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REEBUILD Integrated Techniques for the Seismic Strengthening and Energy Efficiency of Existing Buildings

Building renovation in the EU: scenarios and impact assessment

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REEBUILD

Integrated Techniques for the
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Building renovation in the EU:

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Foreword

Our buildings are ageing, posing an urgent need for renovation to align with the goals of multidimensional European and international policies. The built-up area in Europe covers 25 billion square meters, 10 billion of which were constructed before 1960 and 20 billion before 1990. 40% of the European Union (EU) buildings are located in seismic prone regions and were built without modern seismic design considerations. Apart from Member States with moderate and high seismic risk, such as Greece, Italy and Croatia with a severe impact from earthquakes during the last decades (fatalities, injuries and economic losses), attention should be drawn to regions with lower risk, e.g. in France and Spain. At the same time, buildings stand out as one of the most energy consuming sectors, therefore having a negative environmental impact. In fact, buildings are responsible for 40% of the EU energy consumption and 36% of the EU total CO_2 emissions, whereas 75% of the EU existing building stock is considered energy inefficient. The highest amount of energy use in old buildings derives by far from the operational stage of their life (e.g. heating, cooling), resulting in a significant source of carbon emissions with detrimental effects on climate change.

Notwithstanding this negative impact, the building sector provides a unique opportunity to create, through risk-proofed renovation, a safe, sustainable, and resilient built environment which promotes wellbeing and economic growth, and ensures that EU energy and climate targets are met. In this context, the European Parliament entrusted the European Commission's Joint Research Centre with the two-year pilot project 'Integrated techniques for the seismic strengthening and energy efficiency of existing buildings' or REEBUILD.

REEBUILD aims to define technical solutions that can reduce seismic vulnerability and increase energy efficiency of existing buildings, at the same time and in the least invasive way. Thereby, increased earthquake resilience and limited environmental impact of buildings is sought by protecting life, economy and the environment. The project has the following key-objectives:

- Define the tools and guidelines to reduce, all at once, vulnerability and energy inefficiency of buildings
- Stimulate the use of integrated solutions
- Create awareness about the topic in the aim of prevention
- Increase resilience of the built environment to seismic hazard and climate change.

The geographical scope of the project covers EU seismic prone regions. However, all EU citizens are potential beneficiaries of the project since it can easily be extended to all EU regions considering the ageing of existing buildings and other hazards, including extreme climatic events.

In a policy context, REEBUILD provides scientific advice to support the development of an action plan, which shall supplement existing European Union policies and initiatives in the field of building renovation. Crucially, the European Green Deal (COM (2019)640) emphasises the need for a Renovation Wave (COM (2020)662), supported by the New European Bauhaus ([1]) (COM (2021)573) to create sustainable, inclusive and beautiful living spaces. The plans to put the European Green Deal into effect further contribute to the economic recovery following the COVID-19 pandemic. In the Energy Performance of Buildings Directive (EPBD) (Directive 2018/844) and the recent proposal for its revision (COM 2021/802), besides reducing greenhouse gas and carbon emissions, measures related to seismic risk and fire safety are encouraged for planning deep renovations. The implementation of clean and circular economy principles for the construction sector to achieve a climate-neutral society by 2050 are stressed in the new Circular Economy Action Plan (COM (2020)98) which also addresses the revision of the Construction Products Regulation (Regulation (EU) 305/2011). The new idea for a holistic approach to the renovation of buildings is in line with the Union Civil Protection Mechanism (Decision (EU) 2019/420), with respect to disaster prevention measures and the integration of risk reduction and cohesion policies. Likewise, the Action Plan on the Sendai Framework (SWD 2016/205) encourages investment in disaster risk reduction, integrating 'Build Back Better' principles for a more resilient built environment. The European Framework for Action on Cultural Heritage (SWD 2019) emphasises the need to safeguard cultural heritage against natural disasters and climate change, and relevant measures are encouraged when planning long-term renovation strategies and national disaster risk reduction strategies. The above policies and initiatives contribute to the implementation of the 2030 Agenda for Sustainable Development ([2]) (Resolution 2015/A/Res/70/1) and the Sustainable Development Goal 11 'Make cities and human settlements inclusive, safe, resilient and sustainable'.

([1]) https://europa.eu/new-european-bauhaus/index_en
([2]) https://knowsdgs.jrc.ec.europa.eu/intro-policy-mapping

Integrated retrofitting of existing buildings can be seen as a nexus between policies improving the disaster resilience of the EU, encouraging the energy renovation of buildings, promoting circularity within the building sector, and protecting cultural heritage.

Several activities were foreseen to achieve the REEBUILD objectives. EU buildings requiring upgrading were identified, and existing seismic and energy retrofit technologies were assessed in a life-cycle perspective. Combined retrofit solutions were explored based on available technologies and recent scientific developments in the field. A simplified method for the assessment of the combined upgrading was proposed and applied to case studies of representative building typologies retrofitted with the identified solutions. Seismic risk and energy performance of buildings along with socioeconomic aspects were assessed at regional level throughout Europe. Such regional assessments were used to identify appropriate intervention scenarios based on their regional impact and highlight the regions where interventions are of higher priority. National, regional and local authorities, industrial associations and expert communities were involved in enquiries and discussions of relevant implementing measures (legislation, incentives, guidance and standards), technologies and methodologies for the combined upgrading of existing buildings. Dissemination and outreach is further supported by reports, a web platform and public communication material. REEBUILD activities were organised in five main actions:

1. Overview and classification of technologies for seismic strengthening and energy upgrading of existing buildings
2. Analysis of technologies for combined upgrading of existing buildings
3. Methodologies for assessing the combined effect of upgrading
4. Regional impact assessment and contributions to an action plan
5. Stakeholders' engagement.

The present report summarises work performed as part of the fourth action towards the identification of regional renovation scenarios along with the assessment of their impact. It builds on the prioritisation of the EU regions based on seismic risk, energy performance of buildings and socioeconomic vulnerability, presented in Gkatzogias et al. (2022).

Acknowledgements

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Abstract

The work presented in this report aims to provide scientific support to building renovation policies in the EU by promoting a holistic point of view on the topic. As part of the pilot project 'Integrated techniques for the seismic strengthening and energy efficiency of existing buildings', renovation scenarios are defined, and their impact is investigated considering seismic retrofit, and energy efficiency upgrading of residential buildings, both independently and in an integrated way. An integrated analysis framework, proposed earlier to identify priority regions across the EU, is extended here to investigate the impact of renovation scenarios. Within this framework, retrofit is modelled through a target seismic and/or energy performance of buildings, which is quantified by an upgrade of their structural and energy attributes. A series of impact metrics are introduced to investigate first the renovation potential of regions (i.e. the capacity of individual building classes within a region to yield benefit), and subsequently the impact of renovation scenarios (benefit in absolute terms) across the EU-27 with a focus on priority regions. Impact metrics include benefit-to-cost ratios along with the reduction in economic loss, loss of life, and space heating energy consumption. Impact metrics are further assessed considering a variability in renovation cost and planning period. Three strategies are followed for the definition of renovation scenarios: (*i*) renovating predefined macro-taxonomy classes, (*ii*) renovating predefined fractions of the building stock, and (*iii*) renovating building classes so that renovation is beneficial in economic terms. Overall, the efficiency of a renovation strategy increases along with its selectiveness, i.e. the capability of targeting buildings of specific structural and energy attributes rather than generic classes. Inevitably, this comes at the cost of increased complexity in scenario implementation. The results presented in this report clearly illustrate that integrated renovation is capable of tackling the multidimensional problem of building renovation, providing a risk-proofed, sustainable, and inclusive building environment. The economic benefit due to integrated renovation was found to be in the order of magnitude of the highest economic benefit among the seismic and the energy renovation ones (or even higher), whereas integrated renovation presents the unique capability of reducing fatalities and energy consumption at the same time, and depending on the scenario, to a greater extent.

1 Introduction

The pilot project 'Integrated techniques for the seismic strengthening and energy efficiency of existing buildings' or REEBUILD was launched with a view to promoting a holistic approach for the renovation of buildings across Europe. 30% of European buildings are located in areas of moderate seismic hazard where the design peak ground acceleration (*PGA*) is at least 0.1g (Crowley et al., 2020), whereas the European building stock is responsible for 40% of energy consumption and 36% of CO_2 emissions in the EU, making it the single largest energy consumer in Europe (COM (2020)662). Hence, the reduction of seismic vulnerability of European buildings together with an increase in their energy efficiency is of utmost importance for the European environmental targets, resilience, and economy, and can be most efficiently addressed through a holistic approach.

Building renovation in the EU aims to address the low energy efficiency of the existing building stock. This is being supported by policies at the EU level within the European Green Deal (COM 2019/640) through the Renovation Wave (COM 2020/662) of public and private buildings and the recent proposal for the revised EPBD (COM 2021/802). While renovation efforts are being driven from the perspective of energy efficiency enhancement, the latter encourages the Member States to also consider measures related to fire safety and seismic risk in their long-term renovation strategies. In fact, the recent evaluation of long-term renovation strategies (SWD 2021/365) has highlighted the inclusion of seismic retrofitting in several Member States (e.g. Cyprus and Italy). In a similar context, integrated renovation of buildings was included in the national recovery and resilience plans of several seismically prone Member States ([3]). Importantly, the integration of energy and seismic retrofitting of buildings appears more cost-effective than energy retrofitting alone in seismic regions of Europe (e.g. Calvi et al. 2016; Bournas, 2018; Pohoryles et al. 2020; Menna et al., 2021; The World Bank, 2021). Moreover, the continuous development of novel materials and technologies for integrated retrofitting (e.g. Gkournelos et al., 2020, 2021, 2022; Triantafillou et al, 2022; Pohoryles et al., 2022a, b; Baek et al., 2022) is expected to further improve the cost-effectiveness and thus boost integrated retrofitting applications. In seismic regions, integrated seismic and energy retrofitting may be a potential solution for promoting building renovation and hence support the goals of the Renovation Wave to at least double current rates (Pohoryles and Bournas, 2021).

To facilitate the prioritisation of building renovation, an EU-wide regional assessment of seismic risk, energy efficiency of buildings, and socioeconomic vulnerability was performed by Gkatzogias et al. (2022). An integrated analysis framework was presented along with the primary metrics adopted for regional assessment and prioritisation. Metrics addressed (*i*) loss of life, (*ii*) economic loss associated with cost of seismic repair, (*iii*) space heating energy consumption, (*iv*) economic loss associated with the cost of energy, and (*v*) socioeconomic indicators. Initially, metrics were used to form indicators and prioritise regions based on seismic risk, energy performance and socioeconomic vulnerability, independently. Different modes/patterns of prioritisation were identified depending on the considered type and format (absolute/normalised) of indicators. Single and multi-sectoral indicators were subsequently introduced to capture the different patterns in an integrated way. Results clearly indicated that prioritisation of building renovation is a multidimensional problem. Depending on priorities, different integrated indicators should be used to inform policies that accomplish the highest relative or most spread impact.

The present report summarises work performed within REEBUILD on formulating regional renovation scenarios and investigating their impact. Renovation scenarios were implemented across all regions of the 27 EU Member States (EU-27), albeit focusing on priority ones, and thus building on the aforementioned work. The report further complements the methodology and input models presented in Gkatzogias et al. (2022), to model and assess the effect of renovation. It further provides the definition of the investigated renovation scenarios, which herein address residential buildings, along with various metrics employed to assess the renovation impact through cost–benefit analysis. Renovation scenarios may involve multiple building classes within a region and even multiple priority regions.

Following this introduction, Chapter 2, summarises first the integrated analysis framework introduced in Gkatzogias et al. (2022) for the regional assessment and prioritisation of existing buildings across the EU-27. The framework is subsequently extended to assess the impact of renovation scenarios. Different sections describe the additional components of the extended framework, including the definition of impact assessment metrics, the formulation of alternative renovation scenarios, along with physical vulnerability and energy performance models for renovated buildings

([3]) https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en#national-recovery-and-resilience-plans

Chapter 3 provides the output of the regional impact assessments in terms of the adopted metrics. Initially, it investigates the renovation potential within priority regions considering different prioritisation schemes in line with Gkatzogias et al. (2022). Then, the impact of renovation derived from implementing the adopted renovation scenarios is presented and commented across the EU-27, but also with a focus on a specific prioritisation scheme addressing the seismic risk, the energy inefficiency of buildings, and the socioeconomic vulnerability of priority regions. Renovation potential and scenario impact are presented considering separately seismic retrofit, energy efficiency upgrading, and ultimately integrated renovation to facilitate comparisons.

Main conclusions and future steps towards the further development of the integrated framework for seismic risk and energy performance of buildings are summarised in Chapter 4.

Additional details regarding the adopted input models, and impact metrics for priority regions are provided in Annexes A and B.

2 Integrated framework for impact assessment

A framework for regional assessment and prioritisation was presented in Gkatzogias et al. (2022) (Figure 1a). The framework combined three assessment routes addressing seismic risk to existing buildings and occupants, energy performance of existing buildings, and socioeconomic indicators. The three routes used as a reference point a common exposure model addressing both structural and energy attributes of the European building stock. Specifically, the seismic exposure model of the European Seismic Risk Model 2020 was adopted as the starting point (ESRM20, Crowley et al., 2021, available from the European Facilities for Earthquake Hazard and Risk, EFEHR ([4]), © Eucentre Foundation, 2022). In order to perform integrated regional assessments of seismic risk and energy performance, the seismic exposure model was subsequently extended (Gkatzogias et al., 2022) to include building energy attributes.

The undesirable consequences resulting from potential future earthquakes were expressed in terms of loss, and therefore the total probability theorem was applied to estimate risk, combining exposure, seismic hazard, and vulnerability. The final version of the European Seismic Hazard Model 2020 was used (ESHM20, Danciu et al, 2021, available from EFEHR ([5]), © ETH Zurich, 2022). The adopted ESRM20 vulnerability models (Romão et al, 2021) combined fragility functions and consequence (damage-to-loss) models. Seismic loss was expressed as direct economic loss (i.e. cost of repair) and loss of life (i.e. occupant fatalities). A frequency-based seismic performance assessment was performed to estimate the risk metrics of average annual economic loss and average annual loss of life, considering all potential earthquakes that affect a specific site over a given period and their associated frequencies of occurrence. Seismic risk was assessed for both residential and commercial buildings across the EU.

The energy performance of residential buildings was estimated within a deterministic context, considering climatic conditions and the energy attributes of building classes. The energy performance was quantified by the space heating energy consumption (i.e. energy loss), and the associated energy cost (i.e. economic loss). Climatic conditions were estimated from outside air temperature measurements, represented by heating degree days (*HDD*s) (Eurostat, 2020a), and averaged over a 10-year period. Energy attributes comprised the thermal transmittance of the building envelope, adopted from INSPIRE and ENTRANZE projects (Birchall et al., 2014, ENTRANZE and Enerdata, 2008a, b), and the building geometry. A physics-based artificial neural network (Veljkovic et al., 2023) was employed to estimate the average annual space heating energy consumption using as input climatic and building stock data. The average annual space heating energy consumption was translated to average annual economic loss using energy prices for residential use (Grave et al., 2016; Eurostat, 2020b).

Three composite indicators were adopted to quantify socioeconomic development, smart, sustainable, and inclusive growth, and social progress. These indicators were the regional EU Human Development Index (HDI) (Bubbico and Dijkstra, 2011; Eurostat, 2019a, b, 2020c), the EU2020 index (Becker et al., 2020), and the regional EU Social Progress Index (SPI) (Annoni and Bolsi, 2020). The selected composite indicators, measuring socioeconomic wellbeing, were combined to a single measure to express socioeconomic vulnerability (Gkatzogias et al., 2022).

The estimated metrics from each assessment route were used to form indicators and identify priority regions. The proposed indicators addressed separately single metrics of seismic risk, energy performance of buildings and socioeconomic vulnerability, or combined multiple metrics to form single or multi-sectoral (seismic and/or energy and/or socioeconomic) integrated indicators.

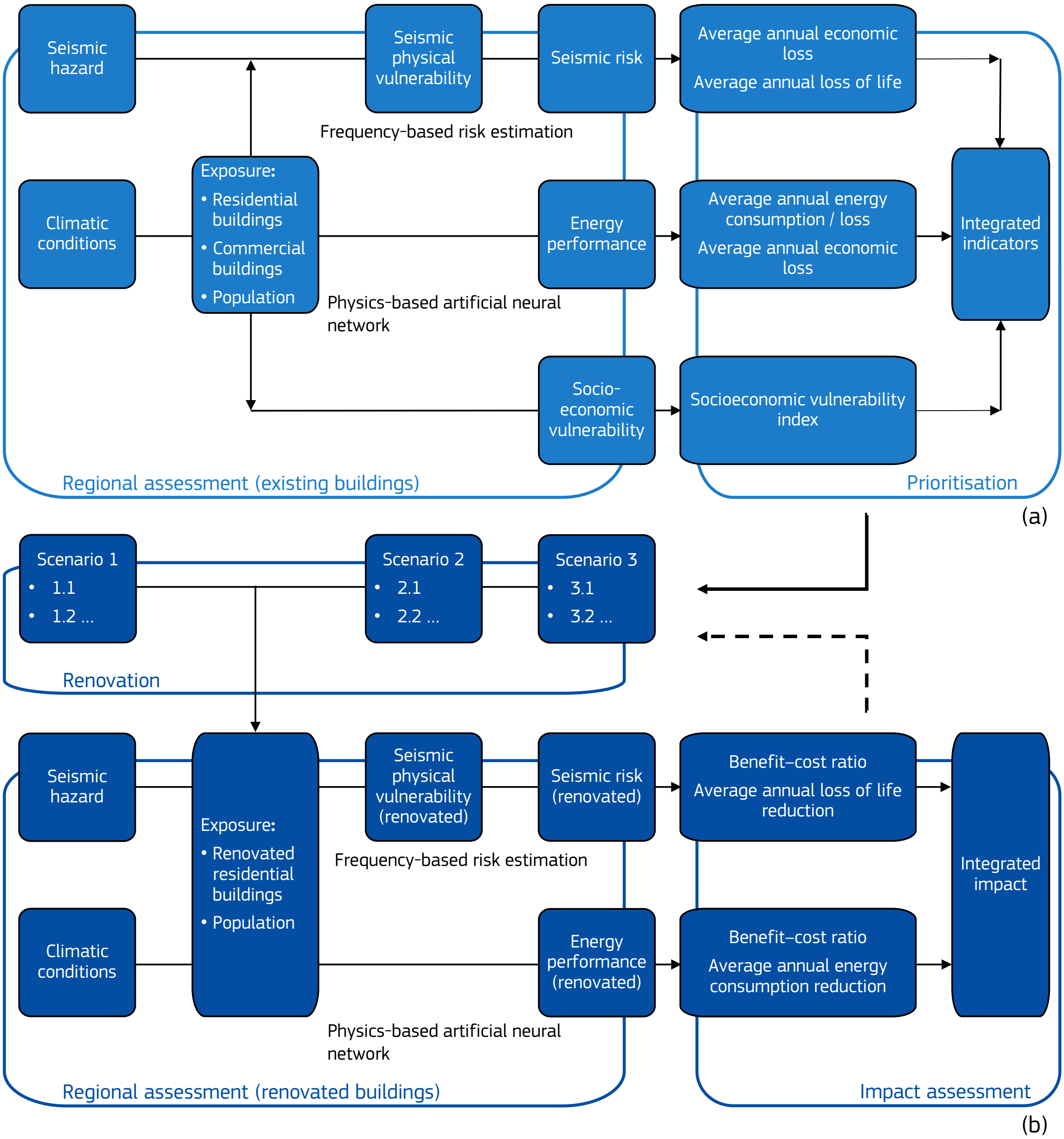
In this report, the aforementioned framework is complemented by the formulation of alternative renovation scenarios, the iteration of regional assessments considering the renovated building stock, and the evaluation of the impact of renovation scenarios (Figure 1b). Renovation scenarios are explored herein addressing the residential building stock, and their impact is presented on maps across the EU-27 regions. As an example of the framework implementation, the report emphasises priority regions identified in Gkatzogias et al. (2022) using single-sectoral indicators based on primary metrics (i.e. economic loss) and multi-sectoral integrated indicators. However, depending on priorities, additional prioritisation schemes may be explored, other than those included in this report. Alternative prioritisation schemes can be found in Gkatzogias et al. (2022).

Renovation scenarios were defined considering seismic, energy, and integrated retrofit of various combinations of building classes per region or multiple regions at the same time. Retrofit targets a predefined improved seismic and/or energy performance of buildings, quantified by an upgrade of the seismic design code level, the lateral force coefficient and/or the thermal transmittance of the building envelope, respectively. Regional

([4]) http://risk.efehr.org/
([5]) http://hazard.efehr.org/en/home/

assessments of seismic risk and energy performance of the renovated buildings were performed by employing the same seismic hazard and climatic conditions, and exposure models as in the case of existing buildings. Yet, each building class was mapped to an upgraded seismic vulnerability and energy performance class to model the effect of renovation according to the considered renovation scenario (i.e. seismic, energy, or integrated retrofit). A frequency-based seismic performance assessment and the physics-based artificial neural network were used to evaluate the seismic and energy performance of the renovated building stock through the average annual economic loss (cost of seismic repair, space heating energy cost), average annual loss of life, and average annual space heating energy consumption.

Figure 1. Framework for (a) regional assessment, and prioritisation, and (b) renovation, and impact assessment



The impact of the investigated scenarios was evaluated at the regional level through cost–benefit analysis with a view to providing insight on economic savings per scenario and region. Benefit-to-cost ratios were estimated, considering the effect of variable planning periods and cost of renovation. Benefit-to-cost ratios address only average annual loss due to seismic repair and energy cost. Although the benefit due to the reduction in the average annual loss of life and CO_2 emissions (derived from seismic and energy upgrading) can be transformed to cost, these metrics did not enter the benefit-to-cost ratio calculation. Instead, the reduction of fatalities and energy consumption (i.e. an implicit measure of greenhouse gas emissions) were calculated for each scenario and used as separate impact metrics. This decision was made for the sake of consistency with the definition of the integrated indicators (Gkatzogias et al., 2022), in which all involved component indicators were normalised to a 0–1 range, and an equal weight was assigned to each one of them. Furthermore, following the approach of separate consideration of these impact metrics, complexity and subjectivity, e.g. arising from assigning a monetary value to loss of life, is avoided, while the relevant contribution in the scenario efficiency is more explicitly acknowledged. Nevertheless, different approaches may be investigated by assigning monetary value to fatalities (e.g. Porter, 2021) and/or to emissions (e.g. similarly to the EU Emissions Trading System, Directive 2018/410).

The following sections describe in detail the components of the framework for renovation and impact assessment that are differentiated from the regional assessment of existing buildings. For the rest of the models and details on the performance evaluation methodologies, the interested reader is referred to Gkatzogias et al. (2022). Section 2.1 provides the definition of the benefit-to-cost ratio and the additional impact metrics adopted in this study along with an overview of the investigated renovation scenarios. Sections 2.2 and 2.3 present the adopted approaches for modelling the seismic physical vulnerability and the energy performance of renovated buildings.

2.1 Renovation scenarios and impact assessment metrics

Different strategies were followed for the definition of renovation scenarios. According to Scenario 1, the building classes in the exposure model of residential buildings, addressing both structural and energy attributes, were first mapped to a macro-taxonomy. Mapping was based on engineering judgement, considering for the sake of simplicity only the seismic design code level in the definition of macro-taxonomy classes. Subsequently, Scenario 1 investigates the impact (or benefit) of renovating predefined macro-taxonomy classes within a region. Instead, Scenarios 2 and 3 take into account the complete taxonomy string of building classes (i.e. without grouping to broader building taxonomy classes), and promote their renovation based on specific selection criteria. Scenario 2, following a similar approach with Scenario 1, investigates the impact of renovating predefined fractions of the building stock within a region. The building classes that comprise the renovated fraction of the building stock are selected based on their individual benefit-to-cost ratio (*BCR*). Finally, Scenario 3 selects building classes for renovation based on their *BCR* value, so that renovation is always beneficial in economic terms, and therefore the fraction of the building stock that is renovated is unknown at the start of the impact analysis process. Specifically, Scenario 3.1 promotes for renovation all building classes presenting individually $BCR \geq 1.0$ within a region, whereas Scenario 3.2 considers all building classes that result in a com-

Table 1. Definition of alternative renovation scenarios.

Scenario		**Type**	**Impact metrics** ([1])
1	Renovate macrotaxonomies	Seismic	BCR; pc_N; pc_C; pc_P; $\Delta AAEL_{(net),eq}$; $\Delta AALL$
		Energy	BCR; pc_N; pc_C; pc_P; $\Delta AAEL_{(net),en}$; $\Delta AAEC$
		Integrated	BCR; pc_N; pc_C; pc_P; $\Delta AAEL_{(net),int}$; $\Delta AALL$; $\Delta AAEC$
2	Renovate percentage of building stock (classes selected based on *BCR* per class)	Seismic	BCR; pc_C; pc_P; $\Delta AAEL_{(net),eq}$; $\Delta AALL$
		Energy	BCR; pc_C; pc_P; $\Delta AAEL_{(net),en}$; $\Delta AAEC$
		Integrated	BCR; pc_C; pc_P; $\Delta AAEL_{(net),int}$; $\Delta AALL$; $\Delta AAEC$
3.1	Renovate building classes with $BCR \geq 1$ (per class)	Seismic	BCR; pc_N; pc_C; pc_P; $\Delta AAEL_{(net),eq}$; $\Delta AALL$
		Energy	BCR; pc_N; pc_C; pc_P; $\Delta AAEL_{(net),en}$; $\Delta AAEC$
		Integrated	BCR; pc_N; pc_C; pc_P; $\Delta AAEL_{(net),int}$; $\Delta AALL$; $\Delta AAEC$
3.2	Renovate building classes with cumulative $BCR \approx 1$	Seismic	pc_N; pc_C; pc_P; $\Delta AAEL_{(net),eq}$; $\Delta AALL$
		Energy	pc_N; pc_C; pc_P; $\Delta AAEL_{(net),en}$; $\Delta AAEC$
		Integrated	pc_N; pc_C; pc_P; $\Delta AAEL_{(net),int}$; $\Delta AALL$; $\Delta AAEC$

([1]) *BCR* Cumulative benefit-to-cost ratio
pc_N Percentage of renovated buildings within a region
pc_C Percentage of renovated building value (replacement cost) within a region
pc_P Percentage of population (average number of occupants over 24-hour period) associated with the renovated building stock within a region
$\Delta AAEL_{(net),eq/en/int}$ (Net) average annual economic loss benefit due to earthquake (eq), energy (en), and integrated (int) renovation
$\Delta AALL$ Average annual loss of life benefit (due to seismic or integrated renovation)
$\Delta AAEC$ Average annual energy consumption benefit (due to energy or integrated renovation)

bined/cumulative *BCR* (referring to the group of renovated classes) approximately equal to unity. The investigated scenarios are summarised in Table 1, along with the metrics used to assess the impact of each renovation scenario. Sections 2.1.1 and 2.1.2 provide the definition of the renovation impact metrics adopted in this study along with the associated assumptions. Subsequently, Sections 2.1.3–2.1.5, describe in more detail the investigated scenarios.

2.1.1 Benefit-to-cost ratio

Cost–benefit analysis was employed to assess the impact of renovation scenarios in economic terms. In this context, the benefit-to-cost ratio, associated with the renovation of a single building class (r = 1) or multiple building classes (r > 1) within a region, was defined according to Equation (1). In the equation r denotes a building class promoted for renovation. When a fraction of the buildings within a building class are renovated (instead of the whole building class), the relevant components of Equation (1) denoted with r refer also to the corresponding fraction. In other words, Equation (1) includes only quantities associated with the buildings considered for renovation. Renovation may consist of structural retrofitting against earthquakes (eq), energy efficiency upgrading of building envelopes (en), or both within an integrated (int) renovation approach. $AAEL_{ex/ren,(eq/en/int)}$ represents the average annual economic loss to existing (ex) or renovated (ren) buildings, associated with economic loss due to seismic repair, space heating energy cost, or, once again, due to both relevant losses.

BCR represents the economic benefit derived from renovation over a planning period t, normalised to the cost of renovation (C_{ren}). The benefit is quantified by the difference between absolute average annual economic loss in existing and renovated buildings ($\Delta AAEL$), and the planning period is the length of time over which the renovation is effective. t was assumed equal to the remaining economic life of the asset in years, while the effect of renovation on the remaining life was ignored (Porter, 2021). Hence, t in Equation (1) was assumed constant, irrespective of the renovation type (seismic retrofit, energy efficiency upgrading, integrated retrofit) or retrofit technology (e.g. addition of reinforced concrete walls, thermal insulation). The planning period was also assumed constant among different building classes. According to the above definition, *BCR* may take any non-negative value, with *BCR* = 0 indicating a renovation strategy that has no effect on mitigating risk and/or energy inefficiency, and *BCR* > 1 indicating a beneficial renovation strategy for which the economic benefit is higher than the renovation cost. *BCR* = 1 represents finally the case when the economic benefit fully compensates for the renovation cost but does not yield a net economic benefit.

$$BCR_{(eq/en/int)} = \frac{\sum_{r=1}^{n}\left(AAEL_{ex,(eq/en/int),r} - AAEL_{ren,(eq/en/int),r}\right) \Big/ \sum_{r=1}^{n}\left(C_{rep,r}\right)}{\sum_{r=1}^{n}\left(C_{ren,(eq/en/int),r}\right) \Big/ \sum_{i=1}^{n}\left(C_{rep,r}\right)} \cdot t \qquad (1)$$

In Equation (1), both the renovation benefit and renovation cost are normalised to the present value of replacement cost (C_{rep}), resulting in the difference between average annual economic loss ratio ($\Delta AAELR$) in existing and renovated buildings (i.e. the numerator of the right-hand part of the equation). The rationale behind this normalisation is the approximate consideration of the spatial and material-based variation of the replacement and renovation cost. Specifically, the replacement cost within the exposure model refers to the value of replacing a building in accordance with the latest building codes applicable to a Member State, and it includes the cost of the structural, non-structural components and content (excluding the cost of land). The replacement cost is further differentiated among urban, rural areas, big cities, and among construction materials (Gkatzogias et al., 2022). For the sake of consistency, an attempt was made to implicitly consider the effect of variation in renovation cost, also per Member State, settlement type, and construction material, without explicitly defining cost in absolute terms (i.e. €/m^2) for each of these cases. Instead, C_{ren} was assumed proportional to C_{rep}, so that the denominator in the right-hand part of Equation (1) remains constant irrespective of the Member State, settlement type, construction material, or of whether *BCR* is calculated for a single building class or multiple classes. The constant renovation to replacement cost ratio C_{ren} / C_{rep} was estimated based on a reference case, addressing a reinforced concrete building in an urban area in Italy. The effect of the renovation and replacement cost variation (per Member State, settlement type, and construction material) is then intrinsically considered by the numerator in Equation (1), i.e. the division of *AAEL* by C_{rep}. Accordingly, *BCR* calculation conforms to Equation (2), where the constant C_{ren} / C_{rep} is estimated in Table 2 by renovation type.

$$BCR_{(eq/en/int)} = \frac{\sum_{r=1}^{n}\left(AAEL_{ex,(eq/en/int),r} - AAEL_{ren,(eq/en/int),r}\right) \Big/ \sum_{r=1}^{n}\left(C_{rep,r}\right)}{\left(C_{ren} / C_{rep}\right)_{(eq/en/int)}} \cdot t \quad (2)$$

Table 2. Cost definition in the reference case of a reinforced concrete building in an urban Italian area.

Cost variable	Seismic retrofit	Energy upgrading	Integrated retrofit
Renovation cost (C_{ren} in €/m^2) (1)	160	200	270
Replacement cost (C_{rep} in €/m^2) (2)	1312.5	1312.5	1312.5
$(C_{ren} / C_{rep})_{ref}$	0.12	0.15	0.21

(1) Pohoryles et al. (2020).
(2) ESRM20 (Crowley et al., 2021, available from EFEHR).

The costs of seismic retrofit and energy efficiency upgrading in Table 2 are based on average values obtained from various studies, while the cost of integrated renovation is assumed 25% lower than applying separately each type of renovation (Pohoryles et al., 2020). Accordingly, the renovation costs do not strictly correspond to a specific seismic retrofit or energy efficiency upgrading technology. Although the cost of renovation is expected to vary as a function of the implemented technology, the effect of this variation was investigated by considering a lower and upper bound value for the C_{ren} / C_{rep} ratios of Table 2 as described later. The replacement cost for the reference building was obtained from the ESRM20 (Crowley et al., 2021).

Average annual economic loss due to seismic repair represents a future and uncertain loss which occurs like clockwork once per year, assuming that vulnerability is constant over time. However, in Equations (1) and (2), $AAEL_{eq}$ is not explicitly discounted at present value (e.g. by using a discount rate in line with Porter, 2021). Instead, it is assumed that the increase in the replacement cost of buildings over time (and hence the increase in $AAEL_{eq}$) due to the inflation of the construction cost (6), counterbalances the reduced time value of money due to the inflation considering all goods and services. In a similar context, it is assumed that in the longer term the rate of increase in energy price compensates for the time value of money. In other words, Equations (1) and (2) consider that the inflation of construction cost and energy prices are equal to the inflation of other costs, and thus *BCR* values derived from the above equations reflect the benefit at present value. Although, both construction and energy sectors are characterised by increased market volatility, the above assumptions are rather conservative as they reduce the present value of the renovation benefit (e.g. compared to the case when inflation of energy prices outpaces inflation of other costs). By following the aforementioned approach, more specific aspects affecting the inflationary process, such as the capacity of the construction industry for renovation works (and available expertise) compared to the demand for renovation projects are not explicitly addressed.

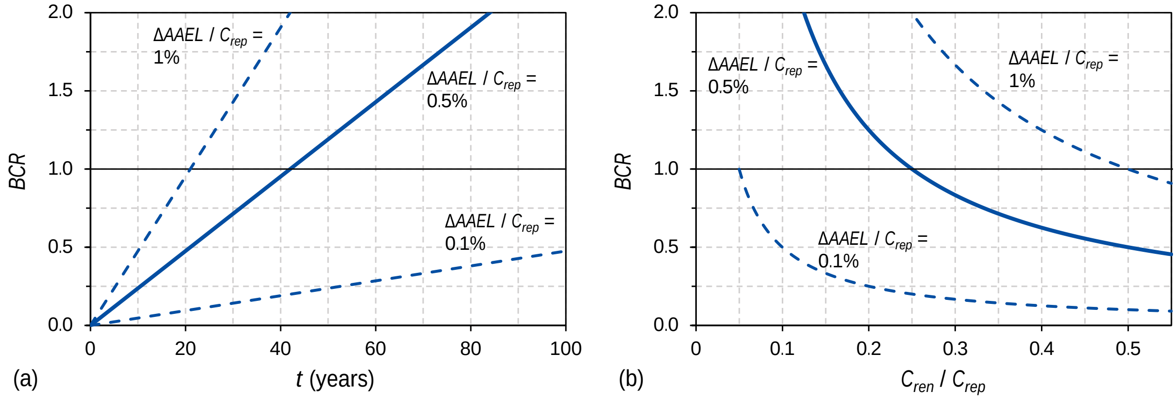
Finally, the variability of renovation cost and planning period was considered according to Table 3 to investigate their effect on *BCR*s and renovation scenarios. In Chapter 3, the impact of different scenarios is presented mainly for the case of $1.0 \cdot (C_{ren} / C_{rep})_{ref}$ and t = 50 years, whereas selected results are provided for analysis variables resulting in lower ($2.0 \cdot (C_{ren} / C_{rep})_{ref}$, t = 35) and upper bound ($0.5 \cdot (C_{ren} / C_{rep})_{ref}$, t = 100) *BCR* values. In all the considered cases, the renovation to replacement cost ratio C_{ren} / C_{rep} was defined according to Table 2. Figure 2 depicts the variation of *BCR* according to Equation (2) for different values of benefit-to-replacement cost ratios, as a function of t and C_{ren} / C_{rep}.

Table 3. Considered variability in renovation cost and planning period.

Variable	Range		
C_{ren} / C_{rep}	$0.5 \cdot (C_{ren} / C_{rep})_{ref}$	$1.0 \cdot (C_{ren} / C_{rep})_{ref}$	$2.0 \cdot (C_{ren} / C_{rep})_{ref}$
$(C_{ren} / C_{rep})_{eq}$	0.06	0.12	0.24
$(C_{ren} / C_{rep})_{en}$	0.08	0.15	0.30
$(C_{ren} / C_{rep})_{int}$	0.10	0.21	0.41
t (years)	100	50	35

(6) The derivation of replacement cost from construction cost is described in Gkatzogias et al. (2022).

Figure 2. *BCR* variation for different values of average annual economic benefit ($\Delta AAEL$) to replacement cost (C_{rep}) as a function of (a) planning period *t* with renovation to replacement cost C_{ren} / C_{rep} = 0.21, and (b) C_{ren} / C_{rep} with *t* = 50 years



2.1.2 Additional impact assessment metrics

Further impact assessment metrics were employed to assess the impact of renovation scenarios in economic and non-economic terms. Specifically, the difference between average annual economic loss due to seismic repair and energy consumption ($\Delta AAEL_{eq}$, $\Delta AAEL_{en}$, $\Delta AAEL_{int}$), average annual loss of life ($\Delta AALL$), and average annual space heating energy consumption ($\Delta AAEC$) before and after renovation, were calculated by renovation type. These metrics, derived from Equations (3)–(5) for a single (r = 1) or multiple (r > 1) renovated building classes, represent measures of annual benefit due to renovation in absolute terms, i.e. monetary value, number of fatalities, and energy consumption for $\Delta AAEL$, $\Delta AALL$, and $\Delta AAEC$, respectively.

$$\Delta AAEL_{(eq/en/int)} = \sum_{r=1}^{n} \left(AAEL_{ex,(eq/en/int),r} - AAEL_{ren,(eq/en/int),r} \right) \tag{3}$$

$$\Delta AALL = \sum_{r=1}^{n} \left(AALL_{ex,r} - AALL_{ren,r} \right) \tag{4}$$

$$\Delta AAEC = \sum_{r=1}^{n} \left(AAEC_{ex,r} - AAEC_{ren,r} \right) \tag{5}$$

The net average annual economic benefit, $\Delta AAEL_{net}$, resulting from the renovation of *n* building classes while excluding the cost of renovation was estimated as:

$$\Delta AAEL_{net,(eq/en/int)} = \Delta AAEL_{(eq/en/int)} - \left(\frac{C_{ren}}{C_{rep}} \right)_{(eq/en/int)} \cdot \sum_{r=1}^{n} \left(C_{rep,r} \right) / t \tag{6}$$

Similarly to *BCR* values, the average benefit in terms of economic loss, fatalities per hundred thousand occupants, and energy consumption was also estimated over the entire planning period (*t* years), and provided as a fraction of the replacement cost, the average number of occupants (over a 24-hour period), and the number of buildings and corresponding regional heating degree days value (*HDD*), respectively. The normalised benefits over the planning period, according to Equations (7)–(9), are expressions analogous (or strictly equal in the case of economic loss) to the numerator of Equation (2). They represent the renovation potential of a single or multiple building classes, defined as their capacity to save economic loss, lives and energy when they are renovated.

$$\Delta AELR_{(eq/en/int)} = \frac{\sum_{r=1}^{n}\left(AAEL_{ex,(eq/en/int),r} - AAEL_{ren,(eq/en/int),r}\right)}{\sum_{r=1}^{n}\left(C_{rep,r}\right)} \cdot t \quad (7)$$

$$\Delta ALLR = \frac{\sum_{r=1}^{n}\left(AALL_{ex,r} - AALL_{ren,r}\right)}{\sum_{r=1}^{n}(P_r)} \cdot t \cdot 10^5 \quad (8)$$

$$\Delta AEC_{bldg/HDD} = \frac{\sum_{r=1}^{n}\left(AAEC_{ex,r} - AAEC_{ren,r}\right)}{\sum_{r=1}^{n}\left(N_{bldg,r}\right) \cdot HDD} \cdot t \quad (9)$$

As noted earlier for *BCR*, the components of Equations (3)-(9) denoted with *r* refer to the buildings of a class promoted for renovation. In this context, the number of the renovated buildings (i.e. fraction of a class, single class or multiple classes) and the associated replacement cost and number of occupants serve as additional impact metrics, indicating the significance and scalability of a renovation strategy. These metrics are provided in most cases normalised to the total number of buildings (N_{bldgs}), total replacement cost (C_{rep}), and total number of average occupants (*P*) of the regional building stock.

$$pc_N = \frac{\sum_{r=1}^{n}\left(N_{bldg,r}\right)}{N_{bldg}} \quad (10)$$

$$pc_c = \frac{\sum_{r=1}^{n}\left(C_{rep,r}\right)}{C_{rep}} \quad (11)$$

$$pc_P = \frac{\sum_{r=1}^{n}(P_r)}{P} \quad (12)$$

In the context of an impact metric, the replacement cost indicates the economic value of buildings, therefore Equation (11), provides the value of buildings undergoing renovation as a fraction of the total value of the regional building stock.

The efficiency of a renovation scenario in creating impact is ultimately a function of the renovation potential of the building classes selected for renovation, and the distribution of buildings (or replacement cost) and occupants in these classes, while its economic feasibility can be described by a cumulative *BCR*. The renovation impact metrics described in this section are used as proxy measures to evaluate the efficiency of a renovation scenario, unless they are preselected as target values during the definition of a renovation scenario, e.g. the percentage of renovated buildings within a region in Scenario 2 (Table 1).

A significant differentiation among the indicators used in regional prioritisation (Figure 1a) and the impact metrics employed in the assessment of renovation scenarios (Figure 1b) should be stressed here. Regional indicators based on primary metrics, such as *AAEL*, *AALL*, *AAEC* and their normalised counterparts (e.g. *AAELR*, *AALLR*, $AAEC_{bldg/HDD}$), consider the entire regional building stock. For example, the regional *AAELR* indicator, was defined as the ratio of *AAEL* over the total replacement cost of buildings within a region (irrespective of their damage or loss state). On the contrary, relevant metrics in impact assessment consider only the renovated building stock. Regarding the previous example, *AAELR* in Equation (7) is defined at the building class level, i.e. both *AAEL* and C_{rep} account for the buildings within the class/classes undergoing renovation. The latter is equal to the regional *AAELR* when all buildings within a region are renovated.

2.1.3 Scenario 1

Scenario 1 investigates the impact of renovating predefined macro-taxonomy classes of the building stock within a region. The rationale behind aggregating building classes of the exposure model (as defined by the complete taxonomy strings, Section 2.1.4) to broader macro-taxonomy classes, is to facilitate the renovation process, e.g. through measures (legislation, programmes, technologies, etc.) with a broad field of application. The definition of the macro-taxonomy was simplistically based here on a single structural attribute relevant to the seismic performance, i.e. the building seismic design code level, although different or additional attributes may be considered based on engineering judgement, though increasing the level of granularity in the macro-taxonomy definition. Accordingly, four different macro-taxonomy classes were defined (Table 4) and used to group building classes.

Table 4. Definition of macro-taxonomy classes.

Exposure attribute		**Definition**
Seismic design code level	CDN	Code Design level - No
	CDL	Code Design level - Low
	CDM	Code Design level - Medium
	CDH	Code Design level - High

Scenario 1 implies the seismic, energy or integrated renovation of all buildings appertaining to a certain macro-taxonomy class within a region, and it may be applied to regions across the EU or focus on selected priority ones. It relies on the intuitive selection of macro-taxonomy classes for renovation, such as buildings with poor seismic or energy performance that are expected to result in high benefit when renovated (e.g. CDN, CDL). The impact is investigated through the cumulative *BCR* (Equation (2)), which indicates the normalised cumulative benefit from renovating all buildings of a certain macro-taxonomy class within a region. Additional metrics employed to assess the impact of this scenario refer to the share of renovated assets and associated population (pc_N, pc_C, pc_P), and the renovation benefit in absolute terms, i.e. the difference between average annual economic loss due to seismic repair and energy cost ($\Delta AAEL_{eq}$, $\Delta AAEL_{en}$, $\Delta AAEL_{int}$), average annual loss of life ($\Delta AALL$), and average annual energy consumption ($\Delta AAEC$) before and after renovation, according to the renovation type (Table 1).

2.1.4 Scenario 2

Scenario 2 investigates the impact of renovating predefined fractions of the building stock within a region, considering the building classes of the exposure model that address both the structural and energy attributes of buildings (*bcl_date*), as follows ([7]):

[MATERIAL] / [LLRS] + [CODE LEVEL or DUCTILITY] + [LATERAL FORCE COEFFICIENT] / [HEIGHT] / [IRREGULARITY] / [CONSTRUCTION DATE]

As a first rough approach, it was assumed that a constant fraction of the buildings from all building classes is renovated. In this case, the number of the renovated buildings within a region, N_{bldg_ren}, is specified in line with Equation (13). *pc* defines different renovation percentages (thus, alternative sub-scenarios) of the number of buildings included in each of the *n* building classes ($N_{bldg/bcl\_date,i}$), resulting in the renovation of an equal percentage (i.e. 10%, 20%) of the total number of the buildings in the considered region (N_{bldg}). The case of renovating the whole building stock within a region (100%) was investigated here (and in the following) mainly for the sake of comparison rather than as a financially viable strategy. Due to the adopted definition of the benefit-to-cost ratio according to Equation (2), the *BCR* of the renovated buildings remains constant irrespective of the percentage of the buildings that are renovated, thus the impact of such a renovation approach can be assessed mainly in terms of absolute benefit.

([7]) See Gkatzogias et al. (2022) for the definition of the components of the building class string.

$$\sum_{r=1}^{n}(N_{bldg,r}) = pc_j \cdot \sum_{i=1}^{n}(N_{bldg/bcl\_date,i}) = pc_j \cdot N_{bldg}, \quad \{pc\}_j = 0.1, \quad 0.2, \quad 1.0 \tag{13}$$

A slightly more evolved approach was finally adopted in **Scenario 2**, and presented in this report, as it generally outperforms the simpler one described in the previous paragraph. Building classes within a region were first sorted (or else prioritised) by decreasing benefit-to-cost ratio. In Equation (14), *BCR* refers to the individual ratio of each building class, as if a single class is renovated within the region under consideration. Scenario 2 aims at the renovation of the same fractions of the regional building stock as in the previous simplified approach (i.e. pc_j = 10%, 20%). However, in Scenario 2 each fraction of the building stock consists of an aggregate of the buildings within the top priority building classes. Buildings are aggregated starting from the building class with the highest *BCR* and moving to the next of lower ratio until the preselected percentage of buildings within a region (i.e. $pc_j \cdot N_{bldg}$) is reached. Equation (15) provides the number of renovated buildings, in the common case when adding the buildings of the *l*th class results in exceeding the preselected $pc_j \cdot N_{bldg}$, thus, only a fraction of the buildings from this class is considered (i.e. the term in parenthesis in the second row of Equation (15)).

$$\{BCR\}_{i=1}^{n} = BCR_{bcl\_date,i}, \quad BCR_{bcl\_date,i+1}, \quad \ldots \quad BCR_{bcl\_date,l}, \quad \ldots \quad BCR_{bcl\_date,n}$$
$$(BCR_{bcl\_date,i} \geq BCR_{bcl\_date,i+1}) \tag{14}$$

$$\begin{aligned} N_{bldg\_ren} &= \sum_{i=1}^{l-1}(N_{bldg/bcl\_date,i}) + \\ &\quad N_{bldg/bcl\_date,l} - \left(\sum_{i=1}^{l}(N_{bldg/bcl\_date,i}) - pc_j \cdot N_{bldg}\right) \\ &= pc_j \cdot N_{bldg} \end{aligned} \tag{15}$$

Accordingly, a cumulative *BCR* value in Scenario 2, indicates the normalised cumulative benefit from renovating the *l* building classes within a region. Contrary to the initial approach, the benefit-to-cost ratio varies with the percentage of buildings undergoing renovation, since different building classes are considered as a function of the *pc* value (Equations (14) and (15)). Apart from *BCR*, the main metrics employed to assess the impact of Scenario 2 refer to the renovation benefit in economic terms ($\Delta AAEL_{eq}$, $\Delta AAEL_{en}$, $\Delta AAEL_{int}$), average annual loss of life ($\Delta AALL$), and average annual energy consumption ($\Delta AAEC$), according to the renovation type (Table 1). Furthermore, the share of the total value of the building stock (pc_C) and the associated population (pc_P), are provided, which correspond to the preselected fraction of renovated buildings (pc_N).

2.1.5 Scenario 3

According to Scenario 3, buildings classes within a region are renovated based on their *BCR* value, calculated either individually (per building class) or for the sum of renovated buildings, so that renovation is always economically beneficial. Building classes within a region are first sorted by decreasing *BCR* according to Equation (14). **Scenario 3.1** renovates all the building classes (*l*) within a region that exhibit individually *BCR* ≥ 1.0, according to Equation (16). The metrics employed to quantify the renovation impact in this scenario include the renovation benefit (similarly to previous scenarios), the *BCR* indicating the normalised cumulative benefit from renovating the *l* building classes, and the share of renovated buildings in terms of exposure, i.e. building count, replacement cost, and average population expressed as a percentage of the regional building stock and population within a region.

$$N_{bldg\_ren} = \sum_{i=1}^{l} N_{bldg/bcl\_date,i} \quad (BCR_{bcl\_date,l+1} < 1.0) \tag{16}$$

Scenario 3.2 selects for renovation those building classes that result cumulatively in a *BCR* approximately equal to unity. Buildings from different building classes are aggregated, starting from the building class with the highest individual *BCR* and moving to the next of lower ratio, until the cumulative *BCR* becomes approximately equal to one. Based on this selection process, Scenario 3.2 renovates all the building classes that are considered in Scenario 3.1, i.e. those classes exhibiting individually *BCR*s ≥ 1.0 and as a group a cumulative *BCR* potentially higher than unity. By exploiting this available margin for further renovation when multiple building classes are renovated within a region (cumulative *BCR* ≥ 1.0), Scenario 3.2 considers in addition classes with individual *BCR*s < 1.0 (i.e. classes that are not economically beneficial to renovate on a stand-alone basis). In this context, Scenario 3.2 results in the maximum fraction of the building stock that can be cost beneficially renovated within a region, following a *BCR*-based prioritisation of building classes. Although not investigated here, alternative compositions of the fraction of buildings undergoing renovation may be explored through optimisation processes. For example, by considering the *BCR* ratio along with promoting for renovation building classes that maximise the number (or replacement cost) of the buildings, and the benefit in terms of energy consumption and loss of life.

$$\begin{aligned} N_{bldg\_ren} &= \sum_{i=1}^{m} N_{bldg/bcl\_date,i} \\ &= \sum_{i=1}^{l} \left(N_{bldg/bcl\_date,i}\right) + \sum_{i=l+1}^{m} \left(N_{bldg/bcl\_date,i}\right) \\ & \Big(l \leq m, \\ & BCR_{bcl\_date,l+1} < 1.0, \\ & BCR_{\sum_{i=1}^{m} bcl\_date,i} \approx 1.0\Big) \end{aligned} \tag{17}$$

The metrics employed to assess the renovation impact of Scenario 3.2 are those described in the case of Scenario 3.1, apart from the cumulative *BCR* which is approximately equal to one in line with the definition of this scenario, unless the entire regional building stock is renovated for a cumulative *BCR* higher than one.

An important feature of both Scenarios 2 and 3 is that the building classes that are promoted for renovation differ by renovation type due to their prioritisation and selection on the basis of *BCR*, which is different for seismic, energy, or integrated renovation per building class. This is in contrast to the strategy followed by Scenario 1, where a specific macro-taxonomy class is promoted for renovation regardless of the renovation type.

2.2 Seismic physical vulnerability of renovated buildings

Given the large-scale implementation of the integrated framework at the building class level across regions in the EU, a simplified approach was adopted to model the effect of building renovation on the average annual economic loss and average annual loss of life. It is reminded that in the case of existing buildings, the building classes of the exposure model were mapped to the available vulnerability models, since a distinct capacity curve was not available for every building class (Gkatzogias et al., 2022). Herein, the effect of seismic retrofit was modelled by mapping each building class of the exposure model to an upgraded vulnerability function, which reflects the improved performance of a retrofitted structure in terms of economic loss and loss of life without explicitly considering the retrofit technology required to attain the specific upgrade.

In the aforementioned context, the effect of seismic retrofit on reducing risk was modelled by upgrading the ductility level in GEM vulnerability models (Martins and Silva, 2021), or the seismic design code level and the lateral force coefficient in SERA models (Romão et al., 2019) ([8]). Regarding GEM models, the vulnerability functions for non-ductile (DNO) existing buildings were upgraded to moderate ductility (DUM) in renovated buildings. Likewise, vulnerability functions for low (DUL) and moderate ductility (DUM) were replaced with functions for high ductility (DUH) to model the effect of renovation. Finally, existing buildings of high ductility were not renovated (hence, the vulnerability function remained the same). In SERA models, building classes assigned with vulnerability functions with no seismic design (CDN) in the case of existing buildings were upgraded to moderate code level (CDM), whereas classes with low (CDL) and moderate code level (CDM) were upgraded to high code level (CDH). In all the cases of SERA models, the lateral load coefficient was increased by 5%.

Accordingly, the building classes of the exposure model were mapped to 243 and 114 vulnerability functions to model the performance of existing and renovated buildings, respectively. The mapping of building classes to vulnerability functions for existing and retrofitted buildings is provided in Table A. 1. Among the 114 vulnerability functions used to model the performance of renovated buildings, 61 functions were also used in modelling the performance of existing buildings (therefore, already presented in Gkatzogias et al., 2022). The rest 53 vulnerability functions were derived from the fragility functions of Table A. 2, according to the vulnerability models described in Gkatzogias et al. (2022). Table A. 2 provides the median (θ_{DSi}) and dispersion (β_{DS}) of lognormal distributions that were fit to discrete fragility models for different damage states (*DS*) (i.e. DS1: slight, DS2: moderate, DS3: extensive, and DS4: complete damage), along with the selected intensity measure (*IM*) selected for the 53 fragility classes. Likewise, the adopted values of the parameters in the damage-loss model for each vulnerability class are provided in Table A. 3. The parameters, also described in Gkatzogias et al. (2022), include: the likelihood that a completely damaged building ($P_{DS4} = P[DS = ds_4|IM]$) will collapse to the extent that it could cause loss of life ($P_{\text{lethal}|DS4}$) times a collapse factor (*cf*) representing a judgement-based correction of $P_{DS4} \cdot P_{\text{lethal}|DS4}$ for different building classes, the probability of entrapment given fatal collapse ($P_{\text{entrapment}}$) varying between daytime and night-time, and the probability of loss of life given entrapment ($P_{LL|\text{entrapment}}$) (Reinoso et al., 2018).

