An Evaluation Methodology for the Feasibility Analysis of Energy Retrofit Investments

Francesco Tajani[1], Pierluigi Morano[2], Felicia Di Liddo[2], Endriol Doko[3](✉), and Carmelo Maria Torre[2]

[1] Department of Architecture and Design, "Sapienza" University of Rome, 00196 Rome, Italy
[2] Department of Civil, Environmental, Land, Building Engineering and Chemistry (DICATECh), Polytechnic University of Bari, 70126 Bari, Italy
[3] Department of Civil and Environmental Engineering (DICA), Polytechnic of Milan, 20133 Milan, Italy
endriol.doko@polimi.it

Abstract. Since the current need to renovate the existing residential asset, especially in Italy numerous fiscal measures have been promoted in order to encourage the buildings energy improvement initiatives. Among the incentive policies for the energy requalification, the Italian "Relaunch" Law Decree No. 34/2020 has introduced a fiscal deduction equal to 110% (so-called "Superbonus") that constitutes a relevant financing measure able to support property owners in activating energy retrofit operations. With reference to the issue outlined, the present research aims to develop a methodology for the economic benefits evaluation, by considering the convenience of the subjects involved associated to the energy upgrade interventions using the Superbonus mechanism. The methodology provides for five phases and it is applied with reference to the residential sector and to the three main urban areas into which the Italian city of Bari is divided (central, semicentral and peripheral).

For each urban area, the market value differential between the post-energy intervention situation and ante-energy intervention one is determined, by considering the case "with" the Superbonus incentive and that "without" it. The methodology proposed could represent a valid tool to support the private operators in the determination of the urban areas or, in a more general terms, the cities for which a higher convenience in energy efficiency investments is detected.

Keywords: Energy retrofit · Fiscal incentives · Energy performance · Residential asset · Superbonus · Economic benefits

1 Introduction

The reduction of energy consumption and waste has assumed increasing importance for the European Union (EU): already in 2007, the Union leaders have set a target of decreasing the EU's annual energy consumption by 20% by 2020 [9]. In 2018, a new goal has been defined as part of the 'Clean Energy Package for all Europeans' to limit the energy use at least 32.5% by 2030 [12].

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During the last decades, energy efficiency measures have been increasingly recognized as a tool for i) achieving a sustainable energy supply, ii) reducing green-house gas emissions, iii) improving supply security, iv) reducing the imports costs, v) promoting the EU competitiveness [2].

Within the EU Directive 2018/844 on the energy performance of buildings - so-called EPBD Directive -, all European countries are required to submit to the Commission a long-term renovation strategy in which specific plans for the national building stock refurbishment by 2050 are included [8].

In the context of the National Energy and Climate Plans (NECPs) that determine the national contributions of each Member State towards the binding EU energy-climate targets, over a period of ten-years, the foreseen energy–climate measures and policies to be implemented over this period to reach the proposed national goals are described [6, 10, 14, 29].

With reference to the Italian territory, the Integrated National Plan for Energy and Climate 2030 represents the fundamental tool for improving the country's energy and environmental policy towards decarbonisation. The plan is structured in five action lines, which will develop in an integrated manner: from decarbonisation to energy efficiency and security, passing through the internal energy market, research, innovation and competitiveness development [7, 24].

According to the energy efficiency goals, the strategy for the energy retrofit of the national property assets provides for a saving equal to 9.3 Mtoe/year of final energy by 2030, of which 60% relates to the civil sector [23].

The expected savings could be achieved thanks to new materials and technologies introduction, new construction standards adoption, the building envelope improvement interventions definition and greater diffusion of renewable energy sources. In this sense, the EU Recommendation 2019/786 related to the existing buildings renovation, taking over the EU Energy Efficiency Directive 2012/27, indicates as deep renovations those that involve a modernization able to reduce the building energy consumption by a significant percentage compared to the levels before the interventions, by promoting a very high energy performance [9, 13].

