

<b>Title of the measure:</b>	POR 16 – Buildings codes on thermal performance characteristics and HVAC Systems (Decree-Law 118/2013, August 20 <sup>th</sup> )
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### ***General description***

The Energy Performance of Non-Residential Buildings (RECS) published in 2013 is a revision of the 2006 legislation, mainly the Regulation code on HVAC Systems (RSECE - Decree-law 79/2006).

This new version establishes new conditions for building design setting strict rules for calculating energy demands in order to achieve high degrees of energy efficiency, in what concerns to:

- Energy consumption requirements (Annex 2)
- Indoor air quality, assuring reference indoor ventilation rates, with criteria expressed as flow rate per number of persons and flow rate per floor area
- Building-component requirements for new buildings and major renovation works, in accordance with the different climatic zones (Annex 1)
- Energy efficiency requirements for technical systems, such as HVAC and DWH that have at least label of “C” or higher.
- Maximum requirements for permissible values of illuminance that have to be in accordance with EN 12464-1
- Maintenance of energy systems, making energy audits mandatory every 8 years for large utility buildings, while energy units with an installed power above 250 kW must have a preventive maintenance plan.

[In the case of non-residential buildings with an useful occupied area above 250 m<sup>2</sup> that are not considered as a large building, energy audits are mandatory every 10 years. Energy audits are mandatory if the following characteristics are observed cumulatively: i) owner is a public entity, ii) is occupied by a public entity, and iii) is frequently visited by general public.

A non-residential building is considered a large building when its useful area is above 1000 m<sup>2</sup> or, in the case of specific typologies, above 500 m<sup>2</sup> (e.g., shopping centers, supermarkets, and heated swimming pools.)

New buildings must comply with RECS whenever a permit is request and also when undergoing major renovations (renovate buildings envelop and/or technical systems with a costs exceeding 25% of the total existing building's value, without considering land cost).



## ***Impact evaluation***

### ***Methods***

The General Directorate for Energy and Geology (DGEG) is the entity in charge of the supervision of the building energy certification system (SCE) in what concerns to its impact and implementation.

The Portuguese Energy Agency (ADENE) is the entity in charge of managing the SCE and its central registry. It also acts as an observatory, managing and evaluating the results of the SCE and the impact from the legislation.

The following table presents the impact observed from the period 2008-2013 and also the expected impact until 2020.

### ***Results***

<b>Ex-post evaluation</b>	2008-2010	2011	2012	2013	Accumulated
Final Energy (Toe) (Fuels/Electricity)	23 697	6 247	3 254	1 924	35 122

#### *Notes:*

- 1) *Source: PNAEE- National Action Plan for Energy Efficiency, which transpose for national European Directive n.º 2006/32/CE relate to energy consumption efficiency aiming achieving the “20-20-20” goals.*
  - 1.1 *The results for 2008-2013 period reflects the effect of energy building codes and labelling in new buildings which have come in force in national legislation from 2006 in compliance to European Directive n.º 2002/91/CE*
- 2) *Ex-post evaluation reflects the implementation of POR 10 and POR 11 described in residential measure list*

## ***Interaction of measures***

- (i) Tertiary sector measures: POR 15 (Energy Certification in Buildings) and POR 4 (Boilers Efficiency Directive)
- (ii) General Cross-Cutting measures: POR 7 (National Action Plan for Energy Efficiency (PNAEE)); POR 8 (Energy Efficiency Fund);

Reinforce interaction with:

- (i) General Cross-Cutting measures: POR 10 (Plan for Promoting Efficiency in Electricity Consumption 2013-2014; POR 11 (Plan for Promoting Efficiency in Electricity Consumption 2017-2018); POR 12 (Portugal 2020) and POR 13 (Efficiency in end-use energy and energetic services)

## ***Means and outputs***

No information available.

## ***Data about energy savings***

From 2008 until 2013, the energy savings is 35 122 of final energy.



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## **Sources of uncertainties about energy savings**

No information available.

## **Historical data**

The first legal instrument with the aim of establishing rules for the HVAC systems dimensioning in buildings, dates from 1992, Decree-Law 156/92, of July 29<sup>th</sup>, under the designation of Quality Regulation on HVAC Systems for Buildings (RQSECE).

In December 2013 entered in force the Decree Law n. 118/2013, August 20<sup>th</sup> that revises and update the Decree-law n. 79/2006, April 4<sup>th</sup> in compliance with the Directive n. 2010/31/UE, of 19th May, brought an improvement of requirements as well in the methodology approach and continuing the proceedings management that has been implemented with RSECE 2006.