2.3 Energy performance of renovated buildings

The effect of renovation on the energy performance of buildings was modelled herein through an upgrade of the thermal insulation properties. Target (i.e. required maximum) thermal transmittance (*U*) values of external walls (U_w) and roofs (U_r) for renovated buildings, were retrieved mainly from the Concerted Action (CA) EPBD online database ([9]). Regional thermal transmittance values were employed when these were available, i.e. in the cases of Croatia (Marđetko Škoro, 2016), France (Bordier et al., 2016), Greece (Decision, 2017/178581), Italy (Costanzo et al., 2016), Portugal (Fragoso and Baptista, 2016) and Spain (DBHE, 2019). For the rest of the Member States, *U* values were adopted at the country level. A full list of adopted values and relevant references for renovated buildings is presented in Table A. 4. As in the case of seismic renovation, the retrofit technology was not explicitly considered. Renovation in all building classes was modelled through the target *U* values, except for classes with thermal transmittance lower than the target one at the as-built (i.e. existing) state. These represents recently built structures, and therefore no renovation was applied in these cases.

Space heating energy consumption and associated costs were calculated using the methodology presented in Gkatzogias et al. (2022) based on a physics-based artificial neural network (ANN) (Veljkovic et al., 2023). Similarly to existing buildings, and given the resolution of the exposure model and the diverse climatic conditions at NUTS-3 level, an ANN was employed to estimate the average annual specific (i.e. per m^2) heating energy demand of renovated buildings. To this end, the building classes of the exposure model were mapped to upgraded energy performance classes, according to their height and the target U_w and U_r values. These energy attributes along with the *HDD*s at the NUTS-3 level were used as input to the ANN. From this point forward, calculations followed the procedure described in Gkatzogias et al. (2022), including the scaling of the average annual specific energy consumption with the same factor, used in the case of existing buildings to match the Eurostat final energy consumption. The energy performance of the renovated EU-27 building stock was finally

([8]) See Gkatzogias et al. (2022) for more details on the adopted vulnerability functions.

([9]) https://epbd-ca.eu/database-of-outputs expressed in terms of the average annual energy consumption (*AAEC*) and average annual economic loss ($AAEL_{en}$) per renovated building class and NUTS-3 region.

The energy prices used to translate energy consumption to cost correspond to the year 2020 (Gkatzogias et al, 2022). Considering the significant increase in energy prices in 2022, it is commented here that the expected economic benefit due to energy efficiency upgrading increases as the cost of energy increases in the long term (i.e. when the inflation of energy prices outpaces inflation of other costs, Section 2.1.1).

3 Renovation impact

Chapter 3 presents georeferenced regional results derived from implementing the framework for impact assessment in the EU-27 as described in Chapter 2. First, in Section 3.1, summary statistics of *BCR* values are presented within priority regions that were identified in Gkatzogias et al. (2022) for various prioritisation schemes, along with additional impact metrics. *BCR* (Equation (2)) and the normalised impact assessment metrics (Equations (7)–(9)) in Section 3.1 refer to individual building classes, as if a single class of buildings is renovated within the region under consideration. In this context, Section 3.1 aims to provide an overview of the **renovation potential** of building classes within regions, reflecting their capacity to be renovated in a cost beneficial way, save lives, and reduce energy consumption. Subsequently, in Sections 3.2–3.4, cumulative *BCR* values and impact metrics are investigated (i.e. for the sum of the renovated buildings), according to the scenarios defined in Section 2.1 (Table 1). Hence, Sections 3.2–3.4 aim to provide the **renovation impact** of scenarios in terms of *BCR*s and benefits in absolute terms (Equations (3)–(5)) derived from renovating multiple building classes within a single or multiple regions. In this case, a multi-sectoral integrated prioritisation scheme is only used to facilitate comparisons. In all sections, results are presented by type of renovation, i.e. seismic retrofit, energy efficiency upgrading, and integrated renovation. Analysis was performed in MATLAB (Mathworks, 2022), whereas maps presenting the geospatial distribution of impact metrics were prepared with the QGIS software (QGIS, 2021).

The impact assessment of renovation scenarios does not aim to identify a unique renovation strategy in each region. On the contrary, an effort was made to showcase the differentiation of results when renovation strategies of different complexity are considered, and identify the associated benefit (in economic terms or otherwise) building renovation may have under the assumptions described in Chapter 2. Overall, the efficiency of a renovation strategy increases along with its selectiveness, i.e. the capability of targeting buildings of specific/detailed structural and energy attributes rather than generic classes of diverse characteristics. Inevitably, this comes at the cost of increased complexity in scenario definition and implementation. On the other hand, less complex renovations scenarios, may provide useful information on the feasibility of a venture depending on the funding source, as shown in the next sections.

Georeferenced impact metrics of renovation scenarios are presented for 1151 NUTS-3 regions (2021 classification) of the EU-27 (in line with Gkatzogias et al., 2022), with a focus on selected priority regions. Selected impact assessment results for the investigated scenarios are provided in more detail in Annex B.

3.1 Benefit-to-cost ratios

3.1.1 Seismic retrofit

Benefit-to-cost ratios per building class due to seismic retrofit are provided in Figure 3a (grey circles) in the case of C_{ren} / C_{rep} = 0.12 and t = 50 years (Table 3). The figure reports values for the top 50 priority regions that were identified based on the regional average annual economic loss ratio ($AAELR_{eq}$) indicator (Gkatzogias et al, 2022). Summary statistics in the figure are provided with the aid of Tukey box plots. On each box, the central horizontal red line indicates the median, and the bottom and top edges of the box correspond to the 25th and 75th percentiles, respectively. The lower adjacent value (denoted with the bottom whisker) is the smallest *BCR* value which is greater than or equal to the lower quartile minus 1.5 times the interquartile range. Likewise, the upper adjacent value is defined as the largest *BCR* less than or equal to the upper quartile plus 1.5 times the interquartile range. Outliers lie mainly outside the upper adjacent value range and indicate here high skewness of the *BCR* distributions rather than systematic errors. Such outliers, and high *BCR* values in general, may be used to increase the efficiency of a renovation scenario (Sections 2.1.5, 3.4). In all priority regions, the median of *BCR* values is lower than one, ranging from 0.17 to 0.56. However, the *BCR* values of the building classes within many regions are characterised by increased variability (coefficient of variation, CV_{BCR} = 0.37–1.51, BCR_{max} = 0.61–8.99). In fact, 35 out of the 50 regions have at least one building class with $BCR \geq 1.0$, whereas in seven Romanian regions, at least 25% of the building classes lie at a *BCR* range higher than one. Regarding the 35 aforementioned regions, the percentage of the building classes with $BCR \geq 1.0$ was found to be within the range of 2–34%. Figure 3a represents the priority regions where building classes are expected to have on average the highest renovation potential in economic terms (*BCR* values), since both the selection of regions and the calculation of *BCR* per class (Equation (2)) are based on $AAELR_{eq}$, defined at the regional and building class level, respectively.

Figure 3b presents box plots for the top 50 priority regions that were identified based on the multi-sectoral integrated indicator $I^*_{eq-en-SVI,3}$. The indicator considers the regional normalised average annual economic loss ratio due to seismic repair ($AAELR_{eq}$) and space heating energy consumption ($AAELR_{en}$), average annual loss of life ratio ($AALLR$), average annual economic loss (seismic repair and energy consumption) per building ($AAEL_{eq/bldg}$, $AAEL_{en/bldg}$), average annual energy consumption per building and HDD ($AAEC_{eq/bldg/HDD}$), and socioeconomic vulnerability (SVI) (Gkatzogias et al., 2022). Due to the multiple components of $I^*_{eq-en-SVI,3}$, the regions where seismic retrofit of building classes is cost beneficial are less compared to Figure 3a. Herein, 26 regions out of the 50 include at least one building class with $BCR \geq 1.0$, while the percentage of the building classes having $BCR \geq 1.0$ was found to be similar to the previous prioritisation scheme (i.e. 1–34%).

Regions with low BCR values in Figure 3a indicate building classes with high renovation and replacement cost, which result in non-beneficial return on investment over the considered planning period despite their high associated seismic risk ($AAELR_{eq}$) and expected renovation benefit ($\Delta AAELR_{eq}$). This is the case of building classes in Italian regions, as opposed to Greek and more so Romanian ones, where seismic retrofit appears appealing in economic terms. On the other hand, low BCR values in Figure 3b are, in addition, indicative of the higher contribution of the socioeconomic vulnerability-related component to the $I^*_{eq-en-SVI,3}$ score (e.g. Teleorman, RO317, Romania), and on some occasions due to the higher contribution of the energy-related components to the same integrated indicator (e.g. Milan, ITC4C, Italy) compared to the contribution of the earthquake component indicators (Gkatzogias et al., 2022). These contributions place the specific regions high in the $I^*_{eq-en-SVI,3}$ ranking despite their low regional $AAELR_{eq}$ indicator value, which in turn is reflected on low BCRs according to Equation (2). The regional average annual economic loss per building ($AAEL_{eq/bldg}$) indicator, which is part of the earthquake component of $I^*_{eq-en-SVI,3}$ along with $AAELR_{eq}$ and $AALLR$, may have a similar effect. For example, Athens (EL303) is dragged by the regional $AAEL_{eq/bldg}$ indicator to a higher-ranking position, but ultimately yields low BCR values in line with its low regional $AAELR_{eq}$ indicator (Gkatzogias et al., 2022).

Although an integrated approach may have a beneficial effect in the aforementioned cases of Figure 3a, b, the sensitivity of BCR values to the economic assumptions regarding the renovation and replacement cost, the inflation of construction cost, and the planning period should be emphasised (Section 2.1.1). As an example, Figure 3c, d highlights for the top 50 priority regions based on $I^*_{eq-en-SVI,3}$, the BCR values in the extreme cases of C_{ren} / C_{rep} = 0.06, t = 100 years, and C_{ren} / C_{rep} = 0.24, t = 35 years (Table 3). These cases exhibit the same coefficients of variation (CV_{BCR} = 0.37–1.51) but a different dispersion range of BCR values (compared to C_{ren} / C_{rep} = 0.12, t = 50 years). For the lowest renovation cost and the longest planning period, the medians of the BCR values are equal or above one in 29 regions out of the 50, whereas in 48 regions the fraction of the building classes with $BCR \geq 1.0$ ranges among 14% and 87%. On the contrary, analysis considering the highest renovation cost and the shortest planning period results in beneficial renovation of building classes only in 15 Romanian regions, where the fraction of building classes with $BCR \geq 1.0$ does not exceed 13%.

Apart from the BCR value, the renovation potential of each building class within a region was also associated with the benefit derived from the reduction of the average loss of life ratio, $\Delta ALLR$, provided by Equation (8). $\Delta ALLR$ on this occasion represents the capacity of a single building class to reduce fatalities over the planning period when it is seismically retrofitted. The benefit is provided per one hundred thousand occupants of the building class under consideration in line with Gkatzogias et al. (2022). Figure 4a presents the BCR values per building class within the top 50 priority regions according to the $I^*_{eq-en-SVI,3}$ indicator for C_{ren} / C_{rep} = 0.12 and t = 50 years. In this figure, the size of the circles indicates the magnitude of $\Delta ALLR$. Interestingly, in regions where seismic retrofit may be beneficial (due to the presence of building classes with $BCR \geq 1$), the building classes with high BCR values exhibit in general also high potential for saving lives.

The absolute benefit in terms of economic loss and fatalities (e.g. Equations (3), (4) per annum), apart from the renovation potential of each building class (Equations (7), (8)), is also a function of the number of buildings, replacement cost, and average number of occupants associated with each class. The distribution of these exposure attributes to the building classes of the top 50 priority regions according to $I^*_{eq-en-SVI,3}$ is indicated in Figure 4b–d. Specifically, the size of each circle in the figure represents the number of buildings, replacement cost, and average number of occupants per class as a fraction of the regional building stock and population according to Equations (10)–(12). The nearly identical distributions of replacement cost and average number of occupants in Figure 4c, d is the result of assumptions followed during the development of the exposure model. Both attributes were derived using the ratio of the number of dwellings per building class to the number of dwellings in the region (Gkatzogias et al., 2022). The figure indicates that the highest share of buildings, replacement cost, and average number of occupants per region is located in building classes with low renovation potential in terms of economy and reduction of loss of life (BCR, $\Delta ALLR$). This introduces further complexity in defining efficient seismic renovation strategies, since a renovation scenario should ideally promote for renovation building classes that combine high renovation potential and exposed assets.

Figure 3. Seismic retrofit: summary statistics for *BCR* values per building class (grey circles) within top 50 priority regions based on (a) the average annual economic loss ratio regional indicator $AAELR_{eq}$, renovation to replacement cost ratio C_{ren} / C_{rep} = 0.12, and planning period t = 50 years, (b) the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, and socioeconomic vulnerability), C_{ren} / C_{rep} = 0.12, t = 50 years, (c) $I^*_{eq-en-SVI,3}$, C_{ren} / C_{rep} = 0.06, t = 100 years, and (d) $I^*_{eq-en-SVI,3}$, C_{ren} / C_{rep} = 0.24, t = 35 years

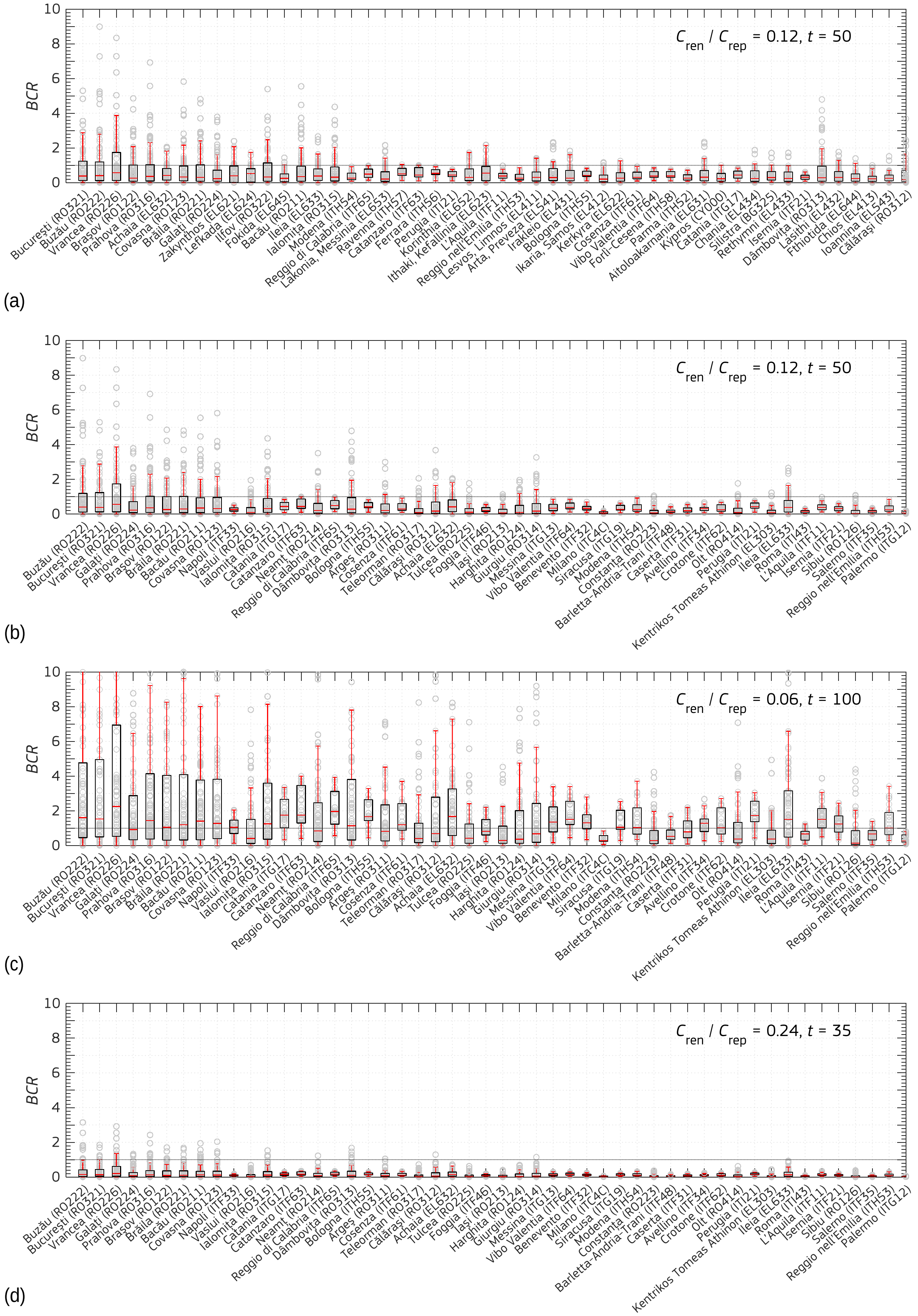
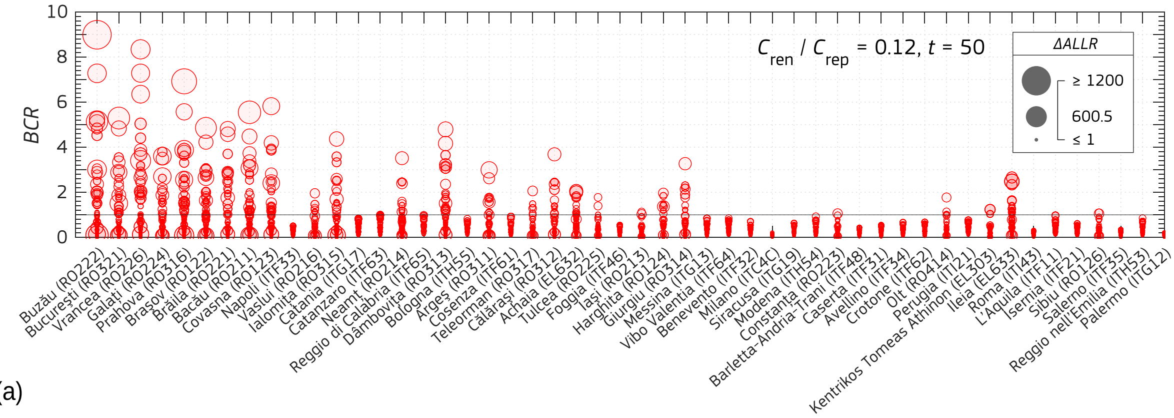
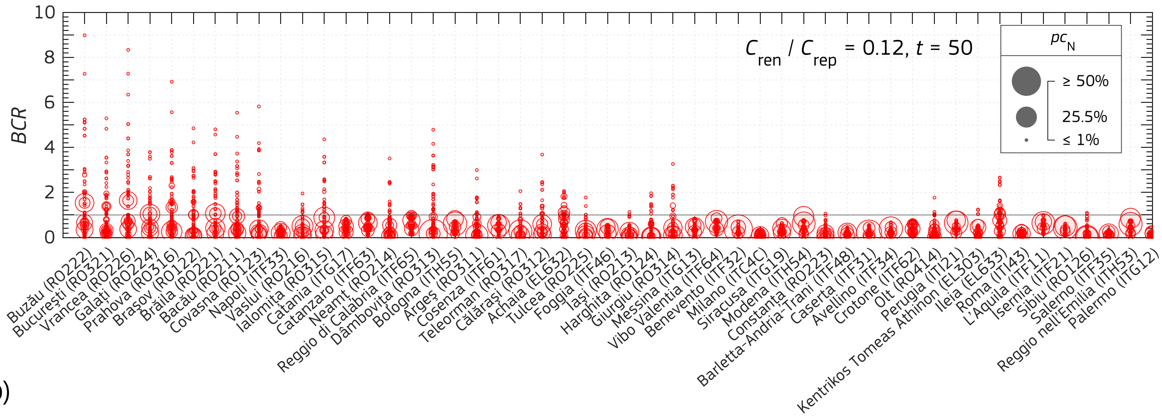


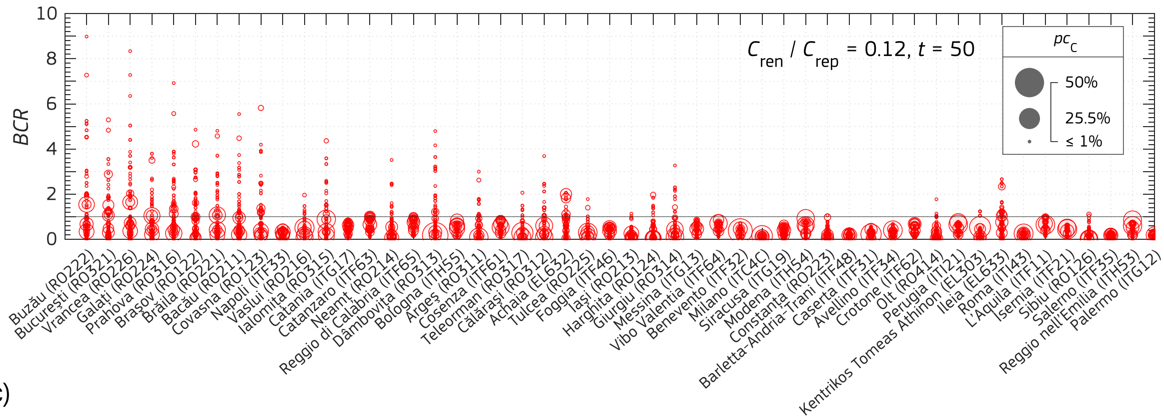
Figure 4. Seismic retrofit: *BCR* values per building class within top 50 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, and socioeconomic vulnerability), renovation to replacement cost ratio C_{ren} / C_{rep} = 0.12, planning period t = 50 years, along with associated (a) potential to reduce average loss of life over t ($\Delta ALLR$), (b) percentage of the regional building stock (pc_N), (c) percentage of the regional replacement cost (pc_C), and (d) percentage of the regional average number of occupants (over 24 hours) (pc_P)



(a)



(b)



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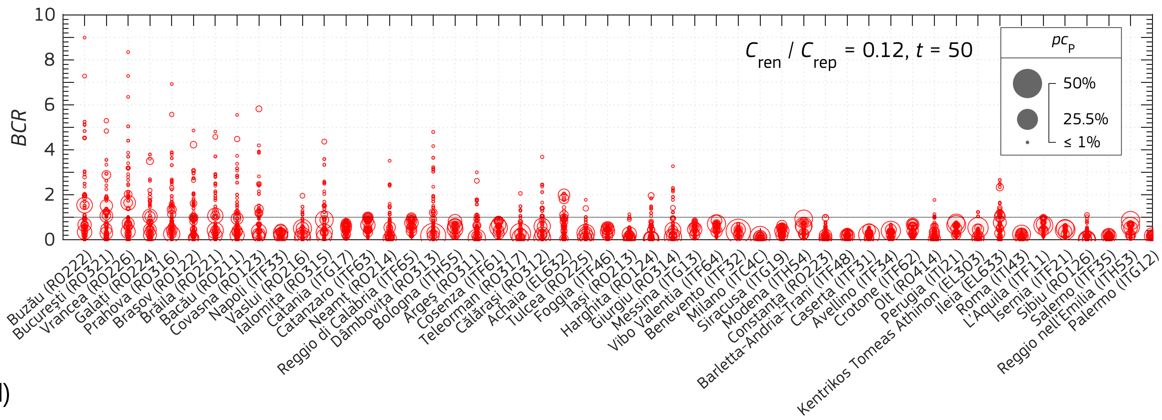


(d)

3.1.2 Energy efficiency upgrading

Benefit-to-cost ratios per building class due to energy efficiency upgrading are provided in Figure 5a in the case of C_{ren} / C_{rep} = 0.15 and t = 50 years (Table 3). The figure reports values for the top 50 priority regions, identified based on the regional average annual economic loss ratio ($AAELR_{en}$) indicator (Gkatzogias et al., 2022). Although this prioritisation scheme includes only 11 common regions to the $AAELR_{eq}$ one (therefore Figure 3a and Figure 5a are not directly comparable), it illustrates the regions where building classes are expected to have on average the highest energy upgrading potential in economic terms (BCR values). In almost all the priority regions (i.e. 49), the median of BCR values is equal or higher than one, ranging in general from 0.68 to 2.50, i.e. values significantly higher than those in the case of seismic retrofit (Figure 3a). On the other hand, the distributions of the BCR values in the priority regions are characterised by reduced variability (CV_{BCR} = 0.31–0.72), general absence of outliers, and $BCR_{\max}$ = 1.79–4.99 that are in general lower than in seismic retrofit. Nevertheless, the largest share of building classes in most regions lies above BCR = 1.0. In fact, all priority regions have at least one building class with $BCR \geq 1.0$, whereas the percentage of the building classes with $BCR \geq 1.0$ was found to be within the range of 36–100%, indicating high economic potential due to energy upgrading.

Figure 5b presents box plots for the top 50 priority regions based on the multi-sectoral integrated indicator $I^*_{\text{eq-en-SVI,3}}$. Due to the multiple components of $I^*_{\text{eq-en-SVI,3}}$ and due to the prioritisation approach followed by this indicator, regions and building classes where energy efficiency upgrading is deemed cost beneficial are less compared to Figure 5a. It is reminded that according to $I^*_{\text{eq-en-SVI,3}}$, the 200 regions with the highest seismic risk were initially selected considering the relevant earthquake component score (integrating $AAEL_{\text{eq,bldg}}$, $AAELR_{\text{eq}}$, $AALLR$). The preselected regions were subsequently ranked based on $I^*_{\text{eq-en-SVI,3}}$ (considering all component indicators), and the top 100 were finally selected (the top 50 are shown in Figure 5b), thus implicitly promoting regions of high seismic risk. Accordingly, in Figure 5b, the medians of BCR values are equal or higher than one in 22 regions, while ranging in general from 0.26 to 1.79. The variability and peak values are further supressed (CV_{BCR} = 0.28–0.62, $BCR_{\max}$ = 0.43–3.85). 31 regions out of the 50 include at least one building class with $BCR \geq 1.0$, while the percentage of the building classes having $BCR \geq 1.0$ within these regions ranges from 1% to 100%. Despite favouring regions of high seismic risk, the economic potential from energy upgrading remains high, providing valuable margin for improving the impact of seismic retrofit (Figure 3b) through integrated renovation.

In general, Italian regions with low BCR values in Figure 5b are indicative of the high renovation and replacement cost. Furthermore, BCR values are further supressed by the individual or combined effect of higher socioeconomic vulnerability (e.g. Naples, ITF33, Italy), higher seismic risk (e.g. Calabria, ITF65, Italy), and higher energy-related component score (i.e. average annual economic loss per building, $AAEL_{\text{en/bldg}}$, and average annual energy consumption per building and HDD, $AAEC_{\text{bldg/HDD}}$) (e.g. Rome, ITI43) compared to the regional $AAELR_{\text{en}}$ (Gkatzogias et al., 2022).

BCR values due to energy efficiency upgrading present a high sensitivity to the economic assumptions regarding the renovation and replacement cost, the inflation of energy prices, and the planning period (Section 2.1.1). Figure 5c, d highlights for the top 50 priority regions based on $I^*_{\text{eq-en-SVI,3}}$, the BCR values in the extreme cases of C_{ren} / C_{rep} = 0.08, t = 100 years, and C_{ren} / C_{rep} = 0.30, t = 35 years (Table 3). For the lowest renovation cost and the longest planning period, the medians of the BCR values are always beneficial, whereas the fraction of the building classes with $BCR \geq 1.0$ ranges among 55% and 100%. On the contrary, analysis considering the highest renovation cost and the shortest planning period results in beneficial renovation of building classes only in 10 Romanian regions, where the fraction of building classes with $BCR \geq 1.0$ does not exceed 12%.

The renovation potential of each building class within a region was further associated here with the benefit derived from the reduction of the average energy consumption per building and HDD, $\Delta AEC_{bldg/HDD}$, provided by Equation (9). $\Delta AEC_{bldg/HDD}$ for a single building class represents its capacity to save energy over the planning period. Figure 6a presents the BCR values per building class within the top 50 priority regions according to the $I^*_{\text{eq-en-SVI,3}}$ indicator for C_{ren} / C_{rep} = 0.15 and t = 50 years. Herein, the size of the circles indicates the magnitude of $\Delta AEC_{bldg/HDD}$. In regions where energy efficiency upgrading is expected to be economically beneficial, the building classes with high potential for saving energy exhibit in general high BCR values.

Finally, Figure 6b–d indicates the distribution of building count, replacement cost, and average number of occupants to the building classes of each region, affecting the absolute benefit in terms of economic loss and energy consumption (Equations (3), (5)), in addition to the renovation potential of each building class (Equations (7), (9)). Contrary to the case of seismic retrofit (Figure 4b–d), the highest share of exposed assets (in regions having at least one building class with $BCR \geq 1.0$) is located in building classes with medium to high BCR and $\Delta AEC_{bldg/HDD}$ values, and conveniently lies in the $BCR \geq 1.0$ range as described earlier.

Figure 5. Energy efficiency upgrading: summary statistics for *BCR* values per building class (grey circles) within top 50 priority regions based on (a) the average annual economic loss regional indicator $AAELR_{en}$, renovation to replacement cost ratio C_{ren} / C_{rep} = 0.15, and planning period t = 50 years, (b) the multi-sectoral integrated regional indicator $I^{*}_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, and socioeconomic vulnerability), C_{ren} / C_{rep} = 0.15, t = 50 years, (c) $I^{*}_{eq-en-SVI,3}$, C_{ren} / C_{rep} = 0.08, t = 100 years, and (d) $I^{*}_{eq-en-SVI,3}$, C_{ren} / C_{rep} = 0.30, t = 35 years

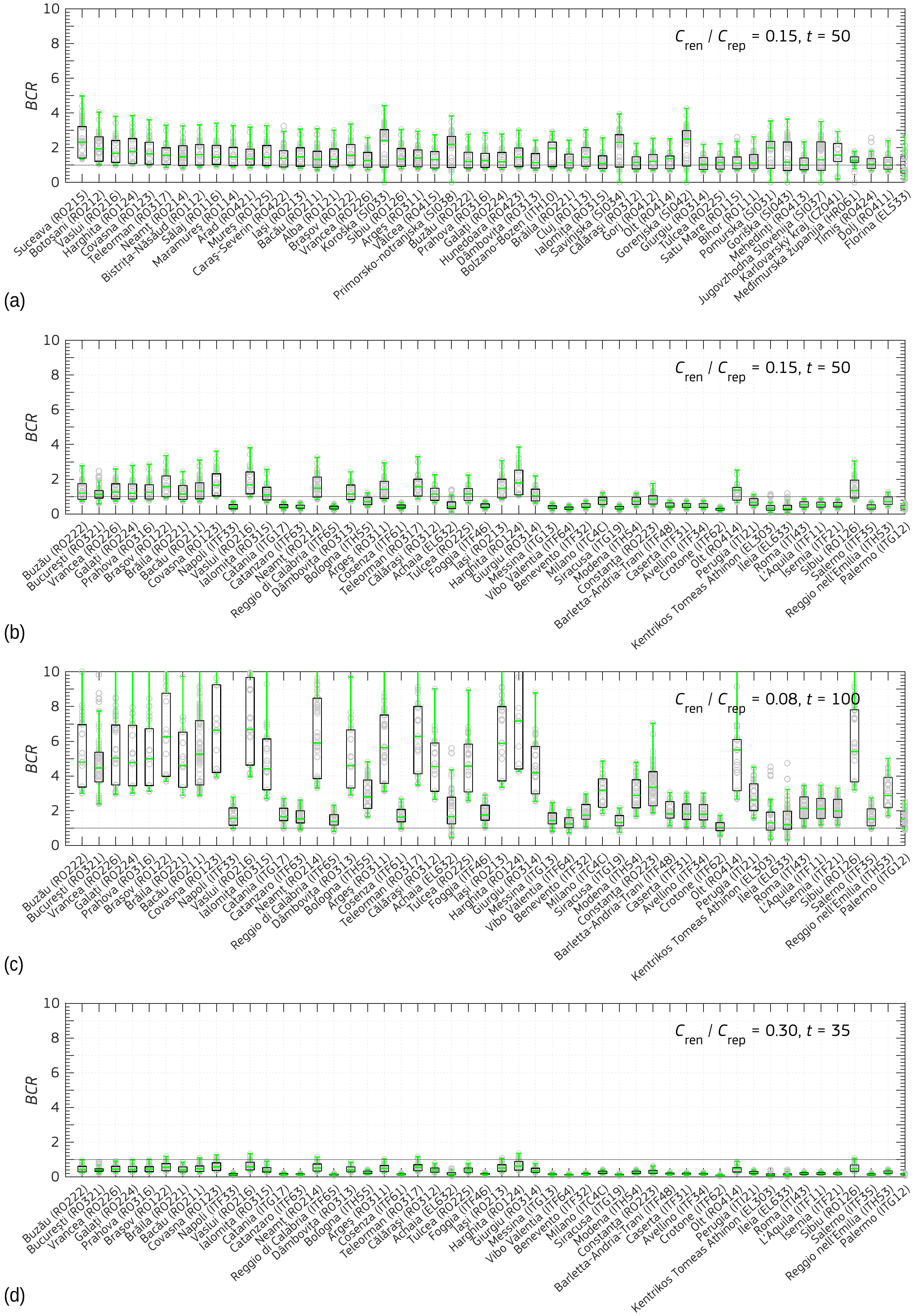
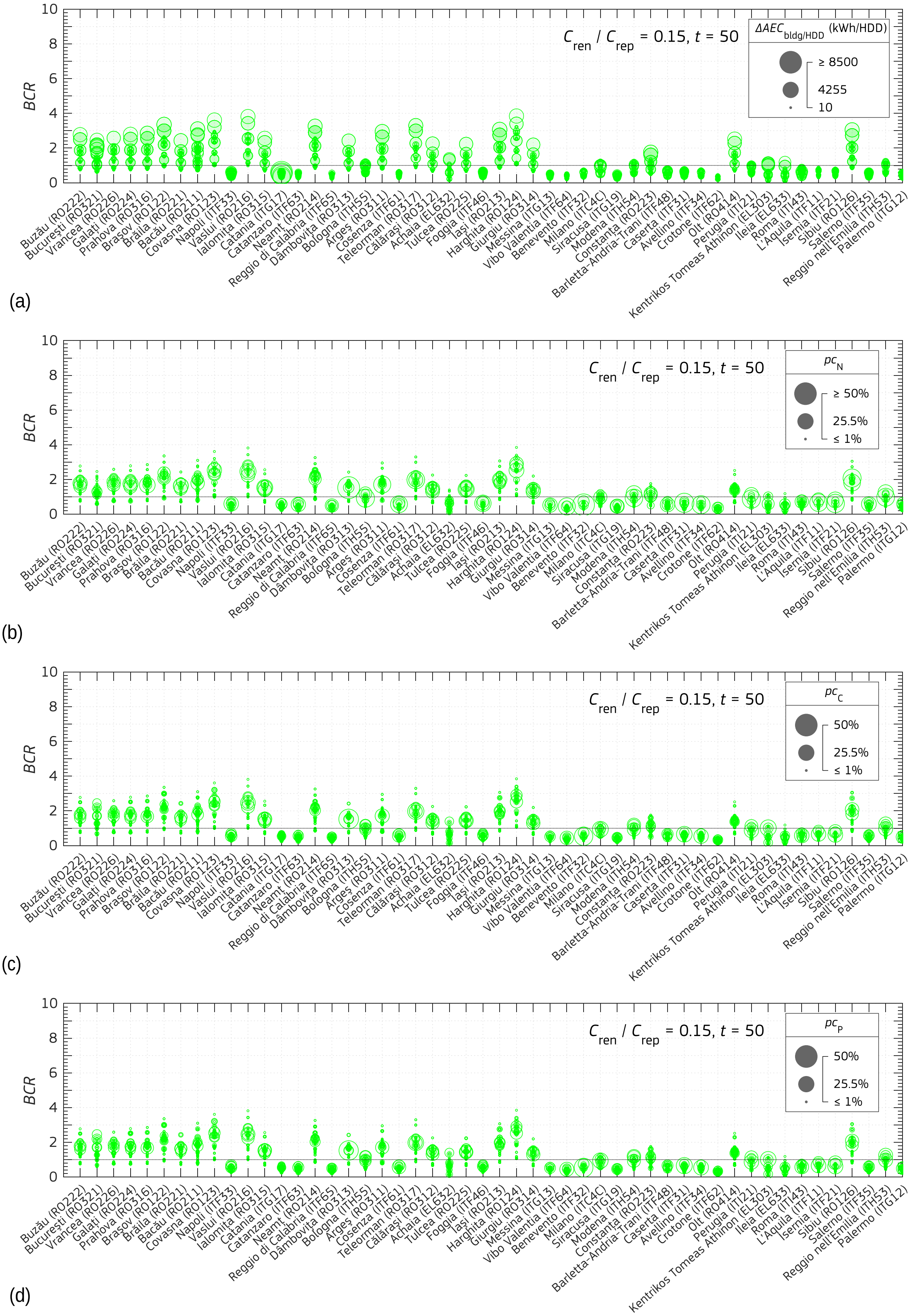


Figure 6. Energy efficiency upgrading: *BCR* values per building class within top 50 priority regions based on the multi-sectoral integrated regional indicator $I^{*}_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost ratio C_{ren} / C_{rep} = 0.15, planning period *t* = 50 years, along with associated (a) potential to reduce average energy consumption over *t* ($\Delta AEC_{bldg/HDD}$), (b) percentage of the regional building stock (pc_N), (c) percentage of the regional replacement cost (pc_C), and (d) percentage of the regional average number of occupants (pc_P)



3.1.3 Integrated renovation

In this section, the beneficial effect of integrated renovation is investigated at the building class level. Specifically, the potential of building classes to reduce economic loss, fatalities and space heating energy consumption due to integrated renovation within priority regions is compared to the case of seismic retrofit (Section 3.1.1) and energy efficiency upgrading (Section 3.1.2).

Benefit-to-cost ratios per building class due to integrated renovation are provided in Figure 7a in the case of C_{ren} / C_{rep} = 0.21 and t = 50 years (Table 3). The figure reports values for the top 50 priority regions based on the regional multi-sectoral integrated indicator I_{eq-en} which integrates component indicators related only to economic loss (i.e. $AAELR_{eq}$ and $AAELR_{en}$, Gkatzogias et al., 2022), and therefore indicates the regions where building classes are expected to have on average the highest *BCR* values. The top 50 ranking based on I_{eq-en} presents 27 and 34 regions in common with the $AAELR_{eq}$ and $AAELR_{en}$ rankings, respectively. In 35 priority regions of Figure 7a, the median of *BCR*s is equal or higher than one, ranging in general from 0.42 to 1.90. The above statistics are slightly inferior to those of the energy efficiency upgrading (Figure 5a), but showcase an improved renovation potential compared to seismic retrofit (Figure 3a). The *BCR* distributions are characterised by a variability range (CV_{BCR} = 0.26–0.76) which is similar to the case of energy upgrading. Yet, in regions that are common among the three rankings (I_{eq-en}, $AAELR_{eq}$, $AAELR_{en}$) the variability of integrated *BCR*s is higher than that of energy upgrading, and distributions are characterised by the presence of outliers (as in seismic retrofit). Peak *BCR* values vary between 1.25–7.18, i.e. lower than seismic retrofit but higher than energy upgrading. All priority regions have at least one building class with *BCR* ≥ 1.0, whereas the percentage of the building classes with *BCR* ≥ 1.0 was found to be within the range of 11–100%, clearly indicating a higher economic potential compared to seismic retrofit alone.

The above remarks are more evident when the potential of the different renovation types is investigated under the same prioritisation scheme. Figure 7b presents box plots for the top 50 priority regions based on the multi-sectoral integrated indicator $I^*_{eq-en-SVI,3}$. Due to the additional components of $I^*_{eq-en-SVI,3}$, regions and building classes where integrated renovation is deemed cost beneficial are less compared to Figure 7a. Specifically, the medians of *BCR* values are equal or higher than one in 21 regions, while ranging in general from 0.33 to 1.66. The variability and peak values vary among CV_{BCR} = 0.27–0.76 and BCR_{max} = 0.59–7.18, respectively. 34 regions out of the 50 include at least one building class with *BCR* ≥ 1.0, while the percentage of the building classes having *BCR* ≥ 1.0 within these regions ranges from 2% to 77%. By comparing Figure 7b with Figure 3b and Figure 5b the following are observed. In integrated renovation the minimum *BCR* values and medians tend to increase compared to seismic retrofit, following a similar trend as in energy efficiency upgrading. On the contrary, maximum *BCR*s, albeit lower, are closer to the range of the values derived from seismic retrofit. In regions where *BCR* values do not indicate a significant economic potential from neither seismic retrofit nor energy efficiency upgrading (e.g. Naples, ITF33, Rome, ITI43), integrated renovation provides a slight improvement but *BCR* values remain in general lower than one. The latter concerns mainly Italian regions due to the high renovation and replacement costs.

Similarly to seismic retrofit and energy upgrading, *BCR* values due to integrated renovation present a high sensitivity to the economic assumptions of Section 2.1.1. Interestingly, in the case of the lowest renovation cost and longest planning period (C_{ren} / C_{rep} = 0.10, t = 100 years in Figure 7c), the fraction of the building classes with *BCR* ≥ 1.0 ranges among 64% and 100%, surpassing in renovation potential the case of energy efficiency upgrading. The highest renovation cost and the shortest planning period (C_{ren} / C_{rep} = 0.41, t = 35 years in Figure 7d) results in beneficial renovation of building classes in 17 Romanian regions, i.e more than the cases of seismic retrofit and energy efficiency upgrading.

The renovation potential of each building class within a region was associated here both with their capacity to reduce fatalities ($\Delta ALLR$) and save energy ($\Delta AEC_{bldg/HDD}$). Figure 8a, b indicates that in regions where integrated renovation is expected to be in general beneficial in economic terms, the highest potential for saving lives and saving energy is concentrated in building classes with *BCR* ≥ 1.0. Likewise, in the same regions, the highest share of building count (Figure 8c) and replacement cost (Figure 8d) are located in building classes with medium to high *BCR*, $\Delta ALLR$, and $\Delta AEC_{bldg/HDD}$ values, which generally lie above *BCR* = 1.0, following the trend in the energy renovation case.

Figure 7. Integrated renovation: summary statistics for *BCR* values per building class (grey circles) within top 50 priority regions based on (a) the average annual economic loss ratio regional indicator I_{eq-en} (due to seismic repair and heating energy consumption), renovation to replacement cost ratio C_{ren} / C_{rep} = 0.21, planning period t = 50 years, (b) the multi sectoral integrated regional indicator $I^{*}_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), C_{ren} / C_{rep} = 0.21, t = 50 years, (c) $I^{*}_{eq-en-SVI,3}$, C_{ren} / C_{rep} = 0.10, t = 100 years, and (d) $I^{*}_{eq-en-SVI,3}$, C_{ren} / C_{rep} = 0.41, t = 35 years

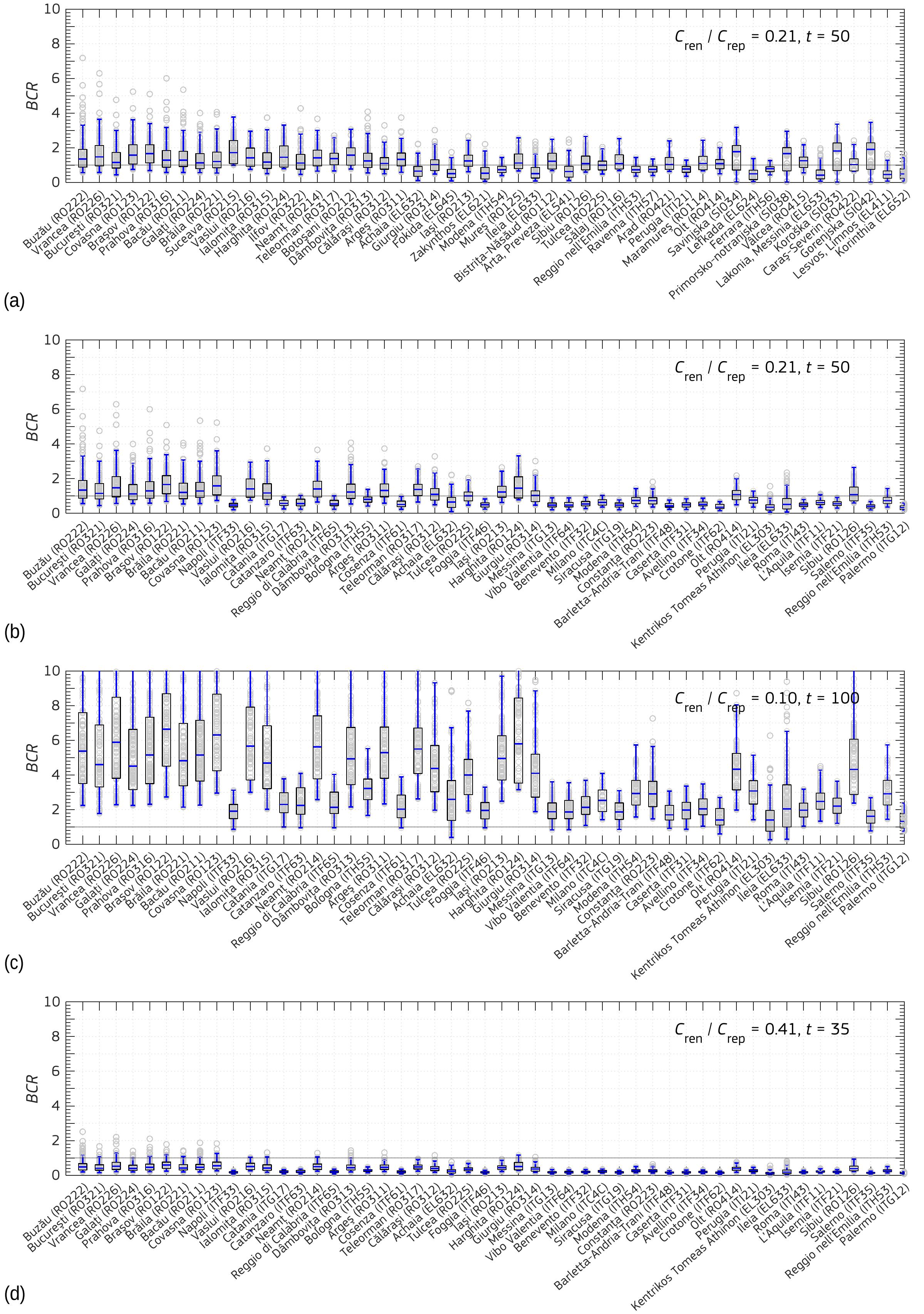
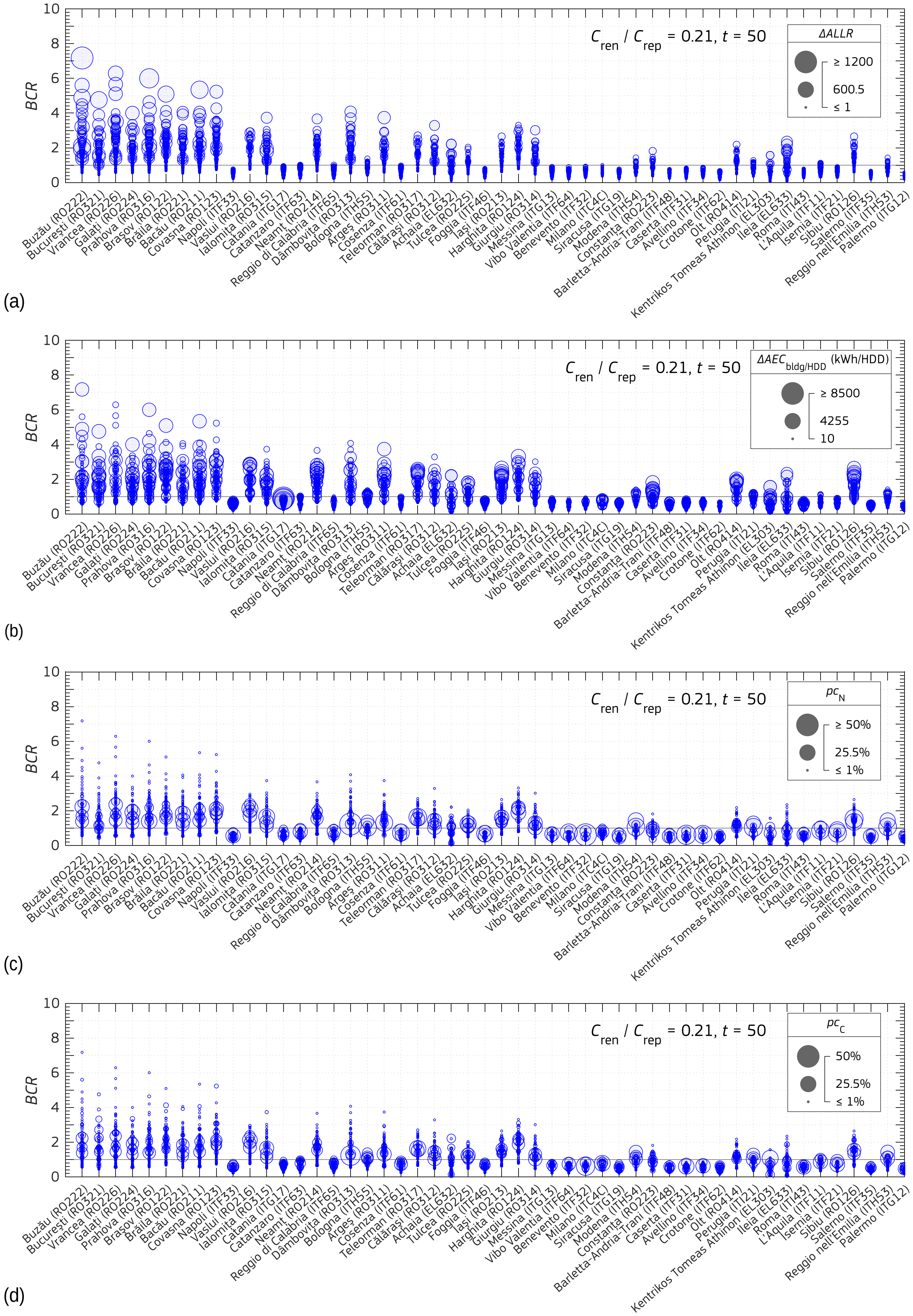


Figure 8. Integrated renovation: *BCR* values per building class within top 50 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.21, planning period t = 50 years, along with associated (a) potential to reduce average loss of life over t ($\Delta ALLR$), (b) potential to reduce average energy consumption over t ($\Delta AEC_{bldg/HDD}$), (c) percentage of the regional building stock (pc_N), (d) percentage of the regional replacement cost (pc_C)



3.2 Scenario 1

Scenario 1 investigates the impact of renovating all buildings within predefined macro-taxonomy classes for all NUTS3 regions across the EU, but with a focus on priority regions, that were identified based on the multi-sectoral integrated indicator $I^*_{eq-en-SVI,3}$. Sub-scenarios 1.1–1.3 refer to the renovation of all buildings within CDN, CDL, and CDM macro-taxonomy classes, respectively, as this is expected to yield the highest benefit due to seismic retrofit, in economic terms or otherwise (e.g. reducing fatalities). In addition to seismic retrofit, the same macro-taxonomy classes were considered in energy and integrated renovation. The impact of the sub-scenarios was assessed in terms of *BCR* and additional metrics as defined in Table 1.

3.2.1 Seismic retrofit

Figure 9 presents the cumulative benefit-to-cost ratios derived from implementing sub-scenarios 1.1–1.3, within the top 50 priority regions. In the case of C_{ren} / C_{rep} = 0.12 and t = 50 years, Figure 9a depicts a cumulative *BCR* range of 0.07–1.17, 0.14–1.66 and 0.09–1.2 for sub-scenarios 1.1–1.3, with only 2, 5 and 4 regions, respectively, exhibiting values equal or higher than one. All the regions with at least one cost-beneficial sub-scenario are Romanian ones, apart from one Greek region, where macro-taxonomy class CDL could be retrofitted in a cost-beneficial way. Finally, only in one region, ranked first in the priority list (i.e. Buzau, RO222, Romania), renovation according to all the three sub-scenarios is economically beneficial.

Adopting the lowest renovation cost and the longest planning period (C_{ren} / C_{rep} = 0.06 and t = 100 years, in Figure 9b) results in a significantly improved economic feasibility of sub-scenarios, with cumulative *BCR* values four times higher than in the previous case (Figure 9a), according to Equation (2), indicating at the same time the sensitivity of renovation impact to these variables. Specifically, 33 out of the 50 regions achieve cost-beneficial renovation in all sub-scenarios (Figure 9b), which in turn encompass almost the entire building stock in these regions. Despite the significant reduction of the renovation cost and the elongation of the planning period, there are still 7 regions, i.e. 2 Romanian and 5 Italian, resulting in economically non beneficial seismic retrofit, irrespective of the considered sub-scenario. On the other hand, C_{ren} / C_{rep} = 0.24 and t = 35 years (Figure 9c) do not lead to economically advantageous renovation in any of 50 selected priority regions. Table 5 reports the number of regions with cumulative *BCR* ≥ 1.0 for the above cases of renovation cost and planning period variability and for each sub-scenario, when the top 100 priority regions are considered.

The renovation impact of sub-scenario 1.2 (i.e. upgrading macro-taxonomy CDL) across the EU NUTS-3 regions is presented in Figure 10 and Figure 11, highlighting the top 100 priority regions in red borders. The impact is presented in terms of the regional percentage of buildings (pc_N) undergoing renovation, the associated average annual benefit in economic (Δ*AAEL*) and loss of life (Δ*AALL*) terms, and the cumulative *BCR*s corresponding to the renovation of CDL buildings. Scenario 1 promotes for renovation specific macro-taxonomy classes (i.e. CDL in Figure 10 and Figure 11), and therefore buildings are renovated across most of the EU regions (Figure 10a) irrespective of their seismic risk. In a similar context, the economic and loss of life impact extends across the EU (Figure 10b, Figure 11a), regardless of the economic feasibility (*BCR* ratios in Figure 11b). Regions shown in white colour in Figure 10 and Figure 11a do not include CDL buildings. These are Belgian and Dutch regions where the entire building stock has been constructed with no seismic design considerations (all buildings belong to the CDN macro-taxonomy). In Figure 11b, regions in white and grey include, in addition, those where seismic retrofit is not beneficial (with grey ones exhibiting cumulative *BCR*s closer to one).