In Italy, the concept of major restructuring has been defined according to the Law 90/2013 and the Ministerial Decree of 26/06/2015 (Minimum Requirements), in which the classification of interventions has been specified - "new construction", "major renovation", "energy requalification" [3, 5, 15, 21].

In accordance with the Ministerial Decree 26/06/2015, firstly, in "new construction" interventions category, the demolition and reconstruction and the expansion of existing buildings (with new air-conditioned gross volume greater than 15% of the existing gross air-conditioned volume or greater than 500 cubic meters) are included, whereas the "important refurbishment" defines the intervention that affects the building envelope with an incidence greater than 25% of the total gross dispersive surface of the building. Furthermore, the major renovations of first-level concern the refurbishment of at least 50% of the envelope and the renovation of the heating and/or cooling plant of the entire building, and the major renovations of second-level are defined as interventions involving more than 25% of the external building surface with or without renovation of the heating and/or cooling plant.

All other energy requalification interventions, despite having an impact on the building energy performance, involve a surface less than or equal to 25% of the total gross dispersant surface of the building and/or consist of new installation or refurbishment of a thermal plant.

By taken into account the consistency of the existing public building stock and the low rate of new constructions, the main goals of the energy retrofit concern the property assets renovation towards nearly Zero Energy Building (nZEB) levels. In particular, for the nZEB construction the local climatic factors to build a housing system model that adapts to winter (heating) and summer (cooling) climatic conditions play a relevant role, by including the assessment of prevailing winds and the influence of external environmental factors on the microclimate: green areas, sun-shine/shading determined by other buildings or natural elements, should be analysed and considered, and the local and natural building materials should be selected in order to sustainable development [17, 22, 28].

From January 1st 2021 in the Italian context the nZEB requirement for all new buildings or for interventions that involve demolition and subsequent reconstruction has been introduced: in this sense, in 2018 the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) has developed the National Observatory of the nZEB for the monitoring of the high energy performance buildings construction according to current European and Italian legislation [11, 18].

2 Aim

The present research intends to develop a methodology for the evaluation of the economic benefits, in terms of the convenience of the subjects involved (Public Administrations, private investors, investment funds, banks, real estate lenders, asset management companies), obtained from the implementation of energy retrofit interventions. The operational approach for the assessment of benefits generated by energy improvement interventions on existing buildings is organized into five phases that, starting from the analysis of the reference context to be examined, allow to determine the market value differential between the post-energy and ante-energy intervention situations. The methodology is applied with reference to the residential sector and to the Italian territory and, in particular, to the three main urban areas into which the city of Bari is divided (central, semicentral and peripheral).

For each urban area, the economic benefit, in terms of market value differential between the post-energy intervention situation and ante-energy intervention situation is determined. Furthermore, this differential is calculated with reference to the energy requalification costs, by considering the case “with” and “without” the incentive of the Superbonus.

It should be highlighted that the present work is the first step of a wider and current research line aimed at defining the methodological approach for the evaluation of the economic benefits related to energy retrofit investments. The next research goal will concern the application of the proposed methodology to all the Italian provincial capitals for an overall assessment of the benefits connected to the Superbonus incentive.

The methodological approach defined in the study could be useful for i) the Public Administration, for the monitoring of the influencing market dynamics on the buying

decisions and the identification of the most convenient areas for the investments, ii) the private investors, for the elaboration of a summary framework able to support the design phases and for guiding the investment choices towards suitable operations.

The sequence of the Sections contents included in the paper are described below: in Sect. 3 the main questions related to the Italian Superbonus fiscal incentive are specified and the interventions on which the tax measure could be applied are explained. In Sect. 4 the methodology is illustrated and the main steps that constitute the logical procedure to be implemented in order to assess the economic benefits connected to the energy retrofit initiatives are described. In Sect. 5 the case study is presented and the developed methodology is applied to the Italian city of Bari. Finally, in Sect. 6 the conclusions are introduced and the further insights of the research are listed.

