Figure 8 is a prime example of how easy it has become to view energy performance information for the entire certified building stock.

As a final remark, it is important to highlight the relevance of the consumer and the role they play in the building and energy sector. Based on all the information stored in the SCE database, ADENE will fully launch the Portal casA+ after a piloting phase in 2021. This portal is a hub for consumers to have all relevant information stored in a platform accessible only by them; it relates to their own homes and deals with energy performance. Additionally, the portal gathers various stakeholders across the construction sector together and serves as a one-stop-shop for requesting proposals to implement improvement measures. It effectively contributes to closing the gap between the supply chain and the consumer.

Besides Portal casA+, ADENE is also focused on contributing to the enhancement of energy literacy throughout civil society, via an information centre called CINERGIA - Energy Information Centre, available since the beginning of 2019. This is an initiative generated by ADENE, in the context of the Portuguese Energy measure under the SIMPLEX +2017 programme, a programme that aims to give all citizens and energy producers an overview of the energy sector. Aimed at the general public (families, students, teachers, urban youth, etc.) and institutions (public and private institutions in the energy as well as other sectors, universities and research centres), CINERGIA provides a didactic narrative covering the forms, sources and production of energy, its transport, distribution, storage and marketing, and its use by various industrial sectors and by end consumers. Issues such as the history of energy in the country, its use in homes and in mobility are at the centre, as is the country's energy dependency, the state of RES and the connection between energy and water efficiency. Consumers will have the opportunity to learn more about energy efficiency in their region by browsing[25] all information available on buildings with energy certificates.