Figure 12 presents in more detail the same impact metrics shown on maps (pc_N, Δ*AAEL* and Δ*AALL*) for all three sub-scenarios in the top 50 priority regions. According to Figure 12a, sub-scenario 1.1 results in general in the renovation of the largest share of the regional building stocks, since buildings appertaining to CDN macro-taxonomy are the most common in the majority of the top 50 regions. The same remark is also valid for the top 100 regions in total terms, as shown in Table 6: sub-scenario 1.1 renovates the largest share of buildings, followed by sub-scenario 1.2 (renovation of CDL buildings) and 1.3 (CDM buildings). The shares of replacement cost and average number of occupants associated with renovated buildings are quite balanced between sub-scenarios 1.1 and 1.2, exceeding by far the relevant percentages in sub-scenario 1.3, which is in line with the small fraction of CDM buildings in the top 100 priority regions. The cumulative *BCR*s and the net economic benefits, provided in Table 6, correspond to the venture of renovating the relevant macro-taxonomy classes of the building stock within all top 100 priority regions. Both these metrics imply an economically non beneficial venture over the planning period of 50 years.

In Figure 12b, the highest average annual economic benefit was found for sub-scenarios 1.1 and 1.2 in Italian regions, but relevant *BCR*s are lower than 1.0 (Figure 9a), mainly due to the high renovation cost in Italy, compared to Romania and Greece. Regarding the reduction of fatalities (Figure 12c), the highest benefit was observed in Bucharest (RO321), with 18 and 13 saved lives annually in the case of sub-scenarios 1.1 and 1.2, respectively, out of which only scenario 1.2 is cost-beneficial (Figure 9a).

Overall, seismic retrofit according to Scenario 1 appears to be economically feasible in a few regions characterised by quite high seismic risk and low renovation cost (Figure 11b), whereas it is not economically feasible to implement this scenario as a general renovation strategy in the investigated priority regions. Regarding the economic feasibility, sub-scenario 1.2 appears in general more beneficial in economic terms than scenario 1.1 (e.g. Figure 9). The lower benefit-to-cost ratios derived in the case of renovating CDN buildings may be attributed first to the presence of such buildings in lower seismicity regions (Crowley et al., 2021), and thus to a lower contribution to the average annual economic loss to existing buildings ($AAEL_{ex,eq}$ in Equation (2)), compared to the relevant contribution of CDL buildings. Second, according to the renovation strategy adopted herein (Section 2.2), CDN buildings are upgraded to CDM, whereas CDL buildings to CDH. The relevant improvement in building structural performance, derived from the associated code level prescriptions, is much higher in the second case, which in turn results in lower $AAEL_{ren,eq}$. The combined effect of these two points counterbalances the typically lower replacement cost of CDL buildings and results in lower *BCR* values. The venture of renovating CDN and CDL buildings within all top 100 priority regions (Table 6) represents a relevant example, where *BCR* for sub-scenario 1.1 results lower than in 1.2, despite the higher presence of CDN buildings and their lower total value.

Table 5. Scenario 1 – seismic retrofit: number of regions with cumulative *BCR*s ≥ 1.0 by sub-scenario, considering the variability of renovation cost and planning period, and the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	C_{ren} / C_{rep} = 0.24, *t* = 35 years			C_{ren} / C_{rep} = 0.12, *t* = 50 years			C_{ren} / C_{rep} = 0.06, *t* = 100 years		
	Sub-scenario 1.1	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**
	CDN	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**
Regions (cumulative *BCR* ≥ 1)	0	0	0	3	6	4	65	78	73

Table 6. Scenario 1 – seismic retrofit: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.12 and planning period *t* = 50 years.

Impact metric	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
	CDN	**CDL**	**CDM**
Regions of implementation	100	100	100
Cumulative *BCR*	0.31	0.35	0.34
Average annual economic loss benefit *ΔAAEL* (10^6 €)	828.31	1083.58	145.49
Net average annual economic loss benefit $\Delta AAEL_{net}$ (10^6 €)	-1825.16	-1972.47	-280.65
Average annual loss of life benefit *ΔAALL* (fatalities)	72	85	9
Average annual energy consumption benefit *ΔAAEC* (GWh)	-	-	-
Buildings	6215321	3464134	587030
Replacement cost (10^6 €)	1088337.76	1253459.63	174785.06
Average occupants (over 24 hrs)	13058142	13611294	2874415
Buildings (%)	59	33	6
Replacement cost (%)	42	49	7
Average occupants (%)	43	44	9

Figure 9. Scenario 1 – seismic retrofit: cumulative *BCR* values per sub-scenario of renovating CDN, CDL, CDM buildings within top 50 priority regions (based on the multi sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for (a) renovation to replacement cost C_{ren} / C_{rep} = 0.12, planning period t = 50 years, (b) C_{ren} / C_{rep} = 0.06, t = 100 years, and (c) C_{ren} / C_{rep} = 0.24, t = 35 years

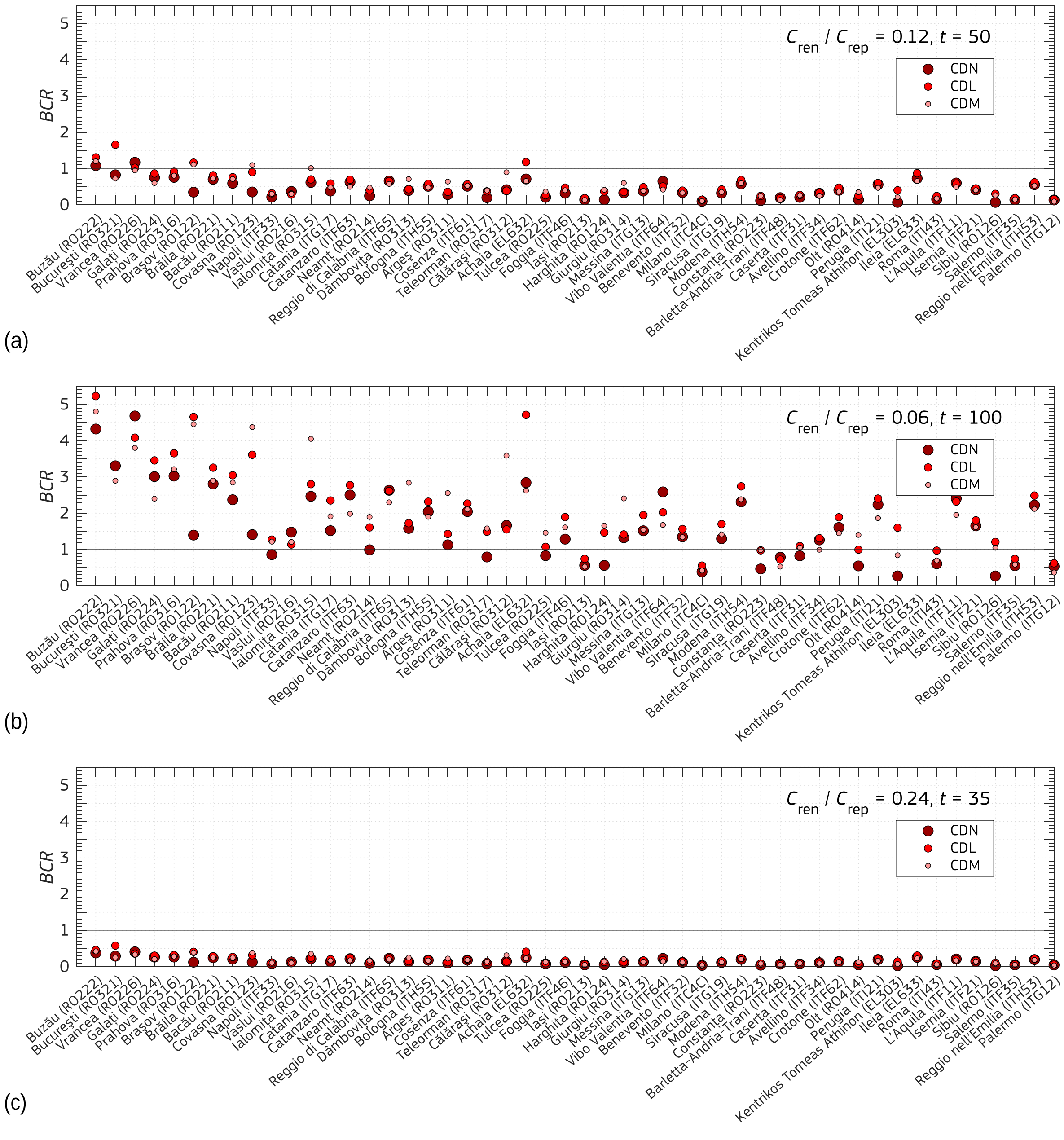


Figure 10. Scenario 1 – CDL seismic retrofit: (a) percentage of renovated buildings (pc_N), and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.12, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

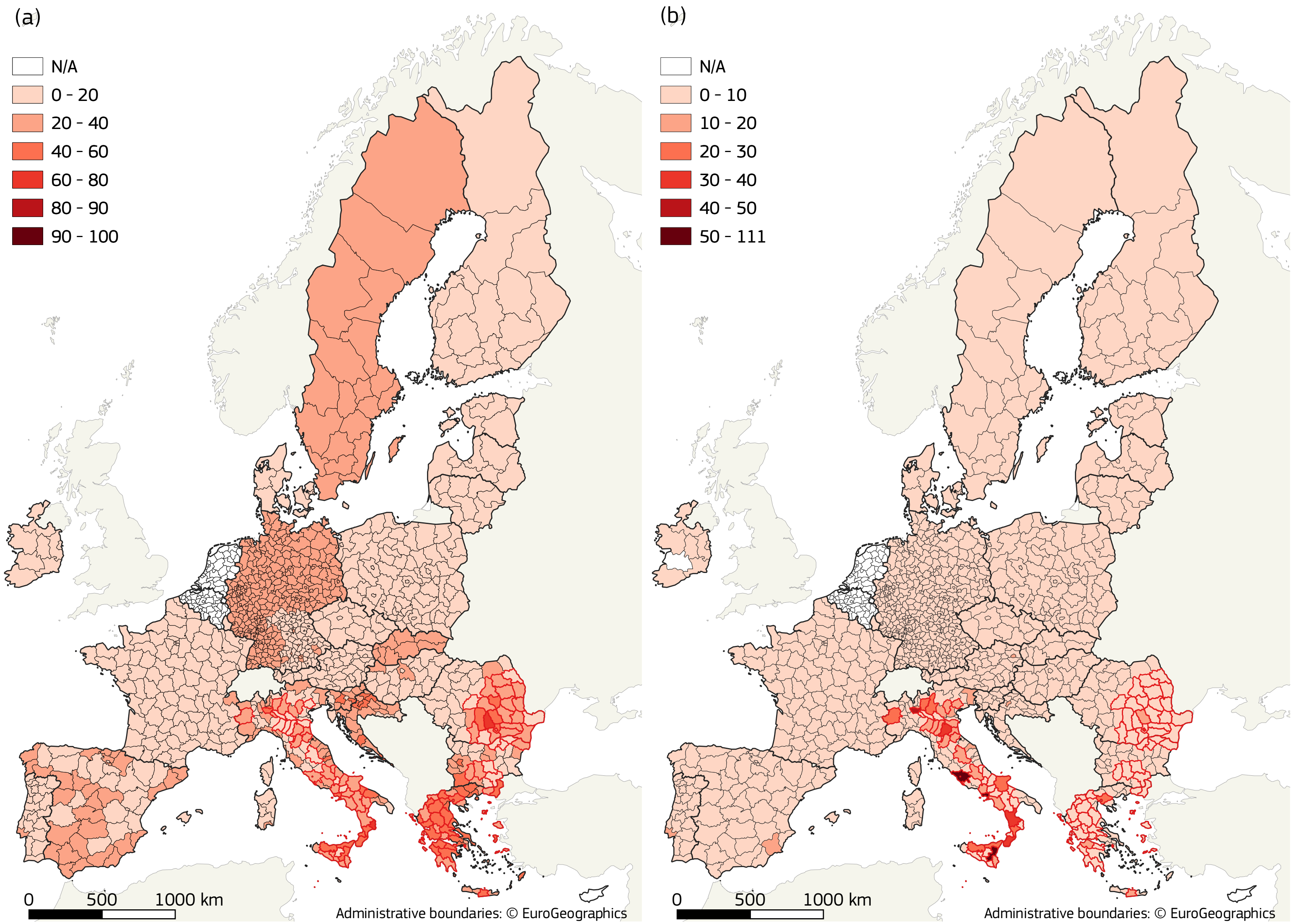


Figure 11. Scenario 1 – CDL seismic retrofit: (a) average annual benefit in terms of fatalities (Δ*AALL*), and (b) cumulative *BCR*s of renovated buildings for C_{ren} / C_{rep} = 0.12, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

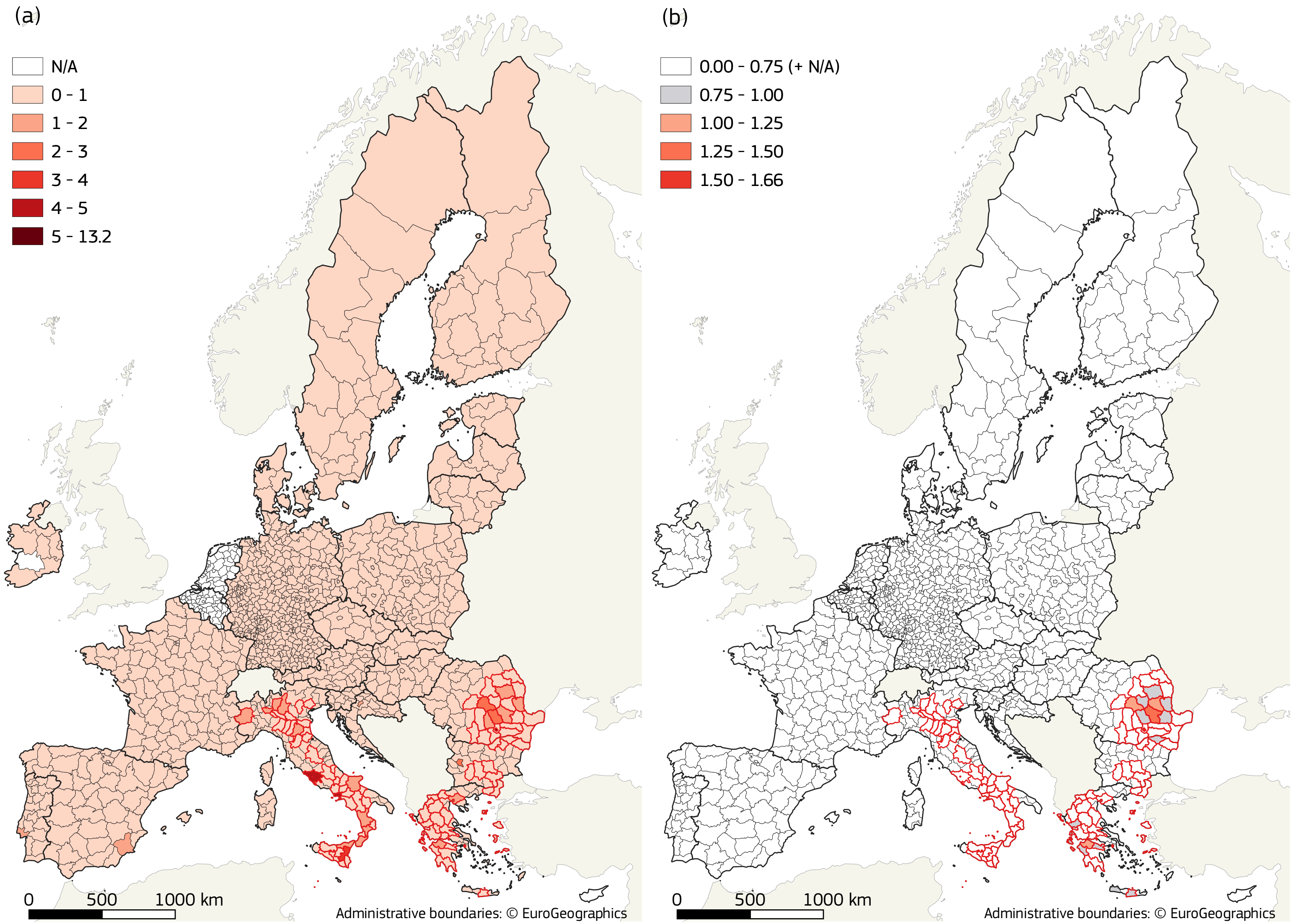
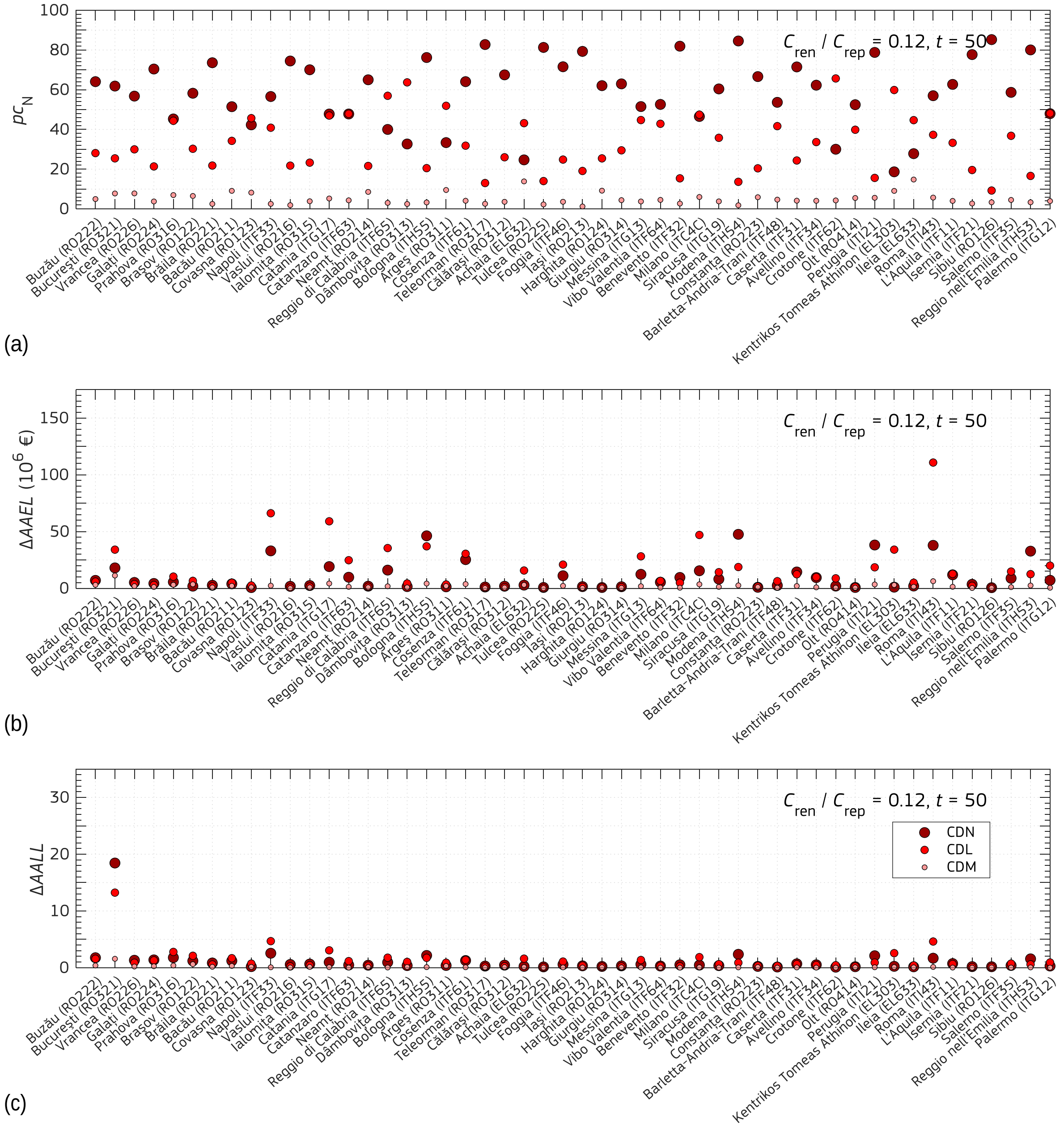


Figure 12. Scenario 1 – seismic retrofit: (a) percentage of renovated buildings (pc_N) per sub-scenario (CDN, CDL, CDM), and corresponding average annual benefit in terms of (b) economic loss (Δ*AAEL*), and (c) fatalities (Δ*AALL*), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.12, planning period t = 50 years



3.2.2 Energy efficiency upgrading

Figure 13 presents the cumulative benefit-to-cost ratios derived from implementing sub-scenarios 1.1–1.3 for the energy upgrading of buildings. *BCR* values herein are significantly higher compared to those of seismic retrofit, due to the higher economic benefit from energy savings. For C_{ren} / C_{rep} = 0.15 and t = 50 years (Figure 13a), their values reach up to 2.76, 2.74 and 1.86 for sub-scenarios 1.1–1.3 respectively. Most economically beneficial is the renovation of CDN and CDL buildings, whereas all three sub-scenarios have *BCR* ≥ 1.0 in 22 out of the top 50 priority regions (Figure 13a), all of them located in Romania. In 20 Italian and three Greek regions, renovation is not economically beneficial in all sub-scenarios, although many of these regions have higher economic benefit compared to seismic retrofit. In the case of C_{ren} / C_{rep} = 0.08 and t = 100 years (Figure 13b), almost all regions achieve a cost-beneficial energy renovation in all sub-scenarios. Data that are not visible in the first nine Romanian regions reach cumulative *BCR* values of 5.5–10.2. On the contrary, C_{ren} / C_{rep} = 0.30 and t = 35 years (Figure 13c) result again in the lack of economic benefit regardless of the considered sub-scenario and priority region, indicating the relevant sensitivity of impact metrics.

Out of the top 100 priority regions, 41, 30, and 22 regions, allow the energy upgrading of CDN, CDL, and CDM buildings, respectively, in the case of C_{ren} / C_{rep} = 0.15 and t = 50 years (Table 7). Renovating all CDN buildings within the top 100 regions is almost economically beneficial with a cumulative *BCR* equal to 0.93 in Table 8. This is similar to the effect that the renovation of multiple classes within a region may have on the cumulative *BCR*, described in Section 2.1.5 (i.e. in the definition of Scenario 3) and presented in more detail in Sections 3.3 and 3.4. Overall, sub-scenario 1.1 presents the highest benefit in energy cost and consumption, as it considers old buildings with low energy performance. It is noteworthy that in different countries, CDN, CDL and CDM macro-taxonomy classes encompass buildings constructed during different time periods and thus characterised by different thermal insulation properties (Gkatzogias et al., 2022). Even in a single country, the considered macro-taxonomy classes integrate buildings of different thermal transmittance values and height. More refined macro-taxonomy classes, addressing the aforementioned energy attributes of buildings, are expected to result in more beneficial renovation scenarios. Although such detailed analysis is not presented in this section for the sake of simplicity (i.e. macro-taxonomy classes are defined solely on the basis of seismic code design level), Scenario 3 follows such an approach, where building classes are not aggregated to macro-taxonomies but retain all their structural and energy attributes, yet, at the expense of complexity.

The maps shown in Figure 14 and Figure 15 give an overview of the cumulative *BCR* and the average annual benefit in terms of energy cost and consumption in the case of sub-scenario 1.2, applied across all considered NUTS-3 EU regions. Among the top 100 priority regions, the highest benefit is observed in densely populated regions, including northern (e.g. Milan, ITC4C, Turin, ITC11), but also central and southern areas of Italy (e.g. Rome, ITI43, Naples, ITF33, Palermo, ITG12), and regions in Greece (Athens, EL303, Thessaloniki, EL522). Nevertheless, renovation is economically beneficial (Figure 14a) only in two northern Italian regions (i.e. Turin, ITC11, and Brescia, ITC47), five northern Greek regions, and in all priority regions in Romania.

Figure 16 shows the same impact metrics of the energy efficiency upgrade ($\Delta AAEL_{en}$ and $\Delta AAEC$) derived from the three sub-scenarios and the top 50 priority regions. The share of renovated buildings (pc_N), and the associated replacement cost (pc_C) and average number of occupants (pc_P), are identical to those presented in the case of seismic retrofit (Table B. 7), since the same buildings are renovated irrespective of the renovation type (macro-taxonomies defined on the basis of code design level). In both sub-scenarios 1.1 and 1.2, energy efficiency upgrading returns the highest benefits, in terms of both energy cost and consumption, in three Italian regions: Milan (ITC4C), Rome (ITI43), and Naples (ITF33). The high percentage of occupants within CDN and CDL buildings (Table B. 7) and the fact that these are by far the most populated regions within the top 50 ranking, result in high energy consumption in absolute terms, despite the relatively mild climates (i.e. *HDD* values of around 2000, 1400 and 1000, respectively). Regarding the economic feasibility of renovation, among the three regions only Milan exhibits cumulative *BCR* ≥ 1.0 for sub-cenario 1.1 and C_{ren} / C_{rep} = 0.15 and t = 50 years (Figure 13a). Bologna (ITH55) and Modena (ITH54), which follow in terms of magnitude of economic benefit ($\Delta AAEL_{en}$ ≥ 100 billion euros in sub-scenario 1.1), are characterized by *HDD* ≈ 2000 and present cumulative *BCR*s ≥ 1.0 but close to unity, as Milan (Figure 13a).

Overall, Scenario 1 is deemed more promising in the case of energy efficiency compared to seismic retrofit. The next section explores the impact of integrated renovation by combining the benefits derived from reducing the seismic risk and the energy inefficiency of buildings.

Table 7. Scenario 1 – energy efficiency upgrading: number of regions with cumulative *BCR*s ≥ 1.0 by sub-scenario, considering the variability of renovation cost and planning period, and the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	C_{ren} / C_{rep} = 0.30, t = 35 years			C_{ren} / C_{rep} = 0.15, t = 50 years			C_{ren} / C_{rep} = 0.08, t = 100 years		
	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
	CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
Regions (cumulative *BCR* ≥ 1)	0	0	0	41	30	22	100	100	88

Table 8. Scenario 1 – energy efficiency upgrading: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.15 and planning period t = 50 years.

Impact metric	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
	CDN	CDL	CDM
Regions of implementation	100	100	100
Cumulative *BCR*	0.93	0.73	0.56
Average annual economic loss benefit $\Delta AAEL$ (10^6 €)	3094.79	2797.23	299.12
Net average annual economic loss benefit $\Delta AAEL_{net}$ (10^6 €)	-222.05	-1022.84	-233.56
Average annual loss of life benefit $\Delta AALL$ (fatalities)	-	-	-
Average annual energy consumption benefit $\Delta AAEC$ (GWh)	33445.68	30140.58	3418.45
Buildings	6215321	3464134	587030
Replacement cost (10^6 €)	1088337.76	1253459.63	174785.06
Average occupants (over 24 hrs)	13058142	13611294	2874415
Buildings (%)	59	33	6
Replacement cost (%)	42	49	7
Average occupants (%)	43	44	9

Figure 13. Scenario 1 – energy efficiency upgrading: cumulative *BCR* values per sub-scenario of renovating CDN, CDL, CDM buildings within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for (a) renovation to replacement cost C_{ren} / C_{rep} = 0.15, planning period t = 50 years, (b) C_{ren} / C_{rep} = 0.08, t = 100 years, and (c) C_{ren} / C_{rep} = 0.30, t = 35 years

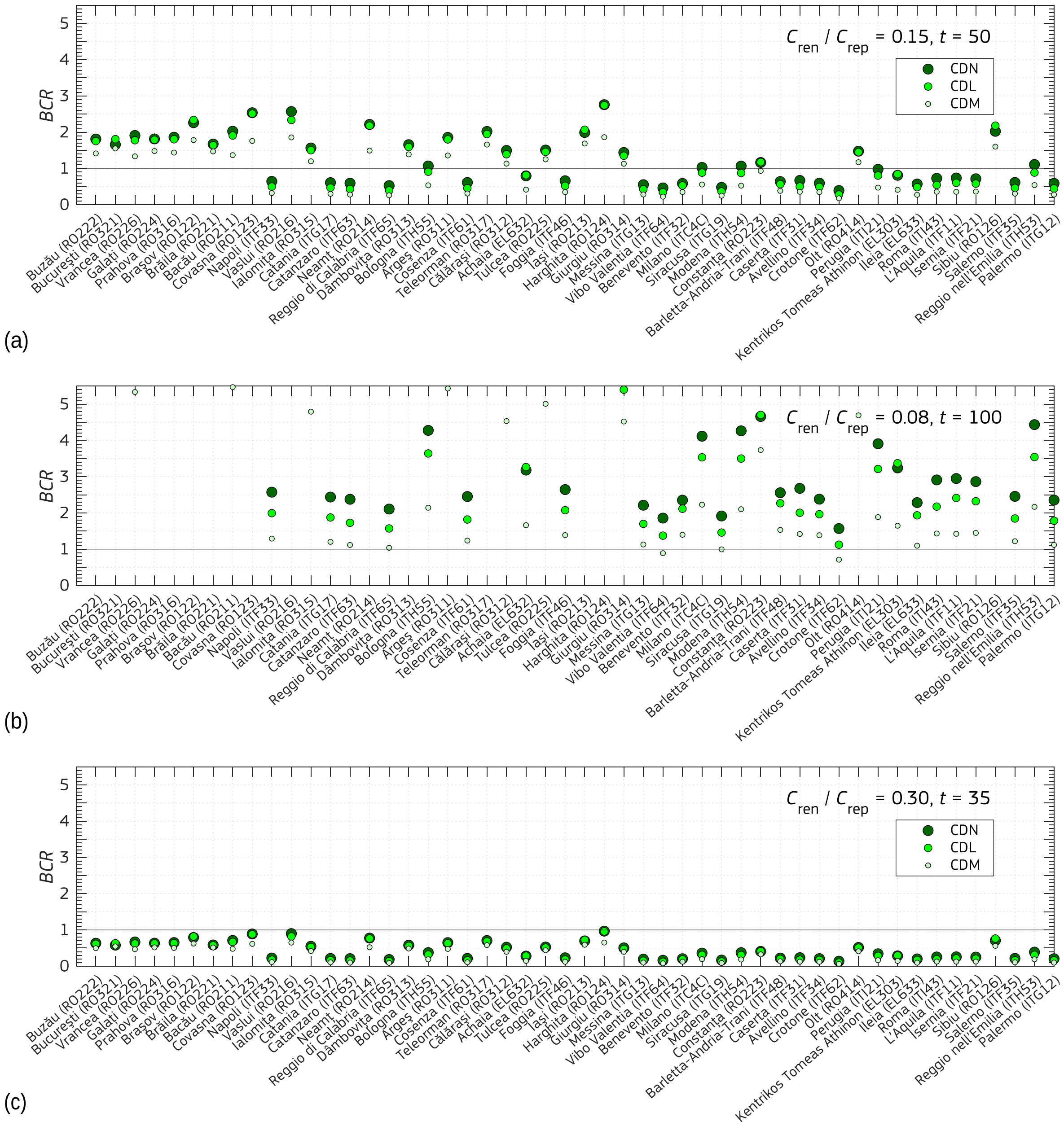


Figure 14. Scenario 1 – CDL energy efficiency upgrading: (a) cumulative *BCR*s of renovated buildings, and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.15, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

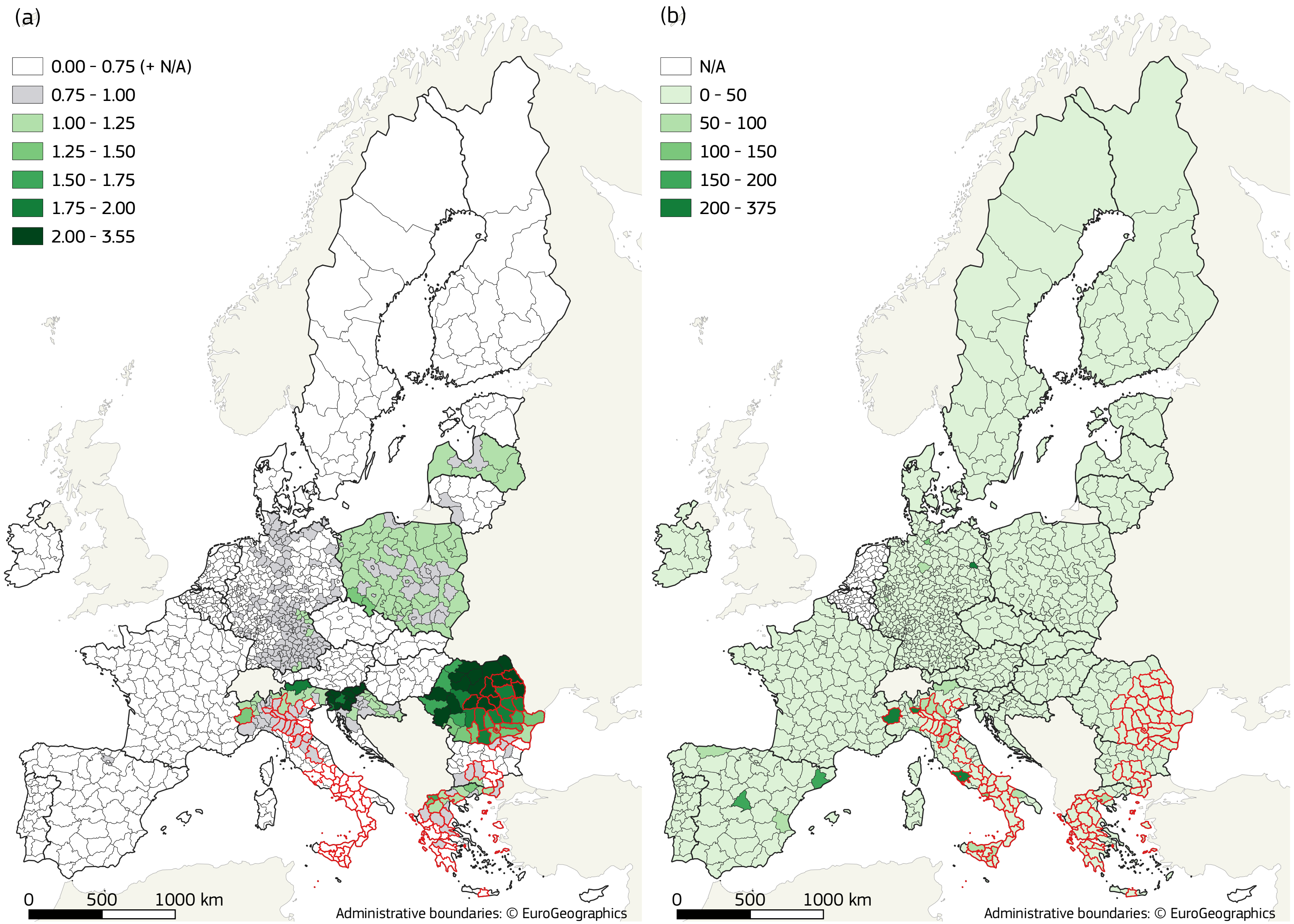


Figure 15. Scenario 1 – CDL energy efficiency upgrading: average annual benefit in terms of energy consumption ($\Delta AAEC$, GWh) for C_{ren} / C_{rep} = 0.15, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

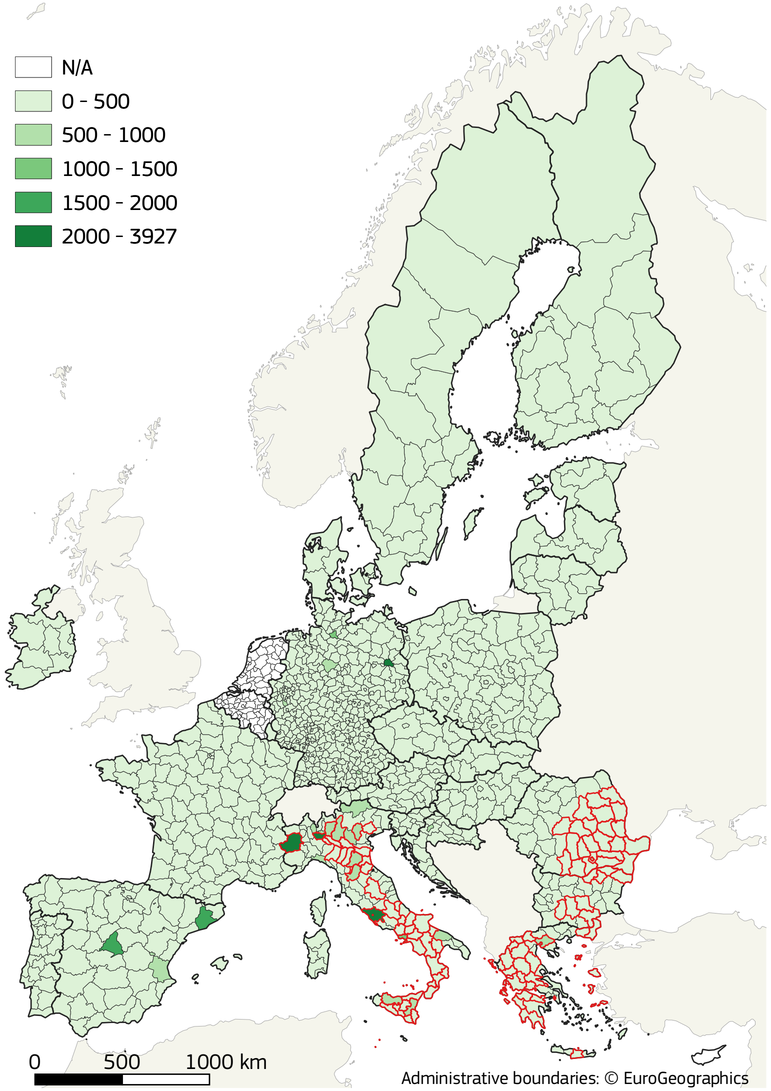
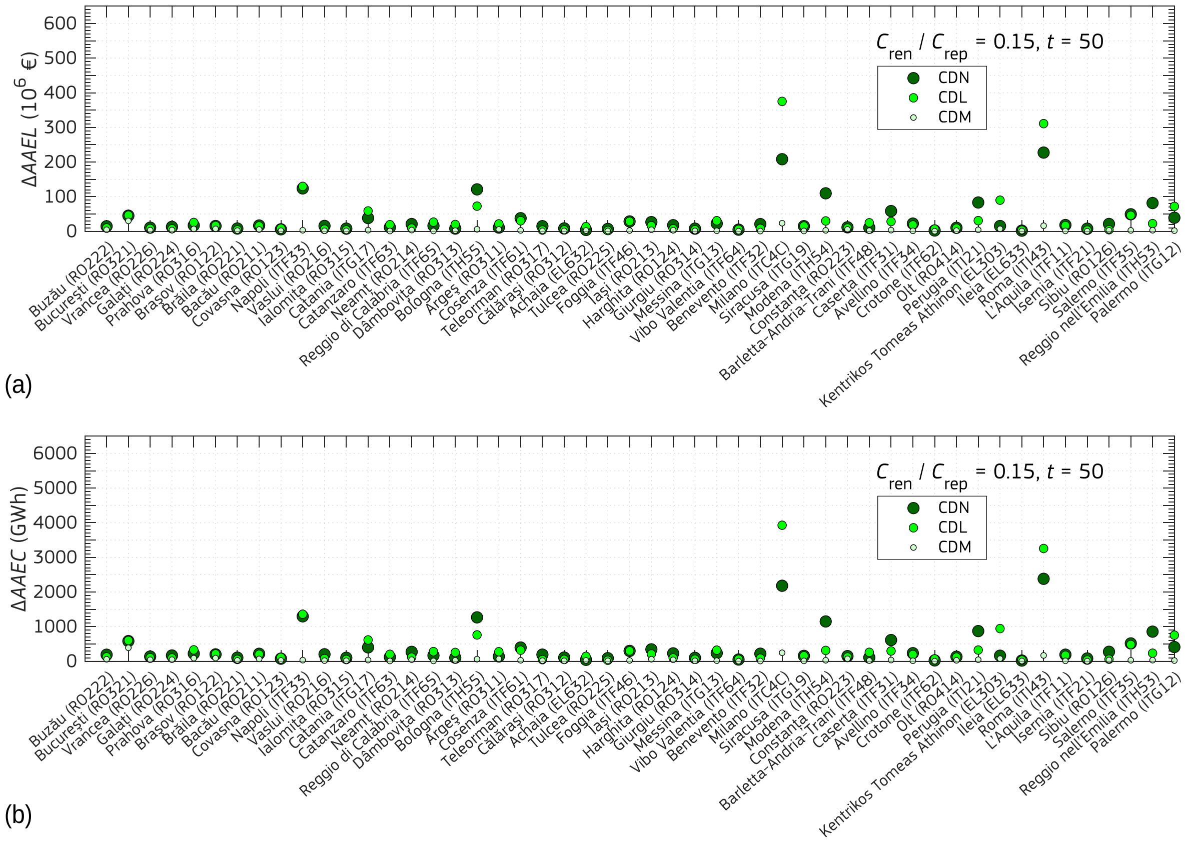


Figure 16. Scenario 1 – energy efficiency upgrading: average annual benefit per sub-scenario (CDN, CDL, CDM) in terms of (a) economic loss (Δ*AAEL*), and (b) energy consumption (Δ*AAEC*), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.15, planning period t = 50 years



3.2.3 Integrated renovation

In the case of integrated renovation, maximum cumulative *BCR* values remain high, as in energy upgrading, with values that reach up to 2.13, 2.42 and 1.98 for renovating CDN, CDL and CDM buildings, respectively (C_{ren} / C_{rep} = 0.21 and t = 50 years in Figure 17a). All sub-scenarios that were found to be cost-beneficial in certain regions for seismic retrofit (Figure 9a), remain beneficial in this case as well. The same is valid for sub-scenarios in the case of energy efficiency upgrading, apart from Milan (ITC4C), and Constanța (RO223), where renovating CDN buildings results in cumulative *BCR* ≤ 1.0. In the latter cases, the cumulative economic benefit due to seismic retrofit and energy upgrading does not compensate for the increased cost of integrated renovation. On the contrary, in many regions, the economic benefit from energy efficiency upgrading is quite high, thus despite the increased cost of integrated renovation and the low economic benefit due to seismic retrofit, integrated renovation results in cumulative *BCR*s ≥ 1.0. The same 22 Romanian regions (out of the top 50 priority regions, Figure 17a) exhibit cumulative *BCR*s ≥ 1.0 in all sub-scenarios, as in the case of energy efficiency upgrading (Figure 13a). Overall, the number of regions where at least one integrated renovation sub-scenario appears economically beneficial is slightly increased compared to energy efficiency upgrading; it further represents a significant improvement compared to the number of regions identified in the case of seismic retrofit (Figure 9a). Yet, in 20 Italian and two Greek regions, integrated renovation is not economically beneficial irrespective of the considered sub-scenario. The sensitivity of impact metrics to the renovation cost and planning period is illustrated in Figure 17b, c.

With regard to the top 100 priority regions, renovating CDN, CDL and CDM buildings in a cost-efficient way is feasible in 36, 37 and 22 regions, respectively, for C_{ren} / C_{rep} = 0.21 and t = 50 years (Table 9). The venture of renovating CDN buildings in all top 100 priority regions, results in a cumulative *BCR* value equal to 0.88 (Table 10) which is slightly lower when compared to upgrading energy efficiency alone (Table 8). Figure 18 provides an overview of the cumulative *BCR* values and the average annual economic loss benefit (Δ$AAEL_{int}$) derived from integrated renovation of CDL buildings across the EU. The number of priority regions where renovation is economically beneficial (Figure 18a) increases compared to energy efficiency upgrading (Figure 14a). Once again, among the top 100 priority regions, the highest economic benefit is observed in densely populated regions (Figure 18b), including at the top of the list 14 regions in Italy, three in Greece, and one in Romania (Bucharest, RO321). The benefit in terms of reducing fatalities (*ΔAALL*) and energy consumption (*ΔAAEC*) are identical to the cases of seismic retrofit (Figure 11a) and energy efficiency upgrading (Figure 15), since Scenario 1 investigates the renovation of predefined macro-taxonomy classes, irrespective of the considered renovation type.

Figure 19 provides in more detail the average annual economic benefit ($\Delta AAEL_{int}$) derived from implementing integrated renovation according to the three sub-scenarios in the top 50 priority regions. The highest benefits are observed in Milan (ITC4C), Rome (ITI43), Naples (ITF33), Catania (ITG17), and Athens (EL303). Nevertheless, none of the sub-scenarios is cost beneficial in these regions. Among the Italian regions with relatively high $\Delta AAEL_{int}$ that result in cumulative *BCR*s ≥ 1.0 for sub-scenario 1.1, are Bologna (ITH55), Modena (ITH54), Reggio Emilia (ITH53), and Perugia (ITI21).

Overall, integrated renovation may allow the seismic upgrading of buildings in a cost-efficient way to a greater extent, and importantly in regions of high seismic risk, further contributing to the reduction in the average annual loss of life.

Table 9. Scenario 1 – integrated renovation: number of regions with cumulative *BCR*s ≥ 1.0 by sub-scenario, considering the variability of renovation cost and planning period, and the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	C_{ren} / C_{rep} = 0.41, *t* = 35 years			C_{ren} / C_{rep} = 0.21, *t* = 50 years			C_{ren} / C_{rep} = 0.10, *t* = 100 years		
	Sub-scenario 1.1	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**
	CDN	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**
Regions (cumulative *BCR* ≥ 1)	0	0	0	36	37	22	100	100	99

Table 10. Scenario 1 – integrated renovation: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.21 and planning period *t* = 50 years.

Impact metric	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
	CDN	**CDL**	**CDM**
Regions of implementation	100	100	100
Cumulative *BCR*	0.88	0.75	0.62
Average annual economic loss benefit *ΔAAEL* (10^6 €)	3923.10	3880.81	444.60
Net average annual economic loss benefit $\Delta AAEL_{net}$ (10^6 €)	-554.63	-1276.28	-274.51
Average annual loss of life benefit *ΔAALL* (fatalities)	72	85	9
Average annual energy consumption benefit *ΔAAEC* (GWh)	33445.68	30140.58	3418.45
Buildings	6215321	3464134	587030
Replacement cost (10^6 €)	1088337.76	1253459.63	174785.06
Average occupants (over 24 hrs)	13058142	13611294	2874415
Buildings (%)	59	33	6
Replacement cost (%)	42	49	7
Average occupants (%)	43	44	9

Figure 17. Scenario 1 – integrated renovation: cumulative *BCR* values per sub-scenario of renovating CDN, CDL, CDM buildings within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for (a) renovation to replacement cost C_{ren} / C_{rep} = 0.21, planning period t = 50 years, (b) C_{ren} / C_{rep} = 0.10, t = 100 years, and (c) C_{ren} / C_{rep} = 0.41, t = 35 years

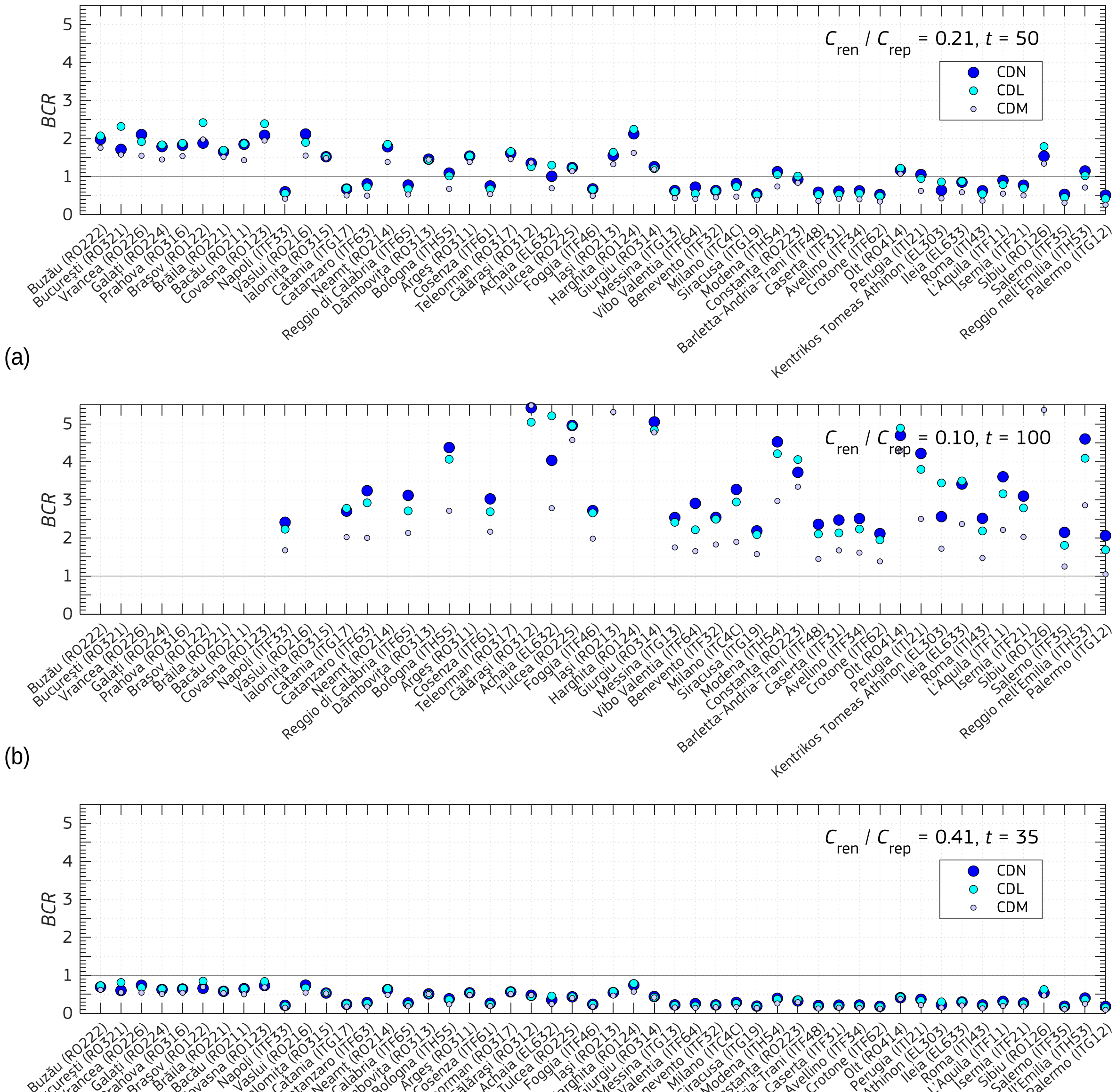


Figure 18. Scenario 1 – CDL integrated renovation: (a) cumulative *BCR*s of renovated buildings, and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.21, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

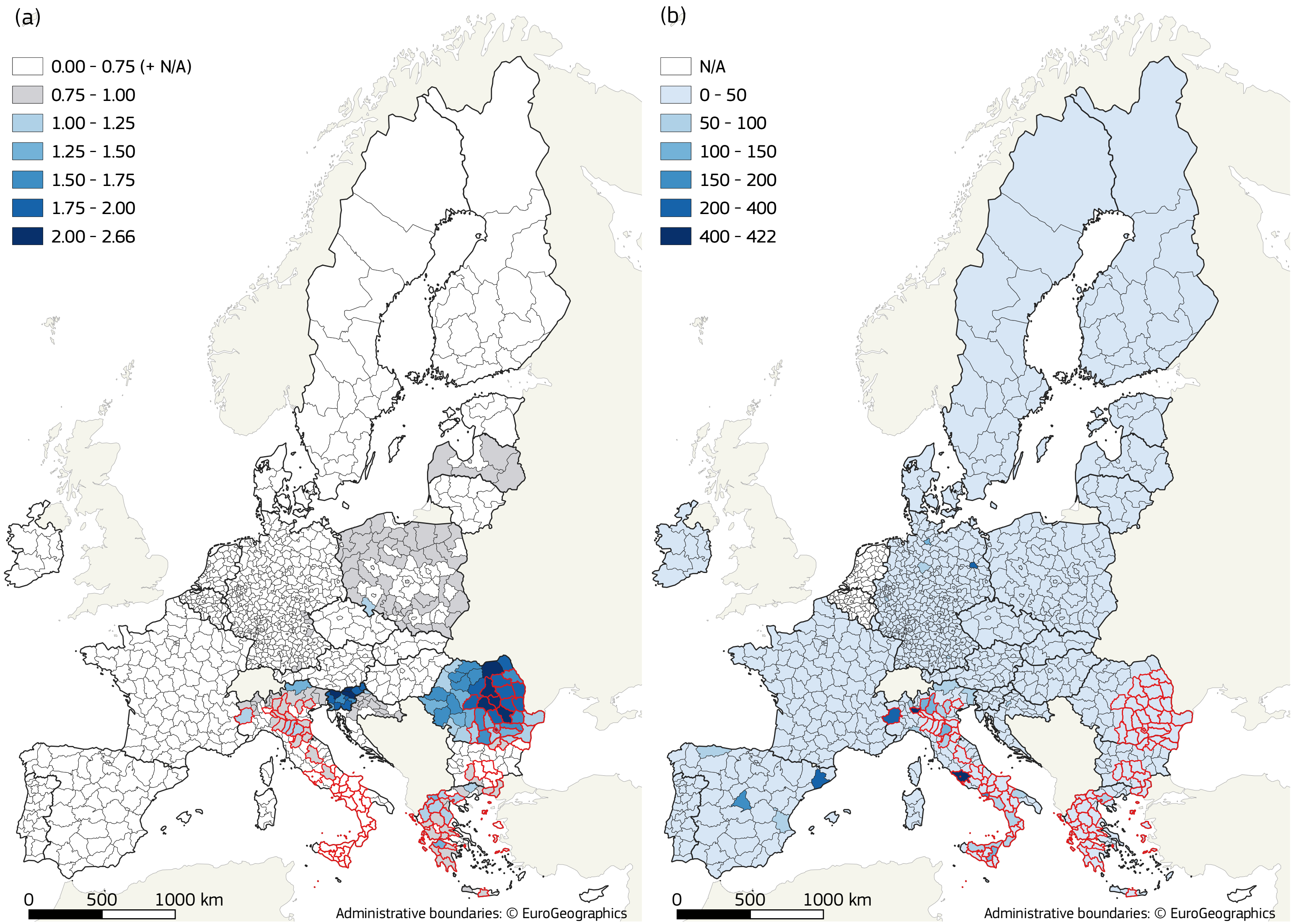
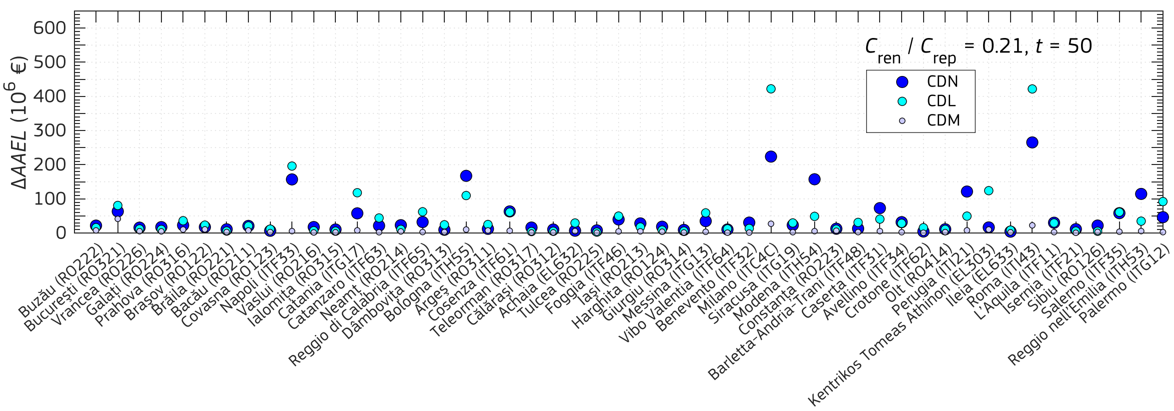


Figure 19. Scenario 1 – integrated renovation: average annual benefit per sub-scenario (CDN, CDL, CDM) in terms of economic loss (Δ*AAEL*), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.21, planning period t = 50 years



3.3 Scenario 2

Renovation Scenario 2 follows a similar approach to Scenario 1. However, instead of investigating the economic feasibility of renovating predefined macro-taxonomy classes, the scenario targets the renovation of predefined fractions of the regional building stocks. Sub-scenarios 2.1 and 2.2 correspond to renovating 10% and 20% of the regional building stocks, starting from the building classes with the highest *BCR*s and moving to the next ones of lower ratios, until the preselected percentages of buildings within each region are reached. In this context, building classes per region are prioritised based on their individual *BCR*, and therefore those promoted for renovation differ among regions and renovation type.