3 The Italian Superbonus Incentive

Within the incentives promoted by the Italian government and aimed at improving the existing assets, Superbonus is a tax reduction introduced by the "Relaunch Decree" (Law Decree 34/2020) which raises to 110% the deduction rate of costs incurred for the works associated to the energy retrofit of existing buildings. In particular, all interventions must allow the improvement of two energy labels, by determining the improvement of the energy efficiency of the existing property assets [19].

The bonus constitutes a fiscal deduction that can be transformed into a tax credit equal to the measure of 110% on the value of the costs of the redevelopment works, that can be divided among four annual installments of the same amount, within the limits of the capacity of the annual tax resulting from the tax return [1].

As an alternative to the direct use of the deduction, the fiscal incentive provides for the possibility of opting for an advance contribution in the form of a discount applied by the suppliers of goods or services (so-called "discount on invoice") or for the assignment of the credit corresponding to the tax deduction due.

The Superbonus measure can be applied in case of interventions related to i) thermal insulation, ii) replacement of the winter air conditioning systems and iii) seismic risk reduction. The other costs that are covered by the incentive concern the installation of solar photovoltaic and storage systems, the infrastructure for charging electric vehicles and the interventions aimed at the removal of architectural barriers.

According to the Law No. 234/December 2021 the extension of the tax incentive has been fixed for condominiums and non-profit organizations of social utility to 2025 in the measure of 110% for costs incurred up to 31 December 2023, 70% for the expenses related to 2024 and 65% for the costs paid in 2025, for single-family buildings to 31 December 2023, provided that by 30 June 2022, works are carried out for at least 30% of the total intervention, for the operations on public housing properties developed by IACP or building cooperatives, on the condition that by 30 June 2023, at least 60% of the work has carried out [20].

In the context of the National Recovery and Resilience Plan (NRRP) within the Next Generation EU (NGEU) [26, 27, 30], the component 3 of the "Green Revolution and Ecological Transition" Mission 2 is focused on the energy efficiency and on the private and public buildings renovation. In order to achieve the complete decarbonisation of the

civil sector planned for 2050 by Long Term Strategy and the Renovation wave, the NRRP promotes the rapid energetic conversion of the building stock, by favoring the "deep retrofit" and the transformation into nearly zero-energy buildings and by envisaging a combination of economic measures, such as Superbonus incentive, with measures aimed at overcoming the not-economic barriers that reduce the choices of investment in energy redevelopment or that slow down the interventions execution (bureaucratic obstacles, long procedure time, etc.).

4 Methodology

The methodology proposed in the present research intends to provide an operational approach for the assessment of economic benefits generated by energy improvement interventions on existing residential buildings. In particular, the outputs that can be obtained from the implementation of the evaluation protocol concern the market value differential between the post-energy and ante-energy intervention situations.

The five phases in which the methodology is articulated are described in Fig. 1.

