CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

# Implementation of the EPBD Italy

## Status in 2020

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NATIONAL WEBSITES
**www.mise.gov.it/index.php/it/energia/efficienza-energetica,**
**www.enea.it/it,**
**efficienzaenergetica.enea.it,**
**www.cti2000.it,**
**www.regioni.it/materie/ambiente-energia/energia,**
**www.istat.it/it/archivio/237399,**
**www.mise.gov.it/index.php/it/energia/efficienza-energetica/edifici**

EPBD LEGISLATION
**Decrees 26.06.2015:**
**www.mise.gov.it/index.php/it/energia/efficienza-energetica/edifici**

**Presidential Decree 74/2013:**
**www.gazzettaufficiale.it/eli/id/2013/06/27/13G00114/sg**

**Presidential Decree 75/2013:**
**www.gazzettaufficiale.it/eli/id/2013/06/27/13G00115/sg**

**Decree 10.06.2020 n. 48 - Transposition of Directive 2018/844/EU:**
**www.gazzettaufficiale.it/eli/id/2020/06/10/20G00066/sg**

## 1. Introduction

On 21 January 2020, the Ministry of Economic Development (MISE) submitted the final text of the Integrated National Energy and Climate Plan (NECP) for the years 2021-2030 to the European Commission. The main objective of the NECP concerning energy efficiency consists of a reduction of primary energy consumption by 43%, compared to PRIMES 2007 projections, higher than the overall EU target of 32.5%.

At the internal legislative level, Directive 2018/844/EU has been implemented by Decree 10.06.2020 n. 48, which introduced the necessary changes to Legislative Decree 192/2005.

Decree 192/2005[1], modified by Legislative Decree 311/2006[2], set the basis for the EPBD implementation in Italy. It was followed by a number of complementary legal acts updating the minimum energy performance requirements for buildings, building components and technical building systems, while extending the calculation to cooling and lighting systems and providing guidelines for energy performance certification (2009) and defining requirements for assessors as well as specifications for the inspection of technical building systems (2013).

Law 90/2013[3] has implemented Directive 2010/31/EU, introducing significant changes to the first 2005 implementation. In June 2015, three inter-ministerial decrees (26 June 2015)[4] completed the EPBD transposition, which also established stricter minimum requirements for new buildings and major renovations, defined NZEB as well as rules for taking RES in buildings into account, and provided new national guidelines for Energy Performance Certificates (EPCs).

Until the publication of the operative decrees foreseen by Decree 10.06.2020 n. 48, the three inter-ministerial decrees (26 June 2015) apply.

Italian regions and autonomous provinces (a total of 21 authorities) have final jurisdiction in energy topics. For this reason, in the past, a number of regions implemented the EPBD separately, thereby creating a very heterogeneous and complex regulatory framework. The current legislation provided an advanced harmonisation of the EPBD implementation all over the national territory.

A national Information System (SIAPE) for Energy Performance Certificates (EPCs) has been created and a national register for the inspection of technical heating/cooling systems is under development, although regions and the autonomous provinces are still in charge of managing their own databases and for related monitoring and control.

# 2. Current Status of Implementation of the EPBD

## 2.I. Energy performance requirements: NEW BUILDINGS

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

Waiting for the complete implementation of Directive 2018/844, Decree 26.06.2015 'Minimum Requirements' is in force and provides:

1) Minimum energy performance requirements for buildings, building systems and building components:

The minimum energy performance requirements for new buildings (and major renovations) are based on the application of the cost-optimal methodology results (EPBD, Article 5) and include heating, cooling, domestic hot water and ventilation for residential buildings as well as lighting and internal transports (lifts, escalators) for non-residential buildings.

The overall energy performance of new buildings varies with typology and climatic zone.

The minimum energy performance requirements were set for two different time steps:

- from July 2015
- from January 2019 (for public buildings) and from January 2021 (for all the other buildings)

2) Rules for taking into account the use of RES in buildings and the system boundary:

Compensation between energy needs and renewable energy produced on-site is allowed only for the same energy carrier on a monthly basis and only to cover the total energy demand for that carrier (the exported energy is not taken into account).

3) The energy performance calculation methodologies:

The calculation methodologies are based on national standard UNI/TS 11300 (series from 1 to 6)[5], which constitutes the national instrument for applying the set of standards developed by CEN to support EPBD implementation. UNI/TS 11300 series are presently under revision to be in line with the new set of CEN standards defined under mandate M/480. The adoption of the hourly calculation instead of monthly calculation is under consideration.

4) Primary energy conversion factors:

Renewable, non-renewable and total primary energy conversion factors are defined for each energy carrier (see Table 1).

5) Definition and requirements for NZEB:

NZEB are new or renovated buildings respecting:

- all the requirements included in Decree 26.06.2015 'Minimum Requirements', with the limit values set for 2019/2021;
- the RES requirements included in Decree 3.3.2011 n. 28 (i.e., 50% of the energy used for heating, cooling, ventilation and domestic hot water).

| **Energy Carrier** | $f_{P,nren}$ | $f_{P,ren}$ | $f_{P,tot}$ |
|---|---|---|---|
| Natural Gas (1) | 1.05 | 0 | 1.05 |
| LPG | 1.05 | 0 | 1.05 |
| Diesel fuel and fuel oil | 1.07 | 0 | 1.07 |
| Coal | 1.10 | 0 | 1.10 |
| Solid biofuels | 0.20 | 0.80 | 1.00 |
| Liquid and gaseous biofuels | 0.40 | 0.60 | 1.00 |
| Electricity (1) | 1.95 | 0.47 | 2.42 |
| District heating (2) | 1.50 | 0 | 1.50 |
| Solid urban waste | 0.2 | 0.2 | 0.2 |
| District cooling (2) | 0.5 | 0 | 0.5 |
| Thermal energy from solar collectors | 0 | 1.00 | 1.00 |
| Electricity produced by photovoltaics, mini wind turbines and small hydro systems | 0 | 1.00 | 1.00 |
| Geo- aero-, hydrothermal energy | 0 | 1.00 | 1.00 |

(1) To be updated every two years on the basis of data supplied by GSE, the state-owned company which promotes and supports renewable energy sources (RES) in Italy

(2) Default value in the absence of specific values declared by the supplier and certified by a third party.

$f_{P,nren}$ = non-renewable primary energy factor for delivered energy carrier
$f_{P,ren}$ = renewable primary energy factor for delivered energy carrier
$f_{P,tot}$ = total primary energy factor (sum of non-renewable and renewable energy factors)

*Table 1. Primary energy factors.*

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

Decree 26.06.2015 'Minimum Requirements' prescribes the calculation of the following energy performance indicators:

- Specific energy needs for heating ($EP_{H,nd}$), cooling ($EP_{C,nd}$) and domestic hot water ($EP_{W,nd}$);
- Energy performance indices for heating ($EP_H$), cooling ($EP_C$), domestic hot water ($EP_W$) and ventilation ($EP_V$) for residential buildings, plus lighting ($EP_L$) and transport ($EP_T$) for non-residential buildings, expressed in non-renewable and in total primary energy [kWh/m$^2$];
- Global energy performance index $EP_{gl} = EP_H + EP_C + EP_W + EP_V + EP_L* + EP_T*$ expressed in non-renewable and in total primary energy [kWh/m$^2$] (lighting and transport services for non-residential building only);
- Minimum requirements are defined according to the 'reference building'[6] (see Table 2 and Table 3). More severe parameters of the reference building entered into force in 2019 for public buildings and will apply to all the buildings as from 2021;
- A new building (or majorly renovated building) satisfies the minimum requirements if the specific energy needs for heating and cooling ($EP_{H,nd}$, $EP_{C,nd}$) and the global energy performance $EP_{gl}$ are lower than those calculated for the reference building. New buildings further need to have a fixed minimum ratio of RES for the supply[7];
- In case the required RES integration should not be feasible, the building has to adhere to a proportionally lower $EP_{gl}$ limit value;
- The designer has to justify compliance or non-compliance of the project to minimum energy performance requirements in a report (model provided in one of the 2015 decrees). This validation is compulsory to obtain the construction licence. Controls from local authorities to check compliance are performed on demand.