3.3.1 Seismic retrofit

Figure 20 presents the cumulative benefit-to-cost ratios derived from implementing Scenario 2. For comparative purposes, the figure reports also the cumulative benefit-to-cost ratio that corresponds to renovating the entire regional building stock, in which case the relevant risk metrics (e.g. *AAEL*, *AALL*) become equal to the regional indicators used to identify priority regions in Gkatzogias et al. (2022) (Section 2.1.2). The priority regions shown in the figure are based on the multi-sectoral integrated indicator $I^*_{eq-en-SVI,3}$, and *BCR* values correspond to C_{ren} / C_{rep} = 0.12 and t = 50 years. Overall, increasing the number of renovated buildings, results in decreasing *BCR*s. According to Scenario 2, building classes within a region are prioritised for renovation based on their individual *BCR* (i.e. ranked by decreasing *BCR*, Section 2.1.4). Hence, the more classes are renovated to attain an increased percentage of renovated buildings, the less the cumulative *BCR* becomes. Sub-scenarios 2.1 and 2.2 result in economically beneficial renovation in 16 and 13 regions (in Romania and Greece), respectively, out of the top 50 priority ones. In Italian regions, none of the sub-scenarios is deemed economically beneficial, due to the lack of even a single building class with an individual $BCR \geq 1.0$ (Figure 3b). Among the reasons mentioned in Section 3.1.1 explaining this trend, the high renovation and replacement cost is the most decisive one in supressing *BCR* below one in Italy. According to the adopted exposure model, the replacement cost varies in Italy by construction material and settlement type in the range of 1050–1700 €/m^2 (with seismic retrofitting cost assumed equal to a constant fraction of C_{rep} according to Section 2.1.1). On the contrary, C_{rep} lies within the range of 650–1100 €/m^2 and 300 – 650 €/m^2 in Greece and Romania, respectively.

Figure 21 and Figure 22 present the geospatial distribution of the impact of sub-scenario 2.2, implemented across the EU-27. The impact is presented in terms of the cumulative *BCR*s corresponding to the renovation of the 20% of the regional building stock, and the associated average annual economic benefit (Δ*AAEL*) and reduction in fatalities (Δ*AALL*). The maps also highlight in red borders the top 100 priority regions based on the $I^*_{eq-en-SVI,3}$ indicator. Although buildings are seismically retrofitted in all regions according to Scenario 2, thus observing benefit in terms of economic loss (Figure 21b) and loss of life (Figure 22) across the whole EU, renovation is economically beneficial only in regions of Romania, Greece, one region in Italy, and one in Bulgaria.

Specifically, focusing in the top 100 priority regions, sub-scenarios 2.1 and 2.2 result in beneficial renovation in 34 and 25 regions, respectively (Table 11). As shown in Table 12, which summarises the impact assessment of Scenario 2 within the top 100 priority regions, the replacement value and the average occupants of the renovated buildings represent fractions of the existing building stock that in general are close to the fractions of the renovated buildings (i.e. 10% and 20%) according to Section 3.1.1 (see also Figure 23a, Table B. 14) . The cumulative *BCR*s provided in Table 12 correspond to the venture of renovating the relevant fractions of the building stock within all top 100 priority regions, i.e. a useful metric when renovation funding is provided by a single central investor rather than fragmented among individual regional authorities. Values smaller than one indicate that Scenario 2 would not be beneficial in economic terms over the planning period of 50 years, as also implied by the negative values of the net average annual economic benefit ($\Delta AAEL_{net}$).

Figure 23 provides in more detail impact assessment metrics per priority region and sub-scenario for the top 50 priority regions. Metrics include the percentage of replacement cost (pc_C) associated with renovated buildings, and the average annual benefit in terms of economic loss ($\Delta AAEL$) and fatalities ($\Delta AALL$).

Table 11. Scenario 2 – seismic retrofit: number of regions with cumulative *BCR*s ≥ 1.0, considering the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
	10%	**20%**	
Regions (cumulative *BCR* ≥ 1)	34	25	3

Table 12. Scenario 2 – seismic retrofit: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.12 and planning period t = 50 years.

Impact metric	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
	10%	**20%**	
Regions of implementation	100	100	100
Cumulative *BCR*	0.71	0.54	0.33
Average annual economic loss benefit $\Delta AAEL$ (10^6 €)	494.60	825.84	2062.31
Net average annual economic loss benefit $\Delta AAEL_{net}$ (10^6 €)	-204.27	-700.11	-4225.22
Average annual loss of life benefit $\Delta AALL$ (fatalities)	68	88	167
Average annual energy consumption benefit $\Delta AAEC$ (GWh)	-	-	-
Buildings	1059169	2118337	10591686
Replacement cost (10^6 €)	286647.19	625877.31	2578871.82
Average occupants (over 24 hrs)	4217030	7928183	30595128
Buildings (%)	10	20	100
Replacement cost (%)	11	24	100
Average occupants (%)	14	26	100

Figure 20. Scenario 2 – seismic retrofit: cumulative *BCR* values per sub-scenario of renovating 10%, 20%, 100% of buildings within top 50 priority regions (based on the multi sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.12, planning period t = 50 years

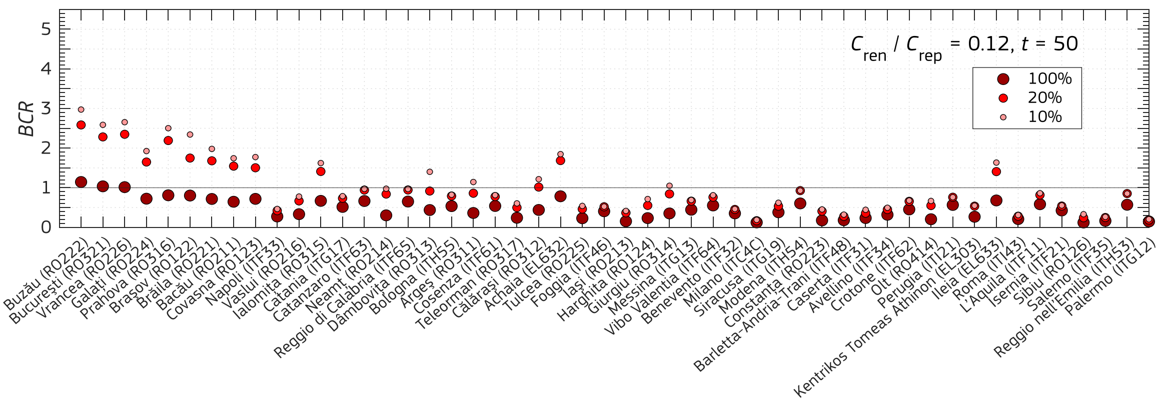


Figure 21. Scenario 2.2 – seismic retrofit: (a) cumulative *BCR*s of renovated buildings, and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.12, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

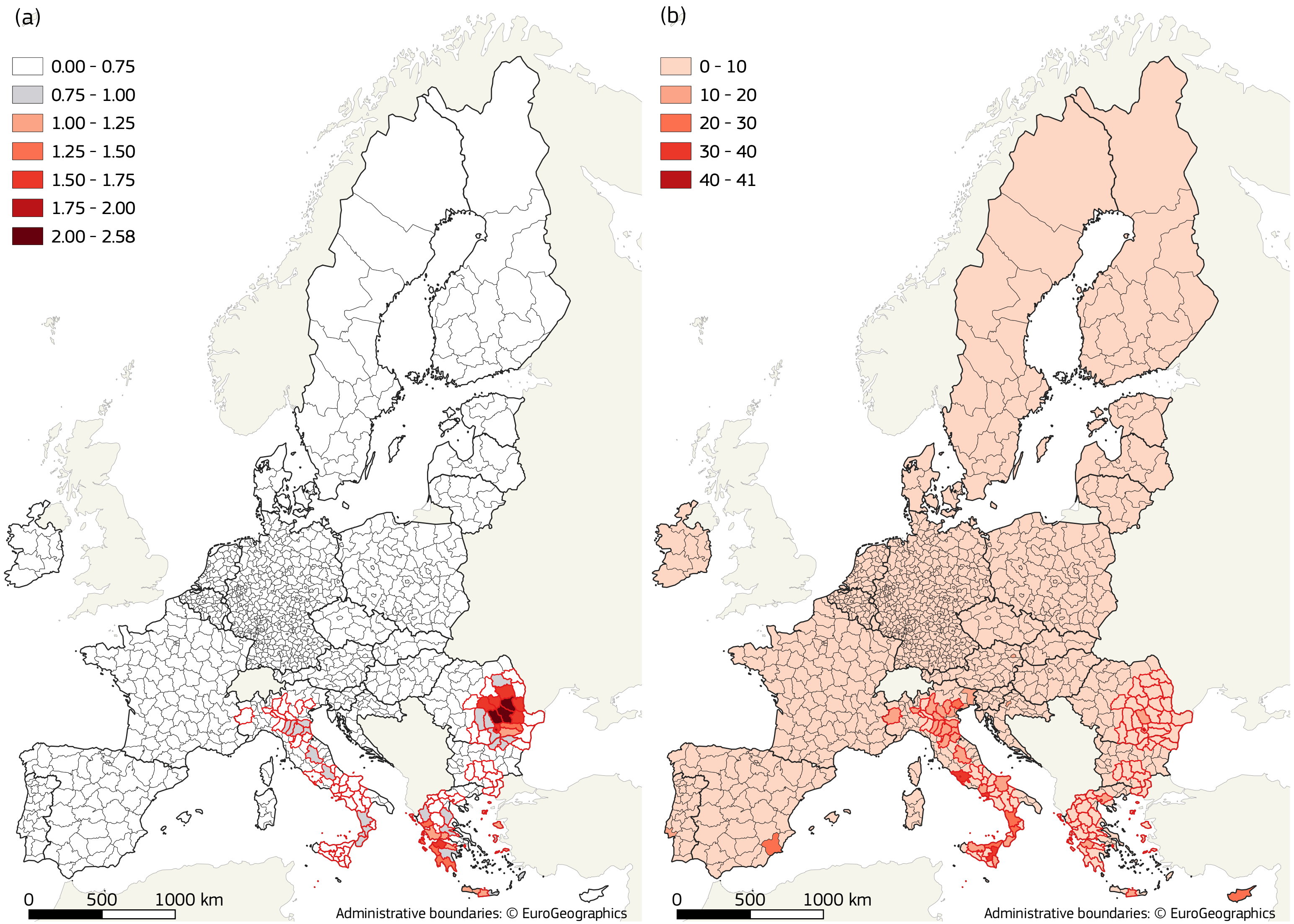


Figure 22. Scenario 2.2 – seismic retrofit: average annual benefit in terms of fatalities ($\Delta AALL$) for C_{ren} / C_{rep} = 0.12, t = 50 years, showing in red borders the top 100 priority regions based on $I^{*}_{eq-en-SVI,3}$

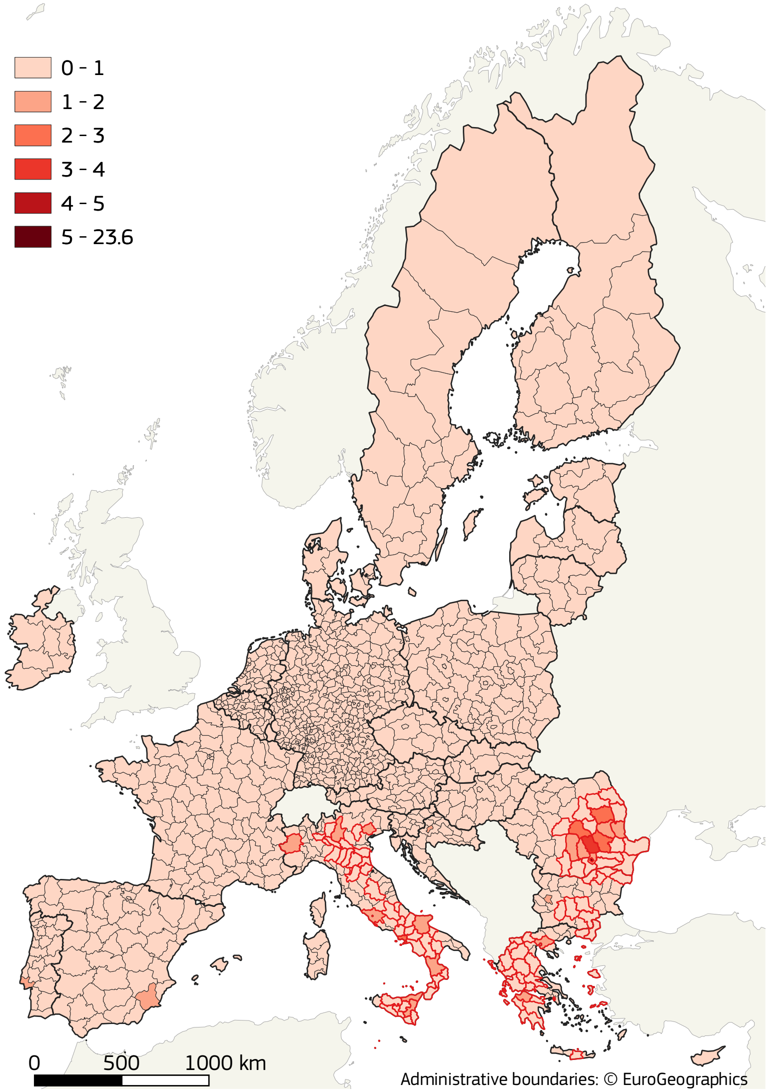
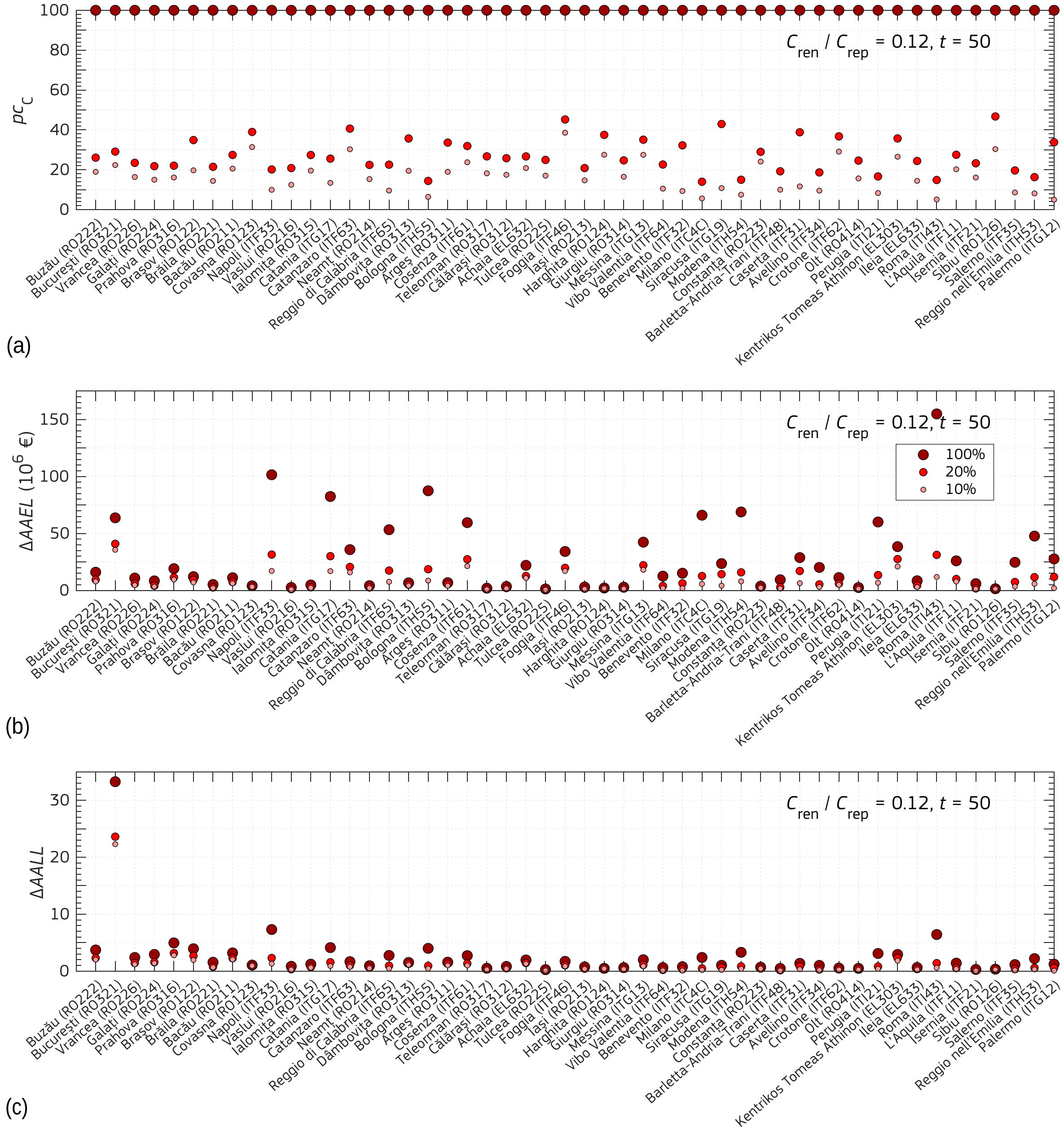


Figure 23. Scenario 2 – seismic retrofit: (a) percentage of replacement cost (pc_C) associated with renovated buildings per sub-scenario (pc_N = 10%, 20%, 100%), and corresponding average annual benefit in terms of (b) economic loss ($\Delta AAEL$), and (c) fatalities ($\Delta AALL$), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.12, planning period t = 50 years



3.3.2 Energy efficiency upgrading

Figure 24 presents the cumulative benefit-to-cost ratios derived from implementing Scenario 2 as a means to mitigate the energy inefficiency of buildings. The priority regions shown in the figure are based on the multi-sectoral integrated indicator $I^*_{eq-en-SVI,3}$, and *BCR* values are based on C_{ren}/C_{rep} = 0.15 and t = 50 years. Renovating the 10% and 20% of the regional building stock according to Scenario 2, results in an economic benefit which exceeds the cost of renovation over the planning period in 30 and 29 regions, respectively. As in the case of seismic retrofit, these regions are located in Romania and Greece. Italian regions present in general cumulative *BCR* values below one, as a consequence of the increased renovation cost, and the individual or combined effect of high socioeconomic vulnerability, seismic risk, and energy related regional component indicator score (other than *AAELR*, Section 3.1.2). Exceptions are Milan (ITC4C), Bologna (ITH55), Modena (ITH54), Reggio Emilia (ITH53), and Perugia (ITI21) with *BCR*s in the range of 1.10–1.25. Furthermore, Figure 24 indicates that in all Romanian regions and in two Italian ones (i.e. Modena, Reggio Emilia) energy efficiency upgrading of the whole regional building stock would be economically feasible.

Figure 25 and Figure 26 present the geospatial distribution of the impact of renovation sub-scenario 2.2, as reflected on the cumulative *BCR*s corresponding to the renovation of the 20% of the regional building stock, and the associated average annual benefit in terms of economic loss ($\Delta AAEL$), and energy consumption ($\Delta AAEC$). Compared to the case of seismic retrofit, Figure 25b and Figure 26 show a similar spread of benefit across all EU regions, albeit the economic one appears here to be an order of magnitude higher. Importantly, economically beneficially renovation is feasible in most of the EU Member States except for Cyprus, Denmark, Estonia, Finland, Malta, Portugal, Spain and Sweden (Figure 25a).

Considering the top 100 priority regions (highlighted in red borders in Figure 25 and Figure 26), sub-scenarios 2.1 and 2.2 identified 53 and 50 regions, respectively, where energy efficiency upgrading is economically beneficial (Table 13), i.e. a 50% and 100% increase in the number of regions compared to seismic retrofit. Energy efficiency upgrading remains unfavourable in central and southern Italian and Greek regions, and in regions of Bulgaria. Even though these regions represent almost half of the top 100 priority ones, cumulative *BCR*s and positive net average annual economic benefits over the total 100 regions in Table 14 indicate that both sub-scenarios become economically viable for central funding entities. This is similar to the effect that the renovation of multiple classes within a region may have on the cumulative *BCR*, described in Section 2.1.5 (i.e. in the definition of Scenario 3) and presented in more detail in Section 3.4. As in Scenario 3, where building classes with high individual *BCR*s may compensate for the cost of renovating building classes with *BCR*s < 1.0, here regions with a high net economic benefit compensate for those that present cumulative *BCR*s < 1.0, ultimately resulting in an economically viable scenario over the period of 50 years. This comes at the expense of reduced net benefit when the fraction of renovated buildings in increased from 10% to 20% (Table 14) but doubles the benefit in terms of energy consumption ($\Delta AAEC$).

Finally, Figure 27 provides impact assessment metrics per priority region and sub-scenario for the top 50 priority regions. Metrics include the percentage of replacement cost (pc_C) associated with renovated buildings, and the average annual benefit in terms of economic loss ($\Delta AAEL$) and energy consumption ($\Delta AAEC$).

Table 13. Scenario 2 – energy efficiency upgrading: number of regions with cumulative *BCR*s ≥ 1.0, considering the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
	10%	**20%**	
Regions (cumulative *BCR* ≥ 1)	53	50	30

Table 14. Scenario 2 – energy efficiency upgrading: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.15 and planning period t = 50 years.

Impact metric	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
	10%	**20%**	
Regions of implementation	100	100	100
Cumulative *BCR*	1.12	1.03	0.80
Average annual economic loss benefit **Δ*AAEL* (10^6 €)**	844.06	1752.04	6249.65
Net average annual economic loss benefit **Δ$AAEL_{net}$ (10^6 €)**	92.09	44.21	-1609.77
Average annual loss of life benefit **Δ*AALL* (fatalities)**	-	-	-
Average annual energy consumption benefit **Δ*AAEC* (GWh)**	9337.51	19051.61	67657.15
Buildings	1059169	2118337	10591686
Replacement cost (10^6 €)	246739.55	560382.75	2578871.82
Average occupants (over 24 hrs)	3825590	7419868	30595128
Buildings (%)	10	20	100
Replacement cost (%)	10	22	100
Average occupants (%)	13	24	100

Figure 24. Scenario 2 – energy efficiency upgrading: cumulative *BCR* values per sub-scenario of renovating 10%, 20%, 100% of buildings within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for C_{ren} / C_{rep} = 0.15, planning period t = 50 years

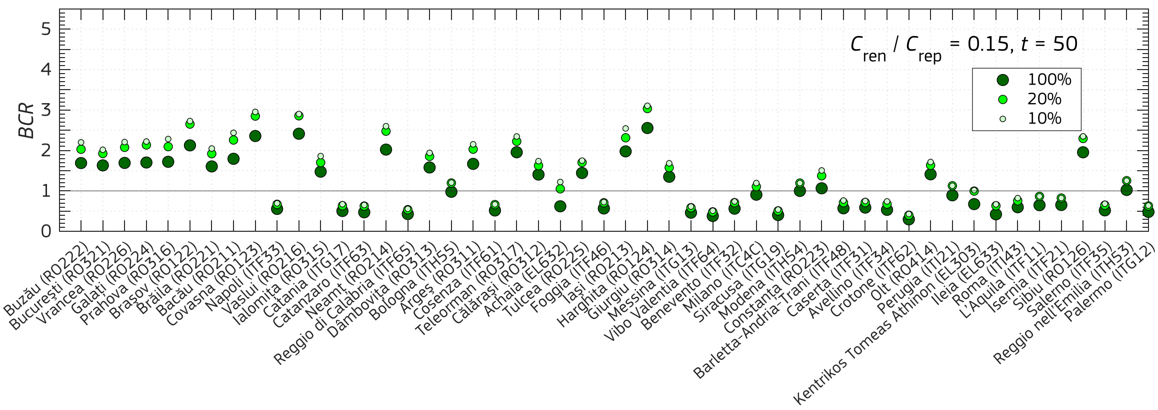


Figure 25. Scenario 2.2 – energy efficiency upgrading: (a) cumulative *BCR*s of renovated buildings, and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.15, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

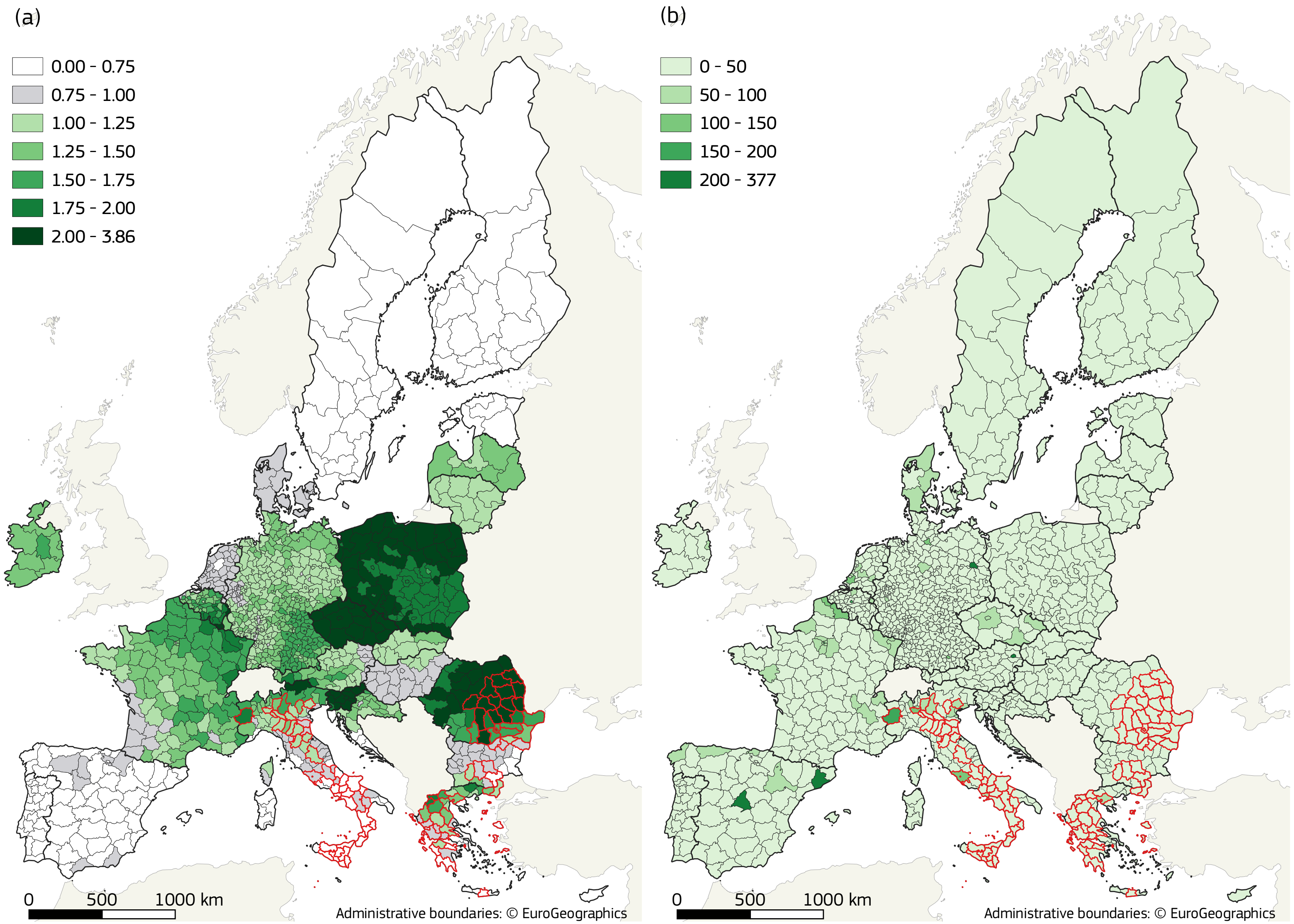


Figure 26. Scenario 2.2 – energy efficiency upgrading: average annual benefit in terms of energy consumption ($\Delta AAEC$, GWh) for C_{ren} / C_{rep} = 0.15, t = 50 years, showing in red borders the top 100 priority regions based on $I^{*}_{eq-en-SVI,3}$

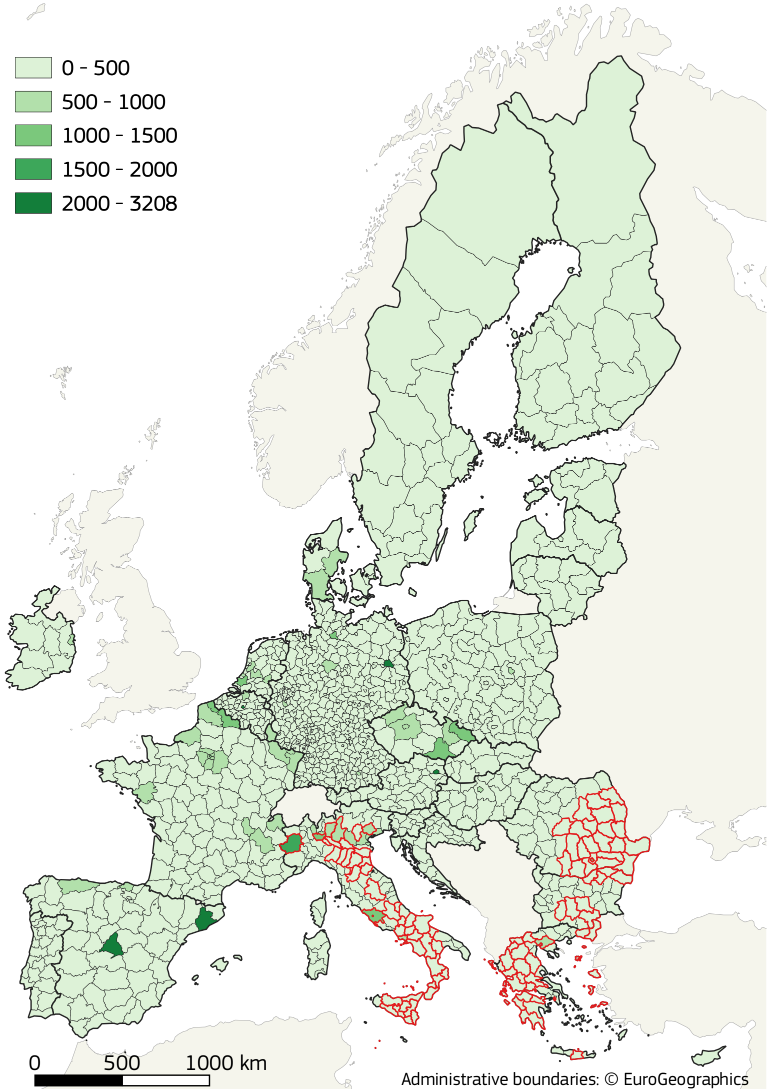
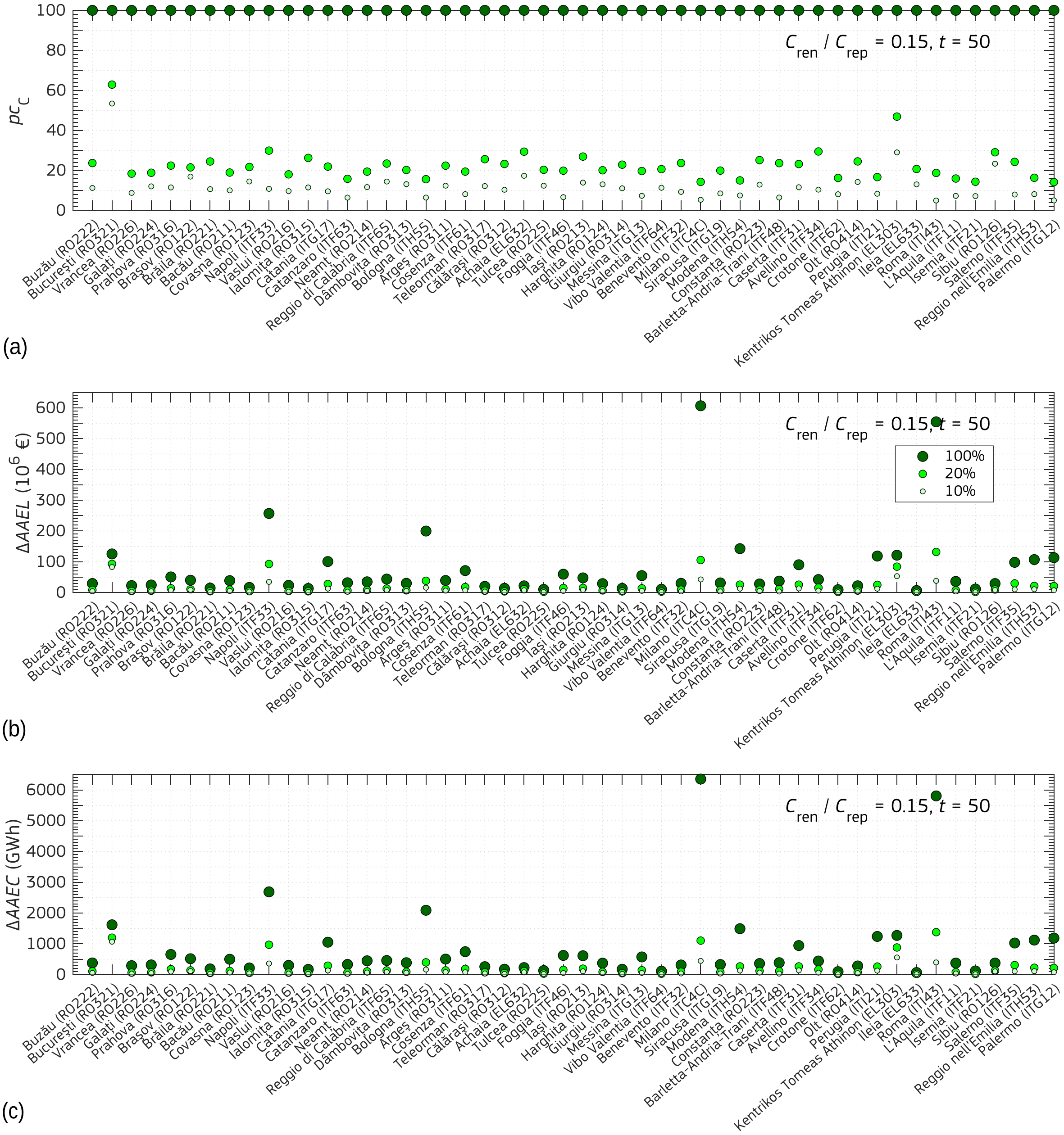


Figure 27. Scenario 2 – energy efficiency upgrading: (a) percentage of replacement cost (pc_C) associated with renovated buildings per sub-scenario (pc_N = 10%, 20%, 100%), and corresponding average annual benefit in terms of (b) economic loss ($\Delta AAEL$), and (c) energy consumption ($\Delta AAEC$), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.15, planning period t = 50 years



3.3.3 Integrated renovation

Figure 28 presents the cumulative benefit-to-cost ratios derived from implementing Scenario 2 with a view to mitigating both seismic risk and energy inefficiency of buildings through integrated renovation. When 10% and 20% of the regional building stock is renovated, Scenario 2 was found to be economically beneficial in 31 and 30 regions, respectively, out of the top 50, whereas in 25 of these regions 100% of the building stock may be renovated in a cost-efficient way. Thus, the figure suggests a similar renovation impact to the case of energy efficiency upgrading, and a superior one compared to seismic retrofit. If the relevant benefit-to-cost ratios are compared, integrated renovation, according to sub-scenario 2.2, results in higher cumulative *BCR*s in 32 regions when compared with the case of energy efficiency upgrading (Figure 24), and in 46 regions when compared to seismic retrofit (Figure 20). Among the Italian regions where energy efficiency upgrading was found to be feasible in economic terms (Section 3.3.2), only Milan (ITC4C) appears with *BCR*s < 1.0. Yet, the attained values in sub-scenarios 2.1 and 2.2 are fairly close to one (i.e. 0.98 and 0.90), suggesting that the renovation of a fraction of buildings slightly lower than 10% is expected to be economically beneficial (as verified later during the implementation of Scenario 3).

The beneficial effect of integrated renovation in absolute terms is illustrated in Figure 29 and Figure 30 across the EU-27, highlighting also the top 100 priority regions based on $I^*_{eq-en-SVI,3}$. The figures map the renovation impact through the cumulative *BCR*s corresponding to the renovation of the 20% of the regional building stock, along with the associated average annual benefits Δ*AAEL*, Δ*AALL*, and Δ*AAEC*. Integrated renovation according to sub-scenario 2.2 is economically beneficial in regions spread across the EU Member States, excluding those where energy efficiency is not beneficial (Section 3.3.2), and in addition excluding Hungary, Lithuania, Luxembourg, and the Netherlands, where in any case seismic risk is low. At the NUTS-3 level, integrated renovation exhibits cumulative *BCR*s ≥ 1.0 in 448 regions (out of the 1151 considered across the EU-27) as opposed to 774 regions in the case of energy efficiency upgrading (Figure 25a), and just 29 in the seismic retrofit case (Figure 21a). In simple terms, integrated renovation according to sub-scenario 2.2, allows upgrading the seismic safety of structures in a cost-efficient way to a much larger extent than seismic retrofit alone, while presenting an economic benefit in the same order of magnitude as energy efficiency upgrading. Despite the spread impact across the EU (Δ*AAEL*, Δ*AALL*, Δ*AAEC*), due to the indiscriminate implementation of Scenario 2 in all regions according to the preselected fractions of the regional building stocks, renovation is applied even in regions where no economic benefit is foreseen. In this context, it makes sense to investigate the economic feasibility of the venture, as if the renovation scenario is funded by a single central entity (as in Sections 3.3.1, 3.3.2).

Assuming that the venture consists of renovating 10% or 20% of the building stock within the top 100 priority regions based on the multi-sectoral integrated indicator $I^*_{eq-en-SVI,3}$, integrated renovation is assessed as economically beneficial in 68 and 64 regions, respectively. Although, this share of regions represents an additional increase compared to the case of energy efficiency upgrading (Table 15 vs. Table 13), priority regions mainly in southern Italy, but also in Greece and Bulgaria (Figure 29a), do not provide a positive net economic benefit (i.e. cumulative *BCR*s per region remain lower than 1.0). Yet, renovating 10% and 20% of the regional building stock within the top 100 regions, becomes economically beneficial for a central funding entity, i.e. cumulative *BCR*s ≥ 1.0 and positive net economic benefit in Table 16). At the same time integrated renovation exhibits superior or similar performance to both seismic retrofit and energy efficiency upgrading. Specifically, by comparing Table 16 to Table 12 and Table 14, it is seen that integrated renovation results in higher net economic benefit, and approximately the same benefit in terms of loss of life and energy consumption.

Figure 31 provides impact metrics per priority region for Scenario 2 considering the top 50 according to $I^*_{eq-en-SVI,3}$. Metrics include the percentage of replacement cost (pc_C) associated with renovated buildings, and the average annual benefit in terms of economic loss (Δ*AAEL*), fatalities (Δ*AALL*), and energy consumption (Δ*AAEC*).

Table 15. Scenario 2 – integrated renovation: number of regions with cumulative *BCR*s ≥ 1.0, considering the top 100 priority regions based on on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
	10%	**20%**	
Regions (cumulative *BCR* ≥ 1)	68	64	28

Table 16. Scenario 2 – integrated renovation: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.21 and planning period t = 50 years.

Impact metric	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
	10%	**20%**	
Regions of implementation	100	100	100
Cumulative *BCR*	1.22	1.06	0.78
Average annual economic loss benefit **$\Delta AAEL$ (10^6 €)**	1275.38	2458.83	8311.97
Net average annual economic loss benefit **$\Delta AAEL_{net}$ (10^6 €)**	228.34	132.66	-2298.25
Average annual loss of life benefit **$\Delta AALL$ (fatalities)**	67	87	167
Average annual energy consumption benefit **$\Delta AAEC$ (GWh)**	9360.04	18554.51	67657.15
Buildings	1059169	2118337	10591686
Replacement cost (10^6 €)	254488.94	565389.62	2578871.82
Average occupants (over 24 hrs)	4036015	7542763	30595128
Buildings (%)	10	20	100
Replacement cost (%)	10	22	100
Average occupants (%)	13	25	100

Figure 28. Scenario 2 – integrated renovation: cumulative *BCR* values per sub-scenario of renovating 10%, 20%, 100% of buildings within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.21, planning period t = 50 years

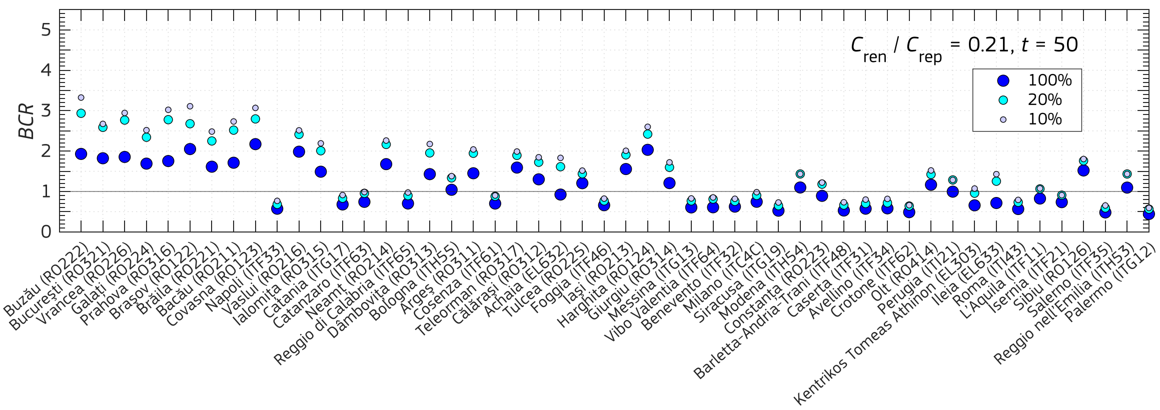


Figure 29. Sub-scenario 2.2 – integrated renovation: (a) cumulative *BCR*s of renovated buildings, and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.21, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

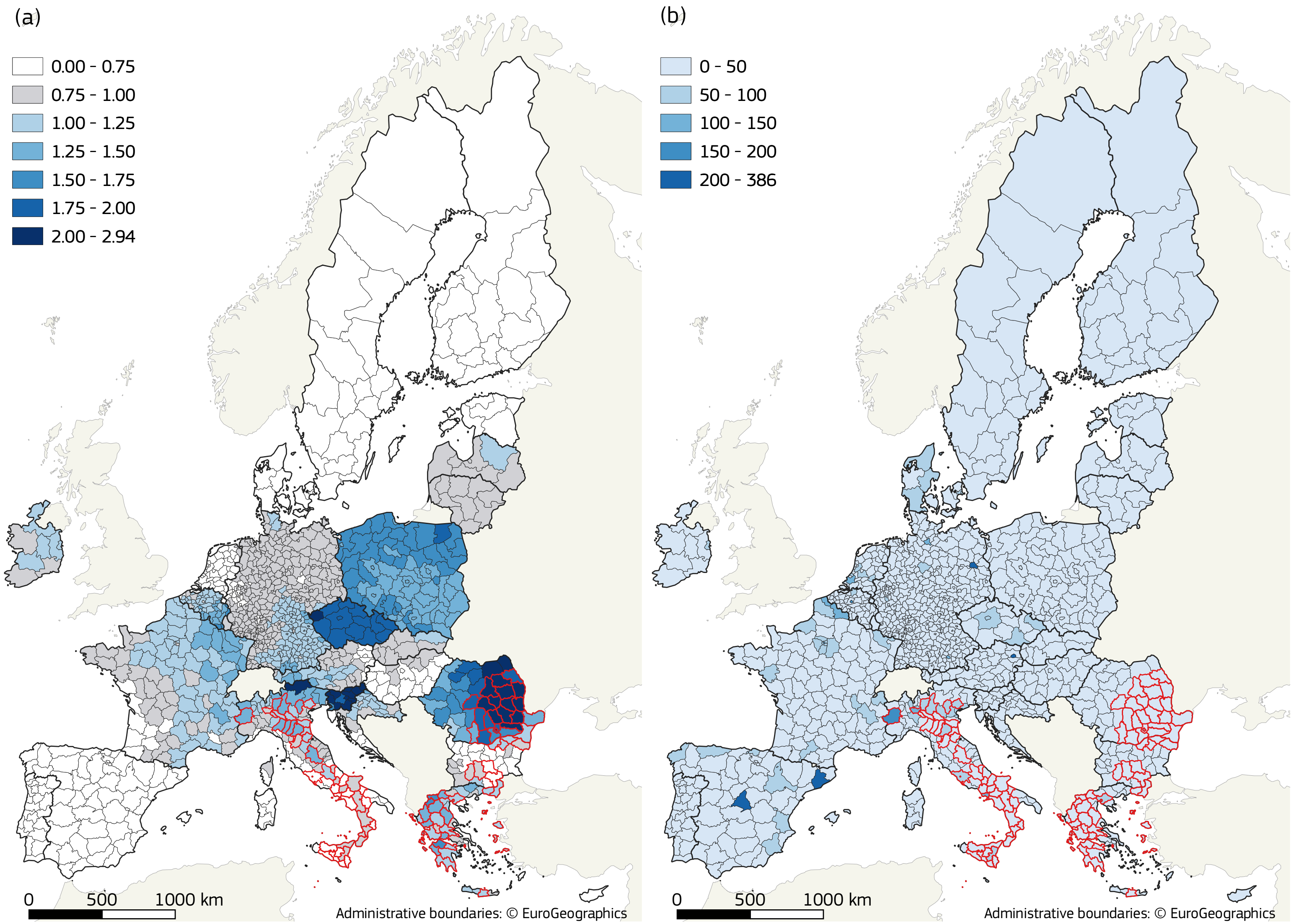


Figure 30. Sub-scenario 2.2 – integrated renovation: average annual benefit in terms of (a) fatalities ($\Delta AALL$), and (b) energy consumption ($\Delta AAEC$, GWh) for C_{ren} / C_{rep} = 0.21, t = 50 years, showing in red borders the top 100 priority regions based on $I^{*}_{eq-en-SVI,3}$

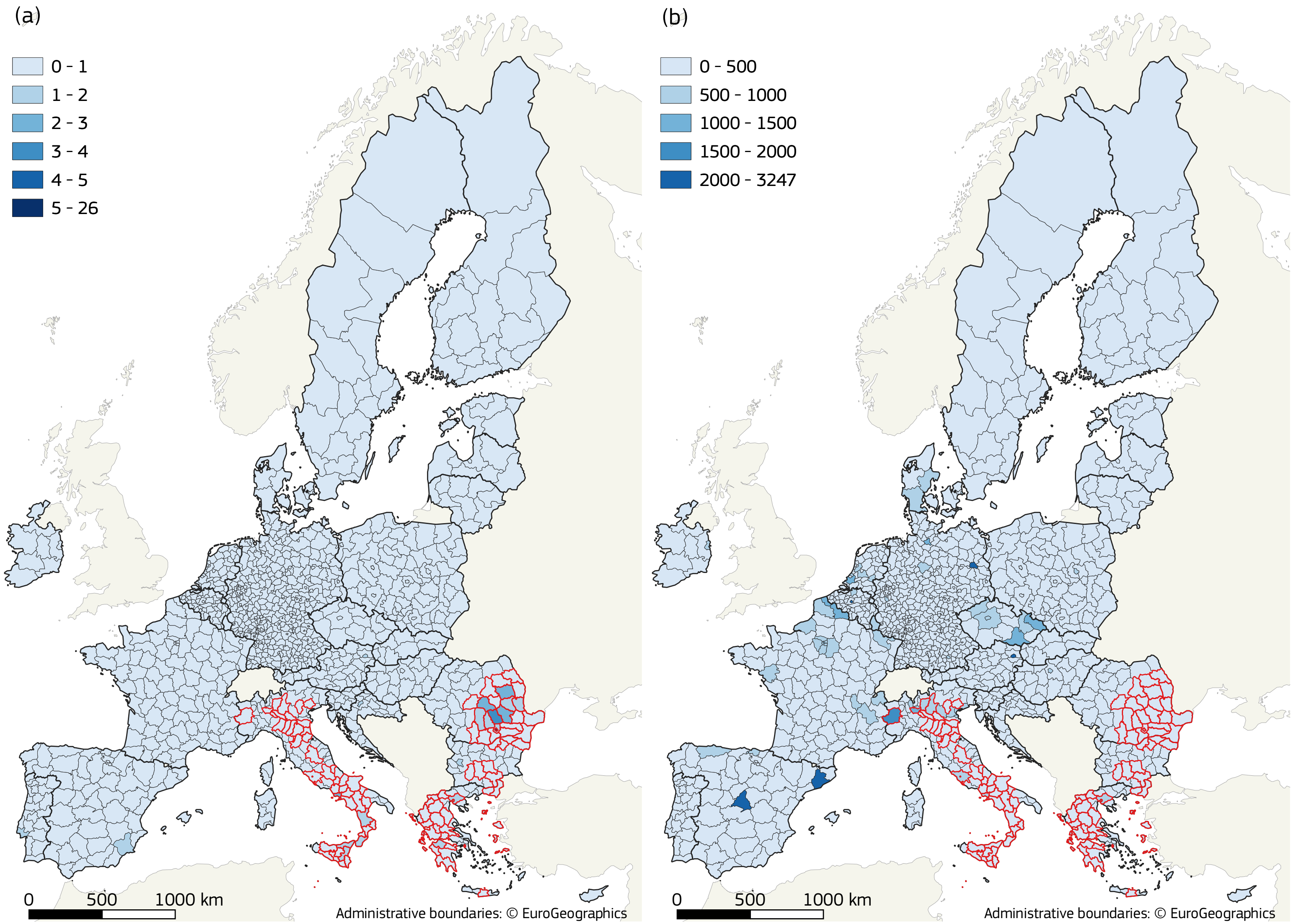
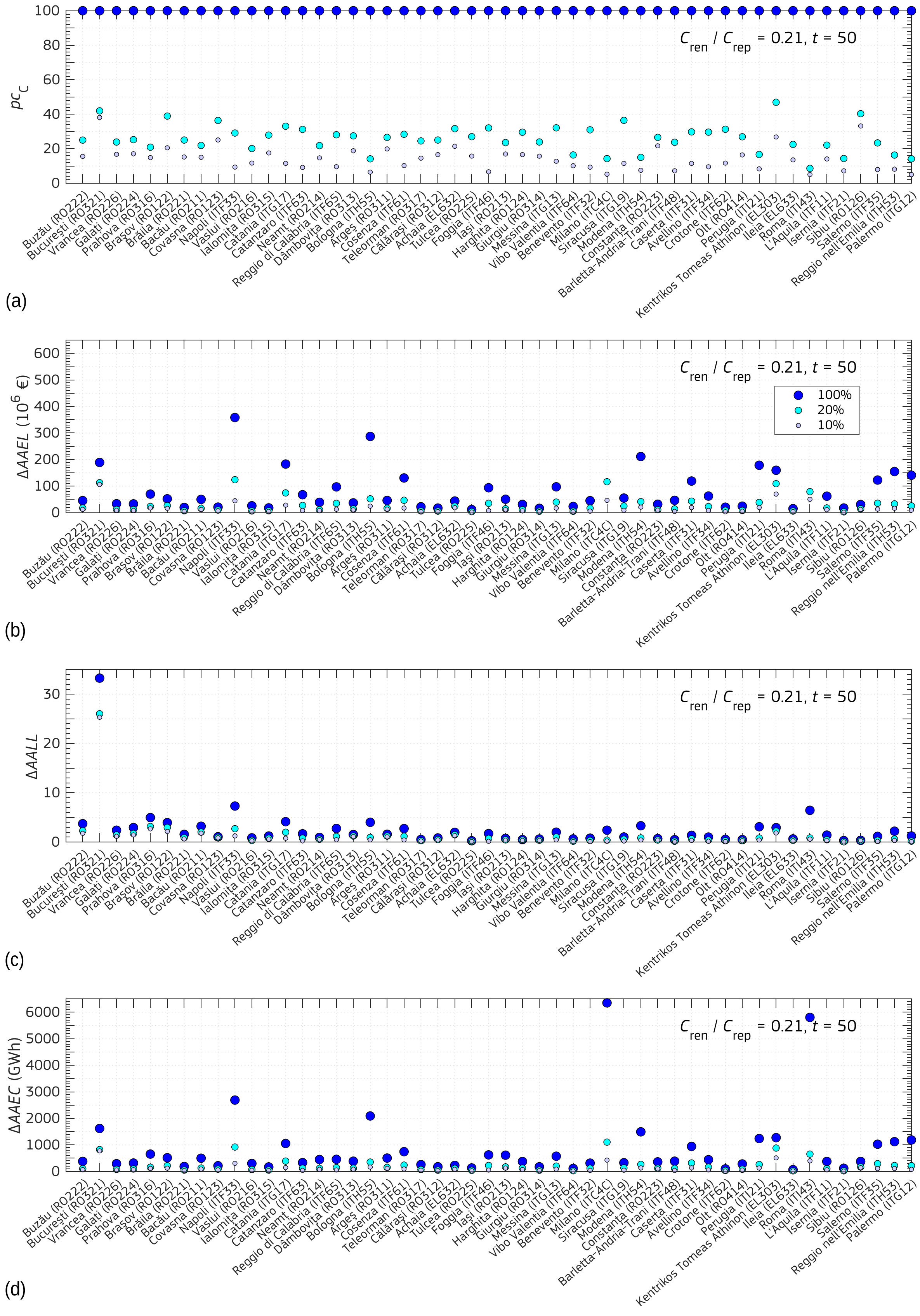


Figure 31. Scenario 2 – integrated renovation: (a) percentage of replacement cost (pc_C) associated with renovated buildings per sub-scenario (pc_N = 10%, 20%, 100%), and corresponding average annual benefit in terms of (b) economic loss ($\Delta AAEL$), (c) fatalities ($\Delta AALL$), and (d) energy consumption ($\Delta AAEC$), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.21, planning period t = 50 years



3.4 Scenario 3

Contrary to the previous scenarios that investigate the attained benefit-to-cost ratios (and impact metrics) due to the renovation of predefined macro-taxonomy classes or fractions of the regional building stocks, Scenario 3 follows an inverse approach. Specifically, it aims to identify the maximum fraction of the regional building stock and the relevant building classes, the renovation of which always results in a cumulative *BCR* equal or larger than unity, thus in an economically advantageous renovation strategy.