## **References**

- [www.p3e-portugal.com](http://www.p3e-portugal.com)
- Decree-law 40/90, of February 6<sup>th</sup>;
- Decree-law 80/2006, of April 4<sup>th</sup> (RCCTE 2006);
- Decree-law 79/2006, of April 4<sup>th</sup> (RSECE 2006);
- Decree-law 78/2006, of April 4<sup>th</sup> (SCE – Buildings Energy Certification System, 2006);
- Decree-law 118/2013, of August 20<sup>th</sup> (SCE – Buildings Energy Certification System);
- Decree-law 68-A/2015, of April 30<sup>th</sup> (Establishes issues of energy efficiency and CHP, transposing for national legislation the European Directive n.º 2012/27/UE)
- Law n.º 58/2013, of August 20<sup>th</sup> (Professional qualifications of SCE technicians);
- Ordinance n.º 349-A/2013 of, November 29<sup>th</sup> (Establishes the buildings category of energy certification (CE) as well as the types of certificate model, the taxes of CE register in the SCE internet platform and the criteria for quality verification of energy certification process.
- Ordinance n.º 115/2015 of April 24<sup>th</sup> (clarifications and some rectifications on Ordinance n.º 349-A/2013 of November 29<sup>th</sup>)
- Ordinance n.º 349-C/2013 of December 2<sup>nd</sup> (Establishes the required documents for the construction and use permit);
- Ordinance n. 349-D/2013 of December 2<sup>nd</sup> (Establishes the design requirements for the thermal envelop quality and the efficiency of the technical systems of new buildings, large intervention buildings and existing buildings)
- Ordinance n. 17-A/2016 of February 4<sup>th</sup> (First amendment to Ordinance n. 349-D/2013 of December 2<sup>nd</sup>)
- Ordinance n.º 353/2013 of December 4<sup>th</sup> (Establishes the building cost per square meter)
- Ordinance n.º 353-A/2013 of December 4<sup>th</sup> (Establishes the minimum ventilation rates requirements, as well the protection thresholds and reference conditions for air pollutants inside the non-residential buildings)
- Order n.º 15793-C/2013 of December 3<sup>rd</sup> (Publishes the energy certificate layout for residential and non-residential buildings);
- Ordinance n. 349-B/2013 of November 29<sup>th</sup> (REH solutions requirements for residential buildings);
- Order n.º 15793-D/2013 of December 3<sup>rd</sup> (Publishes the final energy conversion factors to primary energy and CO<sub>2</sub> emission system under energy certificate process );
- Order n.º 15793-F/2013 of December 3<sup>rd</sup> (Publishes the climate data);
- Order n.º 15793-H/2013 of August 20<sup>th</sup> (Establishes the rules for the accounting of renewable energy under energy certificate process);
- Order n. 15793-E/2013 of December 3<sup>rd</sup> (Establishes the rules of simplified calculations methods to be applied in existing buildings);

- Order n.º 15793-I/2013 of December 3<sup>rd</sup> (Publishes the methodology of nominal energy household demands);
- Order n.º 15793-k/2013 of December 3<sup>rd</sup> (Publishes the thermal parameters of constructions solutions);
- Order n.º 15793-G/2013 of December 3<sup>rd</sup> (Establishes the proceedings for testing and acceptance of facilities as well as the guidance of minimum information required to be included in the Maintenance Plan)
  
- Order 8892/2015, of August 11st, (Defines the classification methodology to adopt for lifts, conveyors and escalators to be installed in commercial buildings and services in order to assess compliance with the minimum energy efficiency requirements according to ISO 25745 standard)
- Order 7113/2015, of June 29st, (Responsible for publishing quality verification of the selection criteria of the processes and methods of checking the quality of the certification processes carried out by the technicians of the Building Energy Certification System (SCE), particularly the Qualified Experts)
- Order 14985/2015, of December 17th, (Defines the methodology to be used for determine the values (Qusable) and Seasonal Performance Factor used in the calculation methodology of the renewable energy contribution from heat pumps).
- Order 3156/2016, of March 1st, (Replaces the calculation program of the determination of the energy produced by the solar thermal system and solar photovoltaic system, under the Building Energy Certification System).
- Order 6470/2016, of May 17th, (Defines the requirements associated to the elaboration of energy rationalization plans).

Besides all above listed diplomas, it was also published in April 30<sup>th</sup> the Decree-law 68-A/2015 that establishes requirements on energy efficiency and CHP, transposing for national legislation the European Directive 2012/27/UE.

***Annex 1: Envelop requirements***



The reference thermal conduction coefficient and solar factor were determined according to different season, winter and summer, respectively for heating and cooling purpose. The country was divided into three distinct winter and summer areas, but the country division taking in consideration 18°C as a reference temperature in winter and exterior average temperature in summer which the criteria is:  $\theta_{\text{ext}, v} \leq 20^\circ\text{C}$ ;  $20^\circ\text{C} < \theta_{\text{ext}, v} \leq 22^\circ\text{C}$  and  $\theta_{\text{ext}, v} > 22^\circ\text{C}$ .