| Elements / Components | Validity period | Thermal transmittance U [W/m$^2$.K](including thermal bridges) | | | | |
|---|---|---|---|---|---|---|
| | | Climatic Zone | | | | |
| | | A and B | C | D | E | F |
| **Envelope – walls** | From 2015 | 0.45 | 0.38 | 0.34 | 0.30 | 0.28 |
| | From 2019/2021 | 0.43 | 0.34 | 0.29 | 0.26 | 0.24 |
| **Envelope – roofs** | From 2015 | 0.38 | 0.36 | 0.30 | 0.25 | 0.23 |
| | From 2019/2021 | 0.35 | 0.33 | 0.26 | 0.22 | 0.20 |
| **Envelope – floors** | From 2015 | 0.46 | 0.40 | 0.32 | 0.30 | 0.28 |
| | From 2019/2021 | 0.4 | 0.38 | 0.29 | 0.26 | 0.24 |
| **Doors, windows and shutter boxes** | From 2015 | 3.20 | 2.40 | 2.00 | 1.80 | 1.50 |
| | From 2019/2021 | 3.00 | 2.20 | 1.80 | 1.40 | 1.10 |
| **Indoor partitions** | From 2015 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| | From 2019/2021 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| | | Total solar energy transmittance $g_{gl+sh}$ [-] | | | | |
| | | A and B | C | D | E | F |
| **Windows with shading devices** | From 2015 | 0.35 | | | | |
| | From 2019/2021 | | | | | |

*Table 2. Reference building - Performance of single building elements.*

| | Thermal energy production | | | In situ electricity production |
|---|---|---|---|---|
| | **Heating (H)** | **Cooling (C)** | **Water (W)** | |
| Heat generator - liquid fuels | 0.82 | - | 0.80 | - |
| Heat generator - gas fuels | 0.95 | - | 0.85 | - |
| Heat generator - solid fuels | 0.72 | - | 0.70 | - |
| Heat generator - solid biofuels | 0.72 | - | 0.65 | |
| Heat generator - liquid biofuels | 0.82 | | 0.75 | |
| Heat pump with electrically driven compressor | 3.00 | (*) | 2.50 | |
| Chiller with electrically driven compressor | - | 2.50 | - | |
| Absorption heat pump | 1.20 | (*) | 1.10 | |
| Indirect power absorption chiller | - | 0.60 x $\eta_{gn}$ (**) | - | |
| Direct-fired absorption chillers | - | 0.60 | - | |
| Combined heat power systems | 0.55 | - | 0.55 | 0.25 |
| Electrical heating | 1.00 | - | - | - |
| District heating | 0.97 | - | - | - |
| District cooling | - | 0.97 | - | - |
| Solar collectors | 0.3 | - | 0.3 | - |
| Photovoltaic systems | - | - | - | 0.1 |
| Mini wind turbines and small hydro-systems | - | - | - | (**) |
| | Thermal energy use (***) $\eta_u$ | | | |
| | **H** | **C** | **W** | |
| Water based systems | 0.81 | 0.81 | 0.70 | |
| AC systems | 0.83 | 0.83 | - | |
| Mixed distribution | 0.82 | 0.82 | - | |

(*) For reversible heat pumps the value of the correspondent chiller is assumed.

(**) The efficiency of the system installed in the real building is assumed.

(***) Including emission, control and distribution.

*Table 3. Reference building – technical building systems efficiency.*

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

According to Law 90/2013, a NZEB is a building characterised by a very high energy performance in which the very low energy demand is significantly covered by RES, produced within the building system boundaries.

In the national plan for NZEBs (PANZEB)[8], priority is given to ambitious renovation rather than new constructions, which have a very low rate in Italy.

The Italian authorities started implementing NZEBs in 2019 for public buildings, which will be fully implemented by 2021 for all new buildings. Some Italian local authorities anticipated these deadlines.

From 2021, all new buildings or buildings subject to a 'first-level major renovation' must meet the technical and performance requirements imposed by Annex 1 of the Ministerial Decree 06/26/2015 for NZEBs.

The number of NZEBs in 2018 amounted to around 1,400 buildings, mostly new construction (90%) and for residential use (85%), and it is estimated that the construction of NZEBs is increasing in all Italian regions.

Measures addressing the transition to NZEB include:

- Progressive strengthening of the building regulations: plans for implementing NZEB as a standard stem from 31 December 2018;
- Specific national incentives (thermal account and tax deductions) for existing public buildings undergoing renovation to NZEB level (demolition and reconstruction alternative is included);
- In new public buildings, the obligation for the share of RES is 10% higher compared to the minimum share required for private ones (i.e., 60% of minimum ratio of RES in energy supply).

Law 107/2015[9] promotes new public schools with stricter earthquake-proof reinforcement and innovative energy systems as an extra requirement, increasing the ad-hoc fund of 23.9 million € in 2016 and 126 million €/year from 2017 to 2021. With the following Decree 94/2015, the Ministry of Education, University and Research allocated 300 million € to the Italian regions for the construction of 30 new innovative schools.

Within a research financed by the Ministry of Economic Development, in order to monitor and improve national and regional policies, ENEA has established a National Observatory, *'Osservatorio nazionale NZEB*', that investigates numbers, typology, technologies and driving factors of Italian NZEBs according to the legislation in force. For the first three years, before the requirements scheduled by Directive 2010/31/EU, the activity focused on looking for real NZEB study cases across the country. By establishing the national EPC register and having NZEB mandatory requirements enter into force, the activity since 2019 has focused on analysing NZEB building characteristics by way of extracting information directly from the national database; this activity results in better utilisation of the more detailed available data.

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

In addition to the aforementioned requirements for the whole building performance, the following energy requirements for system and building components shall be verified[10]:

- The mean transmission heat transfer coefficient, $H'_T$ [W/m$^2$K], is lower than the limit value for the given climatic zone and surface-area-to-volume ratio (S/V) of the building (Table 4);
- The ratio of summer effective collecting areas of the transparent components ($A_{sol,est}$ ) to the net floor area ($A_{sup\ util}$) is lower than the limit value defined for residential and non-residential buildings (Table 5);
- The mean efficiencies of the technical building systems for heating (ηH), cooling (ηC) and domestic hot water (ηC) are higher than those calculated for the reference building;
- The mass of the external walls (except northeast to northwest) is larger than 230 kg/m² or, alternatively, their periodic thermal transmittance YIE (as defined in EN ISO 13786) is lower than 0.12 W/m²K;
- The periodic thermal transmittance YIE of roofs and floors is lower than 0.18 W/m²K;
- The U-value of the inter-building opaque components (floors and walls) is lower than 0.80 W/m²K (Table 2).

| S/V ratio of the building | Climatic zone | | | | |
|---|---|---|---|---|---|
| | A - B | C | D | E | F |
| S/V ≥ 0.7 | 0.58 | 0.55 | 0.53 | 0.50 | 0.48 |
| 0.7 > S/V ≥ 0.4 | 0.63 | 0.60 | 0.58 | 0.55 | 0.53 |
| 0.4 > S/V | 0.80 | 0.80 | 0.80 | 0.75 | 0.70 |
| Second level major renovation (>25% envelope) | 0.73 | 0.70 | 0.68 | 0.65 | 0.62 |
| S is the total surface of all elements of a building that delimits the conditioned volume (V) with respect to outdoors, the ground, environments with different temperatures or non-conditioned environments | | | | | |

*Table 4. $H'_T$ maximum limit value.*

| Building categories | All climatic zones |
|---|---|
| Residential buildings | ≤ 0.030 |
| Non-residential buildings | ≤ 0.040 |

*Table 5. $A_{sol,est}/A_{sup,utile}$ maximum limit value.*

### *2.I.v. Enforcement systems new buildings*

In 2014, Italy published its first National Infrastructural Plan for recharging electric vehicles (PNIRE) which contains indications on how to promote electro-mobility by means of prescription as well as how to put in Local Mobility Plans and specific requirements for new parking areas (public and private ones).

By transposing Directive 2014/94/EU (Legislative Decree 257/2016), PNIRE has been updated and actions to promote electro-mobility have become more stringent, mandating municipalities to modify their building codes.

The Decree established that in new residential buildings with almost ten (10) dwellings, the installation of ducting infrastructure (namely conduits for electric cables) should guarantee a percentage of parking spaces for electric vehicles almost equal to 20% of total car parking spaces; this percentage becomes 100% in case of new (first-level major renovation) non-residential buildings with a total useful floor area over 500 $m^2$.

According to Directive 844/2018, Italian law will introduce further specific regulations for the installation and requirements of charging points of electric vehicles. Municipalities should ensure the integration of charging points in the buildings, updating their building code. To obtain a building permit for residential and non-residential buildings, new or undergoing first-level major renovation, it will be mandatory to include in the project the installation of ducting infrastructure for a certain number of recharging points. All the requirements will be defined in the piece of legislation transposing Directive 844/2018/EU.

## 2.II. Energy performance requirements: EXISTING BUILDINGS

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

The building sector is responsible for 45% of the final energy consumption and for 17.5% of $CO_2$ direct emissions in Italy, due to the use of fossil fuels in building premises and the related emission of any greenhouse gases into the atmosphere.

The Italian National Energy and Climate Plan (PNIEC) for residential building stock requires in 2030 a final energy saving of 0.332 Mtoe/year. To achieve such goal an annual rate of deep energy renovation of existing residential buildings is estimated to be nearly 0.85%.