3.4.1 Seismic retrofit

Figure 32 presents the cumulative benefit-to-cost ratios derived from implementing Scenario 3. Scenario 3.1 renovates the building classes within a region that present individually *BCR* ≥ 1.0, whereas Scenario 3.2 the building classes that result in a cumulative *BCR* approximately equal to one (denoted on the figure as Σ*BCR* ≈ 1.0). Therefore, both scenarios can be implemented only if at least one building class with an individual *BCR* > 1.0 is present in the region under consideration, i.e. a marked difference with Scenario 2. For comparative purposes, the figure reports also the cumulative benefit-to-cost ratio that correspond to renovating the entire regional building stock. The priority regions shown in the figure are based on the multi-sectoral integrated indicator $I^*_{eq\text{–}en\text{–}SVI,3}$. Figure 32a depicts the case of C_{ren} / C_{rep} = 0.12 and t = 50 years. Renovating building classes with individual *BCR*s ≥ 1.0 according to Scenario 3.1 results in a cumulative benefit-to-cost ratio in the range of 1.05–2.24 within the top 50 priority regions, indicating an economic benefit which exceeds the cost of renovation over the planning period. On the other hand, Scenario 3.2 takes advantage of this available margin to renovate more building classes which would not be beneficial to retrofit on a stand-alone basis. Therefore, cumulative ratios derived from Scenario 3.2 are close to unity. In the above context, Scenario 3.2 may be of interest to state authorities, aiming to maximise the percentage of renovated buildings and the affected population rather than yield a net economic benefit.

The absence of data for Scenario 3.1 (e.g. Naples, ITF33, Italy) in Figure 32a derives from the lack of even a single building class with an individual *BCR* ≥ 1.0, resulting also in the absence of data for Scenario 3.2 (based on Equation (17)). This is the case for all Italian regions in the figure (i.e. 24 out of the 50 priority regions) as was already shown in Figure 3b, due to their high renovation and replacement cost. It should be recalled, though, that replacement cost does not consider regional variations, but it is defined at the national level by material and settlement type (Section 2.1.1). The significant differentiation of cost among regions of different countries, renders renovation economically beneficial in regions with significantly lower seismic risk (in terms of the regional *AAELR* indicator) compared to Italian ones (e.g. Iaşi, RO213, Romania vs. Modena, ITH54, Italy). Finally, identical cumulative *BCR* values among Scenario 3.1 and 3.2 in Figure 32a (e.g. coinciding circles in the case of Constanța, RO213, Romania) indicate that in Scenario 3.2 no additional classes (compared to Scenario 3.1) can be renovated in a cost-beneficial way. In a similar context, when Scenario 3.2 values are equal to the cumulative *BCR* corresponding to the renovation of the 100% of the building stock, it is economically beneficial to renovate all buildings within a region.

The sensitivity of the Scenarios 3.1 and 3.2 output is reported in Figure 32b and c. For the lowest considered renovation cost and the longest planning period, Scenario 3.2 results in a cost-beneficial renovation of the entire building stock in most of the Romanian and Greek regions. On many occasions, Scenario 3.2 is capable of renovating the entire building stock while at the same time retaining a high cumulative *BCR* value. For example, renovating all buildings in Bucharest (RO321) yields an economic benefit which is four times higher than the renovation investment. Interestingly, the same is valid for 18 out of the 24 Italian regions, nevertheless, exhibiting lower economic benefits. Milan (ITC4C) and Palermo (ITG12) are the only Italian regions where Scenarios 3.1 and 3.2 cannot result in beneficial renovation despite the significant renovation cost reduction and planning period elongation. On the contrary, the highest renovation cost and the shortest planning period result in beneficial renovation of building classes only in 15 Romanian regions, in line with Figure 3d. Table 17 reports the number of regions where seismic retrofit was found to be economically beneficial for the above cases of renovation cost and planning period variability when the top 100 priority regions are considered.

Figure 33 and Figure 34 present the geospatial distribution of the impact of renovation Scenario 3.2, implemented across the 1151 NUTS-3 regions of the EU-27 for C_{ren} / C_{rep} = 0.12 and t = 50 years. The impact is presented in terms of the regional percentage of buildings renovated cost-beneficially (pc_N), and the associated average annual benefit in terms of economic loss (Δ*AAEL*) and fatalities (Δ*AALL*). The maps assign data only to regions where Scenario 3.2 is implemented (i.e. where it yields cost-beneficial renovation) irrespective of their seismic risk, and therefore regions of high seismic risk may be shown in white colour if the cumulative *BCR* < 1.0. Contrary to Scenario 2 impact maps, where benefit is spread across all considered regions, here benefit (Δ*AAEL*, Δ*AALL*) is concentrated in regions of high seismic risk and relatively low to medium renovation cost. Scenario 3.2 allows renovation in regions of Greece, Romania, Bulgaria, Croatia, Italy, and Cyprus (in order of decreasing number of regions).

Within the top 100 priority regions, Scenario 3.2 identified 47 regions where seismic retrofit is economically beneficial, whereas the renovated building stock corresponds to 13% of the buildings, 5% of the replacement value, and 13% of occupants of the existing building stock. The impact assessment of Scenarios 3.1 and 3.2 is summarised in Table 18. Cumulative *BCR*s presented in the table are, by definition of Scenario 3, higher than one, as opposed to Scenario 2 (Table 12). The difference of the net economic benefit $\Delta AAEL_{net}$ among the two scenarios in the table (i.e. 77.79 – 12.36 = 65.43, 10^6 €) represents the available economic margin which is invested in the case of Scenario 3.2 to renovate additional building classes, increasing the number of renovated buildings, and the associated replacement cost and number of occupants (compared to Scenario 3.1). Likewise, the annual benefit in terms of saved lives increases by 30% in Scenario 3.2, corresponding to 72% (i.e. 71 / 167) of the lives that would be saved if all buildings were renovated.

Although Scenario 3 results in economically advantageous seismic retrofit in 47 out of the 100 priority regions, the percentage of renovated buildings remains low. This is primarily associated with the exclusion of Italian regions from renovation (except for Ravenna, ITH57, Figure 33, Figure 34) that represent the largest share of buildings (54%), replacement cost (84%) and occupants (64%) within the priority regions.

Figure 35 provides in more detail impact assessment metrics per priority region and scenario for the top 50 priority regions. Metrics include the percentage of renovated buildings (pc_N), and the average annual benefit in terms of economic loss ($\Delta AAEL$) and fatalities ($\Delta AALL$).

Table 17. Scenario 3 – seismic retrofit: number of regions with cumulative *BCR*s ≥ 1.0 by scenario, considering the variability of renovation cost and planning period, and the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Scenario 3.1 BCR ≥ 1	**Scenario 3.2** ΣBCR ≥ 1	**100%**	**Scenario 3.1** BCR ≥ 1	**Scenario 3.2** ΣBCR ≥ 1	**100%**	**Scenario 3.1** BCR ≥ 1	**Scenario 3.2** ΣBCR ≥ 1	**100%**
Regions (cumulative *BCR* ≥ 1)	15	15	0	47	47	3	96	96	71

Table 18. Scenario 3 – seismic retrofit: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.12 and planning period t = 50 years.

Impact metric	Scenario 3.1 BCR ≥ 1	Scenario 3.2 ΣBCR ≈ 1	100%
Regions of implementation	47	47	100
Cumulative *BCR*	1.59	1.04	0.33
Average annual economic loss benefit $\Delta AAEL$ (10^6 €)	209.16	298.55	2062.31
Net average annual economic loss benefit $\Delta AAEL_{net}$ (10^6 €)	77.79	12.36	-4225.22
Average annual loss of life benefit $\Delta AALL$ (fatalities)	55	71	167
Average annual energy consumption benefit $\Delta AAEC$ (GWh)	-	-	-
Buildings	421331	1331098	10591686
Replacement cost (10^6 €)	53882.69	117385.11	2578871.82
Average occupants (over 24 hrs)	1804493	3950521	30595128
Buildings (%)	4	13	100
Replacement cost (%)	2	5	100
Average occupants (%)	6	13	100

Figure 32. Scenario 3 – seismic retrofit: cumulative *BCR* values per scenario (*BCR* ≥ 1, Σ*BCR* ≈ 1, 100%) within top 50 priority regions based on the multi sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for (a) renovation to replacement cost C_{ren} / C_{rep} = 0.12, planning period t = 50 years, (b) C_{ren} / C_{rep} = 0.06, t = 100 years, and (d) C_{ren} / C_{rep} = 0.24, t = 35 years

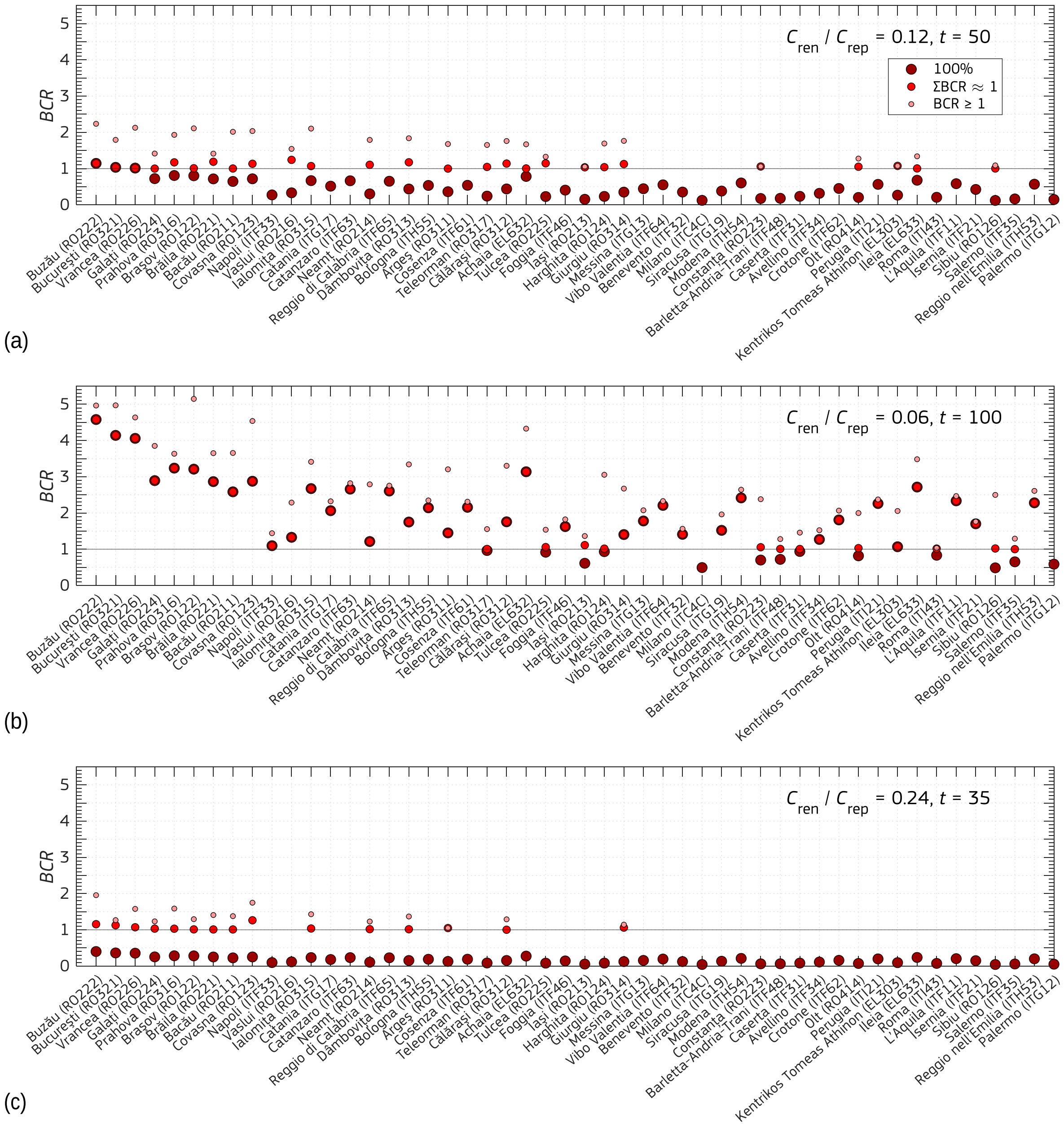


Figure 33. Scenario 3.2 – seismic retrofit: (a) percentage of renovated buildings (pc_N), and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.12, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

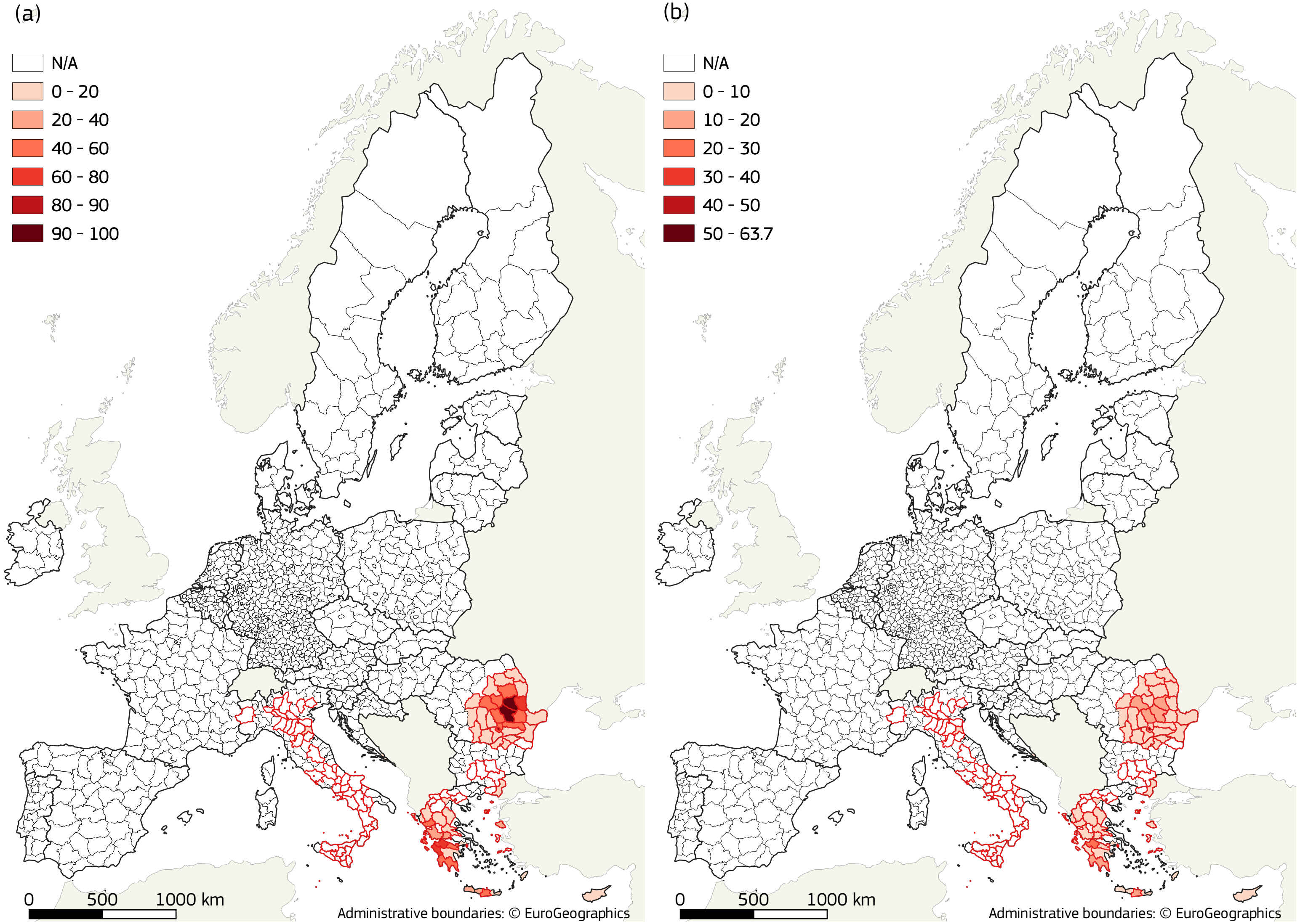


Figure 34. Scenario 3.2 – seismic retrofit: average annual benefit in terms of fatalities ($\Delta AALL$) for C_{ren} / C_{rep} = 0.12, t = 50 years, showing in red borders the top 100 priority regions based on $I^{*}_{eq-en-SVI,3}$

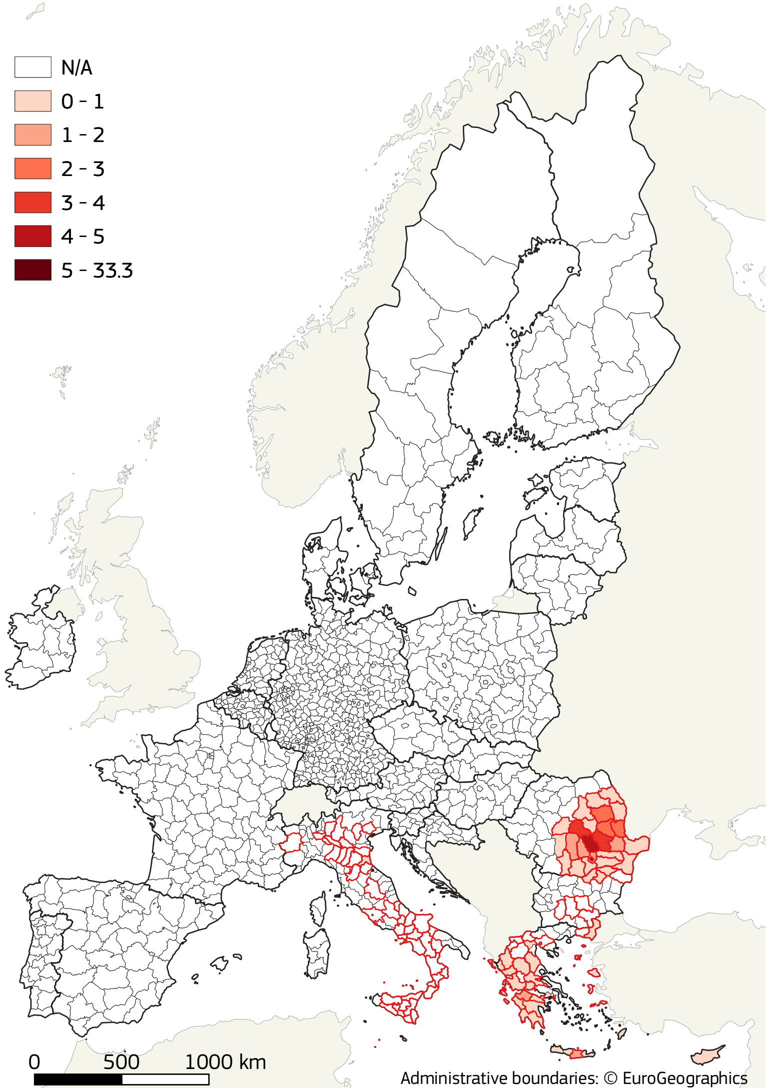
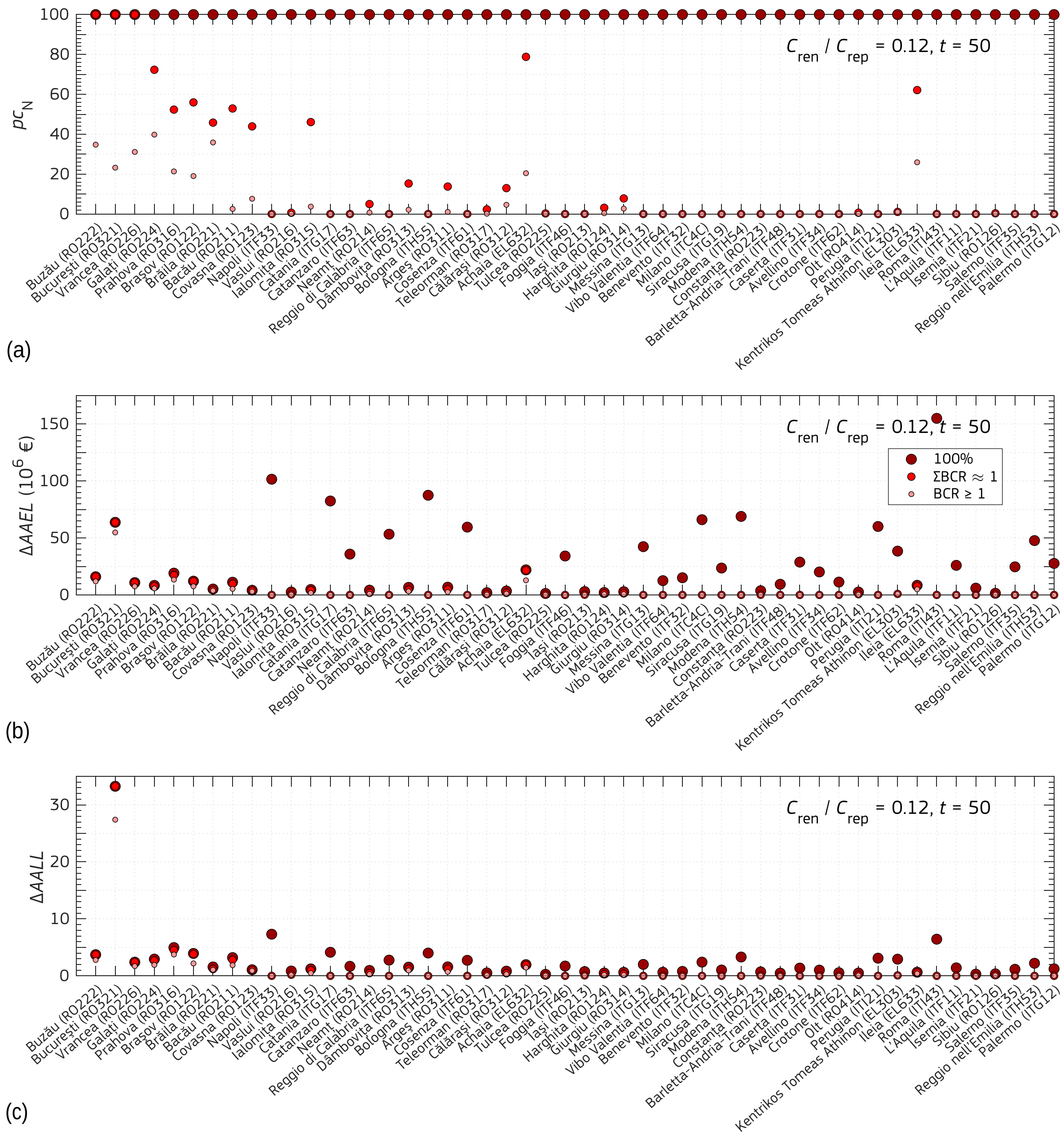


Figure 35. Scenario 3 – seismic retrofit: (a) percentage of renovated buildings (pc_N) per scenario (*BCR* ≥ 1, Σ*BCR* ≈ 1, 100%), and corresponding average annual benefit in terms of (b) economic loss (Δ*AAEL*), and (c) fatalities (Δ*AALL*), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.12, planning period *t* = 50 years



3.4.2 Energy efficiency upgrading

Figure 36 presents the cumulative benefit-to-cost ratios derived from implementing Scenarios 3.1 and 3.2 as a means to mitigate the energy inefficiency of buildings. The priority regions shown in the figure are based once again on the multi-sectoral integrated indicator $I^*_{eq-en-SVI,3}$. Figure 36a depicts the case of C_{ren} / C_{rep} = 0.15 and t = 50 years. Renovating building classes with individual *BCR*s ≥ 1.0 according to Scenario 3.1 results in a cumulative benefit-to-cost ratio in the range of 1.02–2.56 within the top 50 priority regions, indicating an economic benefit which exceeds the cost of renovation over the planning period. Scenario 3.2 does not provide an evident advantage in renovating additional building classes (as in the case of seismic retrofit, Figure 32a) and the cumulative *BCR* values from the two scenarios look similar, apart from the case of two Greek regions, i.e. Achaia (EL632) and Ilia (EL633). Nevertheless, *BCR* values are not representative of the renovation impact in absolute terms. In fact, small reductions in the cumulative *BCR* values among the two scenarios may integrate a large number of additional buildings, building value and occupants, thus exhibiting a strong impact on mitigating energy inefficiency, as it will be seen later in the section. Notwithstanding the last remark, when Scenarios 3.1, 3.2, and the case of renovating the entire building stock result in the same cumulative *BCR* value in Figure 36a (e.g. coinciding circles in Vaslui, RO216, Romania), then all buildings within a region are renovated by Scenario 3.1 and no additional classes are renovated by Scenario 3.2.

Absence of data for Scenarios 3.1 and 3.2 is observed in 19 Italian regions in Figure 36a, primarily due to the high associated renovation (and replacement) cost. In the rest of the Italian regions (i.e. Milan, ITC4C, Bologna, ITH55, Modena, ITH54, Reggio Emilia, ITH53, Perugia, ITI21) a certain fraction of buildings may be renovated in a cost-beneficial way, however, the cumulative *BCR* values of these regions for Scenario 3.1 remain low. In Romanian regions, certain cases of Scenario 3.2 with high cumulative *BCR*s (rather than being close to unity) imply the renovation of the entire building stock.

The sensitivity of Scenarios 3.1 and 3.2 in terms of *BCR* values is investigated through Figure 36b and c. For the lowest considered renovation cost and the longest planning period, Scenario 3.1 results in a cost-beneficial renovation of the entire building stock in 38 out of the top 50 priority regions, whereas Scenario 3.2 in all 50 regions. Data that are not visible in the first nine Romanian regions reach cumulative *BCR* values of 6.4-9.4 implying a quite high economic benefit compared to the renovation investment. On the contrary, the highest renovation cost and the shortest planning period result in beneficial renovation of building classes only in 10 Romanian regions (less than those in the case of seismic retrofit). Table 19 reports the number of regions where energy efficiency upgrading was found to be economically beneficial as a function of renovation cost and planning period variability when the top 100 priority regions are considered.

Figure 37 and Figure 38 present the geospatial distribution of the impact of renovation Scenario 3.2, implemented across the EU-27 for C_{ren} / C_{rep} = 0.15 and t = 50 years. The impact is presented in terms of the regional percentage of buildings which can be cost-beneficially renovated (pc_N), and the associated average annual benefit in terms of economic loss ($\Delta AAEL$), and energy consumption ($\Delta AAEC$). By comparing the maps with those derived from seismic retrofit (Figure 33, Figure 34), the extent of the energy renovation impact becomes immediately apparent in terms of both magnitude of metrics and spatial distribution of regions where energy upgrading is beneficial. Scenario 3.2 results in beneficial renovation in all EU Member States apart from Cyprus, Denmark, Estonia, Finland, Malta, Portugal, and Sweden.

Considering the top 100 priority regions (highlighted in red borders in Figure 37 and Figure 38), Scenario 3.2 identified 66 regions where energy efficiency upgrading is economically beneficial, as opposed to 47 in the case of seismic retrofit. Energy efficiency upgrading is not economically beneficial in 29 priority regions in southern Italy, four priority regions in Greece, and one in Bulgaria. A net average annual economic benefit of 141.12 · 10^6 € (calculated as $\Delta AAEL_{net,Scenario\,3.1}$ - $\Delta AAEL_{net,Scenario\,3.2}$ from Table 20) is invested back in renovation in Scenario 3.2, increasing the number of renovated building classes compared to Scenario 3.1. Overall, the number of renovated buildings, and the associated replacement cost and number of occupants increase from 37%, 25%, and 36%, in Scenario 3.1, to 47%, 37%, and 47%, in Scenario 3.2, respectively. Likewise, the benefit in terms of average annual energy consumption increases to 38523 GWh which corresponds to 57% of the energy that would be saved if all buildings were renovated.

Figure 39 provides impact assessment metrics per priority region and scenario for the top 50 priority regions. The figure illustrates that a seemingly small reduction in the cumulative *BCR* value in Scenario 3.2 (Figure 36a) may be accompanied by a large increase in the number of renovated buildings. For example, in the case of Bologna (ITH55), Milan (ITC4C), and Reggio Emilia (ITH53), the number of renovated buildings is at least doubled (Figure 39a), which yields a significant impact in the economic loss (Figure 39b) and energy consumption benefit (Figure 39c) in Scenario 3.2.

Table 19. Scenario 3 – energy efficiency upgrading: number of regions with cumulative *BCR*s ≥ 1.0 by scenario, considering the variability of renovation cost and planning period, and the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	C_{ren} / C_{rep} = 0.30, t = 35 years			C_{ren} / C_{rep} = 0.15, t = 50 years			C_{ren} / C_{rep} = 0.08, t = 100 years		
	Scenario 3.1	Scenario 3.2	100%	Scenario 3.1	Scenario 3.2	100%	Scenario 3.1	Scenario 3.2	100%
	BCR ≥ 1	ΣBCR ≥ 1		BCR ≥ 1	ΣBCR ≥ 1		BCR ≥ 1	ΣBCR ≥ 1	
Regions (cumulative *BCR* ≥ 1)	10	10	0	66	66	30	100	100	100

Table 20. Scenario 3 – energy efficiency upgrading: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.15 and planning period t = 50 years.

Impact metric	Scenario 3.1	Scenario 3.2	100%
	BCR ≥ 1	ΣBCR ≈ 1	
Regions of implementation	66	66	100
Cumulative *BCR*	1.36	1.19	0.80
Average annual economic loss benefit $\Delta AAEL$ (10^6 €)	2648.55	3499.45	6249.65
Net average annual economic loss benefit $\Delta AAEL_{net}$ (10^6 €)	707.65	566.53	-1609.77
Average annual loss of life benefit $\Delta AALL$ (fatalities)	-	-	-
Average annual energy consumption benefit $\Delta AAEC$ (GWh)	29494.07	38522.75	67657.15
Buildings	3951536	4951193	10591686
Replacement cost (10^6 €)	636857.71	962363.32	2578871.82
Average occupants (over 24 hrs)	11055075	14390638	30595128
Buildings (%)	37	47	100
Replacement cost (%)	25	37	100
Average occupants (%)	36	47	100

Figure 36. Scenario 3 – energy efficiency upgrading: cumulative *BCR* values per scenario (*BCR* ≥ 1, Σ*BCR* ≈ 1, 100%) within top 50 priority regions (based on the multi sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for (a) renovation to replacement cost C_{ren} / C_{rep} = 0.15, planning period *t* = 50 years, (b) C_{ren} / C_{rep} = 0.08, *t* = 100 years, and (d) C_{ren} / C_{rep} = 0.30, *t* = 35 years

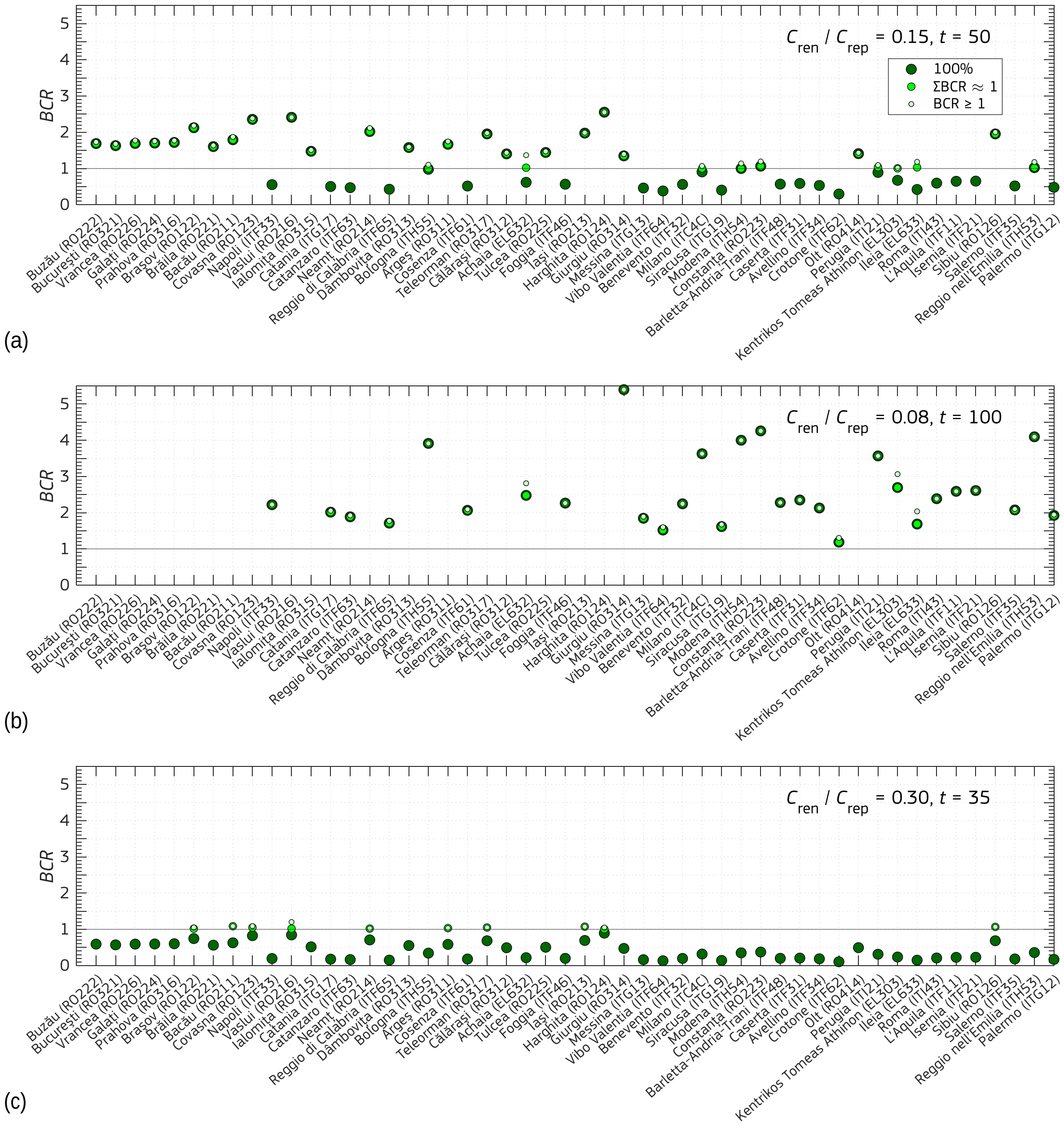


Figure 37. Scenario 3.2 – energy efficiency upgrading: (a) percentage of renovated buildings (pc_N), and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.15, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

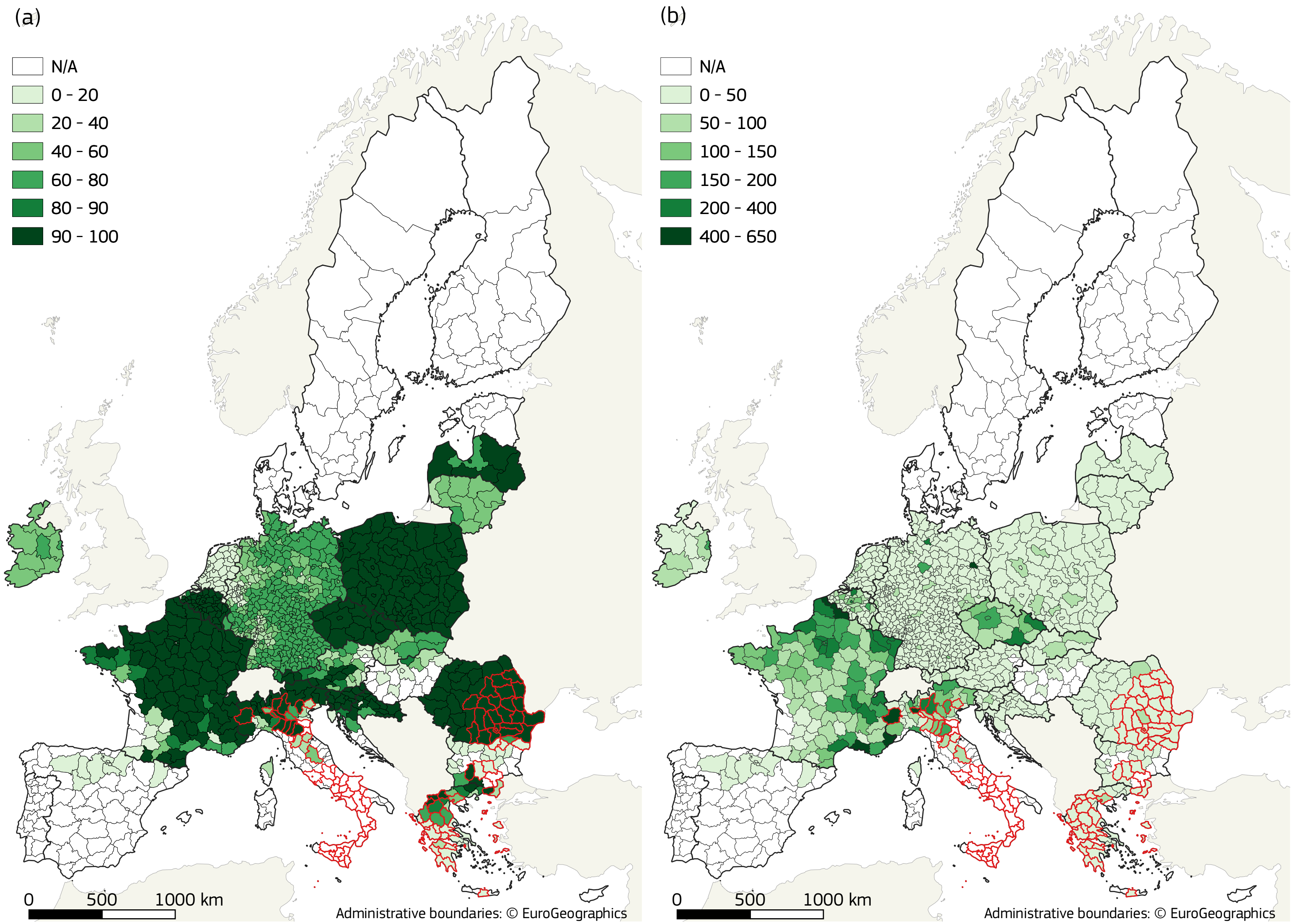


Figure 38. Scenario 3.2 – energy efficiency upgrading: average annual benefit in terms of energy consumption ($\Delta AAEC$, GWh) for C_{ren} / C_{rep} = 0.15, t = 50 years, showing in red borders the top 100 priority regions based on $I^{*}_{eq-en-SVI,3}$

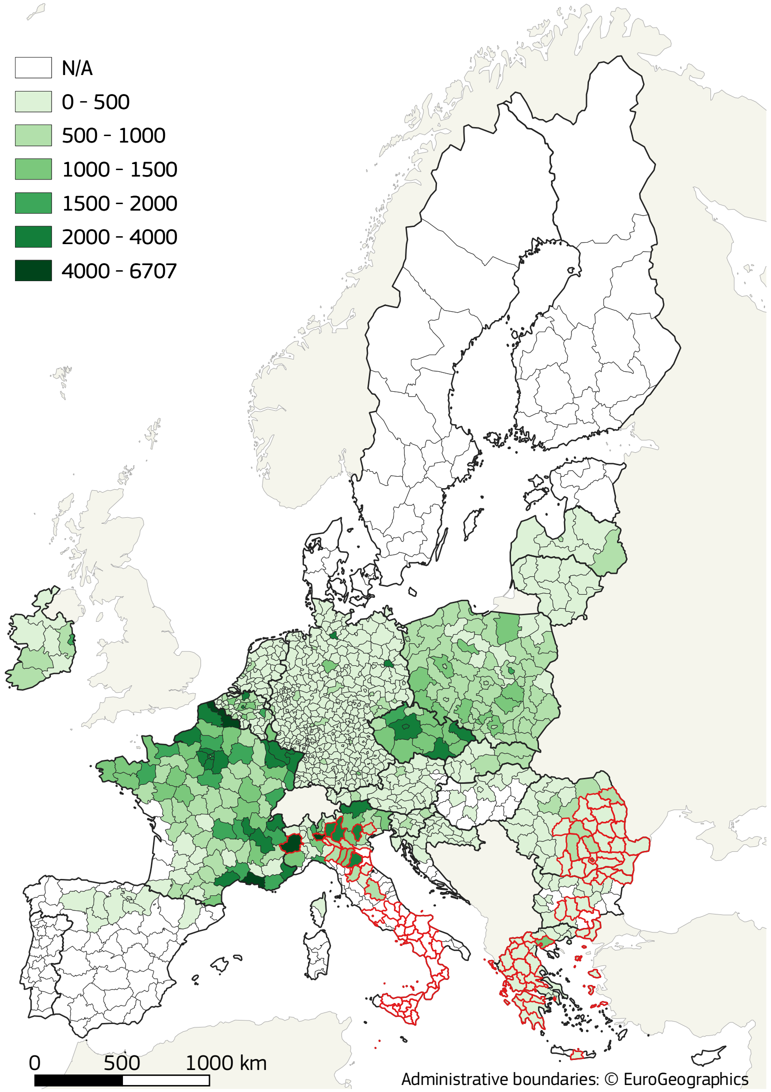
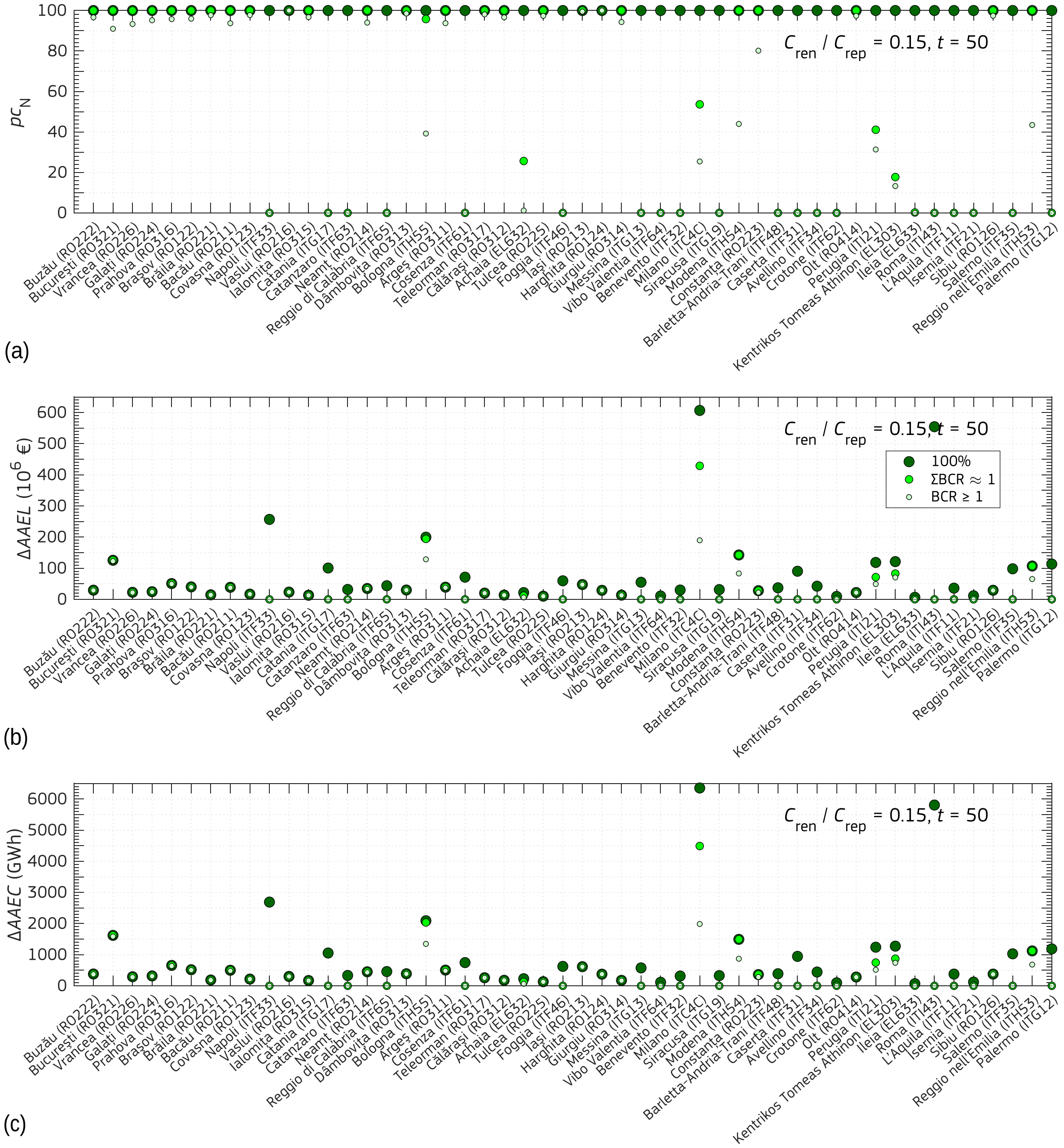


Figure 39. Scenario 3 – energy efficiency upgrading: (a) percentage of renovated buildings (pc_N) per scenario ($BCR \geq 1$, $\Sigma BCR \approx 1$, 100%), and corresponding average annual benefit in terms of (b) economic loss ($\Delta AAEL$), and (c) energy consumption ($\Delta AAEC$), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.15, planning period t = 50 years



3.4.3 Integrated renovation

Figure 40 presents the cumulative benefit-to-cost ratios derived from implementing Scenarios 3.1 and 32 as a means to mitigate both seismic risk and energy inefficiency of buildings through integrated renovation. Figure 40a depicts the case of C_{ren} / C_{rep} = 0.21 and t = 50 years for the top 50 priority regions based on $I^*_{eq-en-SV,3}$, similarly to the cases of seismic retrofit (Figure 32a) and energy efficiency upgrading (Figure 36a). Renovating building classes with individual *BCR*s ≥ 1.0 according to Scenario 3.1, results in a cumulative benefit-to-cost ratio in the range of 1.01–2.23 within the top 50 priority regions, with the upper value being closer to the case of seismic retrofit. Yet, cumulative *BCR*s derived from Scenario 3.2 tend to higher-than-one values, like in the case of energy efficiency upgrading, implying that a higher number of buildings, compared to seismic retrofit, can be renovated in a cost-beneficial way. Furthermore, absence of data for Scenarios 3.1 and 3.2 is observed in 17 Italian regions in Figure 40a, i.e. less than those in seismic retrofit but also in energy efficiency upgrading, providing a good indication of the beneficial effect of integrated renovation. Calabria (ITF65) and Catanzaro (ITF63) comprise the two Italian regions, in addition to those mentioned in Section 3.4.2, where integrated approaches enable economically beneficial renovation.

The sensitivity of Scenarios 3.1 and 3.2 in terms of *BCR* values is shown in Figure 40b and c. For the lowest considered renovation cost and the longest planning period, Scenario 3.1 results in a cost-beneficial renovation of the entire building stock in 41 out of the top 50 priority regions, whereas Scenario 3.2 in all 50 regions, thus exceeding the number of regions calculated in energy efficiency upgrading. Data that are not visible in the first nine Romanian regions reach cumulative *BCR* values of 6.4-8.7, maintaining a high economic benefit. On the other hand, the highest renovation cost and the shortest planning period result in beneficial renovation of building classes in 17 Romanian regions. Table 21 reports the number of regions where integrated renovation was found to be economically beneficial as a function of renovation cost and planning period variability when the top 100 priority regions are considered. By comparing Table 21 with Table 17 and Table 19, it is seen that integrated renovation consistently allows economically beneficial renovation in more priority regions regardless of the considered renovation cost and planning period.

To investigate the validity of the latter statement at a larger scale but also the beneficial effect of integrated renovation in absolute terms, Figure 41 and Figure 42 present the geospatial impact of Scenario 3.2, implemented across the EU-27 for C_{ren} / C_{rep} = 0.21 and t = 50 years. The impact is presented in terms of the regional percentage of renovated buildings (pc_N), and the associated average annual benefits Δ*AAEL*, Δ*AALL*, and Δ*AAEC*. Scenario 3.2 results in beneficial renovation in all the EU Member States apart from Cyprus, Denmark, Estonia, Finland, Hungary, Malta, Portugal, Spain, and Sweden. Overall, economically beneficial renovation is feasible in 734 regions out of the 1151 considered NUTS-3 across the EU-27. Although the number of regions is lower than in the case of energy efficiency upgrading (i.e. 922 regions in Figure 37, Figure 38), it represents a vast increase when compared to the 62 regions identified in the case of seismic retrofit (Figure 33, Figure 34) showing a significant impact in reducing fatalities across the EU. At the same time, the economic benefit and the reduction in energy consumption are in the same order of magnitude as in the case of energy efficiency upgrading, and occasionally higher. Impact maps in the form of Figure 33, Figure 37, and Figure 41 further provide valuable guidance by highlighting the regions where each type of renovation is most suitable for implementation.

Interestingly, when only the top 100 priority regions are considered, selected on the basis of seismic risk, energy inefficiency, and socioeconomic vulnerability, integrated renovation according to Scenario 3 has either an impact which is more beneficial compared to both seismic retrofit and energy efficiency upgrading, or slightly inferior to the latter, depending on the scenario and considered impact metric (Table 22 vs. Table 18 and Table 20). Specifically, the number of renovated buildings, and the average annual benefit in terms of economy and fatalities were found to be increased. On the contrary, the net average annual benefit, the replacement cost, and the number of average occupants, were found to be lower, albeit close to the values of the energy efficiency upgrading case. Scenario 3.2 identified 73 regions where integrated renovation is economically beneficial, as opposed to 47 and 66 in the cases of seismic retrofit and energy upgrading, respectively. Integrated renovation was not found economically beneficial in 25 priority regions in southern Italy, and two in Bulgaria.

Among the two scenarios in integrated renovation, the number of renovated buildings, and the associated replacement cost and number of occupants increase from 36%, 22%, and 34%, in Scenario 3.1, to 50%, 34%, and 46%, in Scenario 3.2, respectively, for an additional annual investment of 229.53 · 10^6 €. The benefits in terms of average annual loss of life and energy consumption are also increased according to Table 22 and represent 68% and 52% of the relevant benefits if all buildings were renovated. Finally, in Figure 43, impact assessment metrics are provided per priority region and scenario for the top 50 priority regions.

Table 21. Scenario 3 – integrated renovation: number of regions with cumulative *BCR*s ≥ 1.0 by scenario, considering the variability of renovation cost and planning period, and the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (integrating seismic risk, energy efficiency, socioeconomic vulnerability).

Impact metric	C_{ren} / C_{rep} = 0.41, t = 35 years			C_{ren} / C_{rep} = 0.21, t = 50 years			C_{ren} / C_{rep} = 0.10, t = 100 years		
	Scenario 3.1	Scenario 3.2	100%	Scenario 3.1	Scenario 3.2	100%	Scenario 3.1	Scenario 3.2	100%
	BCR ≥ 1	ΣBCR ≥ 1		BCR ≥ 1	ΣBCR ≥ 1		BCR ≥ 1	ΣBCR ≥ 1	
Regions (cumulative *BCR* ≥ 1)	17	17	0	73	73	28	100	100	100

Table 22. Scenario 3 – integrated renovation: impact assessment for the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability), renovation to replacement cost C_{ren} / C_{rep} = 0.21 and planning period t = 50 years.

Impact metric	Scenario 3.1	Scenario 3.2	100%
	BCR ≥ 1	ΣBCR ≈ 1	
Regions of implementation	73	73	100
Cumulative *BCR*	1.32	1.14	0.78
Average annual economic loss benefit *ΔAAEL* (10^6 €)	3095.77	4154.19	8311.97
Net average annual economic loss benefit $\Delta AAEL_{net}$ (10^6 €)	741.58	512.04	-2298.25
Average annual loss of life benefit *ΔAALL* (fatalities)	100	113	167
Average annual energy consumption benefit *ΔAAEC* (GWh)	26505.36	35042.89	67657.15
Buildings	3827331	5261696	10591686
Replacement cost (10^6 €)	572199.59	885244.32	2578871.82
Average occupants (over 24 hrs)	10352712	13926651	30595128
Buildings (%)	36	50	100
Replacement cost (%)	22	34	100
Average occupants (%)	34	46	100

Due to its definition, Scenario 3 is potentially more suitable when renovation funds are handled at a regional or national level. In regions where renovation is not economically beneficial, funding schemes that partially cover the cost of renovation may be explored. As an example of the latter remark, Figure 44 illustrates the percentage of the regional building stocks across the EU that can be renovated beneficially according to Scenario 3.2 for the same planning period but a reduced renovation cost compared to Figure 41a. The reduced renovation cost models here a partial funding (e.g. by state authorities) equal to 50%. Accordingly, the impact map in Figure 44 reflects the regions where renovation becomes economically advantageous for the beneficiaries of the hypothetical funding scheme and can be used for its promotion to the public. The extent of beneficial renovation becomes immediately apparent in Figure 44; in 1064 out of the 1151 regions across the EU, integrated renovation is beneficial for high percentages of the regional building stocks, as opposed to 734 regions in Figure 41a. Reduced state funds may be explored in this hypothetical scheme (i.e. less than 50%), ensuring that renovation remains advantageous for the beneficiaries in the areas of interest.

Naturally, in many of the 734 (or 1064) regions cited above, seismic retrofit may attract little interest due to the low associated risk (e.g. regions in central Europe). However, the extent to which seismic upgrading becomes feasible is a strong indication of the beneficial effect integrated renovation, and, in general, holistic approaches may have in increasing the efficiency of renovation strategies. For example, structural interventions aiming to improve the capacity of the ageing European building stock under vertical loads, environmental actions or other hazards (e.g. induced seismicity due to gas extraction) may be more relevant in such regions and can be investigated through the framework proposed herein.