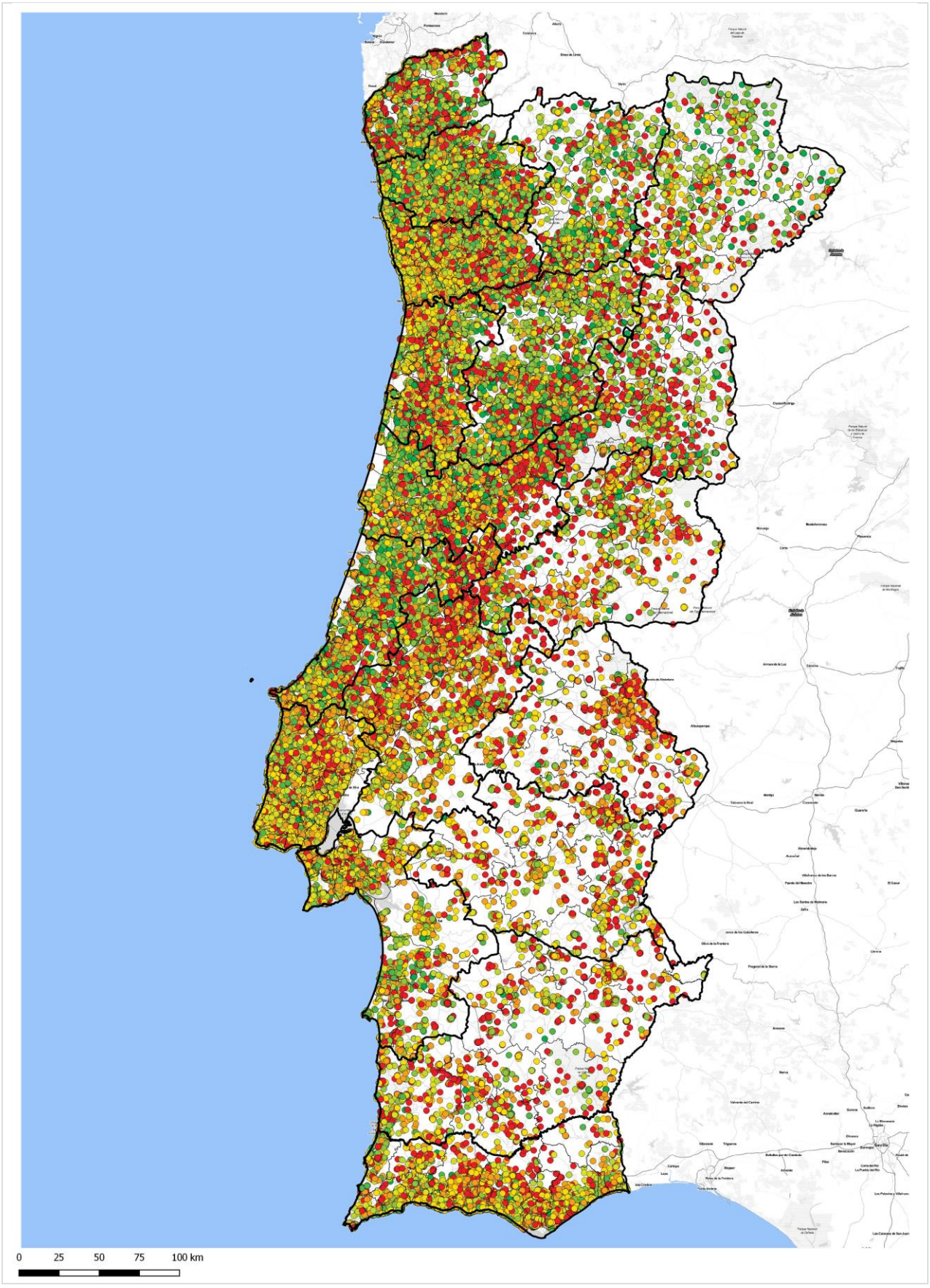

Figure 8: Energy performance information for the entire certified building stock.

Endnotes

1. The EPC database currently connects the National Institute of Statistics (INE) and the Electric Utility (EDP Distribuição) databases. The INE database provides geographical information about the residential building stock and, most importantly, references the INSPIRE ID for future European connections. Information from the EDP details the infrastructure of a building in terms of electric meters.
2. https://www.sce.pt/legislacao/
3. https://dre.pt/pdf1sdip/2013/11/23201/0001800029.pdf
4. http://dre.pt/pdf1sdip/2013/12/23302/0004000073.pdf
5. https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings
6. https://dre.pt/application/conteudo/70789581 and https://dre.pt/application/conteudo/73441202 (Portuguese versions only)
7. https://www.sce.pt/pesquisa-de-tecnicos/
8. https://dre.pt/application/conteudo/74468516 (Portuguese version only)
9. http://ecoap.pnaee.pt/ (Portuguese version only)
10. www.pnaee.pt/fee (Portuguese version only)
11. https://ifrru.ihru.pt/
12. https://casaeficiente2020.pt/
13. http://www.fundiestamo.com/index.php/fundos/area-fnre/
14. https://www.portaldahabitacao.pt/1.%C2%BA-direito
15. https://www.portaldahabitacao.pt/web/guest/o-que-e-rpa-ha
16. https://poseur.portugal2020.pt/
17. https://www.portugal2020.pt/
18. https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/accelerating-energy-renovation-investments-buildings
19. https://portalcasamais.pt/simulador/
20. https://youtu.be/oB7U3xeLYAM
21. confidencialimobiliario.com/media/revista/2017/mar/files/assets/common/downloads/publication.pdf (page 10) (Portuguese version only)
22. https://dre.pt/application/file/a/70196785 (Portuguese version only)
23. http://inspire.ec.europa.eu/
24. Potentially after the 2018 EPBD version
25. http://www.cinergia.pt

Annexes -Key Indicators & Decisions

Key Indicators & Decisions – General Background

no	Key Implementation Decisions – General Background	Description / value / response	Comments
01.01	Definition of public buildings (according to article 9 b)	Non-residential buildings with floor area above 1,000 m^2, or 500 m^2 for shopping center, supermarkets and covered pools.	
01.02	Definition of public buildings used by the public (according to article 13)	Non-residential buildings owned by a public entity, with floor area above 250 m^2 occupied by public entity, and frequently visited by the public.	
01.03	Number of residential buildings	3,604,407	Mostly residential; data from the National Statistics Institute - INE, reference 31/12/2018
01.04	Number of non-residential buildings	26,237	Mostly non-residential, data from 2011 Census (National Institute of Statistics - INE)
01.05	If possible, share of public buildings included in the number given in 01.04	(no information available)	
01.06	If possible, share of commercial buildings included in the number given in 01.04	(no information available)	
01.07	Number of buildings constructed per year (estimate)	14,788	Average of last 3 years Data from the National Statistics Institute - INE, reference 31/12/2018
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	10,949 residential buildings - 74%	Average of the last 3 years; data from the National Statistics Institute - INE, reference 31/12/2018
01.09	If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07)	(no information available)	
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	4,858 million	Average of the last 3 years (2018, 2017, 2016); data from the National Institute of Statistics - INE