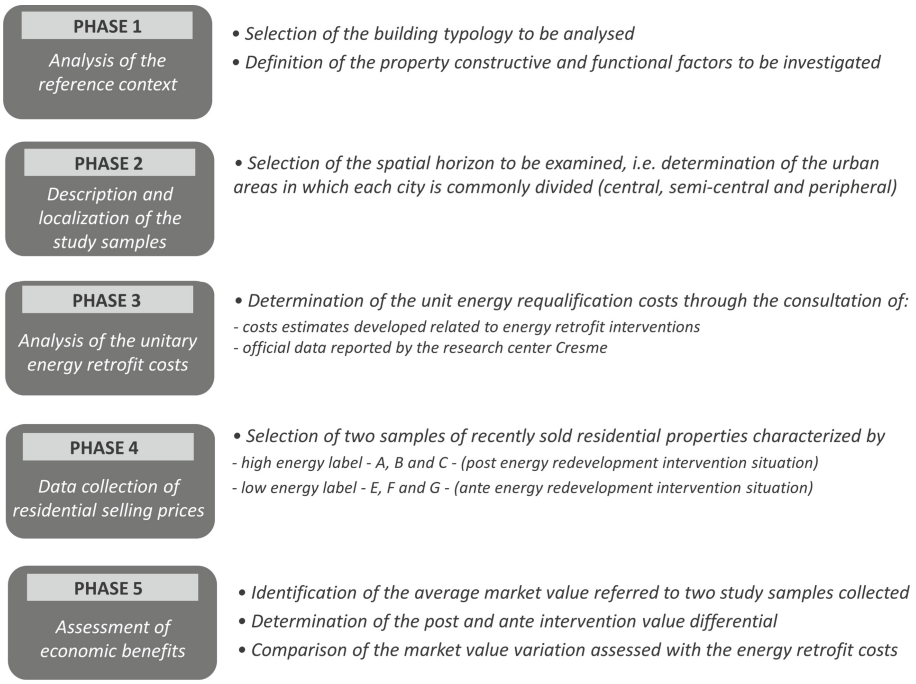

Fig. 1. The five phases of the proposed evaluation methodology

5 Case Study

The case study of the present research concerns the city of Bari (Southern Italy). The localization of the city of Bari in the Italian context is reported in Fig. 2.



Fig. 2. Localization of the city of Bari in the Italian context

In order to apply the proposed evaluation methodology of the economic benefits, in terms of convenience of the operators involved generated by energy improvement interventions on existing residential buildings, the five phases in which the protocol is structured have been implemented.

In particular, the analysis has been developed with reference to a housing "prototype", i.e. a multi-storey building made of reinforced concrete, composed by four floors without basement, equipped with a lift and characterized by medium quality of the finishes and the materials (Phase 1). In Fig. 3 the prototype selected for the analysis is shown.

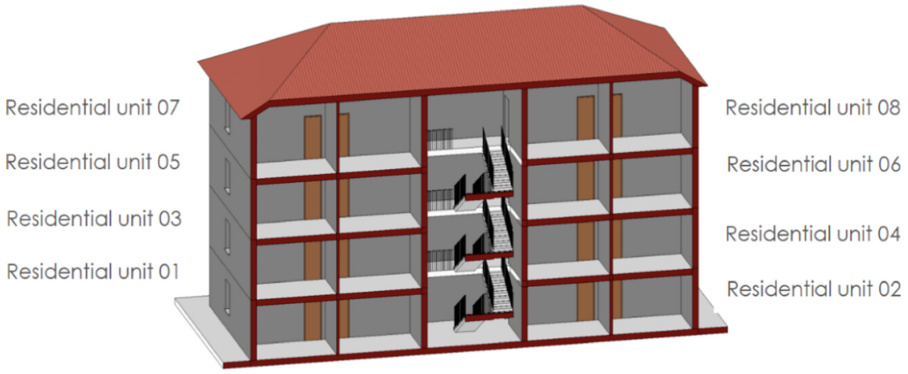

Fig. 3. Building prototype selected for the analysis

Moreover, the spatial horizon considered for the analysis has been defined. In particular, in the research the geographical distribution developed by the Real Estate Market Observatory (OMI) of the Italian Revenue Agency, for the city of Bari has been taken into account (Phase 2) [16]. The urban areas considered are the central, the semicentral, the peripheral one, whereas the suburban and extraurban areas have been excluded as the building scarcely present or mainly for rural use.

In Fig. 4 the distribution of the OMI urban areas in the city of Bari is reported.