Figure 40. Scenario 3 – integrated renovation: cumulative *BCR* values per scenario (*BCR* ≥ 1, Σ*BCR* ≈ 1, 100%) within top 50 priority regions (based on the multi sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for (a) renovation to replacement cost C_{ren} / C_{rep} = 0.21, planning period t = 50 years, (b) C_{ren} / C_{rep} = 0.10, t = 100 years, and (d) C_{ren} / C_{rep} = 0.30, t = 35 years

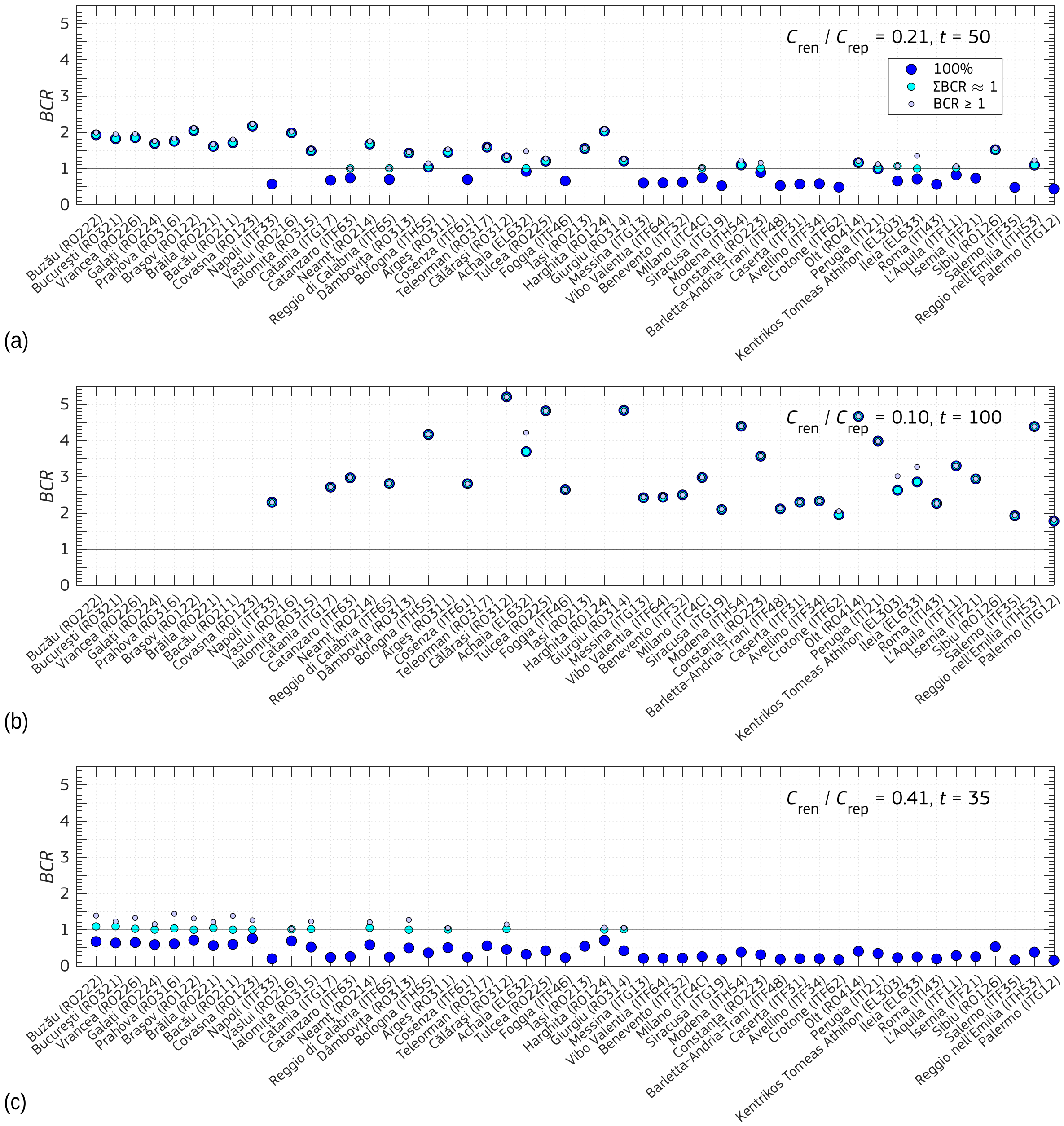


Figure 41. Scenario 3.2 – integrated renovation: (a) percentage of renovated buildings (pc_N), and (b) average annual benefit in terms of economic loss ($\Delta AAEL$, 10^6 €) for C_{ren} / C_{rep} = 0.21, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

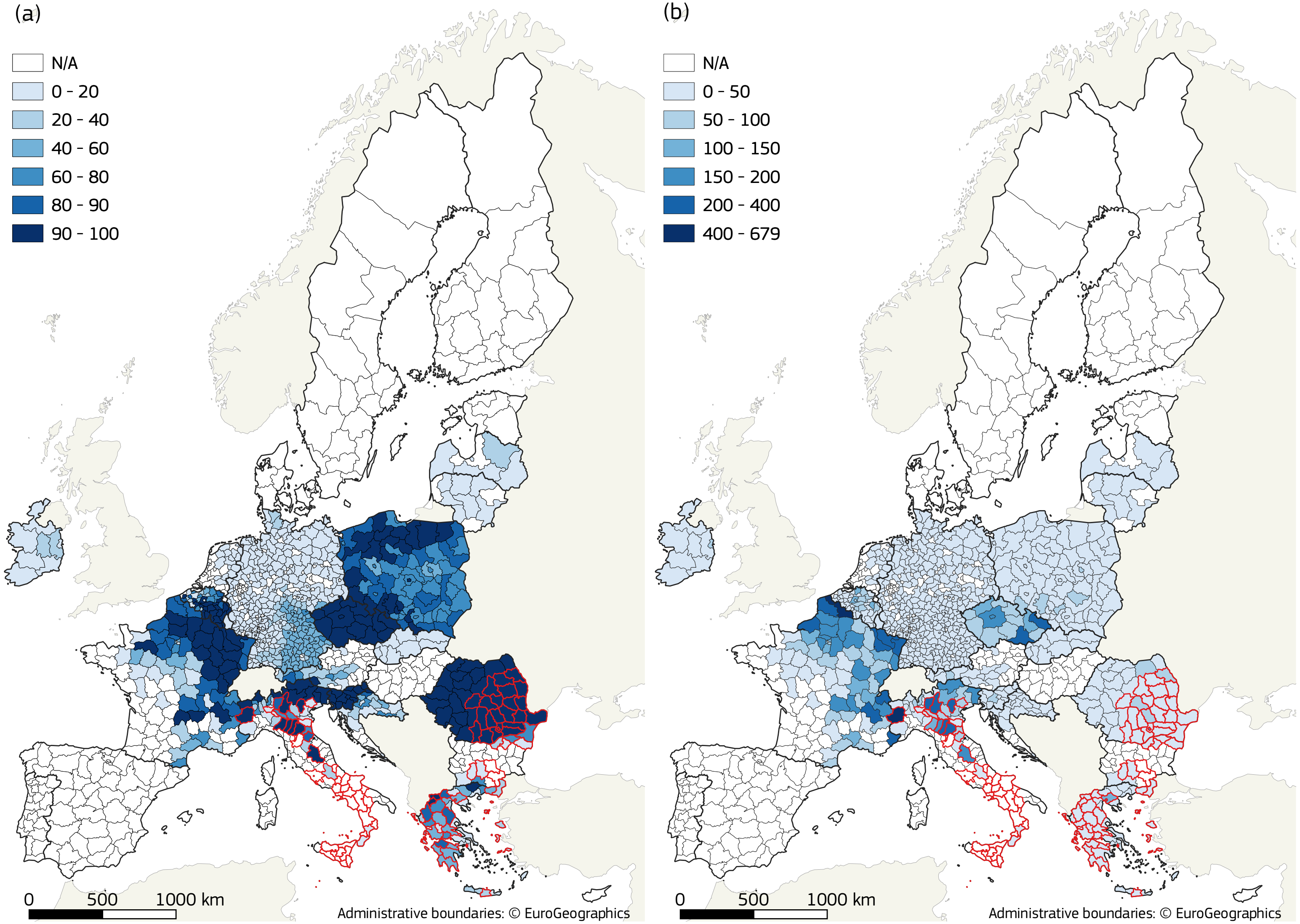


Figure 42. Scenario 3.2 – integrated renovation: average annual benefit in terms of (a) fatalities ($\Delta AALL$), and (b) energy consumption ($\Delta AAEC$, GWh) for C_{ren} / C_{rep} = 0.21, t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$

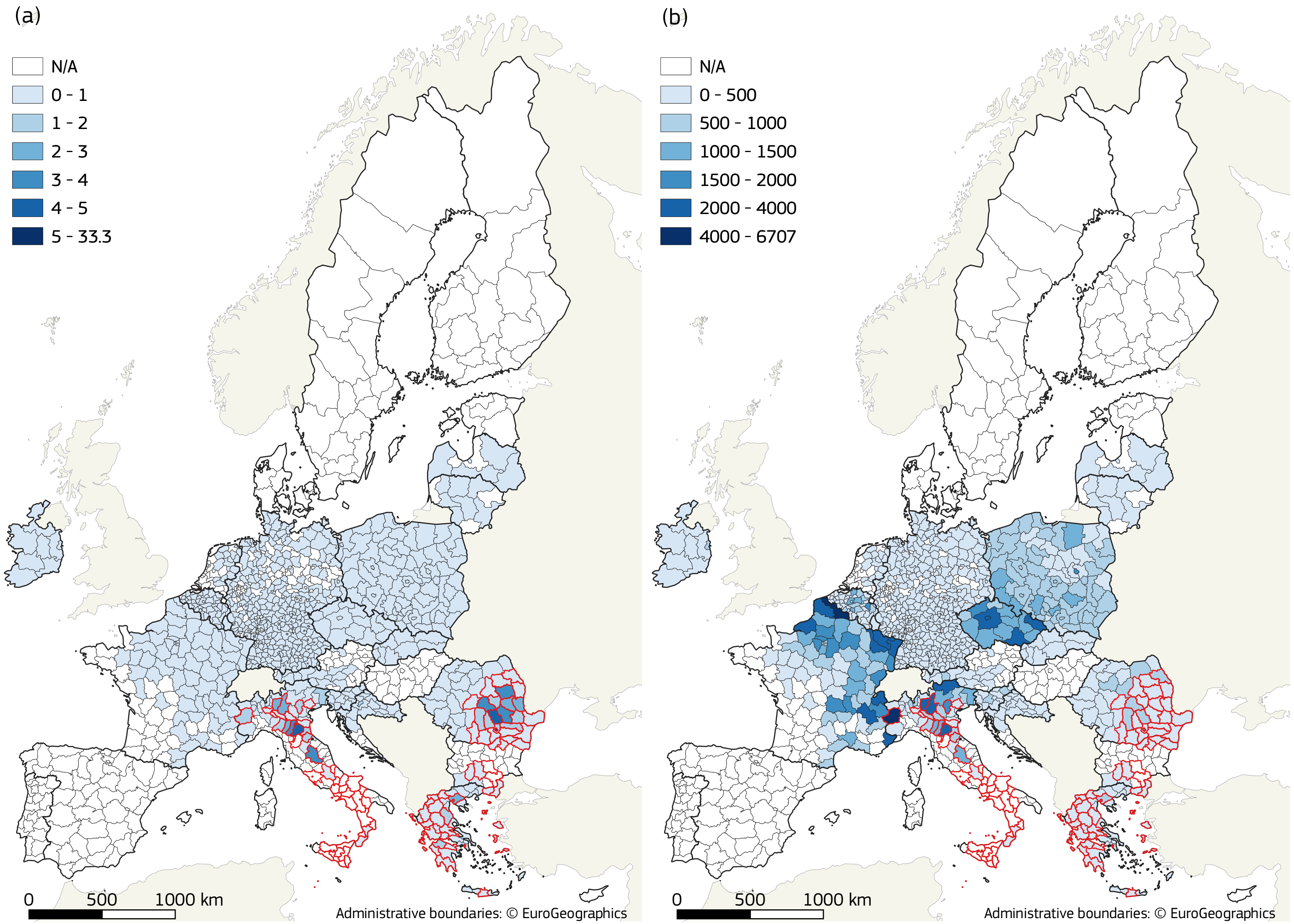


Figure 43. Scenario 3 – integrated renovation: (a) percentage of renovated buildings (pc_N) per scenario ($BCR \geq 1$, $\Sigma BCR \approx 1$, 100%), and corresponding average annual benefit in terms of (b) economic loss ($\Delta AAEL$), (c) fatalities ($\Delta AALL$), and (d) energy consumption ($\Delta AAEC$), within top 50 priority regions (based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$, considering seismic risk, energy efficiency, socioeconomic vulnerability) for renovation to replacement cost C_{ren} / C_{rep} = 0.21, planning period t = 50 years

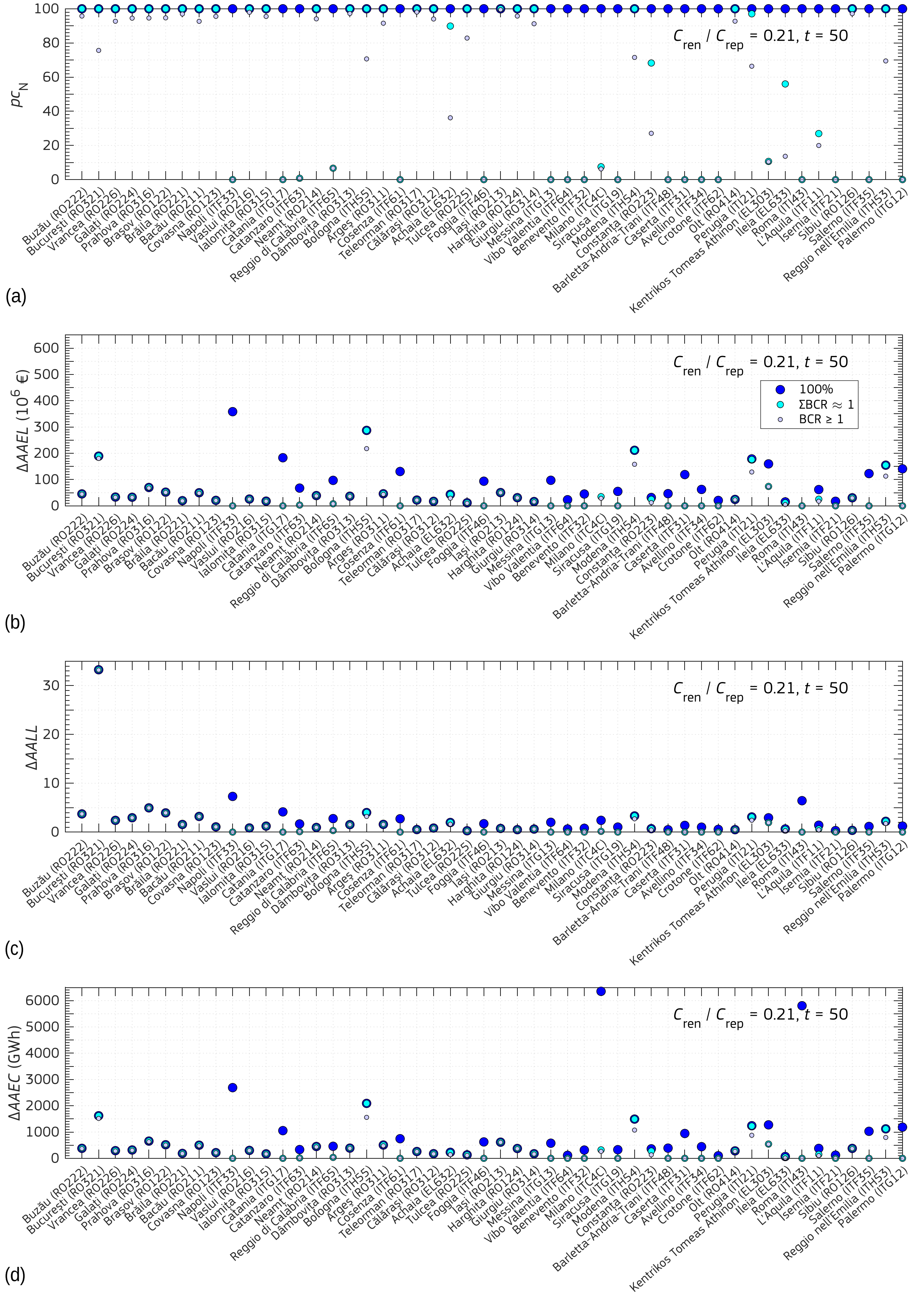
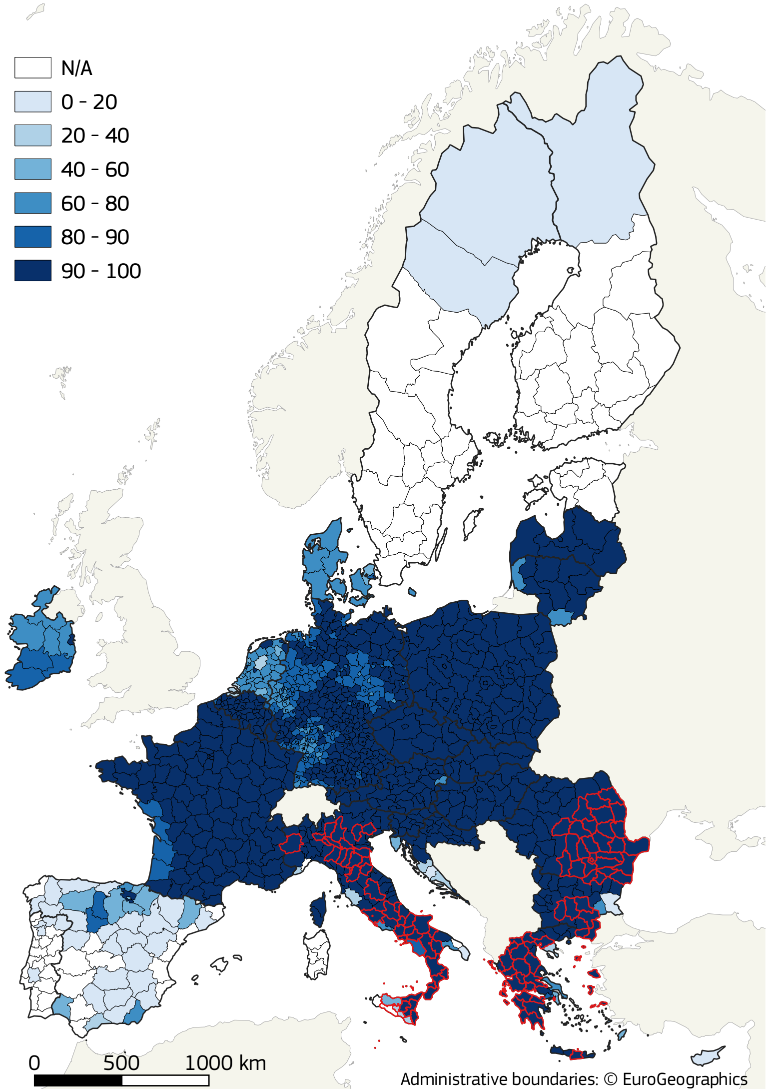


Figure 44. Scenario 3.2 – integrated renovation: percentage of renovated buildings (pc_N) for C_{ren} / C_{rep} = 0.10 and t = 50 years, showing in red borders the top 100 priority regions based on $I^*_{eq-en-SVI,3}$



4 Discussion and conclusions

The work presented in this report aims to **provide scientific support to building renovation policies in the EU**. The renovation of buildings is one of the focal areas of the European Green Deal policies and funding initiatives to achieve climate-neutrality in the EU by 2050. As such, building renovation is seen as a critical tool to reduce energy consumption, and hence greenhouse gas emissions, by improving the energy efficiency of the EU building stock. The impact assessment presented in this report had the goal to identify beneficial renovation strategies across the EU regions of high priority in terms of seismic risk, energy efficiency, and socioeconomic vulnerability. Hence, according to the wider scope and work of the REEBUILD project, building renovation is approached from a **holistic point of view**: an existing building may not only be upgraded to a better energy performance, but also gain structural safety improvements. The latter is crucial in seismic regions of the EU, where building renovation can enhance their resilience to natural disasters, such as earthquakes, and thus create a stable environment for risk-proofed investments. In the above context and considering the diverse seismic, climatic, socioeconomic, and exposure characteristics across the EU-27, the report summarises the work performed within the REEBUILD project on the definition of renovation scenarios, and the investigation of their impact considering seismic retrofit, and energy efficiency upgrading of buildings, both independently and in an integrated way.

To investigate the impact of renovation scenarios, an **integrated analysis framework** was employed. The framework has been used earlier to identify priority regions for building renovation considering seismic risk, energy efficiency of buildings, and socioeconomic vulnerability (Gkatzogias et al., 2022). Herein, the framework was extended to formulate alternative renovation scenarios, perform regional assessments considering the renovated building stock, and evaluate the impact of renovation scenarios. Renovation scenarios and their impact were explored addressing the residential building stock. Retrofit of buildings targeted here at a predefined improved seismic and/or energy performance of buildings, quantified by an upgrade of the seismic design code level, the lateral force coefficient and/or the thermal transmittance of the building envelope, respectively. Regional assessments of seismic risk and energy performance of the renovated buildings were performed by employing the same environmental excitation (i.e. seismic hazard and climatic conditions) and exposure models as in the case of existing buildings (Gkatzogias et al., 2022). Yet, each building class was mapped to an upgraded seismic vulnerability and energy performance class to model the effect of renovation. A frequency-based seismic performance assessment and a physics-based artificial neural network were used to evaluate the seismic and energy performance of the renovated building stock through the average annual economic loss (cost of seismic repair, space heating energy cost), average annual loss of life, and average annual space heating energy consumption.

A series of impact metrics were introduced to investigate first the **renovation potential of regions** and subsequently the **impact of renovation scenarios** (in absolute terms) across the EU-27. Impact metrics included benefit-to-cost ratios (*BCR*s) derived from cost–benefit analysis, and additional ones in normalised or absolute form addressing the reduction (due to renovation) in economic loss, loss of life, and space heating energy consumption, annually or over the planning period (i.e. the remaining economic life of assets). Impact metrics were further assessed considering a variability in renovation cost and planning period. The renovation potential reflects the capacity of each individual building class within a region to be renovated in a cost beneficial way, save lives, and reduce energy consumption. On the other hand, the impact reflects the actual benefit in absolute terms derived from renovating multiple building classes in a single or multiple regions according to the considered renovation scenario. It further describes the significance of a renovation scenario in terms of the number and value of renovated buildings, affected population, and naturally its economic feasibility, expressed through a cumulative *BCR*.

Among the investigated priority regions, the **seismic renovation potential** in terms of *BCR* values was found to be high in Romanian and Greek regions, as opposed to Italian ones where the high associated renovation cost results in low *BCR*s. Interestingly, in regions where seismic retrofit may be economically beneficial (due to the presence of building classes with $BCR \geq 1$), the building classes with high *BCR* values exhibit in general also high potential for saving lives. Nevertheless, the highest share of buildings, replacement cost, and average number of occupants per region is located in building classes with low renovation potential, introducing further complexity in defining efficient seismic renovation strategies.

The share of the building classes with $BCR \geq 1.0$ indicates a significantly higher economic **potential due to energy efficiency upgrading**, providing valuable margin for improving the impact of seismic retrofit through integrated renovation. Nevertheless, in the case of Italian priority regions, a low renovation potential was observed, associated mainly with the high renovation cost and to a certain extent with the adopted prioritisation indicator. Specifically, a multi-sectoral integrated indicator may promote high in the priority ranking a region with low average annual (energy-related) economic loss ratio (due to the combined effect of the rest of the indicator components), which is ultimately reflected on low *BRC* values of the individual classes. Once again, in regions where energy efficiency upgrading is expected to be economically beneficial, the building classes with high potential for saving energy exhibit in general high *BCR* values. Contrary to the case of seismic retrofit, building classes with high *BCR* accumulate the highest share of exposed assets.

The **potential due to integrated renovation** showcases a significant improve compared to the case of seismic retrofit, while combining positive aspects from both types of renovation (seismic and energy related). The minimum and median *BCR*s of building classes per region tend to increase compared to seismic retrofit, following a similar trend as in energy efficiency upgrading. Interestingly, maximum *BCR*s, albeit lower, are closer to the range of the values derived from seismic retrofit which are generally higher than in energy efficiency upgrading. Finally, in regions where integrated renovation is expected to be in general beneficial in economic terms, the highest potential for saving lives and saving energy is concentrated in building classes with *BCR* ≥ 1.0, which also integrate the highest share of buildings and population.

Following the above investigation, three main renovation scenarios were explored. The scenarios were implemented across the EU-27 regions, emphasising though the top 100 priority regions. These were selected on the basis of a multi-sectoral integrated indicator which considers seismic risk, energy efficiency, and socioeconomic vulnerability.

Scenario 1 investigates the impact of renovating macro-taxonomy classes within a region, defined on the basis of engineering judgement. Macro-taxonomies were simplistically based here on a single structural attribute relevant to the seismic performance, i.e. the building seismic design code level. Such a definition of macro-taxonomy classes ensures a risk-proofed renovated building environment in the case of integrated renovation, since buildings of low seismic capacity are promoted for renovation. On the other hand, the same definition involves a high risk of renovation investment loss due to earthquakes when energy upgrading is only applied. Three sub-scenarios were investigated, corresponding to renovating CDN, CDL, and CDM buildings. According to the scenario definition, building renovation, and hence the associated benefit (i.e. reduction in economic loss, loss of life, and energy consumption), extend across most of the EU regions regardless of their seismic risk and/or energy performance. Yet, seismic retrofit according to Scenario 1 appears to be economically feasible in a few regions, characterised by quite high seismic risk and low renovation cost. The scenario is deemed more promising in the case of energy efficiency upgrading. Specifically, upgrading the energy performance of CDN buildings within all top 100 priority regions was found to be almost economically beneficial (cumulative *BCR* equal to 0.93), as CDN buildings within these regions are old and characterised by low energy performance (hence, high economic loss). An integrated approach allows renovating CDL buildings in a cost beneficial way in 77 regions across the EU, as opposed to 155 and only 6 regions in the case of energy efficiency and seismic upgrading, respectively. If only the top 100 regions are considered, integrated renovation of CDL buildings is economically beneficial in 37 regions contrary to 30 regions in the case of energy efficiency upgrading. At the same time, integrated renovation of CDL buildings presents the highest average annual economic benefit among the three types of renovation and identical reduction in fatalities and energy consumption to seismic retrofit and energy efficiency upgrading, respectively (in line with the scenario definition). Scenario 1 is expected to be more cost-efficient if the granularity in the definition of macro-taxonomy classes is increased, i.e. by including additional structural but also energy attributes (e.g. construction date, height of buildings). Inevitably, this comes at the cost of increased complexity in scenario definition and implementation.

Scenario 2 investigates the impact of renovating predefined fractions (i.e. 10% and 20%) of the regional building stocks. The building classes that comprise the renovated fractions were selected following a prioritisation of building classes based on their individual *BCR*. Overall, increasing the number of renovated buildings, results in decreasing the cumulative *BCR*s per region, and thus the efficiency of the renovation scenario. Across the EU, at the NUTS-3 level, integrated renovation of the 20% of the regional building stock exhibits cumulative *BCR*s ≥ 1.0 in 448 regions (out of the 1151), as opposed to 774 regions in the case of energy efficiency upgrading, and just 29 in the seismic retrofit case. In this context, integrated renovation allows upgrading the seismic safety of structures in a cost-efficient way to a much larger extent than seismic retrofit alone, while it presents regional economic benefits with the same order of magnitude as energy efficiency upgrading. Given the indiscriminate renovation in all regions according to the preselected fractions of the regional building stocks, Scenario 2 comes in handy when the venture is funded by a single central entity and renovation is urged in regions with no expected net economic benefit. For example, implementing integrated renovation in the 20% of the building stock within the top 100 priority regions was assessed as economically beneficial for 64 regions. Although this share of regions represents an additional increase compared to the case of energy efficiency upgrading, 36 priority regions mainly in southern Italy, but also in Greece and Bulgaria, still do not provide a positive net economic benefit. Yet, if the cumulative *BCR* and net average annual economic benefit are calculated over all the top 100 regions, integrated renovation becomes economically viable for a central funding entity. This is also valid for energy efficiency upgrading but not seismic retrofit. In favour of integrated renovation, it further results in the highest net economic benefit, and approximately the same benefit in terms of loss of life and energy consumption.

Scenario 3 selects building classes for renovation based on their *BCR* value, so that renovation is always beneficial in economic terms. Therefore, it aims to identify the maximum fraction of the regional building stock and the relevant building classes, the renovation of which results always in a cumulative *BCR* equal or higher than unity. In this context, impact maps derived from Scenario 3 may provide valuable guidance to decision-makers by highlighting the regions where each type of renovation is most suitable for implementation. Two different variations were explored. Scenario 3.1 promotes for renovation all building classes presenting individually *BCR* ≥ 1.0 within a region, whereas Scenario 3.2 considers all building classes that result in a cumulative *BCR* approximately equal to unity. In economic terms, Scenario 3.2 exploits the net economic benefit derived from Scenario 3.1 to renovate additional building classes which would not be beneficial to renovate on a stand-alone basis. A marked difference with Scenario 2 is that Scenario 3 can be implemented in a region on the condition that at least one building class with an individual *BCR* > 1.0 is present. Therefore, benefit (economic, reduction in fatalities and energy consumption) is concentrated in regions of high seismic risk and energy inefficiency, and relatively low to medium renovation cost. The above characteristics render Scenario 3 potentially more suitable when renovation funds are handled at a regional or national level; in regions where renovation is not economically beneficial, funding schemes that partially cover the cost of renovation may be explored.

Overall, economically beneficial integrated renovation according to Scenario 3.2 is feasible in 734 regions out of the 1151 considered NUTS-3 across the EU-27. Although the number of regions is lower than in the case of energy efficiency upgrading, it represents a vast increase when compared to the 62 regions identified in the case of seismic retrofit, showing a significantly increased impact in reducing fatalities across the EU. At the same time, the economic benefit and the reduction in energy consumption are in the same order of magnitude with energy efficiency upgrading, and occasionally higher. Likewise, when only the top 100 priority regions are considered, integrated renovation has an impact which is either more beneficial compared to both seismic retrofit and energy efficiency upgrading, or slightly inferior to the latter, depending on the sub-scenario and considered impact metric. Specifically, the number of renovated buildings, and benefits in terms of economy and reduction in fatalities is increased. The net economic benefit, and the affected population were found to be lower, albeit close to the values of the energy efficiency upgrading case.

Irrespective of the considered scenario or type of renovation, both the renovation potential and impact were found to be sensitive to relevant economic assumptions regarding the renovation and replacement cost, the inflation of construction cost and energy prices, and the planning period. Yet, the results presented in this report clearly illustrate that **integrated renovation is capable of tackling the multidimensional problem of building renovation**, providing a risk-proofed, sustainable, and inclusive building environment. Importantly, integrated approaches may achieve this in a cost-efficient way. Integrated renovation exhibits a beneficial effect similar to the case when building classes with high individual *BCR*s compensate for the cost of renovating building classes with *BCR*s < 1.0 within a region (irrespective of the type of renovation), or similar to the case when regions with high net economic benefit due to renovation compensate for those that present cumulative *BCR*s < 1.0 in a renovation venture funded by a central investor across multiple regions. According to this effect, in regions of high seismic risk (e.g. in southern and western Greece), the high economic benefit due to seismic retrofit may compensate for the increased integrated renovation cost, thus allowing the energy efficiency upgrading of buildings. Conversely, in regions with high average annual energy loss, energy efficiency upgrading may compensate for the cost of integrated renovation, thus allowing seismic upgrading of structures, which is the most common case across the EU. Integrated approaches may render renovation beneficial even in regions where neither seismic retrofit nor energy efficiency upgrading are economically feasible (e.g. regions in central Italy, Greece, northern Bulgaria) through the reduced renovation cost compared to the cumulative cost of implementing seismic and energy renovation separately. In regions where both seismic and energy renovation benefits are expected to be high (e.g. in Romania), integrated renovation will further increase these benefits. In any of the above cases, the economic benefit due to integrated renovation will be in the order of magnitude of the highest economic benefit among the seismic and the energy renovation ones (or even higher), whereas integrated renovation will always present the unique capability of reducing fatalities and energy consumption at the same time.

In the above context, **integrated renovation is expected to be even more beneficial** in high seismic risk regions of southern Europe (e.g. southern Italy) if loss associated with space cooling energy consumption is taken into account (not considered herein), due to the hot climate of these regions and the expected increased benefit due to energy efficiency upgrading. Likewise, integrated renovation is expected to be even more beneficial in central and/or northern Europe if structural interventions aim to improve the capacity of the ageing European building stock under vertical loads, environmental actions or other hazards (e.g. induced seismicity due to gas extraction). A combination of the renovation strategies presented in this report along with their interpretation to annual renovation rates required to attain EU relevant targets by 2030 and 2050 may increase their practicality and value for easier and wider implementation. The REEBUILD team will continue fostering holistic approaches of renovation in support of the EU policies with additional explorations regarding the definition and feasibility of renovation scenarios.

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Annex A Input data for regional assessment

Table A. 1. Mapping of seismic building classes to vulnerability classes for existing and renovated buildings. ([1])

No.	Building class	Vulnerability function	
		Existing buildings	**Renovated buildings**
1	CR+PC/LFM+CDN/H:1	CR_LFM-CDN-0_H1	CR_LFM-CDM-5_H1
2	CR/LFM+CDN/H:1	CR_LFM-CDN-0_H1	CR_LFM-CDM-5_H1
3	CR/LWAL+CDN/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
4	MUR/LWAL+CDN/H:1	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
5	S+SL/LFM+CDN/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
6	S/LFM+CDN/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
7	W/LWAL+CDN/H:1	W_LFM-DUL_H1	W_LFM-DUH_H1
8	CR+PC/LWAL+CDN/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
9	CR+PC/LWAL+CDN/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
10	CR+PC/LWAL+CDN/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
11	CR/LFINF+CDN/H:1	CR_LFINF-CDN-0_H1	CR_LFINF-CDM-5_H1
12	CR/LFINF+CDN/H:2	CR_LFINF-CDN-0_H2	CR_LFINF-CDM-5_H2
13	CR/LFINF+CDN/HBET:3-5	CR_LFINF-CDN-0_H4	CR_LFINF-CDM-5_H4
14	MUR+CL/LWAL+CDN/H:1	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
15	MUR+CL/LWAL+CDN/H:2	MUR-CL99_LWAL-DNO_H2	MR_LWAL-DUM_H2
16	MUR+ST/LWAL+CDN/H:1	MUR-STDRE_LWAL-DNO_H1	MR_LWAL-DUM_H1
17	MUR+ST/LWAL+CDN/H:2	MUR-STDRE_LWAL-DNO_H2	MR_LWAL-DUM_H2
18	CR+PC/LWAL+CDH+LFC:20.0/H:2	CR_LWAL-DUH_H2	CR_LWAL-DUH_H2
19	CR+PC/LWAL+CDH+LFC:20.0/H:1	CR_LWAL-DUH_H1	CR_LWAL-DUH_H1
20	CR+PC/LWAL+CDN/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
21	CR/LWAL+CDH+LFC:20.0/H:1	CR_LWAL-DUH_H1	CR_LWAL-DUH_H1
22	CR/LWAL+CDH+LFC:20.0/H:2	CR_LWAL-DUH_H2	CR_LWAL-DUH_H2
23	CR/LWAL+CDH+LFC:20.0/HBET:3-5	CR_LWAL-DUH_H4	CR_LWAL-DUH_H4
24	CR/LWAL+CDH+LFC:20.0/HBET:6-	CR_LWAL-DUH_H6	CR_LWAL-DUH_H6
25	CR/LWAL+CDM+LFC:16.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
26	CR/LWAL+CDM+LFC:16.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
27	CR/LWAL+CDM+LFC:16.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
28	CR/LWAL+CDM+LFC:16.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
29	CR/LWAL+CDN/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
30	CR/LWAL+CDN/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
31	MUR/LWAL+CDN/H:2	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
32	S/LFBR+CDH/H:1	S_LFBR-DUM_H1	S_LFBR-DUH_H1
33	S/LFBR+CDH/H:2	S_LFBR-DUM_H2	S_LFBR-DUH_H2
34	S/LFBR+CDH/HBET:3-5	S_LFBR-DUM_H4	S_LFBR-DUH_H4
35	S/LFM+CDH/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
36	S/LFM+CDH/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
37	S/LFM+CDH/HBET:3-5	S_LFM-DUM_H4	S_LFM-DUH_H4
38	W/LWAL+CDH/H:1	W_LFM-DUH_H1	W_LFM-DUH_H1
39	W/LWAL+CDH/H:2	W_LFM-DUH_H2	W_LFM-DUH_H2
40	W/LWAL+CDM/H:1	W_LFM-DUM_H1	W_LFM-DUH_H1
41	W/LWAL+CDM/H:2	W_LFM-DUM_H2	W_LFM-DUH_H2
42	W/LWAL+CDN/H:2	W_LFM-DUL_H2	W_LFM-DUH_H2
43	CR+PC/LWAL+CDH+LFC:20.0/HBET:3-5	CR_LWAL-DUH_H4	CR_LWAL-DUH_H4
44	CR+PC/LWAL+CDH+LFC:20.0/HBET:6-	CR_LWAL-DUH_H6	CR_LWAL-DUH_H6
45	CR+PC/LWAL+CDM+LFC:16.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
46	CR+PC/LWAL+CDM+LFC:16.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
47	CR+PC/LWAL+CDM+LFC:16.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
48	CR+PC/LWAL+CDM+LFC:16.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
49	CR/LWAL+CDM+LFC:12.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
50	CR+PC/LWAL+CDH+LFC:8.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
51	CR+PC/LWAL+CDH+LFC:8.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
52	CR+PC/LWAL+CDH+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
53	CR+PC/LWAL+CDH+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
54	CR+PC/LWAL+CDM+LFC:12.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
55	CR+PC/LWAL+CDM+LFC:12.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
56	CR+PC/LWAL+CDM+LFC:12.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
57	CR+PC/LWAL+CDM+LFC:12.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
58	CR/LWAL+CDM+LFC:12.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
59	CR/LWAL+CDH+LFC:8.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
60	CR/LWAL+CDH+LFC:8.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
61	CR/LWAL+CDH+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
62	CR/LWAL+CDH+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
63	CR/LWAL+CDM+LFC:12.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
64	CR/LWAL+CDM+LFC:12.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
65	CR+PC/LWAL+CDH+LFC:0.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
66	CR+PC/LWAL+CDH+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
67	CR/LWAL+CDM+LFC:4.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
68	CR/LWAL+CDM+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
69	CR+PC/LWAL+CDH+LFC:0.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
70	CR/LWAL+CDM+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
71	CR/LWAL+CDM+LFC:4.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
72	CR/LWAL+CDH+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
73	CR/LWAL+CDH+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
74	CR/LWAL+CDH+LFC:0.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
75	CR/LWAL+CDH+LFC:0.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
76	CR+PC/LWAL+CDM+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
77	CR+PC/LWAL+CDM+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
78	CR+PC/LWAL+CDM+LFC:4.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
79	CR+PC/LWAL+CDM+LFC:4.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
80	CR+PC/LWAL+CDH+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
81	CR+PC/LWAL+CDH+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
82	CR+PC/LWAL+CDH+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
83	CR+PC/LWAL+CDH+LFC:10.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
84	CR+PC/LWAL+CDH+LFC:10.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
85	CR/LWAL+CDH+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
86	CR/LWAL+CDH+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
87	CR/LWAL+CDH+LFC:10.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
88	CR/LWAL+CDH+LFC:10.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
89	CR+PC/LFM+CDL/H:1	CR_LFM-CDL-0_H1	CR_LFM-CDH-5_H1
90	CR/LFINF+CDL/H:2	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
91	CR/LFM+CDM/H:1	CR_LFM-CDM-0_H1	CR_LFM-CDH-5_H1
92	CR/LWAL+CDM/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
93	MCF/LWAL+CDL/H:1	MCF_LWAL-DUL_H1	MCF_LWAL-DUH_H1
94	S/LFBR+CDM/H:1	S_LFBR-DUM_H1	S_LFBR-DUH_H1
95	S/LFBR+CDM/HBET:3-5	S_LFBR-DUM_H4	S_LFBR-DUH_H4
96	S/LFBR+CDM/HBET:6-	S_LFBR-DUM_H6	S_LFBR-DUH_H6
97	S/LFINF+CDL/H:1	S_LFINF-DUM_H1	S_LFINF-DUH_H1
98	S/LFM+CDL/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
99	S/LFM+CDL/HBET:3-5	S_LFM-DUM_H4	S_LFM-DUH_H4
100	CR/LFM+CDN/H:2	CR_LFM-CDN-0_H2	CR_LFM-CDM-5_H2
101	S/LFBR+CDN/H:1	S_LFBR-DUM_H1	S_LFBR-DUH_H1
102	MUR+CL/LWAL+CDN/HBET:1-3	MUR-CL99_LWAL-DNO_H2	MR_LWAL-DUM_H2
103	CR/LDUAL+CDN/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
104	CR/LDUAL+CDN/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
105	CR/LWAL+CDN/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
106	S/LFINF+CDN/H:2	S_LFINF-DUM_H2	S_LFINF-DUH_H2
107	S/LWAL+CDN/HBET:3-5	S_LWAL-DUM_H4	S_LWAL-DUH_H4
108	S/LWAL+CDN/HBET:6-	S_LWAL-DUM_H6	S_LWAL-DUH_H6
109	W/LFM+CDN/H:1	W_LFM-DUL_H1	W_LFM-DUH_H1
110	W/LFM+CDN/H:2	W_LFM-DUL_H2	W_LFM-DUH_H2
111	CR/LFM+CDL/H:2	CR_LFM-CDL-0_H2	CR_LFM-CDH-5_H2
112	CR/LWAL+CDL/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
113	CR+PC/LWAL+CDL/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
114	CR+PC/LWAL+CDL/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
115	CR+PC/LWAL+CDM/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
116	CR+PC/LWAL+CDM/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
117	CR+PC/LWAL+CDM/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
118	CR+PC/LWAL+CDM/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
119	CR/LDUAL+CDH/HBET:3-5	CR_LDUAL-DUH_H4	CR_LDUAL-DUH_H4
120	CR/LDUAL+CDH/HBET:6-	CR_LDUAL-DUH_H6	CR_LDUAL-DUH_H6
121	CR/LDUAL+CDL/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
122	CR/LDUAL+CDL/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
123	CR/LDUAL+CDM/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
124	CR/LDUAL+CDM/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
125	CR/LFINF+CDL/HBET:3-5	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
126	CR/LFINF+CDM/H:1	CR_LFINF-CDM-0_H1	CR_LFINF-CDH-5_H1
127	CR/LFINF+CDM/H:2	CR_LFINF-CDM-0_H2	CR_LFINF-CDH-5_H2
128	CR/LFINF+CDM/HBET:3-5	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
129	CR/LFINF+CDN/HBET:6-	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
130	MCF/LWAL+CDL/H:2	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
131	MCF/LWAL+CDL/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
132	MUR+CL/LWAL+CDN/HBET:3-5	MUR-CL99_LWAL-DNO_H4	MR_LWAL-DUM_H4
133	MUR+ST/LWAL+CDN/HBET:3-5	MUR-STDRE_LWAL-DNO_H4	MR_LWAL-DUM_H4
134	MR/LWAL+CDL/H:2	MR_LWAL-DUL_H2	MR_LWAL-DUH_H2
135	S/LWAL+CDL/H:1	S_LWAL-DUM_H1	S_LWAL-DUH_H1
136	W/LFM+CDL/H:1	W_LFM-DUL_H1	W_LFM-DUH_H1
137	CR/LDUAL+CDL+LFC:0.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
138	CR/LDUAL+CDM+LFC:19.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
139	CR/LDUAL+CDM+LFC:19.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
140	CR/LWAL+CDL+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
141	CR/LWAL+CDL+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
142	CR/LFINF+CDM+LFC:19.0/HBET:3-5	CR_LFINF-CDM-20_H4	CR_LFINF-CDH-25_H4

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
143	MIX/LH+CDL/H:1	MCF_LWAL-DUL_H1	MCF_LWAL-DUH_H1
144	MUR+CL/LWAL+CDN/H:2/FC	MUR-CL99_LWAL-DNO_H2	MR_LWAL-DUM_H2
145	MUR+CL/LWAL+CDN/H:1/FW	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
146	MUR+CL/LWAL+CDN/H:1/FC	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
147	CR/LWAL+CDM+LFC:19.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
148	CR/LWAL+CDM+LFC:19.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
149	MCF/LWAL+CDN/H:2	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
150	MCF/LWAL+CDN/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
151	MUR+ADO/LWAL+CDN/H:1	MUR-ADO_LWAL-DNO_H1	MR_LWAL-DUM_H1
152	MUR+CL/LWAL+CDN/H:2/FW	MUR-CL99_LWAL-DNO_H2	MR_LWAL-DUM_H2
153	CR+PC/LWAL+CDL+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
154	W/LWAL+CDL/H:1	W_LFM-DUL_H1	W_LFM-DUH_H1
155	W/LWAL+CDL/H:2	W_LFM-DUL_H2	W_LFM-DUH_H2
156	CR+PC/LWAL+CDL+LFC:0.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
157	CR/LFINF+CDL+LFC:0.0/HBET:3-5	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
158	CR+PC/LWAL+CDL+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
159	CR/LFINF+CDM+LFC:19.0/H:2	CR_LFINF-CDM-20_H2	CR_LFINF-CDH-25_H2
160	CR/LFINF+CDL+LFC:0.0/H:2	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
161	CR/LDUAL+CDL+LFC:0.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
162	CR/LWAL+CDL+LFC:2.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
163	CR/LWAL+CDL+LFC:4.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
164	CR/LWAL+CDL+LFC:4.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
165	CR/LFINF+CDL+LFC:2.5/HBET:3-5	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
166	CR/LFINF+CDL+LFC:4.5/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
167	CR/LFINF+CDL+LFC:4.5/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
168	CR/LDUAL+CDL+LFC:4.5/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
169	CR/LDUAL+CDL+LFC:4.5/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
170	CR+PC/LWAL+CDL+LFC:2.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
171	CR+PC/LWAL+CDL+LFC:4.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
172	CR+PC/LWAL+CDL+LFC:2.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
173	CR+PC/LWAL+CDL+LFC:4.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
174	CR/LFINF+CDL+LFC:2.5/H:2	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
175	CR+PC/LWAL+CDL+LFC:2.5/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
176	CR+PC/LWAL+CDL+LFC:4.5/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
177	CR/LFINF+CDL+LFC:5.0/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
178	CR/LFINF+CDL+LFC:5.0/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
179	CR/LWAL+CDL+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
180	CR+PC/LWAL+CDL+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
181	CR+PC/LWAL+CDL+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
182	CR+PC/LWAL+CDL+LFC:5.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
183	CR/LFINF+CDL+LFC:10.0/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
184	CR/LWAL+CDL+LFC:10.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
185	CR+PC/LWAL+CDL+LFC:10.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
186	CR+PC/LWAL+CDL+LFC:10.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
187	CR/LFINF+CDL+LFC:10.0/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
188	CR+PC/LWAL+CDL+LFC:10.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
189	CR+PC/LWAL+CDL+LFC:18.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
190	CR/LFINF+CDL+LFC:18.0/HBET:3-5	CR_LFINF-CDL-20_H4	CR_LFINF-CDH-25_H4
191	CR+PC/LWAL+CDL+LFC:18.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
192	CR/LWAL+CDL+LFC:18.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
193	CR/LWAL+CDL+LFC:18.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
194	CR/LFINF+CDL+LFC:18.0/H:2	CR_LFINF-CDL-20_H2	CR_LFINF-CDH-25_H2
195	CR/LDUAL+CDL+LFC:18.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
196	CR/LDUAL+CDL+LFC:18.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
197	CR+PC/LWAL+CDL+LFC:18.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
198	CR+PC/LWAL+CDL+LFC:9.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
199	CR+PC/LWAL+CDL+LFC:9.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
200	CR/LWAL+CDL+LFC:9.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
201	CR/LWAL+CDL+LFC:9.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
202	CR/LDUAL+CDL+LFC:9.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
203	CR+PC/LWAL+CDL+LFC:9.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
204	CR/LDUAL+CDL+LFC:9.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
205	CR/LFINF+CDL+LFC:9.0/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
206	CR/LFINF+CDL+LFC:9.0/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
207	CR/LDUAL+CDM+LFC:11.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
208	CR/LDUAL+CDM+LFC:11.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
209	CR/LFINF+CDM+LFC:11.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
210	CR/LWAL+CDM+LFC:11.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
211	CR/LWAL+CDM+LFC:11.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
212	CR/LFINF+CDM+LFC:11.0/H:2	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
213	CR/LDUAL+CDM+LFC:7.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
214	CR/LFINF+CDM+LFC:7.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4

No.	Building class	Vulnerability function	
		Existing buildings	**Renovated buildings**
215	CR/LDUAL+CDM+LFC:7.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
216	CR/LWAL+CDM+LFC:7.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
217	CR/LWAL+CDM+LFC:7.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
218	CR/LFINF+CDM+LFC:7.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
219	CR/LFINF+CDM+LFC:4.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
220	CR/LDUAL+CDM+LFC:4.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
221	CR/LFINF+CDM+LFC:4.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
222	CR/LDUAL+CDM+LFC:4.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
223	CR/LFINF+CDM/HBET:6-	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
224	W/LFM+CDM/H:1	W_LFM-DUM_H1	W_LFM-DUH_H1
225	W/LFM+CDM/H:2	W_LFM-DUM_H2	W_LFM-DUH_H2
226	CR/LFINF+CDN/H:3	CR_LFINF-CDN-0_H3	CR_LFINF-CDM-5_H3
227	CR/LWAL+CDN/HBET:4-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
228	MUR+CB/LWAL+CDN/HBET:1-2	MUR-CB99_LWAL-DNO_H1	MR_LWAL-DUM_H1
229	MUR+CB/LWAL+CDN/HBET:1-4	MUR-CB99_LWAL-DNO_H2	MR_LWAL-DUM_H2
230	MUR+CL/LWAL+CDN/HBET:1-4	MUR-CL99_LWAL-DNO_H2	MR_LWAL-DUM_H2
231	W/LPB+CDL/HBET:1-3	W_LFM-DUL_H2	W_LFM-DUH_H2
232	W/LWAL+CDL/HBET:1-3	W_LFM-DUL_H2	W_LFM-DUH_H2
233	CR/LFINF+CDL/H:1	CR_LFINF-CDL-0_H1	CR_LFINF-CDH-5_H1
234	CR/LWAL+CDM/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
235	CR/LWAL+CDM/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
236	MUR+CB/LWAL+CDN/H:1	MUR-CB99_LWAL-DNO_H1	MR_LWAL-DUM_H1
237	MUR+CB/LWAL+CDN/H:2	MUR-CB99_LWAL-DNO_H2	MR_LWAL-DUM_H2
238	W/LPB+CDM/H:1	W_LFM-DUM_H1	W_LFM-DUH_H1
239	W/LPB+CDM/H:2	W_LFM-DUM_H2	W_LFM-DUH_H2
240	CR+PC/LWAL+CDM+LFC:6.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
241	CR/LFINF+CDH+LFC:11.0/H:1	CR_LFINF-CDH-10_H1	CR_LFINF-CDH-15_H1
242	CR/LFINF+CDH+LFC:11.0/H:2	CR_LFINF-CDH-10_H2	CR_LFINF-CDH-15_H2
243	CR/LFINF+CDH+LFC:11.0/HBET:3-5	CR_LFINF-CDH-10_H4	CR_LFINF-CDH-15_H4
244	CR/LFINF+CDM+LFC:6.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
245	CR/LFINF+CDM+LFC:6.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
246	CR/LFINF+CDM+LFC:6.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
247	CR/LFINF+CDM+LFC:6.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
248	CR/LFINF+CDM+LFC:6.0/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
249	CR/LFINF+CDM+LFC:6.0/HBET:6-/SOS	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
250	CR/LWAL+CDH+LFC:11.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
251	CR/LFINF+CDN/HBET:3-5/SOS	CR_LFINF-CDN-0_H4	CR_LFINF-CDM-5_H4
252	CR/LFINF+CDN/HBET:6-/SOS	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
253	CR/LWAL+CDH+LFC:11.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
254	CR/LWAL+CDH+LFC:11.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
255	CR/LWAL+CDH+LFC:11.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
256	CR/LWAL+CDM+LFC:6.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
257	CR/LWAL+CDM+LFC:6.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
258	CR/LWAL+CDM+LFC:6.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
259	CR/LWAL+CDN/HBET:3-5/SOS	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
260	S/LFINF+CDH/HBET:3-5	S_LFINF-DUM_H4	S_LFINF-DUH_H4
261	S/LFINF+CDH/HBET:6-	S_LFINF-DUM_H6	S_LFINF-DUH_H6
262	W/LWAL+CDH/HBET:3-5	W_LFM-DUH_H4	W_LFM-DUH_H4
263	W/LWAL+CDM/HBET:3-5	W_LFM-DUM_H4	W_LFM-DUH_H4
264	CR/LWAL+CDM+LFC:3.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
265	CR/LWAL+CDM+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
266	CR/LWAL+CDM+LFC:3.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
267	CR/LWAL+CDH+LFC:5.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
268	CR/LWAL+CDH+LFC:5.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
269	CR/LWAL+CDH+LFC:5.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
270	CR/LWAL+CDH+LFC:5.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
271	CR/LFINF+CDH+LFC:5.0/H:1	CR_LFINF-CDH-5_H1	CR_LFINF-CDH-10_H1
272	CR+PC/LWAL+CDM+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
273	CR/LFINF+CDM+LFC:3.0/HBET:6-/SOS	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
274	CR/LFINF+CDM+LFC:3.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
275	CR/LFINF+CDM+LFC:3.0/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
276	CR/LFINF+CDM+LFC:3.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
277	CR/LFINF+CDH+LFC:5.0/H:2	CR_LFINF-CDH-5_H2	CR_LFINF-CDH-10_H2
278	CR/LFINF+CDH+LFC:5.0/HBET:3-5	CR_LFINF-CDH-5_H4	CR_LFINF-CDH-10_H4
279	CR/LFINF+CDM+LFC:3.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
280	CR/LFINF+CDM+LFC:3.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
281	CR/LFINF+CDH+LFC:14.0/HBET:3-5	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
282	CR/LFINF+CDH+LFC:14.0/H:1	CR_LFINF-CDH-15_H1	CR_LFINF-CDH-20_H1
283	CR/LFINF+CDH+LFC:14.0/H:2	CR_LFINF-CDH-15_H2	CR_LFINF-CDH-20_H2
284	CR/LWAL+CDH+LFC:14.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
285	CR+PC/LWAL+CDM+LFC:7.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
286	CR/LWAL+CDM+LFC:7.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
287	CR/LWAL+CDM+LFC:7.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
288	CR/LWAL+CDH+LFC:14.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
289	CR/LWAL+CDH+LFC:14.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
290	CR/LWAL+CDH+LFC:14.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
291	CR/LFINF+CDM+LFC:7.0/HBET:6-/SOS	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
292	CR/LFINF+CDM+LFC:7.0/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
293	CR/LFINF+CDM+LFC:7.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
294	CR/LFINF+CDM+LFC:7.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
295	CR/LFINF+CDH+LFC:8.0/HBET:3-5	CR_LFINF-CDH-10_H4	CR_LFINF-CDH-15_H4
296	CR/LFINF+CDH+LFC:8.0/H:2	CR_LFINF-CDH-10_H2	CR_LFINF-CDH-15_H2
297	CR/LFINF+CDH+LFC:8.0/H:1	CR_LFINF-CDH-10_H1	CR_LFINF-CDH-15_H1
298	CR/LFINF+CDL/HBET:6-	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
299	CR/LWAL+CDL/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
300	CR/LWAL+CDL/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
301	W/LPB+CDL/H:1	W_LFM-DUL_H1	W_LFM-DUH_H1
302	W/LPB+CDL/H:2	W_LFM-DUL_H2	W_LFM-DUH_H2
303	CR/LFM+CDM/H:2	CR_LFM-CDM-0_H2	CR_LFM-CDH-5_H2
304	S+SL/LFM+CDL/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
305	CR/LWAL+CDH/H:1	CR_LWAL-DUH_H1	CR_LWAL-DUH_H1
306	MR/LWAL+CDL/H:1	MR_LWAL-DUL_H1	MR_LWAL-DUH_H1
307	CR/LFINF+CDM+LFC:0.0/H:2	CR_LFINF-CDM-0_H2	CR_LFINF-CDH-5_H2
308	CR/LFINF+CDM+LFC:0.0/HBET:6-	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
309	MCF/LWAL+CDN/H:1	MCF_LWAL-DUL_H1	MCF_LWAL-DUH_H1
310	CR/LFINF+CDM+LFC:0.0/HBET:3-5	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
311	CR/LFINF+CDM+LFC:0.0/H:1	CR_LFINF-CDM-0_H1	CR_LFINF-CDH-5_H1
312	CR/LDUAL+CDM+LFC:0.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
313	CR/LDUAL+CDM+LFC:0.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
314	CR/LFINF+CDM+LFC:2.5/HBET:3-5	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
315	CR/LFINF+CDM+LFC:2.5/HBET:6-	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
316	CR/LDUAL+CDM+LFC:2.5/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
317	CR/LDUAL+CDM+LFC:2.5/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
318	CR/LFINF+CDM+LFC:2.5/H:1	CR_LFINF-CDM-0_H1	CR_LFINF-CDH-5_H1
319	CR/LFINF+CDM+LFC:2.5/H:2	CR_LFINF-CDM-0_H2	CR_LFINF-CDH-5_H2
320	CR/LFINF+CDM+LFC:5.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
321	CR/LFINF+CDM+LFC:5.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
322	CR/LDUAL+CDM+LFC:5.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
323	CR/LFINF+CDM+LFC:5.0/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
324	CR/LFINF+CDM+LFC:5.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
325	CR/LDUAL+CDM+LFC:5.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
326	CR/LFINF+CDM+LFC:10.0/HBET:6-	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
327	CR/LFINF+CDM+LFC:10.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
328	CR/LFINF+CDM+LFC:10.0/H:2	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
329	CR/LFINF+CDM+LFC:10.0/H:1	CR_LFINF-CDM-10_H1	CR_LFINF-CDH-15_H1
330	CR/LDUAL+CDM+LFC:10.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
331	CR/LDUAL+CDM+LFC:10.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
332	CR/LFINF+CDM+LFC:2.0/HBET:3-5	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
333	CR/LFINF+CDL+LFC:7.5/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
334	W/LWAL+CDL/HBET:3-5	W_LFM-DUL_H4	W_LFM-DUH_H4
335	CR/LWAL+CDM+LFC:2.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
336	MIX(MUR+CR)/LWAL+CDL+LFC:7.5/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
337	CR/LFINF+CDL+LFC:7.5/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
338	CR/LFINF+CDM+LFC:2.0/HBET:6-	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
339	S/LFINF+CDN/HBET:3-5	S_LFINF-DUM_H4	S_LFINF-DUH_H4
340	MIX(MUR+CR)/LWAL+CDM+LFC:2.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
341	CR/LWAL+CDL+LFC:7.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
342	CR/LWAL+CDL+LFC:7.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
343	CR/LWAL+CDM+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
344	CR/LFINF+CDM+LFC:2.0/H:2	CR_LFINF-CDM-0_H2	CR_LFINF-CDH-5_H2
345	CR/LFINF+CDL+LFC:7.5/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
346	W/LWAL+CDN/HBET:5-8	W_LFM-DUL_H6	W_LFM-DUH_H6
347	CR/LFINF+CDM+LFC:4.0/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
348	MIX(MUR+CR)/LWAL+CDM+LFC:4.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
349	MIX(MUR+CR)/LWAL+CDL+LFC:0.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
350	MIX(MUR+CR)/LWAL+CDM+LFC:7.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
351	CR/LFINF+CDL+LFC:0.0/HBET:6-	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
352	CR/LWAL+CDL+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
353	MIX(MUR+CR)/LWAL+CDL+LFC:4.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
354	CR/LFINF+CDL+LFC:4.0/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
355	CR/LFINF+CDL+LFC:4.0/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
356	CR/LFINF+CDL+LFC:4.0/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
357	CR/LWAL+CDL+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
358	CR/LFINF+CDH+LFC:6.0/H:2	CR_LFINF-CDH-5_H2	CR_LFINF-CDH-10_H2