Key Indicators & Decisions – New Buildings

no	Key Implementation Decision – New Buildings	Description / value / response	Comments
02.01	Are building codes set as overall value, primary energy, environment (CO_2), reference building or other?	• Reference buildings • Maximum heating and cooling needs • Maximum non-renewable primary energy	
02.02	Requirements for energy performance of residential buildings in current building code	I1 – 73 kWh_{ep}/m^2 I2 – 97 kWh_{ep}/m^2 I3 – 140 kWh_{ep}/m^2	Average calculated primary energy needs, for new residential buildings, according to the different winter climatic zones
02.03	Requirements for energy performance of non-residential commercial buildings in current building code	I1 – 312 kWh_{ep}/m^2 I2 – 256 kWh_{ep}/m^2 I3 – 346 kWh_{ep}/m^2	Average calculated primary energy needs, for new commercial buildings (hotels and office buildings, floor area above 1,000 m^2), according to the different winter climatic zones.
02.04	Requirements for energy performance of non-residential public buildings in current building code	NA	
02.05	Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation?	Yes	
02.06	Nearly zero energy (NZEB) level for residential buildings (level for building code)	Yes	Label A or A+, among other requirements in section 2.I.iii
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	2019/01	
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	Yes	Label A or A+, among other requirements in section 2.I.iii
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)	2019/01	
02.10	Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator?	No	
02.11	Is renewable energy a part of the overall or an additional requirement?	Additional requirement	Additional requirements exist in the case RES are mandatory (solar thermal collectors)
02.12	If renewable energy is an additional requirement to NZEB, please indicate level	Yes	Minimum of 50% of the total primary energy needs for regulated uses
02.13	Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates	Yes	Minimum ventilation rate for residential buildings

Key Implementation Decision – Existing Buildings

<table>
<tr><th>no</th><th>Key Implementation Decision – Existing Buildings</th><th>Description / value / response</th><th>Comment</th></tr>
<tr><td>03.01</td><td>Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation?</td><td>No</td><td></td></tr>
<tr><td>03.02</td><td>Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings?</td><td>-</td><td></td></tr>
<tr><td>03.03</td><td>Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)</td><td>-</td><td></td></tr>
<tr><td>03.04</td><td>Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)</td><td>-</td><td></td></tr>
<tr><td>03.05</td><td>Overall minimum requirements in case of major-renovation</td><td>Additional requirements exist when a major renovation occurs</td><td>Major renovation is when >25% of the building value is spend on building elements</td></tr>
<tr><td>03.06</td><td>Minimum requirements for individual building parts in case of renovation</td><td>Yes, minimum requirements for renovated building parts exist, and must comply with following levels:
<table>
<tr><td colspan="2">[W/(m².ºC)]</td><td colspan="6">Climatic Zone</td></tr>
<tr><td colspan="8">Portugal Continental</td></tr>
<tr><td colspan="2" rowspan="2">Building envelope elements:</td><td colspan="3">From 1 December 2013</td><td colspan="3">From 1 January 2016</td></tr>
<tr><td>I1</td><td>I2</td><td>I3</td><td>I1</td><td>I2</td><td>I3</td></tr>
<tr><td rowspan="2">In contact with exterior or non-useful spaces, with a loss reduction coefficient >0.7</td><td>Vertical opaque elements</td><td>0.50</td><td>0.40</td><td>0.35</td><td>0.50</td><td>0.40</td><td>0.35</td></tr>
<tr><td>Horizontal opaque elements</td><td>0.40</td><td>0.35</td><td>0.30</td><td>0.40</td><td>0.35</td><td>0.30</td></tr>
<tr><td rowspan="2">In contact with other buildings or non-useful spaces, with a loss</td><td>Vertical opaque elements</td><td>1.00</td><td>0.80</td><td>0.70</td><td>0.80</td><td>0.70</td><td>0.60</td></tr>
<tr><td>Horizontal opaque elements</td><td>0.80</td><td>0.70</td><td>0.60</td><td>0.60</td><td>0.60</td><td>0.50</td></tr>
</table></td><td></td></tr>
</table>

no	Key Implementation Decision – Existing Buildings	Description / value / response	Comment

		reduction coefficient ≤0.7							
		Glazed elements (doors and windows) (		2.90	2.60	2.40	2.80	2.40	2.20
		Ground contact elements		0.50			0.50		
		Autonomous Regions							
		Building envelope elements:		From 1 December 2013			From 1 January 2016		
				I1	I2	I3	I1	I2	I3
		In contact with exterior or non-useful spaces, with a loss reduction coefficient >0.7	Vertical opaque elements	0.80	0.65	0.50	0.70	0.60	0.45
			Horizontal opaque elements	0.55	0.50	0.45	0.45	0.40	0.35
		In contact with other buildings or non-useful spaces, with a loss reduction coefficient ≤0.7	Vertical opaque elements	1.60	1.50	1.40	0.90	0.80	0.70
			Horizontal opaque elements	1.00	0.90	0.80	0.70	0.70	0.60
		Glazed elements (doors and windows)		2.90	2.60	2.40	2.80	2.40	2.20
		Ground contact elements		0.50			0.50		