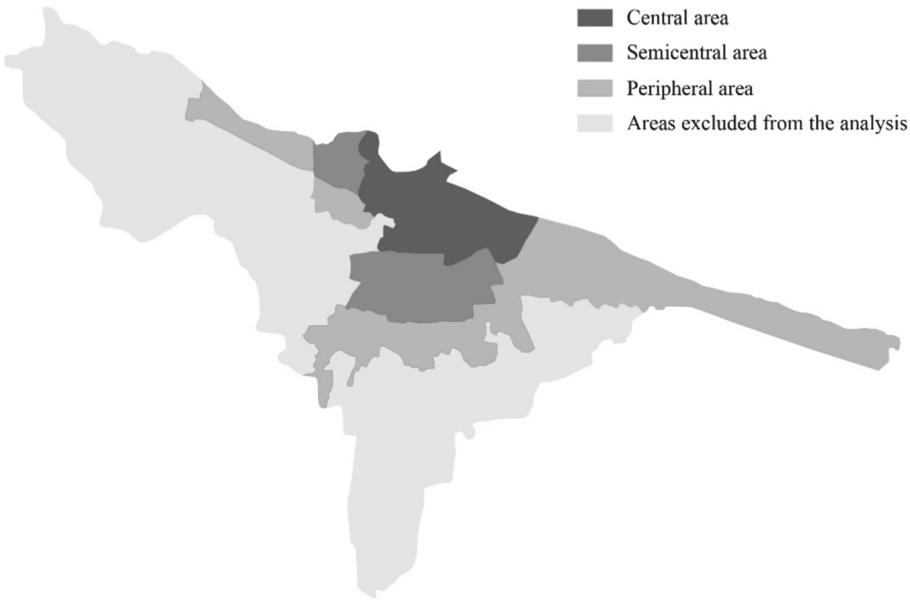

Fig. 4. OMI urban areas in the city of Bari

Furthermore, the Phase 3 of the proposed evaluation methodology has been developed through a comparative methodological approach for the determination of the unit energy requalification costs. Therefore, the data collected from costs estimates developed with reference to interventions aimed at improving the energy performance of buildings located in the Italian territory and the official data reported by the Centro ricerche economiche, sociologiche e di mercato nell'edilizia (Cresme) have been compared [4]. In this sense, the unit redevelopment costs detected by consulting a consistent number of costs estimates relating to energy retrofit initiatives to be implemented or already started on the Italian territory through the Superbonus mechanism have been appropriately adjusted through the building renovation costs reported by Cresme with regards to the "residential renewal" category and the building parameters already defined. In Table 1 the average energy improvement intervention costs from costs estimates and Cresme data recorded for the city of Bari are specified.

Table 1. Unit energy improvement intervention costs considered for the city of Bari

Unit energy requalification costs			
Costs estimates related to energy retrofit interventions in Italy	Average Italian Cresme costs related to the "total" property refurbishment	Cresme data related to the "total" property refurbishment for the city of Bari	Average cost used for the analysis for the city of Bari
408.17 €/m^2	759.16 €/m^2	777.95 €/m^2	418.27 €/m^2

With reference to the city of Bari, two samples consisting of residential properties sold between March and July 2021 have been collected: each of them involves one hundred and fifty individuals - i.e. fifty residential properties located respectively in each central, semicentral and peripheral municipal trade area, for a total number of properties selected for the analysis equal to three hundred - and it considers the functional and constructive factors previously identified for the definition of the prototype – i.e. multi-storey residential building type, in reinforced concrete, of three and more floor levels without basement, with lift in the building in which the property is located, characterized by medium finishes quality. The two detected samples regard residential units of about 100 m^2 (range considered 80 m^2–120 m^2) and the first one include properties characterized by high energy label - A, B and C – that indicates the post-energy redevelopment intervention situation and the second one is composed of housing properties with low energy label - E, F and G, i.e. the ante-energy redevelopment intervention situation. It should be recalled that the main condition to use the Superbonus incentive is the improvement of the residential property energy performance by at least two energy labels, i.e. the energy requalification intervention must determine a relevant upgrade of building energy efficiency, by passing from the low energy label (E, F and G) to the high ones (A, B and C). In Fig. 5 the localization of the individuals detected for the two study samples selected is shown.

The Phase 5 of the assessment methodology developed in the analysis concerns the assessment of the market value differential between the post-energy intervention and ante-energy intervention. In particular, the economic benefits in terms of market value variation has been determined, by considering firstly the energy requalification costs - i.e. considering the situation "without" the incentive of the Superbonus in which the cost of the intervention is borne by the property private owner - and then the situation "with" the mentioned tax measure in which no costs are incurred by the private.