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
359	CR/LWAL+CDH+LFC:6.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
360	CR/LWAL+CDH+LFC:6.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
361	CR/LWAL+CDM+LFC:1.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
362	CR/LWAL+CDM+LFC:1.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
363	CR/LFINF+CDM+LFC:1.0/H:2	CR_LFINF-CDM-0_H2	CR_LFINF-CDH-5_H2
364	CR/LFINF+CDM+LFC:1.0/HBET:6-	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
365	MIX(MUR+CR)/LWAL+CDM+LFC:1.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
366	CR/LFINF+CDM+LFC:1.0/HBET:3-5	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
367	CR/LWAL+CDM+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
368	MIX(MUR+CR)/LWAL+CDM+LFC:0.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
369	CR/LWAL+CDM+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
370	CR/LWAL+CDH+LFC:4.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
371	CR/LFINF+CDH+LFC:4.0/H:2	CR_LFINF-CDH-5_H2	CR_LFINF-CDH-10_H2
372	CR/LWAL+CDH+LFC:4.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
373	CR/LFINF+CDH+LFC:0.0/H:2	CR_LFINF-CDH-0_H2	CR_LFINF-CDH-5_H2
374	CR/LFINF+CDN/HBET:4-10	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
375	MUR+ST/LWAL+CDN/HBET:1-4	MUR-STDRE_LWAL-DNO_H2	MR_LWAL-DUM_H2
376	CR/LFM+CDL/HBET:3-5	CR_LFM-CDL-0_H4	CR_LFM-CDH-5_H4
377	S/LFBR+CDL/H:1	S_LFBR-DUM_H1	S_LFBR-DUH_H1
378	W/LWAL+CDN/HBET:3-5	W_LFM-DUL_H4	W_LFM-DUH_H4
379	CR+PC/LWAL+CDL+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
380	CR/LFINF+CDL+LFC:3.0/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
381	CR/LFINF+CDL+LFC:3.0/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
382	CR/LWAL+CDL+LFC:3.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
383	CR/LWAL+CDL+LFC:3.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
384	CR/LWAL+CDL+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
385	MIX(MUR+W)/LWAL+CDL/H:1	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
386	MIX(MUR+W)/LWAL+CDL/H:2	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
387	MIX(MUR+W)/LWAL+CDN/H:1	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
388	MIX(MUR+W)/LWAL+CDN/H:2	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
389	MIX/LH+CDL/H:2	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
390	MIX/LH+CDN/H:2	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
391	CR+PC/LWAL+CDH+LFC:5.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
392	CR/LWAL+CDL+LFC:5.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
393	CR/LWAL+CDL+LFC:5.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
394	CR/LWAL+CDL+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
395	CR/LWAL+CDL+LFC:8.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
396	CR/LWAL+CDL+LFC:8.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
397	CR/LWAL+CDL+LFC:8.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
398	CR/LWAL+CDH+LFC:7.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
399	CR/LFINF+CDL+LFC:8.0/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
400	CR/LFINF+CDL+LFC:8.0/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
401	CR+PC/LWAL+CDH+LFC:7.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
402	CR+PC/LWAL+CDL+LFC:8.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
403	CR/LWAL+CDL+LFC:9.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
404	CR/LWAL+CDL+LFC:9.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
405	CR/LFINF+CDH+LFC:10.0/HBET:6-	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
406	CR/LFINF+CDH+LFC:10.0/HBET:3-5	CR_LFINF-CDH-10_H4	CR_LFINF-CDH-15_H4
407	CR+PC/LWAL+CDL+LFC:3.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
408	CR/LFINF+CDL+LFC:3.0/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
409	CR/LWAL+CDL+LFC:3.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
410	CR+PC/LWAL+CDH+LFC:4.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
411	CR/LWAL+CDL+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
412	CR/LWAL+CDL+LFC:13.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
413	CR/LWAL+CDL+LFC:13.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
414	CR/LWAL+CDH+LFC:15.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
415	CR/LFINF+CDL+LFC:13.0/HBET:3-5	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
416	CR/LFINF+CDL+LFC:13.0/H:2	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
417	CR+PC/LWAL+CDL+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
418	CR+PC/LWAL+CDH+LFC:15.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
419	CR+PC/LFM+CDM/H:1	CR_LFM-CDM-0_H1	CR_LFM-CDH-5_H1
420	CR/LFM+CDL/H:1	CR_LFM-CDL-0_H1	CR_LFM-CDH-5_H1
421	S+SL/LFM+CDM/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
422	S/LFM+CDM/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
423	CR/LFINF+CDL/H:3	CR_LFINF-CDL-0_H3	CR_LFINF-CDH-5_H3
424	MUR/LWAL+CDN/HBET:3-5	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4
425	CR/LFINF+CDL+LFC:3.75/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
426	CR/LFINF+CDL+LFC:3.75/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
427	CR/LFINF+CDL+LFC:3.75/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
428	CR/LFINF+CDL+LFC:0.0/H:1	CR_LFINF-CDL-0_H1	CR_LFINF-CDH-5_H1
429	CR/LFINF+CDL+LFC:3.75/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
430	CR/LFINF+CDL+LFC:7.5/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
431	CR/LFINF+CDL+LFC:15.0/HBET:3-5	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
432	CR/LFINF+CDL+LFC:15.0/HBET:6-	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
433	CR/LFINF+CDL+LFC:15.0/H:1	CR_LFINF-CDL-15_H1	CR_LFINF-CDH-20_H1
434	CR/LFINF+CDL+LFC:15.0/H:2	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
435	CR+PC/LFM+CDM/H:2	CR_LFM-CDM-0_H2	CR_LFM-CDH-5_H2
436	CR/LFM+CDH/H:2	CR_LFM-CDH-0_H2	CR_LFM-CDH-5_H2
437	S+SL/LFM+CDH/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
438	CR/LWAL+CDM+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
439	CR/LWAL+CDM+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
440	MCF/LWAL+CDL/HBET:6-	MCF_LWAL-DUL_H5	MCF_LWAL-DUH_H5
441	MIX/LH+CDL/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
442	W/LFM+CDL/H:2	W_LFM-DUL_H2	W_LFM-DUH_H2
443	CR+PC/LWAL+CDL+LFC:3.75/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
444	CR/LWAL+CDM+LFC:5.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
445	CR/LWAL+CDM+LFC:5.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
446	MCF/LWAL+CDN/HBET:6-	MCF_LWAL-DUL_H5	MCF_LWAL-DUH_H5
447	CR+PC/LWAL+CDL+LFC:7.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
448	CR+PC/LWAL+CDL+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
449	CR/LWAL+CDM+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
450	CR/LWAL+CDM+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
451	CR/LWAL+CDM+LFC:10.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
452	CR/LWAL+CDM+LFC:10.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
453	CR/LWAL+CDM+LFC:2.5/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
454	CR/LWAL+CDM+LFC:2.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
455	CR/LWAL+CDM+LFC:2.5/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
456	CR/LWAL+CDM+LFC:2.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
457	CR/LWAL+CDM+LFC:0.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
458	CR/LWAL+CDM+LFC:0.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
459	CR/LDUAL+CDL+LFC:12.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
460	CR/LDUAL+CDH+LFC:15.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
461	CR/LDUAL+CDH+LFC:15.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
462	CR/LDUAL+CDH+LFC:15.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
463	CR/LDUAL+CDH+LFC:15.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
464	CR/LDUAL+CDM+LFC:12.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
465	CR/LFINF+CDM+LFC:12.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
466	S/LFM+CDM/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
467	S/LFM+CDL/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
468	S/LFINF+CDN/H:1	S_LFINF-DUM_H1	S_LFINF-DUH_H1
469	S/LFINF+CDM/H:2	S_LFINF-DUM_H2	S_LFINF-DUH_H2
470	S/LFINF+CDM/H:1	S_LFINF-DUM_H1	S_LFINF-DUH_H1
471	S/LFINF+CDL/H:2	S_LFINF-DUM_H2	S_LFINF-DUH_H2
472	S/LFINF+CDH/H:2	S_LFINF-DUM_H2	S_LFINF-DUH_H2
473	S/LFINF+CDH/H:1	S_LFINF-DUM_H1	S_LFINF-DUH_H1
474	CR/LFINF+CDH+LFC:15.0/HBET:3-5	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
475	CR/LFINF+CDH+LFC:15.0/HBET:6-	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
476	CR/LFINF+CDH+LFC:15.0/H:2	CR_LFINF-CDH-15_H2	CR_LFINF-CDH-20_H2
477	CR/LDUAL+CDM+LFC:8.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
478	CR/LDUAL+CDM+LFC:8.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
479	CR/LDUAL+CDM+LFC:8.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
480	CR/LDUAL+CDN/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
481	CR/LDUAL+CDN/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
482	CR/LFINF+CDH+LFC:15.0/H:1	CR_LFINF-CDH-15_H1	CR_LFINF-CDH-20_H1
483	CR/LDUAL+CDM+LFC:8.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
484	CR/LFINF+CDM+LFC:12.0/HBET:6-	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
485	CR/LFINF+CDM+LFC:12.0/H:2	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
486	CR/LFINF+CDM+LFC:12.0/H:1	CR_LFINF-CDM-10_H1	CR_LFINF-CDH-15_H1
487	CR/LFINF+CDL+LFC:12.0/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
488	CR/LFINF+CDL+LFC:12.0/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
489	S/LFM+CDN/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
490	CR/LDUAL+CDM+LFC:12.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
491	CR/LDUAL+CDM+LFC:12.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
492	CR/LDUAL+CDM+LFC:12.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
493	CR/LDUAL+CDL+LFC:12.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
494	CR/LDUAL+CDL+LFC:8.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
495	CR/LFINF+CDM+LFC:8.0/HBET:6-	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
496	CR/LDUAL+CDL+LFC:8.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
497	CR/LFINF+CDL+LFC:8.0/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
498	CR/LFINF+CDM+LFC:8.0/H:1	CR_LFINF-CDM-10_H1	CR_LFINF-CDH-15_H1
499	CR/LFINF+CDM+LFC:8.0/H:2	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
500	CR/LFINF+CDM+LFC:8.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
501	CR/LFINF+CDL+LFC:6.0/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
502	CR/LFINF+CDL+LFC:6.0/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
503	CR/LDUAL+CDL+LFC:6.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
504	CR/LDUAL+CDM+LFC:6.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
505	CR/LDUAL+CDL+LFC:6.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
506	CR/LDUAL+CDM+LFC:6.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
507	CR/LDUAL+CDM+LFC:6.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
508	CR/LDUAL+CDM+LFC:6.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
509	CR/LDUAL+CDH+LFC:10.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
510	CR/LFINF+CDH+LFC:10.0/H:1	CR_LFINF-CDH-10_H1	CR_LFINF-CDH-15_H1
511	CR/LFINF+CDH+LFC:10.0/H:2	CR_LFINF-CDH-10_H2	CR_LFINF-CDH-15_H2
512	CR/LDUAL+CDH+LFC:10.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
513	CR/LDUAL+CDH+LFC:10.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
514	CR/LDUAL+CDH+LFC:10.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
515	CR/LFINF+CDH+LFC:23.0/HBET:6-	CR_LFINF-CDH-25_H6	CR_LFINF-CDH-30_H6
516	CR/LDUAL+CDH+LFC:23.0/H:1	CR_LDUAL-DUH_H1	CR_LDUAL-DUH_H1
517	CR/LDUAL+CDH+LFC:23.0/H:2	CR_LDUAL-DUH_H2	CR_LDUAL-DUH_H2
518	CR/LDUAL+CDH+LFC:23.0/HBET:3-5	CR_LDUAL-DUH_H4	CR_LDUAL-DUH_H4
519	CR/LDUAL+CDH+LFC:23.0/HBET:6-	CR_LDUAL-DUH_H6	CR_LDUAL-DUH_H6
520	CR/LFINF+CDH+LFC:23.0/H:1	CR_LFINF-CDH-25_H1	CR_LFINF-CDH-30_H1
521	CR/LFINF+CDH+LFC:23.0/H:2	CR_LFINF-CDH-25_H2	CR_LFINF-CDH-30_H2
522	CR/LFINF+CDH+LFC:23.0/HBET:3-5	CR_LFINF-CDH-25_H4	CR_LFINF-CDH-30_H4
523	CR/LWAL+CDL+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
524	CR/LWAL+CDL+LFC:2.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
525	CR/LFINF+CDL+LFC:2.0/HBET:6-/SOS	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
526	CR/LFINF+CDL+LFC:2.0/H:2	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
527	CR+PC/LWAL+CDL+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
528	CR/LFINF+CDL+LFC:2.0/HBET:6-	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
529	CR/LFINF+CDL+LFC:2.0/HBET:3-5	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
530	MIX(MUR+CR)/LWAL+CDM+LFC:6.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
531	MIX(MUR+CR)/LWAL+CDL+LFC:2.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
532	CR/LWAL+CDL+LFC:2.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
533	CR/LFINF+CDL+LFC:2.0/HBET:3-5/SOS	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
534	MIX(MUR+CR)/LWAL+CDH+LFC:11.0/HBET:3-5	MCF_LWAL-DUM_H4	MCF_LWAL-DUH_H4
535	CR/LFINF+CDL+LFC:2.0/H:1	CR_LFINF-CDL-0_H1	CR_LFINF-CDH-5_H1
536	MIX(MUR+CR)/LWAL+CDM+LFC:3.0/HBET:3-5	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
537	MIX(MUR+CR)/LWAL+CDM+LFC:9.0/HBET:3-5	MCF_LWAL-DUM_H4	MCF_LWAL-DUH_H4
538	CR/LWAL+CDM+LFC:9.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
539	CR/LWAL+CDM+LFC:9.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
540	CR/LFINF+CDM+LFC:9.0/H:2	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
541	CR/LFINF+CDM+LFC:9.0/H:1	CR_LFINF-CDM-10_H1	CR_LFINF-CDH-15_H1
542	CR/LFINF+CDM+LFC:9.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
543	CR/LFINF+CDM+LFC:9.0/HBET:6-	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
544	CR+PC/LWAL+CDM+LFC:9.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
545	MIX(MUR+CR)/LWAL+CDH+LFC:5.0/HBET:3-5	MCF_LWAL-DUM_H4	MCF_LWAL-DUH_H4
546	MIX(MUR+CR)/LWAL+CDH+LFC:14.0/HBET:3-5	MCF_LWAL-DUM_H4	MCF_LWAL-DUH_H4
547	CR/LWAL+CDM+LFC:9.0/HBET:3-5/SOS	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
548	CR/LFINF+CDM+LFC:9.0/HBET:6-/SOS	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
549	CR/LFINF+CDM+LFC:9.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
550	MIX(MUR+CR)/LWAL+CDH+LFC:8.0/HBET:3-5	MCF_LWAL-DUM_H4	MCF_LWAL-DUH_H4
551	CR+PC/LWAL+CDL/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
552	CR/LFM+CDL/HBET:6-	CR_LFM-CDL-0_H6	CR_LFM-CDH-5_H6
553	MR/LWAL+CDL/HBET:3-5	MR_LWAL-DUL_H4	MR_LWAL-DUH_H4
554	S/LFM+CDL/HBET:6-	S_LFM-DUM_H6	S_LFM-DUH_H6
555	S/LWAL+CDL/H:2	S_LWAL-DUM_H2	S_LWAL-DUH_H2
556	S/LWAL+CDL/HBET:3-5	S_LWAL-DUM_H4	S_LWAL-DUH_H4
557	S/LWAL+CDL/HBET:6-	S_LWAL-DUM_H6	S_LWAL-DUH_H6
558	CR+PC/LWAL+CDL+LFC:0.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
559	CR/LFINF+CDM+LFC:19.0/H:1	CR_LFINF-CDM-20_H1	CR_LFINF-CDH-25_H1
560	CR/LFINF+CDL+LFC:9.0/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
561	CR+PC/LWAL+CDL+LFC:9.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
562	CR+PC/LWAL+CDL+LFC:4.5/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
563	CR/LFINF+CDL+LFC:4.5/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
564	CR/LFINF+CDM+LFC:11.0/H:1	CR_LFINF-CDM-10_H1	CR_LFINF-CDH-15_H1
565	MUR+ADO/LWAL+CDN/H:2	MUR-ADO_LWAL-DNO_H2	MR_LWAL-DUM_H2
566	W/LFM+CDL/HBET:3-5	W_LFM-DUL_H4	W_LFM-DUH_H4
567	W/LFM+CDN/HBET:3-5	W_LFM-DUL_H4	W_LFM-DUH_H4
568	CR+PC/LFM+CDH/H:1	CR_LFM-CDH-0_H1	CR_LFM-CDH-5_H1
569	CR+PC/LFM+CDN/H:2	CR_LFM-CDN-0_H2	CR_LFM-CDM-5_H2
570	MUR+CL/LWAL+CDN/H:3	MUR-CL99_LWAL-DNO_H3	MR_LWAL-DUM_H3
571	MUR+ST/LWAL+CDN/H:3	MUR-STDRE_LWAL-DNO_H3	MR_LWAL-DUM_H3
572	CR/LWAL+CDM+LFC:13.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
573	CR/LWAL+CDL+LFC:7.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
574	CR/LDUAL+CDH+LFC:20.0/H:2	CR_LDUAL-DUH_H2	CR_LDUAL-DUH_H2

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
575	CR/LDUAL+CDH+LFC:20.0/HBET:3-5	CR_LDUAL-DUH_H4	CR_LDUAL-DUH_H4
576	CR/LWAL+CDL+LFC:7.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
577	CR/LWAL+CDM+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
578	CR/LWAL+CDL+LFC:7.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
579	CR/LWAL+CDM+LFC:13.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
580	CR/LWAL+CDM+LFC:7.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
581	CR/LWAL+CDM+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
582	CR/LDUAL+CDH+LFC:20.0/HBET:6-	CR_LDUAL-DUH_H6	CR_LDUAL-DUH_H6
583	CR/LWAL+CDH+LFC:15.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
584	CR/LWAL+CDH+LFC:15.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
585	CR/LDUAL+CDH+LFC:8.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
586	CR/LDUAL+CDH+LFC:8.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
587	CR/LWAL+CDM+LFC:8.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
588	CR/LWAL+CDM+LFC:8.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
589	CR/LWAL+CDM+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
590	CR/LDUAL+CDH+LFC:8.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
591	CR/LDUAL+CDH+LFC:5.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
592	CR/LDUAL+CDH+LFC:5.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
593	CR/LDUAL+CDH+LFC:5.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
594	CR/LWAL+CDM+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
595	CR/LDUAL+CDH+LFC:0.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
596	CR/LWAL+CDM+LFC:3.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
597	CR/LDUAL+CDH+LFC:0.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
598	S+SL/LFM+CDM/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
599	CR/LFM+CDM+LFC:5.0/H:2	CR_LFM-CDM-5_H2	CR_LFM-CDH-10_H2
600	CR/LFM+CDM+LFC:5.0/H:1	CR_LFM-CDM-5_H1	CR_LFM-CDH-10_H1
601	CR/LDUAL+CDM+LFC:5.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
602	S/LFBR+CDM/H:2	S_LFBR-DUM_H2	S_LFBR-DUH_H2
603	S/LWAL+CDM/HBET:3-5	S_LWAL-DUM_H4	S_LWAL-DUH_H4
604	CR+PC/LWAL+CDM+LFC:5.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
605	CR+PC/LWAL+CDM+LFC:5.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
606	CR+PC/LWAL+CDM+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
607	CR/LDUAL+CDM+LFC:5.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
608	S/LWAL+CDM/H:2	S_LWAL-DUM_H2	S_LWAL-DUH_H2
609	S/LWAL+CDM/H:1	S_LWAL-DUM_H1	S_LWAL-DUH_H1
610	S/LFM+CDM/HBET:3-5	S_LFM-DUM_H4	S_LFM-DUH_H4
611	CR/LDUAL+CDM+LFC:10.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
612	CR/LDUAL+CDM+LFC:10.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
613	CR+PC/LWAL+CDM+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
614	CR+PC/LWAL+CDM+LFC:10.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
615	CR+PC/LWAL+CDM+LFC:10.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
616	CR/LFM+CDM+LFC:10.0/H:1	CR_LFM-CDM-10_H1	CR_LFM-CDH-15_H1
617	CR/LFM+CDM+LFC:10.0/H:2	CR_LFM-CDM-10_H2	CR_LFM-CDH-15_H2
618	CR/LDUAL+CDM+LFC:2.5/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
619	CR/LDUAL+CDM+LFC:2.5/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
620	CR+PC/LWAL+CDM+LFC:2.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
621	CR+PC/LWAL+CDM+LFC:2.5/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
622	CR+PC/LWAL+CDM+LFC:2.5/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
623	CR/LFM+CDM+LFC:2.5/H:1	CR_LFM-CDM-0_H1	CR_LFM-CDH-5_H1
624	CR/LFM+CDM+LFC:2.5/H:2	CR_LFM-CDM-0_H2	CR_LFM-CDH-5_H2
625	CR/LFM+CDM+LFC:0.0/H:1	CR_LFM-CDM-0_H1	CR_LFM-CDH-5_H1
626	CR/LFM+CDM+LFC:0.0/H:2	CR_LFM-CDM-0_H2	CR_LFM-CDH-5_H2
627	CR/LDUAL+CDM+LFC:0.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
628	CR/LDUAL+CDM+LFC:0.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
629	CR+PC/LWAL+CDM+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
630	CR+PC/LWAL+CDM+LFC:0.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
631	CR+PC/LWAL+CDM+LFC:0.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
632	CR/LFINF+CDH+LFC:15.0/HBET:3-5/SOS	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
633	CR/LFINF+CDH+LFC:15.0/H:2/SOS	CR_LFINF-CDH-15_H2	CR_LFINF-CDH-20_H2
634	CR/LDUAL+CDH+LFC:15.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
635	CR/LFINF+CDL+LFC:12.0/H:2/SOS	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
636	CR/LFINF+CDL+LFC:12.0/HBET:6-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
637	CR/LFINF+CDL+LFC:12.0/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
638	CR/LDUAL+CDL+LFC:12.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
639	CR/LDUAL+CDL+LFC:12.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
640	CR/LFINF+CDL+LFC:12.0/HBET:3-5/SOS	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
641	CR/LDUAL+CDM+LFC:12.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
642	CR/LDUAL+CDM+LFC:12.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
643	CR/LDUAL+CDL+LFC:8.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
644	CR/LDUAL+CDL+LFC:12.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
645	CR/LDUAL+CDL+LFC:12.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
646	CR/LDUAL+CDH+LFC:15.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
647	CR/LDUAL+CDH+LFC:15.0/H:2/SOS	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
648	CR/LFINF+CDM+LFC:12.0/HBET:6-/SOS	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
649	CR/LFINF+CDM+LFC:12.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
650	CR/LFINF+CDM+LFC:12.0/H:2/SOS	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
651	CR/LFINF+CDL+LFC:12.0/HBET:6-/SOS	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
652	CR/LFINF+CDH+LFC:15.0/HBET:6-/SOS	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
653	CR/LDUAL+CDM+LFC:12.0/H:2/SOS	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
654	CR/LDUAL+CDL+LFC:12.0/H:2/SOS	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
655	CR/LFINF+CDL+LFC:8.0/HBET:6-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
656	CR/LDUAL+CDL+LFC:8.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
657	CR/LDUAL+CDL+LFC:8.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
658	CR/LFINF+CDM+LFC:8.0/H:2/SOS	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
659	CR/LFINF+CDM+LFC:8.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
660	CR/LFINF+CDM+LFC:8.0/HBET:6-/SOS	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
661	CR/LDUAL+CDL+LFC:8.0/H:2/SOS	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
662	CR/LDUAL+CDM+LFC:8.0/H:2/SOS	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
663	CR/LDUAL+CDM+LFC:8.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
664	CR/LDUAL+CDM+LFC:8.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
665	CR/LFINF+CDL+LFC:8.0/HBET:6-/SOS	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
666	CR/LFINF+CDL+LFC:8.0/HBET:3-5/SOS	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
667	CR/LFINF+CDL+LFC:8.0/H:2/SOS	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
668	CR/LDUAL+CDL+LFC:8.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
669	CR/LDUAL+CDL+LFC:6.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
670	CR/LDUAL+CDL+LFC:6.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
671	CR/LDUAL+CDL+LFC:6.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
672	CR/LDUAL+CDL+LFC:6.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
673	CR/LFINF+CDL+LFC:6.0/H:2/SOS	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
674	CR/LFINF+CDM+LFC:6.0/H:2/SOS	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
675	CR/LFINF+CDL+LFC:6.0/HBET:6-/SOS	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
676	CR/LFINF+CDL+LFC:6.0/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
677	CR/LFINF+CDL+LFC:6.0/HBET:3-5/SOS	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
678	CR/LFINF+CDL+LFC:6.0/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
679	CR/LDUAL+CDM+LFC:6.0/H:2/SOS	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
680	CR/LDUAL+CDM+LFC:6.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
681	CR/LDUAL+CDM+LFC:6.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
682	CR/LDUAL+CDL+LFC:6.0/H:2/SOS	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
683	CR/LFINF+CDH+LFC:10.0/HBET:6-/SOS	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
684	CR/LFINF+CDH+LFC:10.0/HBET:3-5/SOS	CR_LFINF-CDH-10_H4	CR_LFINF-CDH-15_H4
685	CR/LFINF+CDH+LFC:10.0/H:2/SOS	CR_LFINF-CDH-10_H2	CR_LFINF-CDH-15_H2
686	CR/LDUAL+CDH+LFC:10.0/H:2/SOS	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
687	CR/LDUAL+CDH+LFC:10.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
688	CR/LDUAL+CDH+LFC:10.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
689	CR/LFINF+CDH+LFC:23.0/HBET:3-5/SOS	CR_LFINF-CDH-25_H4	CR_LFINF-CDH-30_H4
690	CR/LFINF+CDH+LFC:23.0/H:2/SOS	CR_LFINF-CDH-25_H2	CR_LFINF-CDH-30_H2
691	CR/LDUAL+CDH+LFC:23.0/H:2/SOS	CR_LDUAL-DUH_H2	CR_LDUAL-DUH_H2
692	CR/LDUAL+CDH+LFC:23.0/HBET:3-5/SOS	CR_LDUAL-DUH_H4	CR_LDUAL-DUH_H4
693	CR/LFINF+CDH+LFC:23.0/HBET:6-/SOS	CR_LFINF-CDH-25_H6	CR_LFINF-CDH-30_H6
694	CR/LDUAL+CDH+LFC:23.0/HBET:6-/SOS	CR_LDUAL-DUH_H6	CR_LDUAL-DUH_H6
695	CR+PC/LWAL+CDL/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
696	S/LFM+CDN/HBET:3-5	S_LFM-DUM_H4	S_LFM-DUH_H4
697	S/LFM+CDN/HBET:6-	S_LFM-DUM_H6	S_LFM-DUH_H6
698	CR/LFINF+CDL/HBET:4-10	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
699	CR/LWAL+CDL/HBET:4-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
700	CR+PC/LWAL+CDH/HBET:6-	CR_LWAL-DUH_H6	CR_LWAL-DUH_H6
701	CR/LFINF+CDH/HBET:6-	CR_LFINF-CDH-0_H6	CR_LFINF-CDH-5_H6
702	CR/LFINF+CDL+LFC:3.0/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
703	CR/LWAL+CDH/HBET:3-5	CR_LWAL-DUH_H4	CR_LWAL-DUH_H4
704	CR+PC/LWAL+CDH/HBET:3-5	CR_LWAL-DUH_H4	CR_LWAL-DUH_H4
705	CR+PC/LWAL+CDL+LFC:8.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
706	CR/LFINF+CDL+LFC:9.0/HBET:6-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
707	CR/LFINF+CDL+LFC:5.0/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
708	CR/LFINF+CDL+LFC:5.0/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
709	CR+PC/LWAL+CDL+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
710	CR/LFINF+CDL+LFC:13.0/H:1	CR_LFINF-CDL-15_H1	CR_LFINF-CDH-20_H1
711	CR/LFINF+CDL+LFC:13.0/HBET:6-	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
712	CR/LFINF+CDM+LFC:4.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
713	CR/LFINF+CDM+LFC:1.0/H:1	CR_LFINF-CDM-0_H1	CR_LFINF-CDH-5_H1
714	CR/LFINF+CDL+LFC:4.0/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
715	CR/LFINF+CDH+LFC:6.0/HBET:3-5	CR_LFINF-CDH-5_H4	CR_LFINF-CDH-10_H4
716	CR/LFINF+CDH+LFC:6.0/H:1	CR_LFINF-CDH-5_H1	CR_LFINF-CDH-10_H1
717	CR/LFINF+CDM+LFC:2.0/H:1	CR_LFINF-CDM-0_H1	CR_LFINF-CDH-5_H1
718	CR/LFINF+CDH+LFC:4.0/H:1	CR_LFINF-CDH-5_H1	CR_LFINF-CDH-10_H1