Energy performance requirements for existing buildings are identical regardless of whether they concern residential or non-residential buildings. Minimum requirements are differentiated according to the extent of the renovation intervention:

- **First-level major renovations** are defined as 'refurbishment of at least 50% of the envelope and renovation of the heating and/or cooling plant of the entire building'. Requirements for new buildings apply to the whole building, limited to the considered energy service(s). For building extensions (new volume >15% of the existing volume or >500 $m^3$), these requirements apply only to the new volume.

- **Second-level major renovations** are defined as 'refurbishment of at least 25% of the external surfaces of the building with or without renovation of the heating and/or cooling plant'. The U-value of the concerned surfaces is lower than the limit values (Table 6). The mean transmission heat transfer coefficient $H'_T$ of refurbished building elements is lower that the limit value (Table 4, row 4). The mean efficiencies of renovated technical building systems are higher than the reference values.

- **Minor renovations** are defined as 'refurbishment of less than 25% of the external surfaces of the building and/or modification of the heating and/or cooling plants)'. The performance of single components and of technical building systems has to comply with mandatory limit values.

| Components | Validity period | Thermal transmittance U [W/$m^2$.K] (including thermal bridges) | | | | |
|---|---|---|---|---|---|---|
| | | Climatic Zone | | | | |
| | | A and B | C | D | E | F |
| **Envelope – walls** | From 2015 | 0.45 | 0.40 | 0.36 | 0.30 | 0.28 |
| | From 2021 | 0.40 | 0.36 | 0.32 | 0.28 | 0.26 |
| **Envelope – roofs** | From 2015 | 0.34 | 0.34 | 0.28 | 0.26 | 0.24 |
| | From 2021 | 0.32 | 0.32 | 0.26 | 0.24 | 0.22 |
| **Envelope – floors** | From 2015 | 0.48 | 0.42 | 0.36 | 0.31 | 0.30 |
| | From 2021 | 0.42 | 0.38 | 0.32 | 0.29 | 0.28 |
| **Doors, windows and rolling shutter boxes** | From 2015 | 3.20 | 2.40 | 2.10 | 1.90 | 1.70 |
| | From 2021 | 3.00 | 2.00 | 1.80 | 1.40 | 1.00 |

*Table 6. U-value limits for second level major renovation and minor renovation.*

## *2.II.ii. Regulation on individual parts, distinct from whole building performance*

In case of second-level major renovations and minor renovations, specific requirements on building components are requested, as explained in 2.II.i.

The following specific requirements on buildings parts also apply:

- In case of new windows (except on the north façade), the total solar transmission factor (ggl+sh) shall be lower than 0.35;

- In case of refurbishment of external structures, it is requested to verify the risk of critical surface humidity and interstitial condensation according to EN ISO 13788;

- In case of refurbishment of the roof, it is requested to verify the techno-economic feasibility to adopt technical solutions (cool roof, ventilated roof, green roof) to reduce the energy need for cooling.

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

Given the significant size of the existing public building stock and the low rate of new constructions, efforts are being concentrated on increasing energy efficiency in existing buildings. First-level major renovations impose stringent and challenging limits for achieving the 'minimum requirements' prescribed by the Decree of 26.06.2015.

The NECP scenario foresees a saving of 0.33 Mtoe/year of final energy for the residential sector and of 0.24 Mtoe/year of final energy for the tertiary sector from 2020 to 2030.

In order to increase the annual renovation rate identified by the draft of the recent Long-Term Renovation Strategy (LTRS) to achieve the NECP objectives, numerous initiatives have already been put in place and others are in the pipeline.

The most important new initiative, included in the new EPBD transposition, is the establishment of the National Platform (NP) of the buildings energy performance, which is a tool to promote knowledge of the national existing building stock, its size, consumption and energy performance, and to provide personalised information on the energy performance of buildings to citizens, enterprises and public administrations.

The existing measures include, among others: strengthening tax deductions by introducing the Superbonus 110% programme; strengthening the White Certificates mechanism; and establishing the Decree 28/2012 incentivising scheme, which allows for interventions in the private residential building stock and in that owned by the public administration, all of them further described in section 2.II.v.

Among the existing policies, the Action Plan on Green Public Procurement (PAN GPP) appears to be an initiative of interest for its combined action on environmental and energy efficiency aspects. In particular, the Minimum Environmental Criteria (CAM) for constructions provide that, for the renovation/maintenance projects of existing buildings, an energy audit must be conducted or acquired, to identify the energy performance of the building and the actions to be taken for the reduction of its energy needs. On the other hand, as regards the first-level major renovation interventions, projects must ensure that the overall energy needs of the building are met by renewable energy systems or with alternative high efficiency systems.

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

The LTRS 2020, developed by Italy on the basis of the EU recommendation 786/2019, was published by MISE for public consultation, open until 16 December 2020.

The LTRS contains a review of the national building stock and the identification of its current energy renovation rate and also refers to the opportunities for energy renovation featuring the application of an integrated approach based on 'trigger points'.

In order to estimate the surface to be renovated, a modelling tool has been developed, starting from the cost-optimal method suggested by the EU Commission; this allows the identification of the minimum cost solutions to achieve the energy saving objectives. For the sub-sectors of the tertiary sector not covered by the cost-optimal methodology, processing was carried out starting from the annual energy saving target.

The strategy then reviews the existing measures and actions for residential and non-residential buildings and for the public and private sector, with the assessment, for each of them, of a possible improvement in order to achieve the estimated renovation rate.

Finally, the LTRS describes the most transversal initiatives such as the actions aimed at promoting smart technologies, skills, training and financial mechanisms.

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

Tax deductions (Ecobonus), introduced by the 2007 Italian financial law, are key drivers of energy efficiency improvements in the private housing sector and have stimulated 40 billion € in investments so far. They consist of 50-65% reductions of personal income tax (IRPEF) and corporate income tax (IRES) granted to cover expenses incurred for the overall energy performance upgrade of the building, including major and minor renovations.

Since 2017, Ecobonus has been enhanced with the introduction of specific interventions for condominiums with a tax deduction rate of 70-75%, and with the mechanism of credit transfer now extended to all beneficiaries, including banks and credit institutions. For these reasons, the NECP identifies Ecobonus as a measure to fight energy poverty.
Moreover, the SuperEcobonus scheme, with a tax deduction rate of 110% for anti-seismic and energy renovation interventions, was introduced on 1 June 2021. As the Ecobonus, it is addressed to multi- and single-family houses, but it is mainly addressed to major renovations. In addition to contributing to the achievement of the renovation goal for existing buildings, the SuperEcobonus has been designed to restart the economy affected by the Covid-19 crisis and, in particular, to relaunch the construction sector.

Decree 28/2012 incentivising scheme, dubbed 'Thermal Account', is operational since 2013 and encourages energy performance improvements in public buildings and renovations to NZEB standards. Since June 2016, the incentive mechanism allocated 200 million € per year to public buildings, strengthened and simplified procedures and widened the range of eligible applicants and measures, including building automation. The incentive grants up to 575 €/$m^2$ over a maximum five (5)-year period and covers up to 65% of expenses for NZEB renovations. This incentive can be combined with other grants (i.e., regional ones) of up to 100% of eligible costs.

The Governmental PREPAC Programme (in force since November 2014)[11] has been a widely used measure since its launch in 2016, and has stimulated interventions as well as information and technical assistance activities necessary to be able to renovate 3% of the floor area of central government buildings annually, in compliance with Energy Efficiency Directive (EED) Article 5. In transposing the EED, the Legislative Decree 73/2020[12] Programme has been refinanced for the period 2021-2030.

The White Certificate mechanism, introduced by the Ministerial Decrees of 24 April 2001, still represents an important incentive mechanism for energy efficiency in Italian buildings. They are negotiable securities that certify the achievement of energy savings in the end use of energy through interventions and projects to increase energy efficiency.

For the years from 2020 to 2024, the contribution for building safety within the territory of the Italian municipalities was confirmed by the Italian Government; resources have been increased from 4.9 billion € to 8.8 billion €, allowing safety measures and interventions for the energy efficiency of buildings to be implemented.

## *2.II.vi. Information campaigns / complementary policies*

The energy efficiency and renewable energy agencies ENEA and GSE (Energy Service Manager) have the mandate to manage the governmental incentives for building energy renovation and the related communication campaigns. Beyond several publications and workshops, ENEA annually releases an energy

efficiency report (RAEE) that also monitors trends and best practices on policy and technology advancements in the building sector with the participation of key national stakeholders.

In compliance with the 2015 inter-ministerial Decrees, ENEA developed a guideline to the new EPC. A technical group composed of the different ministries has been established to update the EPC guidelines with Eurostat 2018 indications, taking into account the current legislation in terms of public procurement.

Sections of the ENEA website address EPCs, energy audits, incentives, guidelines for building renovations, technical building systems operation and inspection.