In Table 2 the market value surplus between the post-energy retrofit intervention and ante-energy improvement initiative situations detected for the city of Bari is indicated.

It should be outlined that the present analysis has aimed to assess the effects of the energy efficiency intervention in terms of value differential regardless of the implementation of the Superbonus mechanism and, therefore, to verify the effects of the initiative in absolute terms.

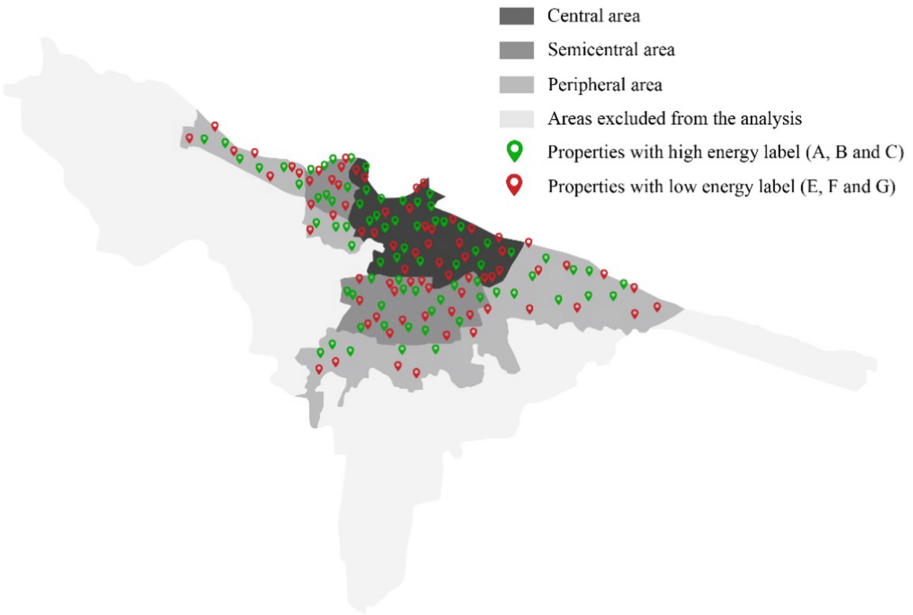

Fig. 5. Localization of the residential properties detected for the two study samples analyzed

In this sense, for each urban area the market value differentials expressed in percentage terms have been calculated without the use of the Superbonus mechanism (first columns of the Table 2) and with the use of the fiscal incentive (second columns of the Table 2). It can be observed that the inclusion of the Superbonus allows an average increase of the economic benefits for the considered urban areas compared to the "without" situation, equal to approximately 75%. The highest growth concerns the peripheral area (equal to +134%), followed by the semicentral area for which the positive variation detected is equal to +53% and, finally, by the central area (+40%).

Table 2. Economic benefits assessed in terms of market value differential between the post-energy retrofit intervention situation and the ante-energy improvement initiative situation detected for the three urban areas of the city of Bari

Economic benefits Market value differential between the post-energy intervention and ante-energy intervention					
Without superbonus			With superbonus		
Central	Semicentral	Peripheral	Central	Semicentral	Peripheral
42.20%	43.24%	25.63%	59.25%	66.74%	59.96%

6 Conclusions

With reference to the current contingence associated to the sanitary crisis due to the Covid-19 pandemic, the building stock regeneration is recognized as an effective driving force for the national economic recovery: in this sense, the several incentive measures envisaged allow the implementation of targeted interventions for the improvement of energy performance indices and the saving of significant monetary amounts for the owners of the properties to be redeveloped [25].

In accordance with the relevance of the construction sector in the national economy connected to the sustainability goals fixed by the Agenda 2030 [31], the Superbonus guarantees a complete remuneration of the costs incurred for the mentioned specific energy retrofit intervention typologies, by determining significant benefits in terms of i) the energy consumption reduction, ii) the bill savings, iii) the improvement of building quality, iv) the increase of living comfort.