03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	The Portuguese Long Term Renovation Strategy has four (4) different renovation packages which apply according to the building need/performance: • Package 1 - Improving the comfort and mitigating Energy Poverty through improvements in the building's envelope: - Up to 2030: 65% of existing dwellings (applies to the worst performing residential buildings built prior to 1990); - Up to 2040: 100% of existing dwellings; • Package 2.1 – Improving Energy Efficiency (lighting and equipment): - Up to 2030: 65% of existing dwellings (applies to the worst performing residential buildings built prior to 1990) and 27% of non-residential buildings; - Up to 2040: 100% of existing dwellings and 52% of non-residential buildings; - Up to 2050: 100% of the existing building stock; • Package 2.2 – Improving Energy Efficiency (HVAC systems): - Up to 2030: 23% of existing dwellings (applies to the worst performing residential buildings built prior to 1990 which needs active systems to guarantee thermal comfort) and 27% of non-residential buildings; - Up to 2040: 77% of existing dwellings and 52%	The reference year for the existing stock to which the percentages refers is 2020.

no	Key Implementation Decision – Existing Buildings	Description / value / response	Comment
		of non-residential buildings; - Up to 2050: 100% of the existing building stock; • Package 3 – Local Decarbonisation (through RES such as solar thermal, PVs and heat pumps): - Up to 2030: 23% of existing dwellings (applies to residential buildings that improved their systems) and 27% of non-residential buildings; - Up to 2040: 75% of existing dwellings and 52% of non-residential buildings; - Up to 2050: 100% of the existing building stock; • Package 4 – Thermal Comfort improvement (through an increase of the availability and use of HVAC systems): - Up to 2030: not expected to change significantly; - Up to 2040: 65% of existing dwellings and 52% of non-residential buildings; - Up to 2050: 100% of the existing building stock. Globally (meaning the implementation of at least one renovation package), these targets are as follows: - Up to 2030: 69% of the existing building stock; - Up to 2040: 99% of the existing building stock; - Up to 2050: 100% of the existing building stock (all packages in all existing building stock).	
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	Primary Energy Reduction: • Up to 2030: 11% • Up to 2040: 27% • Up to 2050: 34% CO_2 Emissions Reduction: • Up to 2030: 15% • Up to 2040: 47% • Up to 2050: 77% Hours of Thermal Discomfort Reduction: • Up to 2030: 26% • Up to 2040: 34% • Up to 2050: 56%	The reference year to which the percentages refer is 2020.

Key Implementation Decision - Energy Performance Certificates

no	Key Implementation Decision – Energy Performance Certificates	Description / value / response	Comment
04.01	Number of EPCs per year (for instance average or values for 3-5 years)	Residential – 190,124 Non-residential – 22,316	From mainland and Madeira island database (3-year average from 2017 to 2019)
04.02	Number of EPCs since start of scheme	1,798,012 million EPC issued 1,590,433 for residential buildings 207,579 for non-residential buildings, of which 15,625 refer to large buildings (>1,000 m^2)	Reference 31/12/2019
04.03	Number of EPCs for different building types	**Residential distribution** Single-family - 31% Multi-family - 69% **Large non-residential (GES)** Supermarkets – 18.6% Offices – 15.2% Nursing homes – 9.2% Hotels (4 stars or more) – 8.5% Hotels (3 stars or fewer) – 5.4% Large supermarkets – 4.4% Schools (basic) – 3.5% Sports clubs (without pools) – 3.4% Shops – 3.1% Shops in commercial buildings – 3.1% Other – 25.6% **Small non-residential (PES)** Shops – 58.9% Offices – 20.0% Restaurants – 4.8% Coffee shops – 3.0% Hotels (3 stars or fewer) – 1.8% Pastry shops – 1.3% Clinics – 1.2% Hotels (3 stars or fewer) – 1.2% Banks or insurance – 0.9% Warehouses – 0.8% Others – 6.1% **Non-residential (GES+PES)** Shops – 55.3% Offices – 19.7% Restaurants – 4.5% Coffee shops – 2.8% Hotels (3 stars or fewer) – 2.0% Supermarkets – 1.7% Hotels (2 stars or fewer) – 1.6% Pastry shops – 1.2% Clinics – 1.2% Nursing homes – 0.9% Others – 9.1%	
04.04	Number of assessors	QE – 2,035 • Exclusively residential – 1,846 • Exclusively non-residential – 128 • Both scopes - 217	QE – Qualified Expert