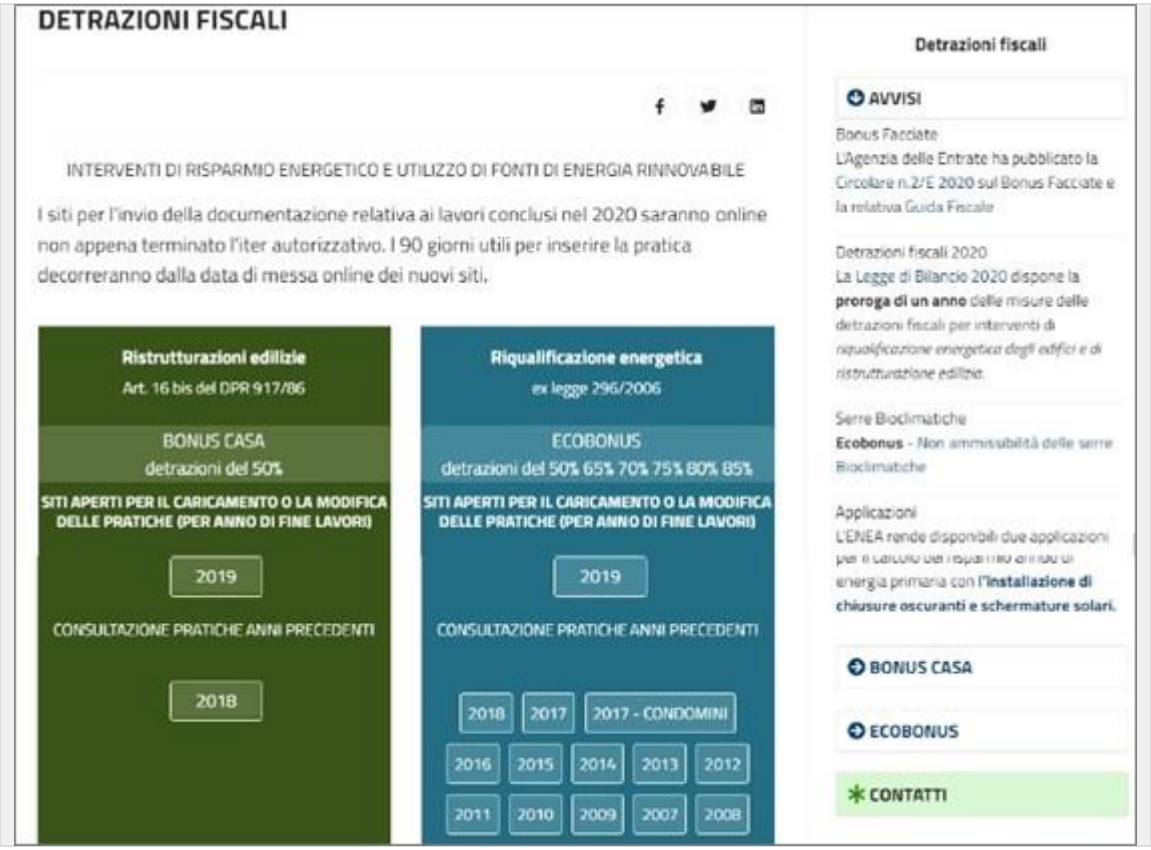



*Figure 1. Institutional portal on tax deductions for building renovations.*

Pursuant to Art. 5 of Legislative Decree 102/2014, modified by Legislative Decree 73/2020, ENEA published the guidelines for executing energy diagnoses in public buildings.

As part of the obligation to draw up an energy audit pursuant to Art. 8 of Legislative Decree 102/2014, modified by Legislative Decree 73/2020, ENEA managed to activate the sectoral technical roundtables that provide support to operators, and this activity has led to the development of various sectoral guidelines for conducting the energy audit.

Within the EED implementation, the ITALIA IN CLASSE A campaign includes a series of training and information activities targeting public administrations, large companies and SMEs, banking institutions, households and students; these were carried out from 2016 to 2020 throughout the national territory. Since 2015, the results achieved by the campaign are estimated at 0.1 Mtoe; given its importance, a new enhanced information and training programme for the 2021-2030 period has been adopted by the government. Social media and a dedicated ENEA web channel are also used to disseminate relevant information.

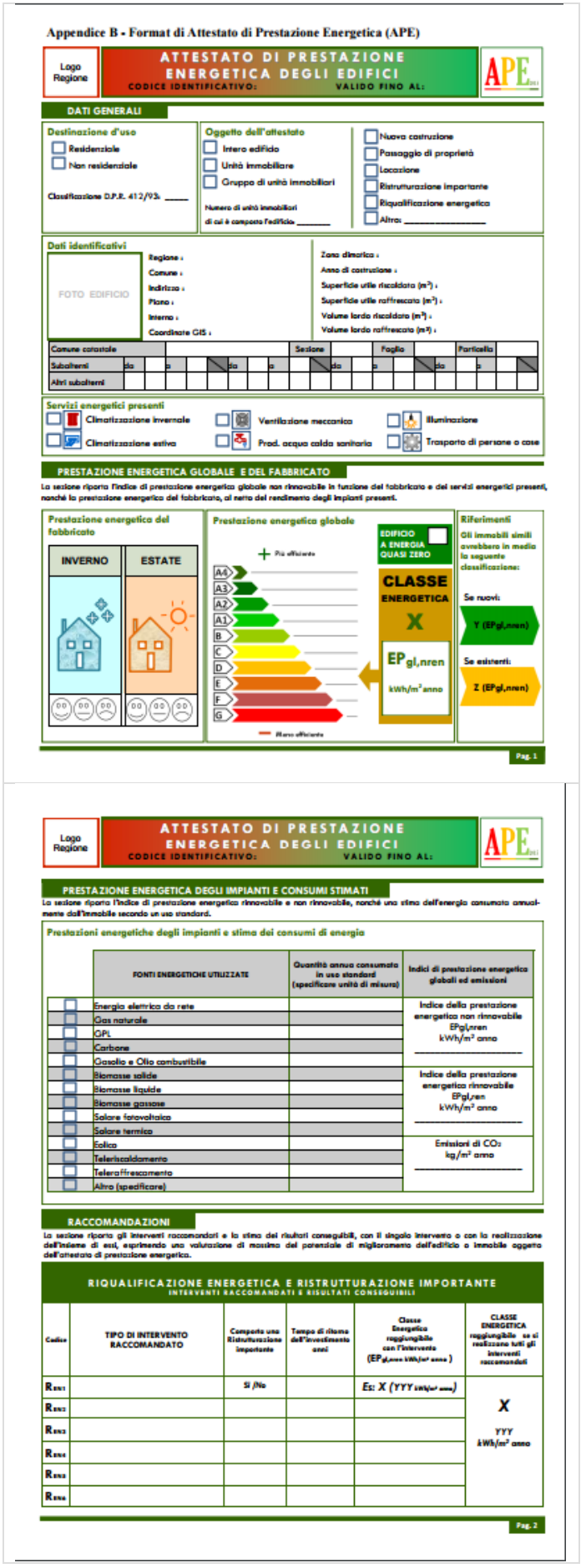

*Figure 2. 'Italia in classe A' ENEA web channel.*

To fill the knowledge gap and complement competences in energy efficiency, the Italian Agency of Territorial Cohesion has been funding ENEA's project ES-PA (Energy and Sustainability for Public Administrations) in the 2018-2023 period, which aims to provide free tools and guidelines that support public administrations in developing and implementing their energy and environmental policies.

## 2.III. Energy performance certificate requirements

Decree 2015, 'EPC guidelines', introduced a new EPC system that is harmonised across the national territory and a new layout which is standardised and unique for residential, commercial and public buildings.

The new EPC layout (Figure 3) is more user-friendly and provides more useful information; it shows the performance of the envelope, both in winter and summer time, and the performance of single energy services. Additionally, it displays energy sources used, allows for comparison of the overall performance with similar units/buildings (new and existing) and clearly indicates if the NZEB standard has been attained. A new energy rating system has been established based on energy performance expressed in non-renewable primary energy $EP_{gl,nren}$, through comparisons with ten (10) fixed energy classes (from G to A4).