With reference to the Italian territory, the present study constitutes the first phase of a wider research aimed at assessing the market value differential between the post-energy intervention situation and ante-energy intervention situation – that is one of the main economic benefits deriving from energy redevelopment initiatives. In particular, the present analysis has intended to define a methodological approach capable of supporting the public and private operators in the decision-making processes related to the energy retrofit investments. In this sense, the proposed methodology has been applied with reference to the city of Bari and the residential intended use, but it represents a flexible tool, that could be replicable in any territorial context (national and international) to verify the investment convenience and to identify the urban areas for which a higher sustainability in energy efficiency interventions is detected.

Future developments of the research will concern the implementation of the methodology proposed with reference to other intended uses (commercial, offices, etc.) and to geographical contexts. In particular, with reference to all the Italian provincial capitals and to the main urban areas into which each city is divided, the methodology will allow the identification of the areas of the different Italian cities for which a higher convenience in energy efficiency interventions will be found. Furthermore, the outputs obtained could be represented on geographical maps, able to quickly identify the urban areas of the different Italian provincial capitals for which i) the use of fiscal incentives are required and ii) a higher convenience in carrying out the intervention through the use of the Superbonus incentive is detected. The visualization through maps will support the private operators - entrepreneurs, investors, credit institutions, assets management companies, insurance providers, real estate funds, technical consultants involved in the energy interventions feasibility assessments, etc. - to define the urban areas in which the investment will be financially convenient and the Public Administrations to locate the areas and/or the provincial capitals in which the current Superbonus incentive is necessary, excessive or insufficient and, through a further analysis, to eventually assess the break-even incentive percentages capable of guaranteeing the condition of minimum convenience for the investor.

References

1. Agenzia delle Entrate: Superbonus 110%. https://www.agenziaentrate.gov.it/portale/web/guest/superbonus-110%25. Accessed 10 Sept 2021
2. Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile ENEA: Rapporto Annuale sull'efficienza energetica (October 2020). https://www.enea.it/it/seguici/pubblicazioni/pdf-volumi/2020/raee-2020.pdf. Accessed 11 Feb 2021
3. Bergero, S., Cavalletti, P., Chiari, A.: Energy refurbishment in existing buildings: Thermal bridge correction according to DM 26/06/2015 limit values. In: Energy Procedia, vol. 140, pp. 127–140 (2017)
4. Centro ricerche economiche, sociologiche e di mercato nell'edilizia CRESME. www.cresme.it. Accessed 11 June 2021
5. Corrado, V., Ballarini, I., Dirutigliano, D., Murano, G.: Verification of the new Ministerial Decree about minimum requirements for the energy performance of buildings. In: Energy Procedia, vol. 101, pp. 200–207 (2016)
6. De Paoli, L., Geoffron, P.: Introduction. A critical overview of the European National Energy and Climate Plans. In: Economics and Policy of Energy and the Environment (2019)
7. De Paoli, L.: The Italian draft national energy-climate plan. In: Economics and Policy of Energy and Environment, Franco Angeli, pp. 97–118 (2019)
8. Directive 2018/844/EU of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, Official Journal of the European Union: Brussels, Belgum (2018). Accessed 25 July 2021
9. Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC. Accessed 11 July 2021
10. Economidou, M., et al.: National Energy and Climate Plans for 2021–2030 under the EU Energy Union, EUR 30487 EN, Publications Office of the European Union, Luxembourg (2020)
11. Enea: Osservatorio Nazionale degli Edifici a Energia quasi Zero NZEB. https://www.enea.it/it/efficienza-energetica/osservatorio-nazionale-degli-edifici-a-energia-quasi-zero-nzeb-sempre-piu-numerose-le-adesioni-al-progetto-enea. Accessed 23 June 2021
12. European Commission, Directorate-General for Energy: Clean energy for all Europeans, Publications Office (2019). https://data.europa.eu/doi/https://doi.org/10.2833/21366. Accessed 5 Oct 2021
13. European Commission: Commission recommendation (EU) 2019/786 of 8 May 2019 on building renovation. Official Journal of the European Union (2019)
14. Gabrielli, L., Ruggeri, A.G.: Developing a model for energy retrofit in large building portfolios: Energy assessment, optimization and uncertainty. In: Energy and buildings, vol. 202, p. 109356 (2019)
15. Italian Ministry of Economic Development: Ministerial Decree 26/06/2015. Applicazione Delle Metodologie di Calcolo Delle Prestazioni Energetiche e definizione delle Prescrizioni e dei Requisiti Minimi degli Edifici. Official Journal of the Italian Republic, 15 July 2015 (in Italian). http://www.sviluppoeconomico.gov.it/index.php/it/normativa/decreti-interministeriali/2032966-decreto-interministeriale-26-giugno-2015-applicazione-delle-metodologie-di-calcolo-delle-prestazioni-energetiche-e-definizione-delle-prescrizioni-e-dei-requisiti-minimi-degli-edifici. Accessed 10 Oct 2021
16. Italian Revenue Agency. Real Estate Market Observatory (OMI). Rapporto immobiliare 2019. Il settore residenziale (2019). www.agenziaentrate.gov.it. Accessed 19 July 2021