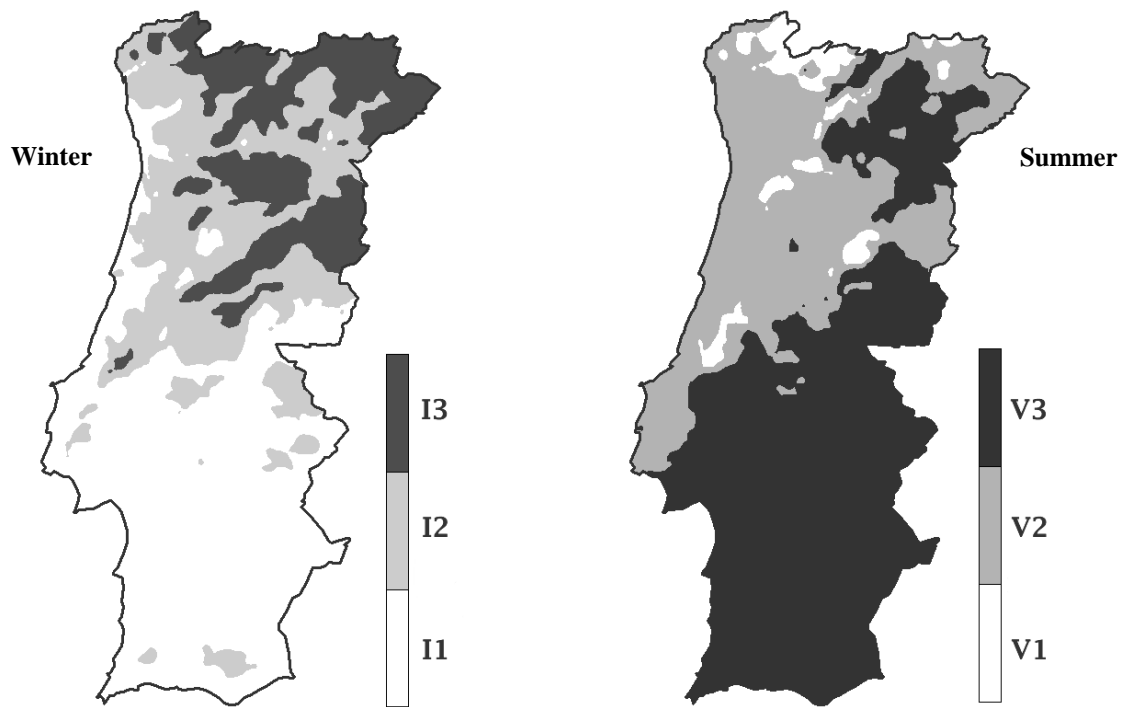


Figure 1 – winter and summer climatic division

1 – Reference thermal conduction coefficient for the non-residential buildings envelope

Reference thermal conduction coefficient – [U-W/m2.°C]

$U_{ref}$ [W/(m <sup>2</sup> .°C)]		Climate zone		
		Portugal		
Envelope elements		I1	I2	I3
External	Walls	0,70	0,60	0,50
	Roofs and floors	0,50	0,45	0,40
Windows ( $U_w$ )		4,30	3,30	3,30
		Azores and Madeira Island		
Envelope elements		I1	I2	I3
External	external	1,4	0,90	0,50
	Roofs and floors	0,80	0,60	0,40
Windows ( $U_w$ )		4,30	3,30	3,30

2 – Reference solar factor coefficient for the non-residential buildings glazing

	Climate zone		
Envelope elements	V1	V2	V3
Glazing solar factor (without shading devices)	0,25	0,20	0,15

## Annex 2: Energy consumption requirements

**IEE pr ≤ IEEpr,reference => Compliance of the regulation**

i) **IEE pr** = IEEpr,S + IEEpr,T – IEEpr,REN (building energy consumption: kWhEP/m<sup>2</sup>.year)

$\mathbf{IEEpr} = \left(\frac{1}{Ap}\right) \sum_i (E_{S,i} \cdot F_{Pu,i}) + \left(\frac{1}{Ap}\right) \sum_i (E_{T,i} \cdot F_{Pu,i}) - \left(\frac{1}{Ap}\right) \sum_i (E_{Ren,i} \cdot i \cdot F_{Pu,i})$	(Primary energy consumption: kWhEP/m <sup>2</sup> .year)
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Ap – Useful floor area

ES,i – Energy consumption by energy source (i) related to HVAC systems, DWH and swimming pool hot water and indoor building lighting [kWh/m<sup>2</sup>.year]

ET,i – Energy consumption by energy source (i) related to ventilation and pumping that are not associated to thermal load control, refrigeration equipment, punctual lighting, elevators and stairs and moving walkways, outdoor building lighting [kWh/m<sup>2</sup>.year] and all the remains equipment's and systems that are excluded from ES,i

ERen,i – Energy consumption provided by renewable energy source

Fpu,i - Conversion factor to primary energy, [kWhEP/kWh]

In the specific case of major renovations, the non-residential buildings could have a IEEpr less than or equal to IEEpr, reference, increased by 50%