<table>
<tr><th>no</th><th>Key Implementation Decision – Energy Performance Certificates</th><th>Description / value / response</th><th>Comment</th></tr>
<tr><td></td><td></td><td>TIM – 2,732</td><td>TIM – Install and maintenance technician, only applicable for non-residential buildings
Reference 31/12/2019</td></tr>
<tr><td>04.05</td><td>Basic education requirements for assessors</td><td>Engineer or architectural degree + 5 years’ experience for residential and small non-residential buildings
Mechanical engineer for non-residential buildings</td><td></td></tr>
<tr><td>04.06</td><td>Additional training demands for assessors</td><td>Assessors must have an approval from an examination; however, they are not obliged to attend training, although they are advised to do so.</td><td></td></tr>
<tr><td>04.07</td><td>Quality assurance system</td><td>Quality assurance is implemented at different levels, apart from the input validation embedded in the platform.
From 2009 to 2013, quality assurance was divided into Detailed (D) and Simple (S) checks as follow:
<table>
<tr><td></td><td>2009</td><td>2010</td><td>2011</td><td>2012</td><td>2013</td></tr>
<tr><td>D</td><td>3,257</td><td>2,567</td><td>790</td><td>287</td><td>175</td></tr>
<tr><td>S</td><td></td><td>2,160</td><td>3,447</td><td>2,247</td><td>1,118</td></tr>
</table>
From 2014 onwards, only a single type of quality assurance takes place – summary checks.
<table>
<tr><td></td><td>2014</td><td>2015</td><td>2016</td><td>2017</td><td>2018</td><td>2019</td></tr>
<tr><td>Summary</td><td>2,907</td><td>2,310</td><td>2,281</td><td>23</td><td>1,340</td><td>1,646</td></tr>
</table>
Quality assurance procedures are currently being revised, and a new system is expected to be implemented in the upcoming months, supported by a 'cost-optimal' approach.</td><td>Reference 31/21/2019</td></tr>
<tr><td>04.08</td><td>National database for EPCs</td><td>Yes</td><td>Two databases exist, one including the mainland and Madeira island and another one including the Azores islands</td></tr>
<tr><td>04.09</td><td>Link to national information on EPCs / Database</td><td>https://www.sce.pt/estatisticas/
https://portaldaenergia.azores.gov.pt/portal/Servicos/SCE-Acores/Indicadores</td><td></td></tr>
</table>

Key Indicators & Decisions – Smart Buildings and Building Systems

no	Key Implementation Decision – Smart Buildings and Building Systems	Description / value / response	Comment
05.01	Is there a national definition of smart buildings?	No	
05.02	Are there current support systems for smart buildings?	No	
05.03	Are there currently specific requirements for technical building systems (for instance in building codes)?	Yes	Please see sections 2.IV.v, 2.IV.vi, 2.IV.vii.
05.04	Are there current requirements for automatics (for instance in building codes)?	Yes	Please see section 2.IV.iii
05.05	Chosen option A or B for heating systems (inspection or other measures)	B	
05.06	Number of heating inspections; reports per year (if option A)	-	
05.07	Chosen option A or B for cooling systems (inspection or other measures)	B	
05.08	Number of AC / cooling system inspections; reports per year (if option A)	-	
05.09	Is there a national database for heating inspections?	Partly	It is embedded in the EPC database. If an inspection has been carried out, it is registered on the EPC database.
05.10	Is there a national database for cooling / AC inspections?	Partly	It is embedded in the EPC database. If an inspection has been carried out, it is registered on the EPC database.
05.11	Are inspection databases combined with EPC databases for registration of EPCs and inspection reports?	Partly	Currently only for storage purposes. Not able to search or use the database on that subject
05.12	Link to national information on Inspection / Database		

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