Appendice B - Format di Attestato di Prestazione Energetica (APE)

Logo Regione

ATTESTATO DI PRESTAZIONE ENERGETICA DEGLI EDIFICI

CODICE IDENTIFICATIVO: VALIDO FINO AL:

APE

DATI GENERALI

Destinazione d'uso
- Residenziale
- Non residenziale

Classificazione D.P.R. 412/93: ____

Oggetto dell'attestato
- Intero edificio
- Unità immobiliare
- Gruppo di unità immobiliari

Numero di unità immobiliari di cui è composto l'edificio: ____

- Nuova costruzione
- Passaggio di proprietà
- Locazione
- Ristrutturazione importante
- Riqualificazione energetica
- Altro: ____

Dati identificativi

FOTO EDIFICIO

Regione:
Comune:
Indirizzo:
Piano:
Interno:
Coordinate GIS:

Zona climatica:
Anno di costruzione:
Superficie utile riscaldata (m²):
Superficie utile raffrescata (m²):
Volume lordo riscaldato (m³):
Volume lordo raffrescato (m³):

| Comune catastale | | Sezione | | Foglio | | Particella | |
|---|---|---|---|---|---|---|---|
| Subalterni | da / a | | da / a | | da / a | | da / a |
| Altri subalterni | | | | | | | |

Servizi energetici presenti
- Climatizzazione invernale
- Climatizzazione estiva
- Ventilazione meccanica
- Prod. acqua calda sanitaria
- Illuminazione
- Trasporto di persone o cose

PRESTAZIONE ENERGETICA GLOBALE E DEL FABBRICATO

La sezione riporta l'indice di prestazione energetica globale non rinnovabile in funzione del fabbricato e dei servizi energetici presenti, nonché la prestazione energetica del fabbricato, al netto del rendimento degli impianti presenti.

Prestazione energetica del fabbricato

INVERNO | ESTATE

Prestazione energetica globale

Più efficiente

A4 A3 A2 A1 B C D E F G

Meno efficiente

EDIFICIO A ENERGIA QUASI ZERO

CLASSE ENERGETICA X

EPgl,nren kWh/m²anno

Riferimenti

Gli immobili simili avrebbero in media la seguente classificazione:

Se nuovi: Y (EPgl,nren)

Se esistenti: Z (EPgl,nren)

Pag. 1

Logo Regione

ATTESTATO DI PRESTAZIONE ENERGETICA DEGLI EDIFICI

CODICE IDENTIFICATIVO: VALIDO FINO AL:

APE

PRESTAZIONE ENERGETICA DEGLI IMPIANTI E CONSUMI STIMATI

La sezione riporta l'indice di prestazione energetica rinnovabile e non rinnovabile, nonché una stima dell'energia consumata annualmente dall'immobile secondo un uso standard.

Prestazioni energetiche degli impianti e stima dei consumi di energia

| | FONTI ENERGETICHE UTILIZZATE | Quantità annua consumata in uso standard (specificare unità di misura) | Indici di prestazione energetica globali ed emissioni |
|---|---|---|---|
| ☐ | Energia elettrica da rete | | Indice della prestazione energetica non rinnovabile EPgl,nren kWh/m² anno ____ |
| ☐ | Gas naturale | | |
| ☐ | GPL | | |
| ☐ | Carbone | | |
| ☐ | Gasolio e Olio combustibile | | |
| ☐ | Biomasse solide | | Indice della prestazione energetica rinnovabile EPgl,ren kWh/m² anno ____ |
| ☐ | Biomasse liquide | | |
| ☐ | Biomasse gassose | | |
| ☐ | Solare fotovoltaico | | |
| ☐ | Solare termico | | |
| ☐ | Eolico | | Emissioni di $CO_2$ kg/m² anno ____ |
| ☐ | Teleriscaldamento | | |
| ☐ | Teleraffrescamento | | |
| ☐ | Altro (specificare) | | |

RACCOMANDAZIONI

La sezione riporta gli interventi raccomandati e la stima dei risultati conseguibili, con il singolo intervento o con la realizzazione dell'insieme di essi, esprimendo una valutazione di massima del potenziale di miglioramento dell'edificio o immobile oggetto dell'attestato di prestazione energetica.

RIQUALIFICAZIONE ENERGETICA E RISTRUTTURAZIONE IMPORTANTE

INTERVENTI RACCOMANDATI E RISULTATI CONSEGUIBILI

| Codice | TIPO DI INTERVENTO RACCOMANDATO | Comporta una Ristrutturazione importante | Tempo di ritorno dell'investimento anni | Classe Energetica raggiungibile con l'intervento (EPgl,nren kWh/m² anno) | CLASSE ENERGETICA raggiungibile se si realizzano tutti gli interventi raccomandati |
|---|---|---|---|---|---|
| $R_{EN1}$ | | SI /No | | Es: X (YYY kWh/m² anno) | X YYY kWh/m² anno |
| $R_{EN2}$ | | | | | |
| $R_{EN3}$ | | | | | |
| $R_{EN4}$ | | | | | |
| $R_{EN5}$ | | | | | |
| $R_{EN6}$ | | | | | |

Pag. 2

*Figure 3. National EPC layout from October 2015, first and second pages.*

Better quality is achieved through a mandatory visit of the unit/building before issuing the EPC, while better knowledge of the technical building system is achieved through a link to the heating and AC (HAC) inspection database. An EPC is valid only if the 'HAC log-book' from regular inspections is attached.

Recommendations for improvements are mandatory with evidence of payback periods and class/performance, achievable through measures carried out in connection with major renovations, and measures for individual building elements or technical building system(s). The expert will report on the feasibility of recommended measures and their cost-effectiveness, together with calculations and verifications certifying compliance of the new or renovated building with the standards. The report is not mandatory for minor measures (e.g., replacement of boilers with power <50kW or replacement of a traditional boiler with condensing boilers).

According to Presidential Decree 75/2013[13], the EPC experts have to be qualified for building design (registered at engineers/architects/other experts' associations) or attend a training course (80 hours) in which they undergo final examinations. Wider use of databases has been experienced in some regions, opening the way for energy planning, insight from local authorities and studies from agencies and academia. In Lombardy, access to the EPC database (CENED[14]) is completely open, allowing useful utilisations by industry leaders and investors.

As of 2020, all regions and provinces have established an EPC database. Moreover, the new national information system (SIAPE[15]) assists regional EPC data analysis and supports knowledge and decision making at the national level.

SIAPE allows the connection between national, regional and provincial registers. At the end of 2020, seven regions and two autonomous provinces have started to export data from their register to the SIAPE and another eight regions have requested access credentials.

The information system allows the collection of data relating to the energy consumption of public and private buildings, measured or calculated, for which an EPC has been issued.

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

Currently, it is mandatory to draw up the EPC in the cases of sale, rental and transfer of the property (except in the case of leasing a single real estate unit). The transposition of Directive 844/2018, DL 48/2020, made it mandatory to include the EPC with the contract. Fines set at the national level range between 3,000 € and 18,000 €. Regions and autonomous provinces are in charge of control.

Since January 2012, it is mandatory to display the EPC rate in the commercial announcements of real estate agencies and, since October 2015, it is mandatory to display a plaque reporting the non-renewable and renewable energy performance index in terms of primary energy, the energy class and the envelope transmission performance (Figure 4). Fines range between 500 € and 3,000 € for people responsible of defaulting announcements.