17. Kurnitski, J., et al.: How to define nearly net zero energy buildings nZEB. Rehva J. **48**(3), 6–12 (2011)
18. Labia, N., et al.: Osservatorio degli edifici a energia quasi zero (nZEB) in Italia–2016–2018. Enea (2019)
19. Law Decree No. 34/2020: Misure urgenti in materia di salute, sostegno al lavoro e all'economia, nonché di politiche sociali connesse all'emergenza epidemiologica da COVID-19. www.gazzettaufficiale.it. Accessed 14 June 2021
20. Law No. 234/2021: State budget for the financial year 2022 and multi-year budget for the three-year period 2022–2024. www.gazzettaufficiale.it. Accessed 5 May 2021
21. Law No. 90/2013: converting into Law Decree No. 63/2013. Transposition of Directive 2010/31/EU on Energy Performance of Buildings. Official Journal of the Italian Republic, general No.181 (2013)
22. Marszal, A.J., et al.: Zero energy building–a review of definitions and calculation methodologies. Energy Build. **43**(4), 971–979 (2011)
23. Ministry of Economic Development, Ministry of the Environment and Protection of Natural Resources and the Sea, Ministry of Infrastructure and Transport: Strategia per la riqualificazione energetica del parco immobiliare nazionale – november, 25 2020 https://www.mise.gov.it/images/stories/documenti/STREPIN_2020_rev_25-11-2020.pdf. Accessed 5 June 2021
24. Ministry of Economic Development, Ministry of the Environment and Protection of Natural Resources and the Sea, Ministry of Infrastructure and Transport: Integrated National Energy and Climate Plan. https://www.mise.gov.it/index.php/it/energia/energia-e-clima-2030. Accessed 20 April 2020
25. Morano, P., Tajani, F., Di Liddo, F., Anelli, D.: A feasibility analysis of the refurbishment investments in the Italian residential market. Sustainability **12**(6), 2503 (2020)
26. National Recovery and Resilience Plan (NRRP). www.mef.gov.it. Accessed 10 July 2021
27. Next Generation EU (NGEU) - Recovery Fund. www.ec.europa.eu.it. Accessed 17 May 2021
28. Official Journal of the European Union: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings - recast (2010)
29. Roberts, J., Gauthier, C.: Energy communities in the draft National Energy and Climate Plans: encouraging but room for improvements. In: REScoop: Berchem, Belgium (2019)
30. Senato della Repubblica, Camera dei Deputati: Il Piano Nazionale di Ripresa e Resilienza (NRRP) – Schede di lettura. Dossier XVIII Legislatura (2021). www.camera.it. Accessed 14 May 2021
31. United Nations: Agenda 2030 (2015). https://unric.org/it/agenda-2030/. Accessed 12 March 2021