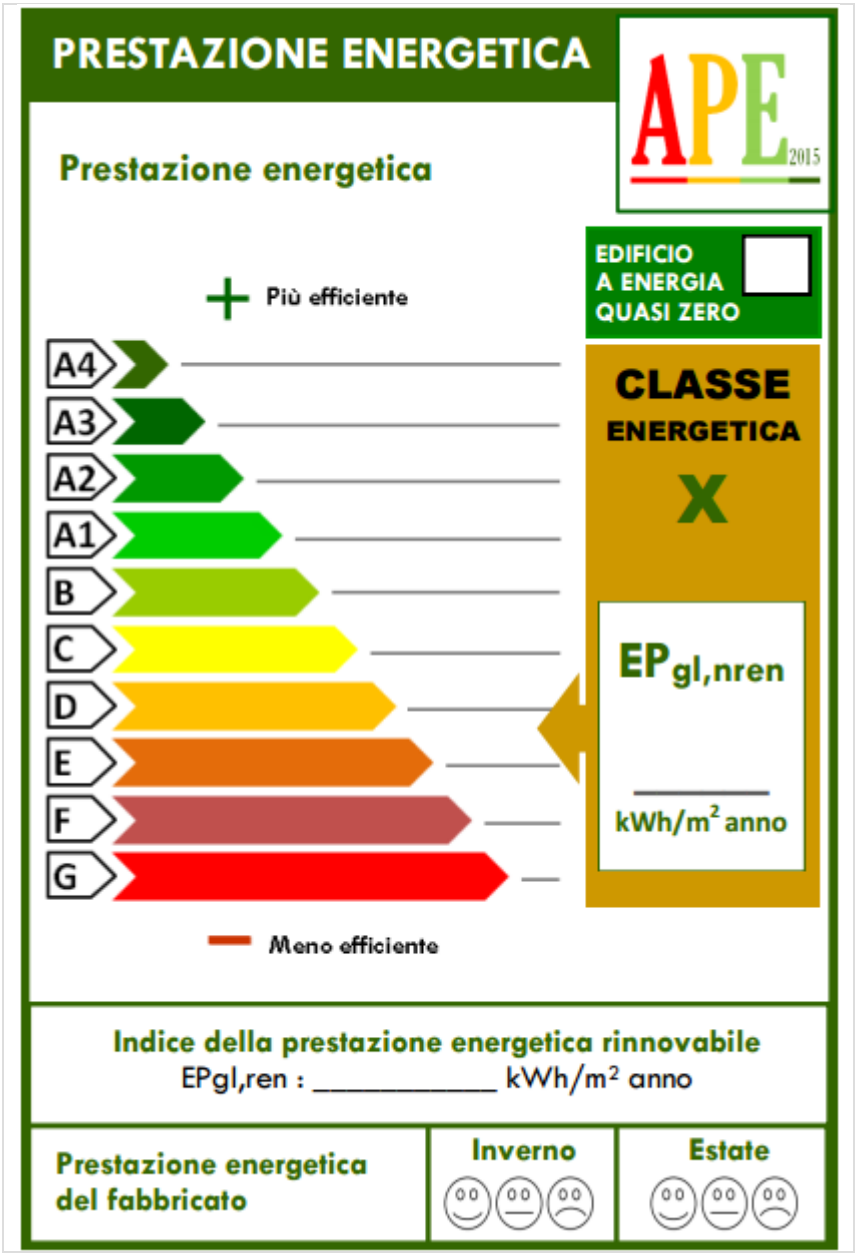



*Figure 4. Plaque in commercial advertisements from October 2015.*

## *2.III.ii. Quality Assurance of EPCs*

Regions and autonomous provinces are responsible for the quality assurance of the EPCs. Some of them have started performing compliance checks on EPC reports, in numbers of a few hundred controls per year.

The national legislation requires 2% of all EPCs to be annually checked, starting from best classes. The regions may choose to bypass and/or adjust this rate following an analysis of reports, and to perform on-site checks only when strictly necessary.

The penalties applied by regions range from 300 € to a maximum of 10,000 €, according to the infringement. There is a gradual tolerance of errors depending on the number, type and repetition rate, as the system objective is to improve the quality of EPCs, considered quite low at present. The transposition of Directive 844/2018 introduced further quality checks on EPCs to increase the effectiveness of certificates themselves as well as the building stock analysis based on EPC register data. In the case of fraud, the penalty may have more severe legal consequences.

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

Buildings occupied by public authorities and frequently visited by the public, with a total useful floor area over 250 $m^2$, must display an EPC, with the energy class displayed outside the building.

Monitoring the display of EPCs in buildings occupied by public authorities and frequently visited by the public, with a total useful floor area over 500 $m^2$ and 250 $m^2$ respectively, has not been implemented in Italian regions so far. This is still to be fully covered by the national legislation.

## 2.IV. Smart buildings and building systems

### *2.IV.i. Status and plans on smart buildings*

There is no specific definition of 'smart buildings' in the Italian legislation. However, the Ministry of Economic Development entrusted ENEA with a research project aimed at defining a 'smart building'. The project investigates different aspects, namely: innovative solutions for building renovations focusing on monitoring and control of technical building systems; optimisation of thermal grids for energy distribution; green technologies for building renovation (green walls, RES for greenhouses); and development of building energy management systems.

Italy will transpose the new indicator into its national laws after the European Commission publishes the delegated act to supplement Directive 844/2018/EU, which establishes the definition of the Smart Readiness Indicator and the methodology by which it is to be calculated.

### *2.IV.ii. Regulation of system performance*

In compliance with Directive 844/2018/EU, the Italian law introduced the definition of technical building systems.

The Italian regulation on building energy renovation defines the specific requirements for technical building systems depending on the type of renovation (Decree of 26.06.2015).

For all renovations:

- Specific energy efficiency requirements in case of micro- combined heat and power system (CHP);
- For heating systems >35 kW it is mandatory to provide the technical building system with a counter for domestic hot water and heating systems refilled with water, and this data must be reported in the heating plant log-book.

For new (or first-level major renovation) buildings:

- Buildings must have a prearrangement for a possible connection to district heating and cooling networks which are closer than 1 km from the designed building or, if the district heating and cooling networks are delineated, in approved plans and closer than 1 km. Otherwise, the chosen solution has to be justified;
- Heating plants must be provided with automatic regulation of room temperature;
- The mean efficiencies of the technical building systems for heating (ηH), cooling (ηC) and domestic hot water (ηC) are verified as higher than those calculated for the reference building.

For energy renovation, it is mandatory for the heating plant to have thermostatic valves or an alternative room temperature regulation system installed, and energy audits must take some options into account, e.g., condensation boilers, heating pumps, integration of solar thermal plants, cogeneration systems and district heating for efficient grids.

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

Under current legislation, in case of new buildings or buildings undergoing major renovation, it is mandatory for the non-residential sector to satisfy a minimum level of automation for building control, regulation, and management (UNI EN 15232-1, Table 5, Class B).

In case of technical building system renovation, the energy audit must take into account the possibility to apply a minimum level of automation for building control, regulation, and management (UNI EN 15232-1, Table 5, Class B).

Italian incentives for building stock renovation also aim to promote the installation of BACs.

According to Directive 844/2018/EU, Italian law introduced the definition of BACs and made it mandatory to install BACs for heating plants with nominal heat output over 290 kW by 25 January 2025 if technically and economically feasible for non-residential buildings.

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

Smart meters are regulated by Article 9 of Legislative Decree 102/2014 (EED 1$^{st}$ transposition). In Italy, the roll-out of the 'first generation' of electricity smart meters started in 2006 and was completed in 2011. ENEL, the main Italian distribution system operator, has installed 32 million smart meters in Italy.

The Italian Regulatory Authority has set standards for 'second-generation' (2G) smart meters for electricity, gas and water (Deliberation 87/2016). The 2G devices are rich in advanced features that allow consumers to have significant advantages by enabling the use of home automation systems.

The replacement of smart meters with new ones has started in 2018 and is expected to be completed in 2024.

The installation of smart meters is financed through a small annual contribution from gas bills, and they will measure gas, water and electricity consumption and, in some cases, other services such as distributed heating, public lighting and waste collection.

Since 2018, the White Certificates incentive mechanism added a new eligible action called 'behavioural measures', aimed at supporting smart devices which make the end user able to analyse energy consumption data, to be warned against strange energy consumption values, and to manage technical building systems in an efficient way.

For new buildings or first-level major renovation of buildings (Decree of 26.06.2015), smart metering devices of energy consumption are mandatory and, in case of centralised heating, it is mandatory to install devices able to count heating, cooling and domestic hot water.

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

Italy adopted regular inspections for both heating and cooling technical building systems.

The responsibility for inspections of heating systems is being transferred from provinces and main cities to regions. The template for heating systems inspections was improved in 2015. The large majority of inspections will be based on document control, and only 2% will consist of on-site checks. Designers of new heating systems and energy distributors are obliged to provide to the region documentation of both new heating systems and grid connected clients; this facilitates control of the compulsory maintenance of the systems by the users. Regions are also responsible for the selection and qualification of the inspectors and for the organisation of annual campaigns for compliance control of inspection reports.

To comply with Directive 844/2018/EU, a new decree to modify the regulation of control and inspections of heating systems (including the skills requirements of technical experts) is planned.

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

The approach followed for inspections of heating systems has also been applied to cooling systems. Regular maintenance of AC systems larger than 12 kW is compulsory and a template has been defined for the compulsory report to be completed by the maintenance staff. Regions are responsible for control of those reports, both through a document analysis and through on-site checks.

Inspectors in charge of this compliance control have to be qualified and certified (at regional level, but equivalences are established nationally), and are contracted by public tenders (if the inspection is performed by a private person or a company) or identified by an agreement (in case of a public organisation).

According to Directive 844/2018/EU, a new decree to modify the regulation of control and inspections of AC systems (including the skills requirements of technical experts) is planned.

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

### Enforcement and penalties

The enforcement of maintenance established penalties for users in terms of payment of the control(s) and fines. Sanctions for the inspection reports consist of suspension or removal of inspectors from the register.

### Quality control of inspection reports

The national register of thermal plants is in progress and in the next years it is expected to hold all data for all regions and autonomous provinces, including the quality control of inspection reports. In the meantime, it is difficult to collect all data, as inspection activities fall under the responsibility of single provinces; thus, data is not centralised.

### Impact assessment

To date, no assessment study of the impact of technical building systems inspections has been carried out.

# 3. A success story in EPBD implementation

An online National Platform (NP) for building energy performance will be developed to comply with the transposition of Directive 844/2018/EU.

The NP has the scope to provide citizens, public administrations and enterprises with information concerning building energy performances, cost-effectiveness, maintenance works to improve building energy efficiency, available incentives, EPCs, etc.

In particular, the NP should be able to make the following available: a building energy map; an overview of potential non-compliance with energy regulations; an evaluation of the potential improvement of the energy efficiency; a selection of the retrofit priorities including a step-by-step renovation strategy; a selection of the most appropriate incentives; and a training path for professionals. For public administrations, the NP should also be able to address the most appropriate incentives and contract models, taking into account the energy performance contracts.

The portal will be designed to provide public and private building owners with all the data available concerning their dwelling characteristics, including energy profile, aimed at creating an advanced visual interface for a high degree of usability.

The NP will also provide the Ministry of Economic Development with valuable technical support and useful information for monitoring national targets and for the development of strategies and promotion programmes for energy efficiency in buildings.

Furthermore, the portal will be able to provide data and processing carried out through periodic reports for statistical and study purposes.

# 4. Conclusions, future plans

The NECP attributed more than 50% of the non-ETS energy savings goal to the civil sector, which was needed to achieve the national energy efficiency target of 2030 (9.3 Mtoe/year). In order to achieve the NECP target and the carbon neutrality of the civil sector, it is necessary to promote the rapid energy conversion of the building stock in terms of deep renovation, integrating the concept of energy efficiency with safe buildings (seismic adaptation). To decrease $CO_2$ emissions from the building stock, the Italian government strengthened national incentives (2.ii.v) and provided Italy with new instruments, also thanks to the Decree 10.06.2020 n. 48 provisions:

- a building digital platform, to deliver detailed knowledge of the building stock. The platform integrates different databases that collect the fragmented information on buildings (see paragraph 3);
- development of new requirements and new regulations to promote the installation of charging points for electric vehicles, integrated within buildings;
- a revision of inspections regulations to promote the automatic controls of advanced technical building systems.

The new national Information System for EPC (SIAPE) has been established at the national level, while the creation of a national Information System for technical building systems is still in progress.

According to the new EPBD provisions, the calculation methodology and the energy performance requirements of buildings are planned to be updated with the integration of the infrastructure for electric mobility in new and renovated buildings as well as with provisions relating to the replacement of technical building installations and the introduction of buildings' 'Smart Readiness Indicator'.

Two new decrees are planned to modify the regulation of control and inspections of heating systems and of AC systems (including skills requirements of technical experts), respectively.

The new LTRS of the national building stock is being defined with the aim of obtaining a decarbonised and energy-efficient building stock by 2050 and to reach a building renovation rate of almost 3%.

# Endnotes

1. DECRETO LEGISLATIVO 19 agosto 2005, n. 192 Attuazione della direttiva 2002/91/CE relativa al rendimento energetico nell'edilizia
2. DECRETO LEGISLATIVO 29 dicembre 2006, n. 311 Disposizioni correttive ed integrative al decreto legislativo 19 agosto 2005, n. 192, recante attuazione della direttiva 2002/91/CE
3. LEGGE 3 agosto 2013, n. 90. Conversione in legge, con modificazioni, del decreto-legge 4 giugno 2013, n. 63, recante disposizioni urgenti per il recepimento della Direttiva 2010/31/UE del Parlamento europeo e del Consiglio del 19 maggio 2010, sulla prestazione energetica nell'edilizia
4. Decreto interministeriale 26 giugno 2015 – 'Applicazione delle metodologie di calcolo delle prestazioni energetiche e definizione delle prescrizioni e dei requisiti minimi degli edifici'
   Decreto interministeriale 26 giugno 2015 – 'Adeguamento linee guida nazionali per la certificazione energetica degli edifici'
   Decreto interministeriale 26 giugno 2015 – 'Schemi e modalità di riferimento per la compilazione della relazione tecnica di progetto ai fini dell'applicazione delle prescrizioni e dei requisiti minimi di prestazione energetica negli edifici'
5. Reference standards for EP calculation UNI/TS 11300
   The reference building is defined as a virtual building which has the same localisation and is geometrically equivalent to that considered in the project, but with thermo-physical characteristics corresponding to the minimum energy requirements in force.
   Fixed RES use for new buildings as a ratio for domestic hot water, heating and cooling services and the obligation to install mandatory RES plants for electricity production are set in RESD implementation Decree 28/2011.
6. Decreto interministeriale 19 giugno 2017 – 'Piano per l'incremento degli edifici a energia quasi zero (PANZEB)'.
7. LEGGE 13 luglio 2015, n. 107. Riforma del sistema nazionale di istruzione e formazione e delega per il riordino delle disposizioni legislative vigenti.
8. According to the aforementioned Decree 26.06.2015 'Minimum Requirements' (see note 4)
9. 'Programma di riqualificazione energetica della Pubblica Amministrazione centrale' (PREPAC). The Ministry of the Environment and of the Ministry of Economic Development, supported by ENEA, Italian National Agency for New Technologies, Energy and Sustainable Development and GSE, coordinate and monitor the development of the programme.
10. DECRETO LEGISLATIVO 14 LUGLIO 2020 n.73 – 'Attuazione della direttiva (UE) 2018/2002 che modifica la direttiva 2012/27/UE sull'efficienza energetica'
11. DPR 16 aprile 2013, n. 75 'Regolamento recante disciplina dei criteri di accreditamento per assicurare la qualificazione e l'indipendenza degli esperti e degli organismi a cui affidare la certificazione energetica degli edifici…'
12. Energy Cadastre of Lombardy Region, CEER. The website www.cened.it/opendata_cenedplus2 allows users to display and download the whole dataset of EPCs: building unit location, energy performance index, energy rating, geometry, technical building systems using fossil fuels and RES.
13. 'Sistema Informativo sugli Attestati di Prestazione Energetica' (SIAPE), set by the Decree of 26 June 2015 'Guidelines for Energy Performance Certification' and managed by ENEA, (www.efficienzaenergetica.enea.it/regioni/siape)

# 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) | Buildings owned by the state, the regions, by local authorities or other public bodies used for the owner's activities or other activities, including dwelling | (Decree 192/2005 EPBD implementation) |
| 01.02 | Definition of public buildings used by the public (according to article 13) | No related definition set | No definition corresponding to Art.13 EPBD, since the definition in Presidential Decree 412/93 and Decree 192/2005 EPBD implementation is: *'Building where the institution activity of public bodies is carried out'* |
| 01.03 | Number of residential buildings | 12,420,403 | Source: CRESME 2018 + Draft LTRS |
| 01.04 | Number of non-residential buildings | 1,576,159 | Source: ISTAT Census 2011 |
| 01.05 | If possible, share of public buildings included in the number given in 01.04 | 5.4% | Only for schools, offices, hospital facilities and prisons (the figure could be underestimated) Source: CRESME 2018 + Draft LTRS |
| 01.06 | If possible, share of commercial buildings included in the number given in 01.04 | 16% | CRESME 2018 + National Trade Observatory 2018 |
| 01.07 | Number of buildings constructed per year (estimate) | Not available. Building permits for 2018: $17.36 \times 10^6$ m$^2$ | ISTAT, Building Permits 2020 |
| 01.08 | If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07) | Not available. Building permits for 2018: $4.73 \times 10^6$ m$^2$ | ISTAT, Building Permits 2020 |
| 01.09 | If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07) | Not available. Building permits for 2018: $12.63 \times 10^6$ m$^2$ | ISTAT, Building Permits 2020 |
| 01.10 | Useful floor area of buildings constructed per year in million square meters (estimate) | 17,365,028 m$^2$ | ISTAT, Building Permits 2020 |

## 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 | Overall value expressed in total primary energy and calculated with the reference building approach | $CO_2$ are reported on EPC for information |
| 02.02 | Requirements for energy performance of residential buildings in current building code | Better energy indexes (listed below) than the corresponding values of the "**reference building" 2015 (new values from 2021):**<br>• Global $EP_{gl}$ index [kWh/m$^2$] (heating, cooling, hot water, ventilation services)<br>• Specific energy needs for heating and cooling<br>• Efficiencies of the technical systems ($h_H$, $h_C$, $h_W$, $h_V$)<br>**Additional limits** for the building envelope:<br>• H'T Transmission heat transfer coefficient<br>• Summer effective solar area<br>• Mass of external walls (or, alternatively, their periodical transmittance)<br>• U-values of inter-building walls/floors<br>**RES integration (+10% for public buildings)**<br>• 50% share for heating, cooling and domestic hot water<br>• 50% share only for domestic hot water<br>• Electric power installed per building footprint unit surface [kW/m$^2$]: 0.02<br>In the case the required RES integration should not be feasible, the building has to respect a proportionally lower $EP_{gl}$ limit value | • Minimum requirements are defined according to the 'reference building', being a virtual building which has the same localisation and is geometrically equivalent to that considered in the project, but with thermo-physical characteristics corresponding to the minimum energy requirements in force.<br>• EP indices are expressed in non-renewable and in total primary energy [kWh/m$^2$].<br>• Energy parameters of the reference building are listed in Tables 2 and 3 of the Italian Country Report 2020.<br>• Summer effective solar area limits are illustrated in Table 5 of the Italian Country Report 2020.<br>• $H'_T$ limits are illustrated in Table 4 of the Italian Country Report 2020. |
| 02.03 | Requirements for energy performance of non-residential commercial buildings in current building code | Same as 02.02 (residential) but also considering EP indices for lighting, lifts and escalators. | Same as comment in 02.01 |
| 02.04 | Requirements for energy performance of non-residential public buildings in current building code | Same as 02.03. | |

| no | Key Implementation Decision – New Buildings | Description / value / response | Comments |
|---|---|---|---|
| 02.05 | Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation? | Yes | In Decree 26.06.2015 'Application of methodologies for calculating energy performance and defining the minimum requirements and provisions of buildings' |
| 02.06 | Nearly zero energy (NZEB) level for residential buildings (level for building code) | (new or existing) NZEBs must respect all the requirements included in Decree 26.06.2015 'Minimum Requirements', with the limit values defined for the reference building 2019/2021 and the RES requirements included in Decree 3.3.2011 n. 28 (i.e., 50% of the energy used for heating, cooling, ventilation and domestic hot water).<br>See 02.02 | |
| 02.07 | Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04) | January 2021 for all new and majorly renovated buildings | |
| 02.08 | Nearly zero energy (NZEB) level for all non-residential buildings (level for building code) | Same as 02.06 (residential) but also considering EP indices for lighting, lifts and escalators. | |
| 02.09 | Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06) | January 2019 for public buildings<br>January 2021 for private buildings | |
| 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? | Yes, Part of overall requirement:<br>See 02.02 | Part as set in Renewable Energy Sources Directive RES-D implementation Decree N. 28/2011 (http://www.acs.enea.it/doc/dlgs_28-2011.pdf |
| 02.12 | If renewable energy is an additional requirement to NZEB, please indicate level | | |
| 02.13 | Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates | Depending on the destination of the building:<br>• internal temperature and humidity<br>• minimum ventilation rates<br>• domestic hot water temperature<br>• minimum lighting levels (for non-residential buildings) | |

## Key Implementation Decision – Existing Buildings

| no | Key Implementation Decision – Existing Buildings | Description / value / response | Comment |
|---|---|---|---|
| 03.01 | Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation? | Yes | In Decree 26.06.2015 'Minimum requirements' |
| 03.02 | Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings? | Yes | |
| 03.03 | Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings) | Identical to new buildings: see 02.06 | |
| 03.04 | Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings) | Identical to new buildings: see 02.08 | |
| 03.05 | Overall minimum requirements in case of major-renovation | According to decree 26.06.2015, the requirements in case of major renovation are structured as follows:<br>**First-level major renovation**: same requirements as new buildings (see 02.02)<br>**Second-level major renovation:**<br>• U-value of the concerned surfaces lower than the limit values<br>• H'T mean transmission heat transfer coefficient of refurbished building elements lower that the limit value.<br>• Mean efficiencies of renovated technical systems higher than reference values. | **First- and second**-level major renovations are defined as follows:<br>First-level major renovation: 'refurbishment of at least 50% of the envelope and renovation of the heating and/or cooling plant of the entire building'.<br>Second-level major renovation: 'refurbishment of at least 25% of the external surfaces of the building with or without renovation of the heating and/or cooling plant'.<br>For U limit values - see Table 6<br>For H'T limit values – see Table 4<br>For mean efficiencies limit values - see Table 3 |
| 03.06 | Minimum requirements for individual building parts in case of renovation | In case of **minor renovation:**<br>• U-value of the concerned surfaces lower than the limit values<br>• Mean efficiencies of renovated technical building systems higher than reference values. | **Minor renovation** is defined a 'refurbishment of less than 25% of the external surfaces of the building and/or modification of the heating and/or cooling plants'.<br>For U limit values - see Table 6<br>For mean efficiencies limit values - see Table 3 |
| 03.07 | National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings) | Target 2030:<br>• 0.8% for residential sector<br>• 4% for tertiary sector<br>Target 2050:<br>• 1.2% for residential sector<br>• 3.7% for tertiary sector | Annual deep renovation rate to achieve the savings objectives to 2030 and 2050 - NECP<br>(these targets are currently being discussed within the framework of the approval of the STREPIN) |

| no | Key Implementation Decision – Existing Buildings | Description / value / response | Comment |
|---|---|---|---|
| 03.08 | National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years) | 0.33 Mtoe / year of final energy for residential sector<br>0.24 Mtoe / year of final energy for the tertiary sector | Reduction Targets - NECP Scenario 2020-2030 |

## Key Implementation Decision - Energy Performance Certificates

| no | Key Implementation Decision – Energy Performance Certificates | Description / value / response | Comment |
|---|---|---|---|
| 04.01 | Number of energy performance certificates per year (for instance average or values for of 3-5 years) | 2019: around 1.1 $x10^6$<br>2016-2018: on average 1.22 $x10^6$ for year<br>2015: around 1.4$x10^6$<br>2014: 1.26$x10^6$<br>2013: 0.42$x10^6$ (+50% compared to the previous year) | Source: ENEA Estimate (2015, 2020) and CTI (2013, 2014)<br>For 2016 and 2017 estimates were made because the data is incomplete. Numbers look very different in years 2013-2015 and the average is not meaningful. |
| 04.02 | Number of EPCs since start of scheme | Over 9.9 $x10^6$ | ENEA estimate based on an inquiry in sample regions and on SIAPE data<br>Start of the certification system at different times in the various regions (from 2007 onwards) |
| 04.03 | Number of EPCs for different building types | 4,538,983 | 2016-2019 period |
| 04.04 | Number of assessors | Data not available for the whole national territory | More than 101,000 in the ten (10) regions with a list of accredited experts (2019, CTI)<br>(Italian regions/autonomous provinces are 21) |
| 04.05 | Basic education requirements for assessors | Registered experts (architect, engineer, industrial technical expert, surveyor) or, in the case of different degrees or diplomas, attendance of an 80-hour course with final examinations. Accreditation is provided by regions. | Independent expert national requirements set in the Presidential Decree n. 75/2013<br>The expert must not have any relationship with the client, the designer, the installer or the manufacturers of products used in the construction. |
| 04.06 | Additional training demands for assessors | Some regions (ten (10) regions/provinces) have set lists of regionally accredited experts and/or periodically establish additional training demands to the national requirements such as course programmes, procedure of accreditation or long-life training. | Requirements vary and are being updated continuously at regional level and in time. |
| 04.07 | Quality assurance system | Regions are responsible for quality assurance of the EPCs. Some regions have started to perform compliance controls (a few hundred per year)<br>2% of EPCs have to be checked per year.<br>Penalties: 300 €-10,000 € | Twelve (12) up 21 regions established |
| 04.08 | National database for EPCs | Partly; established in 2016, collection of data started in 2017 | The SIAPE – National Information System of EPCs, collecting EPC data from regions, has been established in 2016 according to 2015 'EPC Guidelines Decree'. Twenty (20) regions/ autonomous provinces out of 21 are able to send digital EPC data (xml format) since February 2020 |
| 04.09 | Link to national information on EPCs / Database | | https://siape.enea.it/ |

## 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? | Yes<br>Thermal account, tax deductions and White Certificates | |
| 05.03 | Are there currently specific requirements for technical building systems (for instance in building codes)? | Yes<br>See 2.IV.ii | |
| 05.04 | Are there current requirements for automatics (for instance in building codes)? | Yes<br>See 2.IV.iii | |
| 05.05 | Chosen option A or B for heating systems (inspection or other measures) | A | |
| 05.06 | Number of heating inspections; reports per year (if option A) | Not available | Responsibility lies with regions/ autonomous provinces<br>A lower rate compared to 2014 (previous CA reporting period) due to the new scheme of logbook and inspection report |
| 05.07 | Chosen option A or B for cooling systems (inspection or other measures) | A | |
| 05.08 | Number of air-conditioning / cooling system inspections; reports per year (if option A) | Not available | Responsibility lies with regions/ autonomous provinces |
| 05.09 | Is there a national database for heating inspections? | Partly | The National database for EPCs (see 04.01) will gather data from regional databases for heating inspection through a national harmonised routine (XML file) |
| 05.10 | Is there a national database for cooling / air-conditioning inspections? | Partly | The National database for EPCs (see 04.01) will gather data from regional databases for cooling / AC inspections through a national harmonised routine (XML file) |
| 05.11 | Are inspection databases combined with EPC databases for registration of EPCs and inspection reports? | Yes | By means of the ID number of technical building systems in the regional database |
| 05.12 | Link to national information on Inspection / Database | Not available | Responsibility lies with regions/ autonomous provinces |

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