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
719	CR/LFINF+CDH+LFC:4.0/HBET:3-5	CR_LFINF-CDH-5_H4	CR_LFINF-CDH-10_H4
720	CR/LFINF+CDH+LFC:0.0/HBET:3-5	CR_LFINF-CDH-0_H4	CR_LFINF-CDH-5_H4
721	CR/LFINF+CDH+LFC:0.0/H:1	CR_LFINF-CDH-0_H1	CR_LFINF-CDH-5_H1
722	CR+PC/LWAL+CDM+LFC:9.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
723	CR+PC/LWAL+CDM+LFC:9.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
724	CR/LDUAL+CDM+LFC:9.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
725	CR/LDUAL+CDM+LFC:9.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
726	CR/LDUAL+CDM+LFC:4.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
727	CR/LDUAL+CDL+LFC:5.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
728	CR/LFINF+CDM+LFC:4.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
729	CR+PC/LWAL+CDM+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
730	CR+PC/LFM+CDL/H:2	CR_LFM-CDL-0_H2	CR_LFM-CDH-5_H2
731	CR+PC/LWAL+CDM+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
732	CR+PC/LWAL+CDM+LFC:2.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
733	CR/LFINF+CDH+LFC:8.0/HBET:6-	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
734	CR+PC/LWAL+CDM+LFC:2.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
735	CR+PC/LWAL+CDM+LFC:2.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
736	CR/LFINF+CDH+LFC:5.0/HBET:6-	CR_LFINF-CDH-5_H6	CR_LFINF-CDH-10_H6
737	CR/LFINF+CDM+LFC:6.5/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
738	CR/LFINF+CDH+LFC:22.0/HBET:6-	CR_LFINF-CDH-20_H6	CR_LFINF-CDH-25_H6
739	CR/LFINF+CDM+LFC:6.5/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
740	CR/LFINF+CDM+LFC:6.5/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
741	CR/LFINF+CDL+LFC:8.5/HBET:6-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
742	CR+PC/LWAL+CDM+LFC:6.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
743	CR/LFINF+CDH+LFC:22.0/H:2	CR_LFINF-CDH-20_H2	CR_LFINF-CDH-25_H2
744	CR+PC/LWAL+CDM+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
745	CR/LFINF+CDL+LFC:17.5/H:1	CR_LFINF-CDL-15_H1	CR_LFINF-CDH-20_H1
746	CR+PC/LWAL+CDL+LFC:17.5/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
747	CR/LFINF+CDL+LFC:17.5/HBET:6-	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
748	CR/LFINF+CDL+LFC:17.5/HBET:3-5	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
749	CR/LFINF+CDH+LFC:22.0/H:1	CR_LFINF-CDH-20_H1	CR_LFINF-CDH-25_H1
750	CR/LFINF+CDL+LFC:17.5/H:2	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
751	CR/LFINF+CDH+LFC:22.0/HBET:3-5	CR_LFINF-CDH-20_H4	CR_LFINF-CDH-25_H4
752	CR+PC/LWAL+CDL+LFC:17.5/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
753	CR+PC/LWAL+CDL+LFC:17.5/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
754	CR+PC/LWAL+CDL+LFC:17.5/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
755	CR+PC/LWAL+CDM+LFC:6.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
756	CR+PC/LWAL+CDM+LFC:6.5/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
757	CR+PC/LWAL+CDL+LFC:8.5/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
758	CR+PC/LWAL+CDM+LFC:6.5/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
759	CR+PC/LWAL+CDL+LFC:8.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
760	CR+PC/LWAL+CDL+LFC:8.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
761	CR+PC/LWAL+CDL+LFC:8.5/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
762	CR/LFINF+CDM+LFC:6.5/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
763	CR/LFINF+CDL+LFC:8.5/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
764	CR/LFINF+CDL+LFC:8.5/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
765	CR/LFINF+CDL+LFC:8.5/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
766	CR/LFINF+CDH+LFC:19.0/H:2	CR_LFINF-CDH-20_H2	CR_LFINF-CDH-25_H2
767	CR/LFINF+CDH+LFC:19.0/HBET:3-5	CR_LFINF-CDH-20_H4	CR_LFINF-CDH-25_H4
768	CR/LFINF+CDH+LFC:19.0/HBET:6-	CR_LFINF-CDH-20_H6	CR_LFINF-CDH-25_H6
769	CR+PC/LWAL+CDL+LFC:4.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
770	CR+PC/LWAL+CDL+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
771	CR+PC/LWAL+CDL+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
772	CR/LFINF+CDH+LFC:19.0/H:1	CR_LFINF-CDH-20_H1	CR_LFINF-CDH-25_H1
773	CR+PC/LWAL+CDL+LFC:4.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
774	CR/LFINF+CDH+LFC:16.0/HBET:3-5	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
775	CR/LFINF+CDH+LFC:16.0/H:2	CR_LFINF-CDH-15_H2	CR_LFINF-CDH-20_H2
776	CR/LFINF+CDH+LFC:16.0/HBET:6-	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
777	CR/LFINF+CDH+LFC:16.0/H:1	CR_LFINF-CDH-15_H1	CR_LFINF-CDH-20_H1
778	CR/LFINF+CDH+LFC:14.0/HBET:6-	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
779	CR/LFINF+CDH+LFC:11.0/HBET:6-	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
780	CR+PC/LPB+CDN/H:1	CR_LFM-CDN-0_H1	CR_LFM-CDM-5_H1
781	W+S/LPB+CDN/H:1	W_LFM-DUL_H1	W_LFM-DUH_H1
782	MUR+STRUB/LWAL+CDN/H:1	MUR-STRUB_LWAL-DNO_H1	MR_LWAL-DUM_H1
783	MUR+STRUB/LWAL+CDN/H:2	MUR-STRUB_LWAL-DNO_H2	MR_LWAL-DUM_H2
784	MUR+STRUB/LWAL+CDN/H:3	MUR-STRUB_LWAL-DNO_H3	MR_LWAL-DUM_H3
785	MUR+STDRE/LWAL+CDN/HBET:4-	MUR-STDRE_LWAL-DNO_H4	MR_LWAL-DUM_H4
786	CR/LFINF+CDL+LFC:0.0/H:3	CR_LFINF-CDL-0_H3	CR_LFINF-CDH-5_H3
787	CR/LFINF+CDL+LFC:0.0/HBET:4-	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
788	CR/LFINF+CDM+LFC:0.0/H:3	CR_LFINF-CDM-0_H3	CR_LFINF-CDH-5_H3
789	MCF/LWAL+CDN/H:3	MCF_LWAL-DUL_H3	MCF_LWAL-DUH_H3
790	MCF/LWAL+CDN/HBET:4-	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
791	CR/LFINF+CDM+LFC:0.0/HBET:4-	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
792	CR/LFINF+CDL+LFC:7.0/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
793	CR/LFINF+CDL+LFC:7.0/H:3	CR_LFINF-CDL-5_H3	CR_LFINF-CDH-10_H3
794	CR/LFINF+CDM+LFC:7.0/H:3	CR_LFINF-CDM-5_H3	CR_LFINF-CDH-10_H3
795	CR/LFINF+CDL+LFC:7.0/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
796	CR/LFINF+CDL+LFC:7.0/HBET:4-	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
797	CR/LFINF+CDM+LFC:7.0/HBET:4-	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
798	CR/LFINF+CDL+LFC:10.0/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
799	CR/LFINF+CDL+LFC:10.0/H:3	CR_LFINF-CDL-10_H3	CR_LFINF-CDH-15_H3
800	CR/LFINF+CDM+LFC:10.0/H:3	CR_LFINF-CDM-10_H3	CR_LFINF-CDH-15_H3
801	CR/LFINF+CDL+LFC:10.0/HBET:4-	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
802	CR/LFINF+CDM+LFC:10.0/HBET:4-	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
803	CR/LFINF+CDL+LFC:12.5/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
804	MCF/LWAL+CDL/H:3	MCF_LWAL-DUL_H3	MCF_LWAL-DUH_H3
805	MCF/LWAL+CDL/HBET:4-	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
806	CR/LFINF+CDL+LFC:12.5/H:3	CR_LFINF-CDL-10_H3	CR_LFINF-CDH-15_H3
807	CR/LFINF+CDL+LFC:12.5/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
808	CR/LFINF+CDL+LFC:12.5/HBET:4-	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
809	CR/LFINF+CDL+LFC:4.0/H:3	CR_LFINF-CDL-5_H3	CR_LFINF-CDH-10_H3
810	CR/LFINF+CDL+LFC:4.0/HBET:4-	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
811	CR/LFINF+CDM+LFC:4.0/H:3	CR_LFINF-CDM-5_H3	CR_LFINF-CDH-10_H3
812	CR/LFINF+CDM+LFC:4.0/HBET:4-	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
813	CR+PC/LFM+CDL/HBET:1-3	CR_LFM-CDL-0_H2	CR_LFM-CDH-5_H2
814	CR/LFM+CDL/HBET:1-3	CR_LFM-CDL-0_H2	CR_LFM-CDH-5_H2
815	CR/LFM+CDL/HBET:4-6	CR_LFM-CDL-0_H5	CR_LFM-CDH-5_H5
816	CR/LWAL+CDL/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
817	MUR+STRUB/LWAL+CDN/HBET:1-3	MUR-STRUB_LWAL-DNO_H2	MR_LWAL-DUM_H2
818	S/LFM+CDL/HBET:1-3	S_LFM-DUM_H2	S_LFM-DUH_H2
819	CR/LDUAL+CDL/HBET:1-3	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
820	SRC/LFM+CDH/HBET:1-3	S_LFM-DUM_H2	S_LFM-DUH_H2
821	W/LFM+CDL/HBET:1-3	W_LFM-DUL_H2	W_LFM-DUH_H2
822	CR+PC/LFM+CDL/HBET:4-6	CR_LFM-CDL-0_H5	CR_LFM-CDH-5_H5
823	CR/LDUAL+CDL/HBET:4-6	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
824	CR/LWAL+CDL/HBET:4-6	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
825	SRC/LFM+CDH/HBET:4-6	S_LFM-DUM_H5	S_LFM-DUH_H5
826	CR/LDUAL+CDL+LFC:15.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
827	CR/LFINF+CDM+LFC:2.5/HBET:3-5/SOS	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
828	CR/LFINF+CDL+LFC:15.0/HBET:3-5/SOS	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
829	CR/LDUAL+CDL+LFC:15.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
830	CR/LWAL+CDL+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
831	CR/LDUAL+CDL+LFC:3.75/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
832	CR/LFINF+CDL+LFC:3.75/HBET:3-5/SOS	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
833	CR/LDUAL+CDL+LFC:3.75/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
834	CR/LWAL+CDL+LFC:3.75/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
835	CR/LDUAL+CDL+LFC:7.5/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
836	CR/LFINF+CDL+LFC:7.5/HBET:3-5/SOS	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
837	CR/LFINF+CDM+LFC:5.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
838	CR/LDUAL+CDL+LFC:7.5/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
839	CR/LFINF+CDM+LFC:10.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
840	CR/LFINF+CDL+LFC:0.0/HBET:3-5/SOS	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
841	CR/LFINF+CDM+LFC:0.0/HBET:3-5/SOS	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
842	MR/LWAL+CDL/HBET:1-2	MR_LWAL-DUL_H1	MR_LWAL-DUH_H1
843	MUR+ST/LWAL+CDN/H:4	MUR-STDRE_LWAL-DNO_H4	MR_LWAL-DUM_H4
844	MUR+ST/LWAL+CDN/H:5	MUR-STDRE_LWAL-DNO_H5	MR_LWAL-DUM_H5
845	MUR+ST/LWAL+CDN/H:6	MUR-STDRE_LWAL-DNO_H5	MR_LWAL-DUM_H5
846	CR/LFINF+CDL+LFC:4.0/H:7	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
847	CR/LFINF+CDL+LFC:0.0/H:7	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
848	CR/LFINF+CDL+LFC:4.0/H:6	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
849	CR/LFINF+CDL+LFC:0.0/H:6	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
850	CR/LFLS+CDL+LFC:4.0/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
851	CR/LFLS+CDL+LFC:0.0/H:2	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
852	CR/LFINF+CDN/HBET:10-15	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
853	CR/LFINF+CDN/H:9	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
854	CR/LFINF+CDN/H:8	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
855	CR/LFINF+CDN/H:7	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
856	CR/LFINF+CDM+LFC:5.0/HBET:10-15	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
857	CR/LFINF+CDM+LFC:5.0/H:9	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
858	CR/LFINF+CDM+LFC:5.0/H:8	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
859	CR/LFINF+CDM+LFC:5.0/H:7	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
860	CR/LFINF+CDM+LFC:5.0/H:6	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
861	CR/LFINF+CDM+LFC:5.0/H:5	CR_LFINF-CDM-5_H5	CR_LFINF-CDH-10_H5
862	CR/LFINF+CDM+LFC:5.0/H:4	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
863	CR/LFINF+CDM+LFC:5.0/H:3	CR_LFINF-CDM-5_H3	CR_LFINF-CDH-10_H3
864	MCF/LWAL+CDL/H:4	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
865	CR/LFINF+CDL+LFC:0.0/HBET:10-15	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
866	CR/LFINF+CDL+LFC:4.0/H:9	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
867	MCF/LWAL+CDL/H:6	MCF_LWAL-DUL_H5	MCF_LWAL-DUH_H5
868	MCF/LWAL+CDL/H:5	MCF_LWAL-DUL_H5	MCF_LWAL-DUH_H5
869	CR/LFINF+CDL+LFC:4.0/H:8	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
870	CR/LFINF+CDL+LFC:0.0/H:9	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
871	CR/LFINF+CDH+LFC:9.0/H:5	CR_LFINF-CDH-10_H5	CR_LFINF-CDH-15_H5
872	CR/LFINF+CDL+LFC:0.0/H:8	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
873	CR/LFINF+CDL+LFC:4.0/HBET:10-15	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
874	CR/LFLS+CDL+LFC:0.0/H:7	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
875	CR/LFLS+CDL+LFC:4.0/H:7	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
876	CR/LFLS+CDL+LFC:0.0/H:8	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
877	CR/LFLS+CDL+LFC:4.0/H:8	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
878	CR/LFLS+CDL+LFC:0.0/H:9	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
879	CR/LFLS+CDL+LFC:4.0/H:9	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
880	CR/LFLS+CDM+LFC:5.0/H:3	CR_LFINF-CDM-5_H3	CR_LFINF-CDH-10_H3
881	CR/LFLS+CDM+LFC:5.0/H:4	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
882	CR/LFLS+CDM+LFC:5.0/H:5	CR_LFINF-CDM-5_H5	CR_LFINF-CDH-10_H5
883	CR/LFLS+CDM+LFC:5.0/H:6	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
884	CR/LFLS+CDM+LFC:5.0/H:7	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
885	CR/LFLS+CDM+LFC:5.0/H:8	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
886	CR/LFLS+CDM+LFC:5.0/H:9	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
887	CR/LFLS+CDN/H:2	CR_LFINF-CDN-0_H2	CR_LFINF-CDM-5_H2
888	CR/LFLS+CDN/H:3	CR_LFINF-CDN-0_H3	CR_LFINF-CDM-5_H3
889	CR/LFLS+CDN/H:4	CR_LFINF-CDN-0_H4	CR_LFINF-CDM-5_H4
890	CR/LFLS+CDN/H:5	CR_LFINF-CDN-0_H5	CR_LFINF-CDM-5_H5
891	CR/LDUAL+CDH+LFC:9.0/H:6	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
892	CR/LDUAL+CDH+LFC:9.0/H:7	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
893	CR/LDUAL+CDH+LFC:9.0/H:8	CR_LDUAL-DUM_H8	CR_LDUAL-DUH_H8
894	CR/LDUAL+CDH+LFC:9.0/H:9	CR_LDUAL-DUM_H9	CR_LDUAL-DUH_H9
895	CR/LDUAL+CDH+LFC:9.0/HBET:10-15	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
896	CR/LDUAL+CDL+LFC:0.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
897	CR/LDUAL+CDL+LFC:4.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
898	CR/LDUAL+CDM+LFC:5.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
899	CR/LFINF+CDH+LFC:9.0/H:2	CR_LFINF-CDH-10_H2	CR_LFINF-CDH-15_H2
900	CR/LFINF+CDH+LFC:9.0/H:3	CR_LFINF-CDH-10_H3	CR_LFINF-CDH-15_H3
901	CR/LFINF+CDH+LFC:9.0/H:4	CR_LFINF-CDH-10_H4	CR_LFINF-CDH-15_H4
902	CR/LFINF+CDH+LFC:9.0/H:6	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
903	CR/LFLS+CDN/H:6	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
904	CR/LFLS+CDN/H:7	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
905	CR/LFLS+CDN/H:8	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
906	CR/LFLS+CDN/H:9	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
907	MUR+CL/LWAL+CDN/H:4	MUR-CL99_LWAL-DNO_H4	MR_LWAL-DUM_H4
908	CR/LFINF+CDH+LFC:9.0/H:7	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
909	CR/LFINF+CDH+LFC:9.0/H:8	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
910	CR/LFINF+CDH+LFC:9.0/H:9	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
911	CR/LFINF+CDH+LFC:9.0/HBET:10-15	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
912	CR/LFINF+CDL+LFC:0.0/H:4	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
913	CR/LFINF+CDL+LFC:4.0/H:4	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
914	CR/LFINF+CDL+LFC:0.0/H:5	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
915	CR/LFINF+CDL+LFC:4.0/H:5	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
916	MUR+CL/LWAL+CDN/H:6	MUR-CL99_LWAL-DNO_H5	MR_LWAL-DUM_H5
917	MUR+CL/LWAL+CDN/H:5	MUR-CL99_LWAL-DNO_H5	MR_LWAL-DUM_H5
918	CR/LFLS+CDL+LFC:0.0/H:3	CR_LFINF-CDL-0_H3	CR_LFINF-CDH-5_H3
919	CR/LFLS+CDL+LFC:4.0/H:3	CR_LFINF-CDL-5_H3	CR_LFINF-CDH-10_H3
920	CR/LFLS+CDL+LFC:0.0/H:4	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
921	CR/LFLS+CDL+LFC:4.0/H:4	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
922	CR/LFLS+CDL+LFC:0.0/H:5	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
923	CR/LFLS+CDL+LFC:4.0/H:5	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
924	CR/LFLS+CDL+LFC:0.0/H:6	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
925	CR/LFLS+CDL+LFC:4.0/H:6	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
926	CR/LDUAL+CDL+LFC:20.0/HBET:10-15	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
927	CR/LFLS+CDM+LFC:12.0/H:8	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
928	CR/LFLS+CDL+LFC:20.0/H:2	CR_LFINF-CDL-20_H2	CR_LFINF-CDH-25_H2
929	CR/LFLS+CDL+LFC:10.0/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
930	CR/LFLS+CDL+LFC:20.0/H:9	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
931	CR/LFLS+CDL+LFC:10.0/H:9	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
932	CR/LFINF+CDM+LFC:12.0/HBET:10-15	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
933	CR/LFINF+CDM+LFC:12.0/H:9	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
934	CR/LFINF+CDM+LFC:12.0/H:8	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
935	CR/LFINF+CDM+LFC:12.0/H:7	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
936	CR/LFINF+CDM+LFC:12.0/H:6	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
937	CR/LFINF+CDM+LFC:12.0/H:5	CR_LFINF-CDM-10_H5	CR_LFINF-CDH-15_H5
938	CR/LFINF+CDM+LFC:12.0/H:4	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
939	CR/LFINF+CDM+LFC:12.0/H:3	CR_LFINF-CDM-10_H3	CR_LFINF-CDH-15_H3
940	CR/LFINF+CDL+LFC:20.0/HBET:10-15	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
941	CR/LFINF+CDL+LFC:10.0/HBET:10-15	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
942	CR/LFINF+CDL+LFC:20.0/H:9	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
943	CR/LFINF+CDL+LFC:10.0/H:9	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
944	CR/LFINF+CDL+LFC:20.0/H:8	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
945	CR/LFINF+CDL+LFC:10.0/H:8	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
946	CR/LFINF+CDL+LFC:20.0/H:7	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
947	CR/LFINF+CDL+LFC:10.0/H:7	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
948	CR/LFINF+CDL+LFC:20.0/H:6	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
949	CR/LFINF+CDL+LFC:10.0/H:6	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
950	CR/LFINF+CDL+LFC:20.0/H:5	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5
951	CR/LFINF+CDL+LFC:10.0/H:5	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
952	CR/LFINF+CDL+LFC:20.0/H:4	CR_LFINF-CDL-20_H4	CR_LFINF-CDH-25_H4
953	CR/LFLS+CDL+LFC:10.0/H:3	CR_LFINF-CDL-10_H3	CR_LFINF-CDH-15_H3
954	CR/LFLS+CDL+LFC:20.0/H:3	CR_LFINF-CDL-20_H3	CR_LFINF-CDH-25_H3
955	CR/LFLS+CDL+LFC:20.0/H:4	CR_LFINF-CDL-20_H4	CR_LFINF-CDH-25_H4
956	CR/LFLS+CDL+LFC:10.0/H:5	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
957	CR/LFLS+CDL+LFC:20.0/H:5	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5
958	CR/LFLS+CDL+LFC:10.0/H:7	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
959	CR/LFLS+CDL+LFC:20.0/H:6	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
960	CR/LFLS+CDL+LFC:20.0/H:7	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
961	CR/LFLS+CDL+LFC:10.0/H:8	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
962	CR/LFLS+CDL+LFC:20.0/H:8	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
963	CR/LFLS+CDM+LFC:12.0/H:3	CR_LFINF-CDM-10_H3	CR_LFINF-CDH-15_H3
964	CR/LDUAL+CDH+LFC:14.0/H:8	CR_LDUAL-DUM_H8	CR_LDUAL-DUH_H8
965	CR/LDUAL+CDH+LFC:14.0/H:7	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
966	CR/LDUAL+CDH+LFC:14.0/H:6	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
967	CR/LDUAL+CDH+LFC:14.0/H:9	CR_LDUAL-DUM_H9	CR_LDUAL-DUH_H9
968	CR/LDUAL+CDH+LFC:14.0/HBET:10-15	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
969	CR/LDUAL+CDL+LFC:10.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
970	CR/LFLS+CDM+LFC:12.0/H:4	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
971	CR/LFLS+CDM+LFC:12.0/H:5	CR_LFINF-CDM-10_H5	CR_LFINF-CDH-15_H5
972	CR/LFLS+CDM+LFC:12.0/H:6	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
973	CR/LFLS+CDM+LFC:12.0/H:7	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
974	CR/LFLS+CDM+LFC:12.0/H:9	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
975	CR/LFINF+CDL+LFC:10.0/H:4	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
976	CR/LFLS+CDL+LFC:10.0/H:6	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
977	CR/LFLS+CDL+LFC:10.0/H:4	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
978	CR/LDUAL+CDM+LFC:12.0/HBET:10-15	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
979	CR/LFINF+CDH+LFC:14.0/H:3	CR_LFINF-CDH-15_H3	CR_LFINF-CDH-20_H3
980	CR/LFINF+CDH+LFC:14.0/H:4	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
981	CR/LFINF+CDH+LFC:14.0/H:5	CR_LFINF-CDH-15_H5	CR_LFINF-CDH-20_H5
982	CR/LFINF+CDH+LFC:14.0/H:6	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
983	CR/LFINF+CDH+LFC:14.0/H:7	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
984	CR/LFINF+CDH+LFC:14.0/H:8	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
985	CR/LFINF+CDH+LFC:14.0/H:9	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
986	CR/LFINF+CDH+LFC:14.0/HBET:10-15	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
987	CR/LFINF+CDL+LFC:20.0/H:3	CR_LFINF-CDL-20_H3	CR_LFINF-CDH-25_H3
988	CR/LDUAL+CDH+LFC:13.0/HBET:10-15	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
989	CR/LDUAL+CDH+LFC:13.0/H:7	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
990	CR/LDUAL+CDH+LFC:13.0/H:8	CR_LDUAL-DUM_H8	CR_LDUAL-DUH_H8
991	CR/LDUAL+CDH+LFC:13.0/H:9	CR_LDUAL-DUM_H9	CR_LDUAL-DUH_H9
992	CR/LFINF+CDH+LFC:13.0/H:8	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
993	CR/LFINF+CDH+LFC:13.0/H:7	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
994	CR/LFINF+CDH+LFC:13.0/H:6	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
995	CR/LFINF+CDH+LFC:13.0/H:5	CR_LFINF-CDH-15_H5	CR_LFINF-CDH-20_H5
996	CR/LFINF+CDH+LFC:13.0/H:4	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
997	CR/LFINF+CDH+LFC:13.0/H:9	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
998	CR/LFINF+CDH+LFC:13.0/HBET:10-15	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
999	CR/LDUAL+CDH+LFC:13.0/H:6	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
1000	CR/LFINF+CDH+LFC:13.0/H:3	CR_LFINF-CDH-15_H3	CR_LFINF-CDH-20_H3
1001	CR/LFINF+CDH+LFC:13.0/H:2	CR_LFINF-CDH-15_H2	CR_LFINF-CDH-20_H2
1002	CR/LDUAL+CDL+LFC:8.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1003	CR/LFLS+CDL+LFC:8.0/H:9	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1004	CR/LFLS+CDL+LFC:8.0/H:8	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1005	CR/LFLS+CDL+LFC:8.0/H:7	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1006	CR/LFLS+CDL+LFC:8.0/H:6	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1007	CR/LFLS+CDL+LFC:8.0/H:5	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1008	CR/LFINF+CDL+LFC:8.0/HBET:10-15	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1009	CR/LFINF+CDL+LFC:8.0/H:9	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1010	CR/LFLS+CDL+LFC:8.0/H:4	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
1011	CR/LFLS+CDL+LFC:8.0/H:3	CR_LFINF-CDL-10_H3	CR_LFINF-CDH-15_H3
1012	CR/LFLS+CDL+LFC:8.0/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
1013	CR/LFINF+CDL+LFC:8.0/H:8	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1014	CR/LFINF+CDL+LFC:8.0/H:7	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1015	CR/LFINF+CDL+LFC:8.0/H:6	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1016	CR/LFINF+CDL+LFC:8.0/H:5	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1017	CR/LFINF+CDL+LFC:8.0/H:4	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
1018	CR/LFINF+CDL+LFC:8.0/H:3	CR_LFINF-CDL-10_H3	CR_LFINF-CDH-15_H3
1019	CR/LFLS+CDL+LFC:2.0/H:2	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
1020	CR/LFLS+CDL+LFC:2.0/H:3	CR_LFINF-CDL-0_H3	CR_LFINF-CDH-5_H3
1021	CR/LFLS+CDL+LFC:2.0/H:4	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
1022	CR/LFLS+CDL+LFC:2.0/H:5	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1023	CR/LFINF+CDL+LFC:2.0/H:7	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1024	CR/LFLS+CDL+LFC:2.0/H:6	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1025	CR/LFLS+CDL+LFC:2.0/H:7	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1026	CR/LFLS+CDL+LFC:2.0/H:8	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1027	CR/LFLS+CDL+LFC:2.0/H:9	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1028	CR/LFINF+CDH+LFC:5.0/H:8	CR_LFINF-CDH-5_H6	CR_LFINF-CDH-10_H6
1029	CR/LFINF+CDH+LFC:5.0/HBET:10-15	CR_LFINF-CDH-5_H6	CR_LFINF-CDH-10_H6
1030	CR/LFINF+CDL+LFC:2.0/H:3	CR_LFINF-CDL-0_H3	CR_LFINF-CDH-5_H3
1031	CR/LFINF+CDL+LFC:2.0/H:5	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1032	CR/LDUAL+CDL+LFC:2.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1033	CR/LFINF+CDL+LFC:2.0/H:6	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1034	CR/LDUAL+CDH+LFC:5.0/HBET:10-15	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
1035	CR/LDUAL+CDH+LFC:5.0/H:8	CR_LDUAL-DUM_H8	CR_LDUAL-DUH_H8
1036	CR/LDUAL+CDH+LFC:5.0/H:7	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
1037	CR/LDUAL+CDH+LFC:5.0/H:6	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
1038	CR/LFINF+CDH+LFC:5.0/H:9	CR_LFINF-CDH-5_H6	CR_LFINF-CDH-10_H6
1039	CR/LDUAL+CDH+LFC:5.0/H:9	CR_LDUAL-DUM_H9	CR_LDUAL-DUH_H9
1040	CR/LFINF+CDL+LFC:2.0/H:8	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1041	CR/LFINF+CDL+LFC:2.0/H:9	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1042	CR/LFINF+CDL+LFC:2.0/HBET:10-15	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1043	CR/LFINF+CDL+LFC:2.0/H:4	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
1044	CR/LFINF+CDH+LFC:5.0/H:3	CR_LFINF-CDH-5_H3	CR_LFINF-CDH-10_H3
1045	CR/LFINF+CDH+LFC:5.0/H:4	CR_LFINF-CDH-5_H4	CR_LFINF-CDH-10_H4
1046	CR/LFINF+CDH+LFC:5.0/H:5	CR_LFINF-CDH-5_H5	CR_LFINF-CDH-10_H5
1047	CR/LFINF+CDH+LFC:5.0/H:6	CR_LFINF-CDH-5_H6	CR_LFINF-CDH-10_H6
1048	CR/LFINF+CDH+LFC:5.0/H:7	CR_LFINF-CDH-5_H6	CR_LFINF-CDH-10_H6
1049	CR/LFINF+CDM+LFC:1.0/H:4	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
1050	CR/LFLS+CDM+LFC:1.0/H:4	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
1051	CR/LFLS+CDM+LFC:1.0/H:5	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1052	CR/LFLS+CDM+LFC:1.0/H:7	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1053	CR/LFLS+CDM+LFC:1.0/H:8	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1054	CR/LFLS+CDM+LFC:1.0/H:9	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1055	CR/LFLS+CDM+LFC:1.0/H:6	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1056	CR/LFINF+CDM+LFC:1.0/H:9	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1057	CR/LFINF+CDM+LFC:1.0/H:8	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1058	CR/LFINF+CDM+LFC:1.0/H:7	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1059	CR/LFINF+CDM+LFC:1.0/H:6	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1060	CR/LFLS+CDM+LFC:1.0/H:3	CR_LFINF-CDM-0_H3	CR_LFINF-CDH-5_H3
1061	CR/LFINF+CDH+LFC:2.0/H:6	CR_LFINF-CDH-0_H6	CR_LFINF-CDH-5_H6
1062	CR/LDUAL+CDH+LFC:2.0/H:7	CR_LDUAL-DUL_H7	CR_LDUAL-DUH_H7
1063	CR/LDUAL+CDH+LFC:2.0/H:8	CR_LDUAL-DUL_H8	CR_LDUAL-DUH_H8
1064	CR/LDUAL+CDH+LFC:2.0/H:9	CR_LDUAL-DUL_H9	CR_LDUAL-DUH_H9
1065	CR/LFINF+CDH+LFC:2.0/H:2	CR_LFINF-CDH-0_H2	CR_LFINF-CDH-5_H2
1066	CR/LFINF+CDH+LFC:2.0/H:3	CR_LFINF-CDH-0_H3	CR_LFINF-CDH-5_H3
1067	CR/LFINF+CDH+LFC:2.0/H:4	CR_LFINF-CDH-0_H4	CR_LFINF-CDH-5_H4
1068	CR/LFINF+CDH+LFC:2.0/H:5	CR_LFINF-CDH-0_H5	CR_LFINF-CDH-5_H5
1069	CR/LFINF+CDH+LFC:2.0/H:7	CR_LFINF-CDH-0_H6	CR_LFINF-CDH-5_H6
1070	CR/LFINF+CDM+LFC:1.0/H:5	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1071	CR/LFINF+CDM+LFC:1.0/H:3	CR_LFINF-CDM-0_H3	CR_LFINF-CDH-5_H3
1072	CR/LDUAL+CDH+LFC:2.0/H:6	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
1073	CR/LFINF+CDH+LFC:2.0/H:9	CR_LFINF-CDH-0_H6	CR_LFINF-CDH-5_H6
1074	CR/LFINF+CDH+LFC:2.0/H:8	CR_LFINF-CDH-0_H6	CR_LFINF-CDH-5_H6
1075	CR/LFINF+CDM+LFC:1.0/HBET:10-15	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1076	CR/LDUAL+CDM+LFC:1.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1077	CR/LFINF+CDH+LFC:2.0/HBET:10-15	CR_LFINF-CDH-0_H6	CR_LFINF-CDH-5_H6
1078	CR/LDUAL+CDH+LFC:2.0/HBET:10-15	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1079	CR/LFLS+CDL+LFC:14.0/H:8	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1080	CR/LFLS+CDL+LFC:14.0/H:9	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1081	CR/LDUAL+CDL+LFC:14.0/HBET:10-15	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
1082	CR/LFINF+CDL+LFC:14.0/H:3	CR_LFINF-CDL-15_H3	CR_LFINF-CDH-20_H3
1083	CR/LFINF+CDL+LFC:14.0/H:4	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
1084	CR/LFINF+CDL+LFC:14.0/H:5	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1085	CR/LFINF+CDL+LFC:14.0/H:6	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1086	CR/LFINF+CDL+LFC:14.0/H:7	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1087	CR/LFINF+CDL+LFC:14.0/H:8	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1088	CR/LFINF+CDL+LFC:14.0/H:9	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1089	CR/LFLS+CDL+LFC:14.0/H:7	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1090	CR/LFLS+CDL+LFC:14.0/H:2	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
1091	CR/LFLS+CDL+LFC:14.0/H:3	CR_LFINF-CDL-15_H3	CR_LFINF-CDH-20_H3
1092	CR/LFLS+CDL+LFC:14.0/H:4	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
1093	CR/LFLS+CDL+LFC:14.0/H:5	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1094	CR/LFLS+CDL+LFC:14.0/H:6	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1095	CR/LFINF+CDL+LFC:14.0/HBET:10-15	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1096	CR/LDUAL+CDM+LFC:2.5/HBET:6-9	CR_LDUAL-DUL_H7	CR_LDUAL-DUH_H7
1097	CR/LDUAL+CDM+LFC:2.5/H:5	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1098	CR/LFINF+CDM+LFC:2.5/H:3	CR_LFINF-CDM-0_H3	CR_LFINF-CDH-5_H3
1099	CR/LFINF+CDM+LFC:2.5/H:4	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
1100	CR/LFINF+CDM+LFC:2.5/H:5	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1101	MIX/LH+CDM/H:1	MCF_LWAL-DUL_H1	MCF_LWAL-DUH_H1
1102	MIX/LH+CDM/H:2	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
1103	MIX/LH+CDM/H:3	MCF_LWAL-DUL_H3	MCF_LWAL-DUH_H3
1104	MIX/LH+CDM/H:4	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
1105	MIX/LH+CDN/H:1	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
1106	MIX/LH+CDN/H:3	MUR_LWAL-DNO_H3	MR_LWAL-DUM_H3
1107	MIX/LH+CDN/H:4	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4
1108	S/LFM+CDM/H:4	S_LFM-DUM_H4	S_LFM-DUH_H4
1109	S/LFM+CDM/H:3	S_LFM-DUM_H3	S_LFM-DUH_H3
1110	MUR/LWAL+CDN/H:3	MUR_LWAL-DNO_H3	MR_LWAL-DUM_H3
1111	MCF/LWAL+CDN/H:4	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
1112	CR/LDUAL+CDM+LFC:10.0/H:5	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1113	CR/LDUAL+CDM+LFC:10.0/HBET:6-9	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
1114	CR/LFINF+CDM+LFC:10.0/H:4	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
1115	CR/LFINF+CDM+LFC:10.0/H:5	CR_LFINF-CDM-10_H5	CR_LFINF-CDH-15_H5
1116	CR/LDUAL+CDM+LFC:5.0/H:5	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1117	CR/LDUAL+CDM+LFC:5.0/HBET:6-9	CR_LDUAL-DUL_H7	CR_LDUAL-DUH_H7
1118	CR/LFM+CDN/HBET:3-5	CR_LFM-CDN-0_H4	CR_LFM-CDM-5_H4
1119	CR/LFM+CDN/HBET:6-	CR_LFM-CDN-0_H6	CR_LFM-CDM-5_H6
1120	S/LFBR+CDN/H:2	S_LFBR-DUM_H2	S_LFBR-DUH_H2
1121	S/LFBR+CDN/HBET:3-5	S_LFBR-DUM_H4	S_LFBR-DUH_H4
1122	S/LFBR+CDN/HBET:6-	S_LFBR-DUM_H6	S_LFBR-DUH_H6
1123	W/LFM+CDH/HBET:3-5	W_LFM-DUH_H4	W_LFM-DUH_H4
1124	W/LFM+CDH/H:2	W_LFM-DUH_H2	W_LFM-DUH_H2
1125	W/LFM+CDH/H:1	W_LFM-DUH_H1	W_LFM-DUH_H1
1126	CR+PC/LWAL+CDH+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
1127	CR+PC/LWAL+CDH+LFC:15.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1128	CR+PC/LWAL+CDH+LFC:15.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1129	CR/LFINF+CDH+LFC:18.0/HBET:6-	CR_LFINF-CDH-20_H6	CR_LFINF-CDH-25_H6
1130	CR/LFINF+CDH+LFC:18.0/HBET:3-5	CR_LFINF-CDH-20_H4	CR_LFINF-CDH-25_H4
1131	CR/LFINF+CDH+LFC:18.0/H:2	CR_LFINF-CDH-20_H2	CR_LFINF-CDH-25_H2
1132	CR/LFINF+CDH+LFC:18.0/H:1	CR_LFINF-CDH-20_H1	CR_LFINF-CDH-25_H1
1133	CR/LDUAL+CDH+LFC:18.0/HBET:6-	CR_LDUAL-DUH_H6	CR_LDUAL-DUH_H6
1134	CR+PC/LWAL+CDL+LFC:6.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1135	CR+PC/LWAL+CDH+LFC:18.0/H:1	CR_LWAL-DUH_H1	CR_LWAL-DUH_H1
1136	CR+PC/LWAL+CDH+LFC:18.0/H:2	CR_LWAL-DUH_H2	CR_LWAL-DUH_H2
1137	CR+PC/LWAL+CDH+LFC:18.0/HBET:3-5	CR_LWAL-DUH_H4	CR_LWAL-DUH_H4
1138	CR+PC/LWAL+CDH+LFC:18.0/HBET:6-	CR_LWAL-DUH_H6	CR_LWAL-DUH_H6
1139	CR+PC/LWAL+CDL+LFC:6.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
1140	CR+PC/LWAL+CDL+LFC:6.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
1141	CR+PC/LWAL+CDL+LFC:6.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
1142	CR/LFINF+CDH+LFC:13.0/H:1	CR_LFINF-CDH-15_H1	CR_LFINF-CDH-20_H1
1143	CR/LDUAL+CDH+LFC:13.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
1144	CR/LFINF+CDH+LFC:13.0/HBET:3-5	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
1145	CR/LFINF+CDH+LFC:13.0/HBET:6-	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
1146	CR+PC/LWAL+CDH+LFC:13.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1147	CR+PC/LWAL+CDH+LFC:13.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1148	CR+PC/LWAL+CDH+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
1149	CR+PC/LWAL+CDH+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
1150	CR/LFINF+CDL+LFC:11.0/HBET:6-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1151	CR/LFINF+CDL+LFC:11.0/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
1152	CR/LFINF+CDL+LFC:11.0/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
1153	CR+PC/LWAL+CDL+LFC:11.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
1154	CR+PC/LWAL+CDL+LFC:11.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1155	CR/LDUAL+CDL+LFC:11.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
1156	CR+PC/LWAL+CDL+LFC:11.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
1157	CR+PC/LWAL+CDL+LFC:11.0/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
1158	CR/LFINF+CDL+LFC:11.0/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
1159	CR/LFM+CDM/HBET:3-5	CR_LFM-CDM-0_H4	CR_LFM-CDH-5_H4
1160	CR/LFM+CDM/HBET:6-	CR_LFM-CDM-0_H6	CR_LFM-CDH-10_H6
1161	S/LFINF+CDM/HBET:6-	S_LFINF-DUM_H6	S_LFINF-DUH_H6
1162	S/LFINF+CDM/HBET:3-5	S_LFINF-DUM_H4	S_LFINF-DUH_H4
1163	CR/LFM+CDM+LFC:12.0/H:2	CR_LFM-CDM-10_H2	CR_LFM-CDH-15_H2
1164	CR/LFM+CDM+LFC:12.0/H:1	CR_LFM-CDM-10_H1	CR_LFM-CDH-15_H1
1165	CR/LFM+CDM+LFC:9.0/H:1	CR_LFM-CDM-10_H1	CR_LFM-CDH-15_H1
1166	CR/LFM+CDM+LFC:9.0/H:2	CR_LFM-CDM-10_H2	CR_LFM-CDH-15_H2
1167	CR/LFINF+CDL+LFC:15.0/HBET:1-3	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
1168	W/LFM+CDN/HBET:1-3	W_LFM-DUL_H2	W_LFM-DUH_H2
1169	MUR+STRUB/LWAL+CDN/HBET:4-6	MUR-STRUB_LWAL-DNO_H5	MR_LWAL-DUM_H5
1170	MUR+CBH/LWAL+CDN/HBET:1-3	MUR-CB99_LWAL-DNO_H2	MR_LWAL-DUM_H2
1171	MUR+ADO/LWAL+CDN/HBET:1-3	MUR-ADO_LWAL-DNO_H2	MR_LWAL-DUM_H2
1172	CR/LWAL+CDL+LFC:15.0/HBET:4-6	CR_LWAL-DUM_H5	CR_LWAL-DUH_H5
1173	CR/LWAL+CDL+LFC:15.0/HBET:1-3	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1174	CR/LWAL+CDH+LFC:19.0/HBET:7-	CR_LWAL-DUH_H7	CR_LWAL-DUH_H7
1175	CR/LWAL+CDH+LFC:19.0/HBET:4-6	CR_LWAL-DUH_H5	CR_LWAL-DUH_H5
1176	CR/LWAL+CDH+LFC:19.0/HBET:1-3	CR_LWAL-DUH_H2	CR_LWAL-DUH_H2
1177	CR/LFINF+CDN/HBET:1-3	CR_LFINF-CDN-0_H2	CR_LFINF-CDM-5_H2
1178	CR/LFINF+CDL+LFC:15.0/HBET:7-	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1179	CR/LFINF+CDL+LFC:15.0/HBET:4-6	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1180	CR/LFINF(CL)+CDL+LFC:15.0/HBET:7-	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1181	CR/LFINF(CL)+CDL+LFC:15.0/HBET:4-6	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1182	CR/LFINF(CL)+CDL+LFC:15.0/HBET:1-3	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
1183	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:7-	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1184	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:4-6	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1185	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:1-3	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
1186	CR/LDUAL+CDH+LFC:19.0/HBET:7-	CR_LDUAL-DUH_H7	CR_LDUAL-DUH_H7
1187	CR/LDUAL+CDH+LFC:19.0/HBET:4-6	CR_LDUAL-DUH_H5	CR_LDUAL-DUH_H5
1188	CR/LDUAL+CDH+LFC:19.0/HBET:1-3	CR_LDUAL-DUH_H2	CR_LDUAL-DUH_H2
1189	CR+PC/LWAL+CDL+LFC:15.0/HBET:1-3	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1190	W/LWAL+CDN/HBET:1-3	W_LFM-DUL_H2	W_LFM-DUH_H2
1191	CR+PC/LWAL+CDL+LFC:0.0/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1192	CR/LFINF+CDL+LFC:0.0/HBET:7-	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1193	CR/LFINF+CDL+LFC:0.0/HBET:4-6	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1194	CR/LFINF+CDL+LFC:0.0/HBET:1-3	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
1195	CR/LFINF(CL)+CDL+LFC:0.0/HBET:7-	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1196	CR/LFINF(CL)+CDL+LFC:0.0/HBET:4-6	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1197	CR/LFINF(CL)+CDL+LFC:0.0/HBET:1-3	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
1198	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:4-6	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1199	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:1-3	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
1200	CR/LWAL+CDL+LFC:0.0/HBET:4-6	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
1201	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:7-	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1202	CR/LWAL+CDL+LFC:0.0/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1203	CR/LFINF(CL)+CDL+LFC:6.0/HBET:1-3	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
1204	CR/LFINF(CL)+CDL+LFC:6.0/HBET:7-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1205	CR/LWAL+CDL+LFC:6.0/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1206	CR/LFINF+CDL+LFC:6.0/HBET:7-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1207	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:7-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1208	CR/LWAL+CDL+LFC:6.0/HBET:4-6	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
1209	CR+PC/LWAL+CDL+LFC:6.0/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1210	CR/LFINF+CDL+LFC:6.0/HBET:4-6	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1211	CR/LFINF+CDL+LFC:6.0/HBET:1-3	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
1212	CR/LFINF(CL)+CDL+LFC:6.0/HBET:4-6	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1213	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:4-6	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1214	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:1-3	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
1215	CR/LFINF(CL)+CDL+LFC:19.0/HBET:7-	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
1216	CR+PC/LWAL+CDL+LFC:19.0/HBET:1-3	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1217	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:4-6	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5
1218	CR/LWAL+CDL+LFC:19.0/HBET:4-6	CR_LWAL-DUM_H5	CR_LWAL-DUH_H5
1219	CR/LWAL+CDL+LFC:19.0/HBET:1-3	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1220	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:7-	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
1221	CR/LFINF+CDL+LFC:19.0/HBET:7-	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
1222	CR/LFINF+CDL+LFC:19.0/HBET:4-6	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1223	CR/LFINF(CL)+CDL+LFC:19.0/HBET:4-6	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5
1224	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:1-3	CR_LFINF-CDL-20_H2	CR_LFINF-CDH-25_H2
1225	CR/LFINF(CL)+CDL+LFC:19.0/HBET:1-3	CR_LFINF-CDL-20_H2	CR_LFINF-CDH-25_H2
1226	CR/LFINF+CDL+LFC:19.0/HBET:1-3	CR_LFINF-CDL-20_H2	CR_LFINF-CDH-25_H2
1227	CR/LFINF+CDL+LFC:11.0/HBET:7-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1228	CR/LFINF+CDL+LFC:11.0/HBET:4-6	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1229	CR/LFINF+CDL+LFC:11.0/HBET:1-3	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
1230	CR/LFINF(CL)+CDL+LFC:11.0/HBET:7-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1231	CR/LFINF(CL)+CDL+LFC:11.0/HBET:4-6	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1232	CR/LFINF(CL)+CDL+LFC:11.0/HBET:1-3	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
1233	CR+PC/LWAL+CDL+LFC:11.0/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1234	CR/LWAL+CDL+LFC:11.0/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1235	CR/LWAL+CDL+LFC:11.0/HBET:4-6	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
1236	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:7-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1237	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:1-3	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
1238	CR/LDUAL+CDL+LFC:11.0/HBET:7-	CR_LDUAL-DUL_H7	CR_LDUAL-DUH_H7
1239	CR/LDUAL+CDL+LFC:11.0/HBET:4-6	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1240	CR/LDUAL+CDL+LFC:11.0/HBET:1-3	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1241	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:4-6	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1242	CR/LDUAL+CDL+LFC:15.0/HBET:7-	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
1243	CR/LDUAL+CDL+LFC:15.0/HBET:4-6	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1244	CR/LDUAL+CDL+LFC:15.0/HBET:1-3	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
1245	CR/LDUAL+CDH+LFC:25.0/HBET:4-6	CR_LDUAL-DUH_H5	CR_LDUAL-DUH_H5
1246	CR/LDUAL+CDH+LFC:25.0/HBET:1-3	CR_LDUAL-DUH_H2	CR_LDUAL-DUH_H2
1247	CR/LWAL+CDH+LFC:25.0/HBET:7-	CR_LWAL-DUH_H7	CR_LWAL-DUH_H7
1248	CR/LWAL+CDH+LFC:25.0/HBET:4-6	CR_LWAL-DUH_H5	CR_LWAL-DUH_H5
1249	CR/LWAL+CDH+LFC:25.0/HBET:1-3	CR_LWAL-DUH_H2	CR_LWAL-DUH_H2
1250	CR/LDUAL+CDH+LFC:25.0/HBET:7-	CR_LDUAL-DUH_H7	CR_LDUAL-DUH_H7
1251	CR/LDUAL+CDL+LFC:19.0/HBET:7-	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
1252	CR/LDUAL+CDL+LFC:19.0/HBET:1-3	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
1253	CR/LDUAL+CDL+LFC:19.0/HBET:4-6	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1254	CR/LWAL+CDH+LFC:0.0/HBET:4-6	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
1255	CR/LWAL+CDH+LFC:0.0/HBET:7-	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1256	CR/LWAL+CDH+LFC:0.0/HBET:1-3	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1257	CR/LDUAL+CDH+LFC:0.0/HBET:7-	CR_LDUAL-DUL_H7	CR_LDUAL-DUH_H7
1258	CR/LDUAL+CDH+LFC:0.0/HBET:4-6	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1259	CR/LDUAL+CDH+LFC:0.0/HBET:1-3	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1260	CR/LDUAL+CDH+LFC:6.0/HBET:7-	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
1261	CR/LWAL+CDH+LFC:6.0/HBET:4-6	CR_LWAL-DUM_H5	CR_LWAL-DUH_H5
1262	CR/LWAL+CDH+LFC:6.0/HBET:1-3	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1263	CR/LWAL+CDH+LFC:6.0/HBET:7-	CR_LWAL-DUM_H7	CR_LWAL-DUH_H7
1264	CR/LDUAL+CDH+LFC:6.0/HBET:1-3	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
1265	CR/LDUAL+CDH+LFC:6.0/HBET:4-6	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1266	CR/LDUAL+CDL+LFC:6.0/HBET:7-	CR_LDUAL-DUL_H7	CR_LDUAL-DUH_H7
1267	CR/LDUAL+CDL+LFC:6.0/HBET:4-6	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1268	CR/LDUAL+CDL+LFC:6.0/HBET:1-3	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1269	CR/LDUAL+CDL+LFC:0.0/HBET:1-3	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1270	CR/LDUAL+CDL+LFC:0.0/HBET:4-6	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1271	CR/LDUAL+CDL+LFC:0.0/HBET:7-	CR_LDUAL-DUL_H7	CR_LDUAL-DUH_H7
1272	CR/LWAL+CDH+LFC:13.0/HBET:4-6	CR_LWAL-DUM_H5	CR_LWAL-DUH_H5
1273	CR/LDUAL+CDH+LFC:13.0/HBET:7-	CR_LDUAL-DUM_H7	CR_LDUAL-DUH_H7
1274	CR/LWAL+CDH+LFC:13.0/HBET:7-	CR_LWAL-DUM_H7	CR_LWAL-DUH_H7
1275	CR/LDUAL+CDH+LFC:13.0/HBET:4-6	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1276	CR/LDUAL+CDH+LFC:13.0/HBET:1-3	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
1277	CR/LWAL+CDH+LFC:13.0/HBET:1-3	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1278	MUR+CLBRS/LWAL+CDN/HBET:2-5/BPD/RSH3+RMT1+RWO/FC	MUR-CL99_LWAL-DNO_H3	MR_LWAL-DUM_H3
1279	EU+ETR/LWAL+CDN/H:1/BPD/RSH3+RMT1+RWO	MUR-ADO_LWAL-DNO_H1	MR_LWAL-DUM_H1
1280	MUR+CLBRS/LWAL+CDN/HBET:1-3/BPD/RSH3+RMT1+RWO/FM	MUR-CL99_LWAL-DNO_H2	MR_LWAL-DUM_H2
1281	MUR+CLBRS/LWAL+CDN/H:1/BPD/RSH2+RMT1+RWO	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
1282	MCF+CLBLH/LWAL+CDL/HBET:1-3/BPD/RSH3+RMT1+RWO/FC	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
1283	MUR+CLBLH/LWAL+CDN/HBET:1-2/BPD/RSH3+RMT1+RWO/FM	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
1284	W+WLI/LWAL+CDN/H:1/BPD/EWE/RSH3+RMT1	W_LFM-DUL_H1	W_LFM-DUH_H1
1285	MUR+CLBRS/LWAL+CDN/HBET:3-5/BPD/RSH3+RMT1+RWO/FC	MUR-CL99_LWAL-DNO_H4	MR_LWAL-DUM_H4
1286	MUR+CLBRS/LWAL+CDN/HBET:1-2/RSH3+RMT1+RWO/FW	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
1287	CR+CIP/LDUAL+CDM+LFC:5.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1288	MUR/LWAL+CDN/HBET:1-3	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
1289	CR+CIP/LDUAL+CDL+LFC:7.5/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1290	CR+CIP/LDUAL+CDN/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1291	CR+CIP/LFINF+CDL+LFC:7.5/HBET:4-7	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1292	MCF/LWAL+CDL/HBET:1-3	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
1293	CR+CIP/LDUAL+CDL+LFC:7.5/HBET:4-7	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1294	MUR+CLBRS/LWAL+CDN/HBET:3-5	MUR-CL99_LWAL-DNO_H4	MR_LWAL-DUM_H4

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1295	MUR+CLBRS/LWAL+CDN/HBET:1-3	MUR-CL99_LWAL-DNO_H2	MR_LWAL-DUM_H2
1296	EU/LWAL+CDN/H:1	MUR-ADO_LWAL-DNO_H1	MR_LWAL-DUM_H1
1297	MUR+CLBRS/LWAL+CDN/HBET:1-2	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
1298	CR+PC/LWAL+CDM+LFC:5.0/HBET:5-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1299	CR+CIP/LFINF+CDN/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDN-0_H5	CR_LFINF-CDM-5_H5
1300	CR+CIP/LFINF+CDN/HBET:4-7	CR_LFINF-CDN-0_H5	CR_LFINF-CDM-5_H5
1301	CR+PC/LWAL+CDL+LFC:7.5/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1302	CR+CIP/LFINF+CDM+LFC:5.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-5_H5	CR_LFINF-CDH-10_H5
1303	CR+CIP/LFINF+CDM+LFC:5.0/HBET:4-7	CR_LFINF-CDM-5_H5	CR_LFINF-CDH-10_H5
1304	CR+CIP/LFINF+CDL+LFC:7.5/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1305	CR+CIP/LDUAL+CDM+LFC:5.0/HBET:4-7	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1306	CR+CIP/LDUAL+CDL+LFC:15.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1307	CR+CIP/LFINF+CDL+LFC:15.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1308	CR+PC/LWAL+CDL+LFC:15.0/HBET:5-10/RSH1/FC	CR_LWAL-DUM_H7	CR_LWAL-DUH_H7
1309	CR+PC/LWAL+CDM+LFC:5.0/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1310	CR+PC/LWAL+CDN/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1311	MCF+CLBLH/LWAL+CDL/HBET:1-3	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
1312	MUR+CLBLH/LWAL+CDN/HBET:1-2	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
1313	CR+CIP/LDUAL+CDL+LFC:3.75/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1314	CR+CIP/LFINF+CDL+LFC:3.75/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1315	CR+PC/LWAL+CDL+LFC:3.75/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1316	CR+CIP/LDUAL+CDN/HBET:4-7	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1317	CR+PC/LWAL+CDN/HBET:5-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1318	CR+PC/LWAL+CDL+LFC:7.5/HBET:5-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1319	W+WLI/LWAL+CDN/H:1	W_LFM-DUL_H1	W_LFM-DUH_H1
1320	MUR+CLBRS/LWAL+CDN/HBET:1-2/FW	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
1321	MUR+CLBRS/LWAL+CDN/HBET:2-5	MUR-CL99_LWAL-DNO_H3	MR_LWAL-DUM_H3
1322	MUR+CLBRS/LWAL+CDN/H:1	MUR-CL99_LWAL-DNO_H1	MR_LWAL-DUM_H1
1323	CR+CIP/LDUAL+CDM+LFC:10.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1324	CR+CIP/LDUAL+CDM+LFC:10.0/HBET:4-7	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1325	CR+CIP/LFINF+CDL+LFC:15.0/HBET:4-7	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1326	CR+PC/LWAL+CDM+LFC:10.0/HBET:5-10	CR_LWAL-DUM_H7	CR_LWAL-DUH_H7
1327	CR+PC/LWAL+CDL+LFC:15.0/HBET:5-10	CR_LWAL-DUM_H7	CR_LWAL-DUH_H7
1328	CR+CIP/LFINF+CDM+LFC:10.0/HBET:4-7	CR_LFINF-CDM-10_H5	CR_LFINF-CDH-15_H5
1329	CR+CIP/LFINF+CDM+LFC:10.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-10_H5	CR_LFINF-CDH-15_H5
1330	CR+PC/LWAL+CDM+LFC:10.0/HBET:5-10/RSH1/FC	CR_LWAL-DUM_H7	CR_LWAL-DUH_H7
1331	CR+CIP/LDUAL+CDL+LFC:15.0/HBET:4-7	CR_LDUAL-DUM_H5	CR_LDUAL-DUH_H5
1332	CR+PC/LWAL+CDL+LFC:3.75/HBET:5-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1333	CR+CIP/LFINF+CDL+LFC:3.75/HBET:4-7	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1334	CR+CIP/LDUAL+CDL+LFC:3.75/HBET:4-7	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1335	CR+CIP/LDUAL+CDM+LFC:2.5/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1336	MCF+CLBLH/LWAL+CDN/HBET:1-3	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
1337	MCF+CLBLH/LWAL+CDN/HBET:1-3/BPD/RSH3+RMT1+RWO/FC	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
1338	CR+CIP/LDUAL+CDL+LFC:0.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1339	CR+CIP/LFINF+CDL+LFC:0.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1340	CR+CIP/LFINF+CDM+LFC:2.5/HBET:4-7	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1341	CR+CIP/LFINF+CDM+LFC:2.5/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1342	CR+PC/LWAL+CDM+LFC:2.5/HBET:5-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1343	CR+PC/LWAL+CDM+LFC:2.5/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1344	CR+CIP/LDUAL+CDM+LFC:2.5/HBET:4-7	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1345	CR+PC/LWAL+CDL+LFC:0.0/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1346	CR+CIP/LDUAL+CDL+LFC:0.0/HBET:4-7	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1347	CR+CIP/LFINF+CDL+LFC:0.0/HBET:4-7	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1348	CR+PC/LWAL+CDL+LFC:0.0/HBET:5-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1349	MCF/LWAL+CDN/HBET:1-3	MCF_LWAL-DUL_H2	MCF_LWAL-DUH_H2
1350	CR+CIP/LDUAL+CDM+LFC:0.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1351	CR+PC/LWAL+CDM+LFC:0.0/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1352	CR+CIP/LFINF+CDM+LFC:0.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1353	CR+CIP/LDUAL+CDM+LFC:0.0/HBET:4-7	CR_LDUAL-DUL_H5	CR_LDUAL-DUH_H5
1354	CR+CIP/LFINF+CDM+LFC:0.0/HBET:4-7	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1355	CR+PC/LWAL+CDM+LFC:0.0/HBET:5-10	CR_LWAL-DUL_H7	CR_LWAL-DUH_H7
1356	CR/LFLS+CDN/HBET:6-	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
1357	CR/LDUAL+CDL+LFC:4.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
1358	S/LFM+CDM/HBET:6-	S_LFM-DUM_H6	S_LFM-DUH_H6
1359	CR/LDUAL+CDL+LFC:4.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
1360	CR/LFLS+CDN/HBET:3-5	CR_LFINF-CDN-0_H4	CR_LFINF-CDM-5_H4
1361	CR/LFLS+CDN/H:1	CR_LFINF-CDN-0_H1	CR_LFINF-CDM-5_H1
1362	CR/LDUAL+CDL+LFC:4.0/H:10	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1363	CR/LFINF+CDL+LFC:4.0/H:10	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1364	CR/LFINF+CDN/H:10	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
1365	CR/LFLS+CDL+LFC:4.0/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
1366	CR/LDUAL+CDL+LFC:0.0/H:10	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1367	MCF/LWAL+CDN/H:5	MCF_LWAL-DUL_H5	MCF_LWAL-DUH_H5
1368	CR/LFLS+CDL+LFC:0.0/H:1	CR_LFINF-CDL-0_H1	CR_LFINF-CDH-5_H1
1369	CR/LFINF+CDL+LFC:0.0/H:10	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1370	CR/LFLS+CDL+LFC:8.0/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
1371	CR/LDUAL+CDL+LFC:8.0/H:10	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1372	CR/LFINF+CDL+LFC:8.0/H:10	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1373	CR/LWAL+CDL/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1374	S+SR/LFM+CDL/HBET:3-5	S_LFM-DUM_H4	S_LFM-DUH_H4
1375	MIX/LH+CDL/H:4	MCF_LWAL-DUL_H4	MCF_LWAL-DUH_H4
1376	CR/LFINF+CDM+LFC:2.5/HBET:6-9	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1377	MUR/LWAL+CDN/H:4	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4
1378	MUR/LWAL+CDN/H:5	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1379	MIX/LH+CDL/H:3	MCF_LWAL-DUL_H3	MCF_LWAL-DUH_H3
1380	CR/LFINF+CDL+LFC:3.75/H:3	CR_LFINF-CDL-5_H3	CR_LFINF-CDH-10_H3
1381	CR/LFINF+CDL+LFC:3.75/H:4	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
1382	CR/LFINF+CDL+LFC:3.75/H:5	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1383	CR/LDUAL+CDM+LFC:2.5/HBET:10-14	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1384	CR/LDUAL+CDM+LFC:2.5/HBET:15-	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1385	CR/LFINF+CDL+LFC:0.0/HBET:6-9	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1386	CR/LFINF+CDM+LFC:2.5/HBET:10-14	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1387	CR/LFINF+CDM+LFC:2.5/HBET:15-	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1388	CR/LFINF+CDL+LFC:0.0/HBET:10-14	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1389	CR/LFINF+CDL+LFC:3.75/HBET:6-9	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1390	CR/LFINF+CDN/HBET:6-9	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
1391	CR/LFINF+CDN/H:5	CR_LFINF-CDN-0_H5	CR_LFINF-CDM-5_H5
1392	CR/LFINF+CDM+LFC:10.0/HBET:6-9	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
1393	CR/LFINF+CDM+LFC:10.0/HBET:15-	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
1394	CR/LFINF+CDM+LFC:10.0/HBET:10-14	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
1395	CR/LFINF+CDL+LFC:15.0/HBET:6-9	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1396	CR/LFINF+CDL+LFC:15.0/HBET:10-14	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1397	CR/LFINF+CDL+LFC:15.0/H:5	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1398	CR/LFINF+CDL+LFC:15.0/H:4	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
1399	CR/LFINF+CDL+LFC:15.0/H:3	CR_LFINF-CDL-15_H3	CR_LFINF-CDH-20_H3
1400	CR/LDUAL+CDM+LFC:10.0/HBET:15-	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
1401	CR/LDUAL+CDM+LFC:10.0/HBET:10-14	CR_LDUAL-DUM_H12	CR_LDUAL-DUH_H12
1402	CR/LFINF+CDM+LFC:5.0/HBET:6-9	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
1403	CR/LFINF+CDL+LFC:7.5/H:4	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
1404	CR/LFINF+CDL+LFC:7.5/H:3	CR_LFINF-CDL-5_H3	CR_LFINF-CDH-10_H3
1405	CR/LFINF+CDL+LFC:7.5/H:5	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1406	CR/LFINF+CDL+LFC:7.5/HBET:6-9	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1407	CR/LDUAL+CDM+LFC:5.0/HBET:15-	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1408	CR/LFINF+CDM+LFC:5.0/HBET:15-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
1409	CR/LFINF+CDM+LFC:5.0/HBET:10-14	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
1410	CR/LDUAL+CDM+LFC:5.0/HBET:10-14	CR_LDUAL-DUL_H12	CR_LDUAL-DUH_H12
1411	CR/LFINF+CDL+LFC:3.75/HBET:10-14	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1412	CR/LFINF+CDL+LFC:3.75/HBET:15-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1413	CR/LFINF+CDL+LFC:15.0/HBET:15-	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1414	CR/LFINF+CDN/HBET:10-14	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
1415	CR+PC/LWAL+CDM+LFC:9.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1416	CR+CIP/LFINF+CDN/H:1	CR_LFINF-CDN-0_H1	CR_LFINF-CDM-5_H1
1417	CR+CIP/LFINF+CDM+LFC:2.0/H:2	CR_LFINF-CDM-0_H2	CR_LFINF-CDH-5_H2
1418	CR+CIP/LFINF+CDM+LFC:2.0/H:1	CR_LFINF-CDM-0_H1	CR_LFINF-CDH-5_H1
1419	CR+PC/LDUAL+CDM+LFC:5.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
1420	CR+CIP/LFINF+CDH+LFC:8.0/H:1	CR_LFINF-CDH-10_H1	CR_LFINF-CDH-15_H1
1421	CR+CIP/LFINF+CDH+LFC:8.0/H:2	CR_LFINF-CDH-10_H2	CR_LFINF-CDH-15_H2
1422	CR+PC/LDUAL+CDM+LFC:5.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1423	CR+CIP/LFINF+CDL+LFC:0.0/HBET:3-5	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
1424	CR+CIP/LFINF+CDL+LFC:0.0/H:2	CR_LFINF-CDL-0_H2	CR_LFINF-CDH-5_H2
1425	CR+CIP/LFINF+CDL+LFC:0.0/H:1	CR_LFINF-CDL-0_H1	CR_LFINF-CDH-5_H1
1426	MUR/LWAL+CDL/H:1	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
1427	CR+CIP/LFINF+CDN/H:2	CR_LFINF-CDN-0_H2	CR_LFINF-CDM-5_H2
1428	CR+PC/LDUAL+CDM+LFC:5.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
1429	CR+CIP/LFINF+CDH+LFC:8.0/HBET:3-5	CR_LFINF-CDH-10_H4	CR_LFINF-CDH-15_H4
1430	CR+CIP/LFINF+CDM+LFC:5.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
1431	CR+PC/LFM+CDM+LFC:5.0/H:1	CR_LFM-CDM-5_H1	CR_LFM-CDH-10_H1
1432	CR+CIP/LFINF+CDN/HBET:3-5	CR_LFINF-CDN-0_H4	CR_LFINF-CDM-5_H4
1433	CR+PC/LDUAL+CDM+LFC:5.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
1434	CR+PC/LFM+CDM+LFC:5.0/HBET:3-5	CR_LFM-CDM-5_H4	CR_LFM-CDH-5_H4
1435	CR+PC/LFM+CDL+LFC:0.0/H:2	CR_LFM-CDL-0_H2	CR_LFM-CDH-5_H2
1436	CR+CIP/LFINF+CDM+LFC:5.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1437	MUR/LWAL+CDL/H:2	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
1438	MUR/LWAL+CDL/HBET:3-5	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1439	CR+CIP/LFINF+CDM+LFC:2.0/HBET:3-5	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
1440	CR+PC/LFM+CDL+LFC:0.0/HBET:3-5	CR_LFM-CDL-0_H4	CR_LFM-CDH-5_H4
1441	CR+PC/LFM+CDL+LFC:0.0/H:1	CR_LFM-CDL-0_H1	CR_LFM-CDH-5_H1
1442	CR+PC/LFM+CDM+LFC:5.0/H:2	CR_LFM-CDM-5_H2	CR_LFM-CDH-10_H2
1443	CR+CIP/LFINF+CDM+LFC:5.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
1444	CR+CIP/LFINF+CDM+LFC:4.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1445	CR+CIP/LFINF+CDM+LFC:4.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
1446	CR+CIP/LFINF+CDM+LFC:4.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
1447	CR+PC/LWAL+CDM+LFC:3.0/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
1448	CR+CIP/LFINF+CDM+LFC:3.0/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
1449	CR+PC/LDUAL+CDM+LFC:3.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
1450	CR+PC/LDUAL+CDM+LFC:3.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
1451	CR+PC/LFM+CDM+LFC:3.0/H:1	CR_LFM-CDM-5_H1	CR_LFM-CDH-10_H1
1452	CR+PC/LDUAL+CDM+LFC:3.0/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1453	CR+PC/LWAL+CDM+LFC:3.0/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1454	CR+PC/LWAL+CDM+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
1455	CR+CIP/LFINF+CDM+LFC:2.0/HBET:6-	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1456	CR+CIP/LFINF+CDN/HBET:6-	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
1457	CR+PC/LDUAL+CDM+LFC:6.5/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
1458	CR+PC/LDUAL+CDM+LFC:6.5/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
1459	CR+PC/LDUAL+CDM+LFC:6.5/H:2	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1460	CR+PC/LFM+CDM+LFC:6.5/H:1	CR_LFM-CDM-5_H1	CR_LFM-CDH-10_H1
1461	CR+CIP/LFINF+CDM+LFC:6.5/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1
1462	CR+CIP/LFINF+CDL+LFC:4.0/H:2	CR_LFINF-CDL-5_H2	CR_LFINF-CDH-10_H2
1463	CR+CIP/LFINF+CDL+LFC:4.0/H:1	CR_LFINF-CDL-5_H1	CR_LFINF-CDH-10_H1
1464	CR+PC/LFM+CDL+LFC:4.0/H:1	CR_LFM-CDL-5_H1	CR_LFM-CDH-10_H1
1465	CR+PC/LFM+CDM+LFC:5.0/HBET:6-	CR_LFM-CDM-5_H6	CR_LFM-CDH-10_H6
1466	CR+CIP/LFINF+CDH+LFC:8.0/HBET:6-	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
1467	CR+PC/LFM+CDL+LFC:0.0/HBET:6-	CR_LFM-CDL-0_H6	CR_LFM-CDH-5_H6
1468	CR+CIP/LFINF+CDL+LFC:0.0/HBET:6-	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1469	CR+PC/LDUAL+CDM+LFC:8.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
1470	CR+PC/LWAL+CDM+LFC:8.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1471	CR+PC/LDUAL+CDM+LFC:8.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
1472	CR+PC/LWAL+CDM+LFC:8.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1473	CR+CIP/LFINF+CDM+LFC:6.5/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1474	CR+PC/LFM+CDM+LFC:6.5/HBET:3-5	CR_LFM-CDM-5_H4	CR_LFM-CDH-5_H4
1475	CR+PC/LDUAL+CDM+LFC:6.5/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
1476	CR+PC/LDUAL+CDM+LFC:3.0/HBET:6-	CR_LDUAL-DUL_H6	CR_LDUAL-DUH_H6
1477	CR+PC/LFM+CDM+LFC:3.0/HBET:3-5	CR_LFM-CDM-5_H4	CR_LFM-CDH-5_H4
1478	CR+CIP/LFINF+CDM+LFC:3.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1479	CR+PC/LWAL+CDM+LFC:3.0/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
1480	CR+CIP/LFINF+CDL+LFC:4.0/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
1481	CR+CIP/LFINF+CDH+LFC:5.0/H:1	CR_LFINF-CDH-5_H1	CR_LFINF-CDH-10_H1
1482	CR+CIP/LFINF+CDH+LFC:5.0/H:2	CR_LFINF-CDH-5_H2	CR_LFINF-CDH-10_H2
1483	CR+PC/LFM+CDM+LFC:3.0/H:2	CR_LFM-CDM-5_H2	CR_LFM-CDH-10_H2
1484	CR+CIP/LFINF+CDH+LFC:5.0/HBET:3-5	CR_LFINF-CDH-5_H4	CR_LFINF-CDH-10_H4
1485	CR+CIP/LFINF+CDM+LFC:3.0/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
1486	CR+CIP/LFINF+CDH+LFC:5.0/HBET:6-	CR_LFINF-CDH-5_H6	CR_LFINF-CDH-10_H6
1487	CR+PC/LFM+CDM+LFC:3.0/HBET:6-	CR_LFM-CDM-5_H6	CR_LFM-CDH-10_H6
1488	MUR/LWAL+CDL/HBET:6-	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1489	CR+PC/LDUAL+CDM+LFC:10.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
1490	CR+PC/LDUAL+CDM+LFC:10.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
1491	CR+CIP/LFINF+CDM+LFC:6.5/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
1492	CR+CIP/LFINF+CDL+LFC:8.5/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4
1493	CR+CIP/LFINF+CDL+LFC:8.5/H:2	CR_LFINF-CDL-10_H2	CR_LFINF-CDH-15_H2
1494	CR+CIP/LFINF+CDH+LFC:22.0/H:2	CR_LFINF-CDH-20_H2	CR_LFINF-CDH-25_H2
1495	CR+CIP/LFINF+CDH+LFC:22.0/HBET:3-5	CR_LFINF-CDH-20_H4	CR_LFINF-CDH-25_H4
1496	CR+PC/LFM+CDM+LFC:10.0/HBET:3-5	CR_LFM-CDM-10_H4	CR_LFM-CDH-15_H4
1497	CR+PC/LFM+CDM+LFC:10.0/H:1	CR_LFM-CDM-10_H1	CR_LFM-CDH-15_H1
1498	CR+CIP/LFINF+CDM+LFC:10.0/H:1	CR_LFINF-CDM-10_H1	CR_LFINF-CDH-15_H1
1499	CR+PC/LDUAL+CDM+LFC:10.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
1500	CR+CIP/LFINF+CDH+LFC:22.0/H:1	CR_LFINF-CDH-20_H1	CR_LFINF-CDH-25_H1
1501	CR+CIP/LFINF+CDM+LFC:10.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
1502	CR+CIP/LFINF+CDL+LFC:8.5/H:1	CR_LFINF-CDL-10_H1	CR_LFINF-CDH-15_H1
1503	CR+PC/LFM+CDL+LFC:8.5/H:1	CR_LFM-CDL-10_H1	CR_LFM-CDH-15_H1
1504	CR+PC/LWAL+CDM+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
1505	CR+PC/LDUAL+CDM+LFC:13.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
1506	CR+PC/LWAL+CDM+LFC:13.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1507	CR+CIP/LFINF+CDM+LFC:10.0/H:2	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
1508	CR+PC/LFM+CDL+LFC:17.5/H:1	CR_LFM-CDL-15_H1	CR_LFM-CDH-20_H1
1509	CR+PC/LDUAL+CDM+LFC:13.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
1510	CR+CIP/LFINF+CDL+LFC:17.5/H:1	CR_LFINF-CDL-15_H1	CR_LFINF-CDH-20_H1

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1511	CR+CIP/LFINF+CDL+LFC:17.5/HBET:3-5	CR_LFINF-CDL-15_H4	CR_LFINF-CDH-20_H4
1512	CR+PC/LDUAL+CDM+LFC:13.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
1513	CR+CIP/LFINF+CDL+LFC:17.5/H:2	CR_LFINF-CDL-15_H2	CR_LFINF-CDH-20_H2
1514	CR+PC/LFM+CDM+LFC:13.0/HBET:3-5	CR_LFM-CDM-15_H4	CR_LFM-CDH-20_H4
1515	CR+PC/LFM+CDL+LFC:17.5/HBET:3-5	CR_LFM-CDL-15_H4	CR_LFM-CDH-20_H4
1516	CR+PC/LWAL+CDM+LFC:13.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1517	CR+CIP/LFINF+CDM+LFC:13.0/HBET:3-5	CR_LFINF-CDM-15_H4	CR_LFINF-CDH-20_H4
1518	CR+PC/LWAL+CDM+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
1519	CR+PC/LDUAL+CDM+LFC:13.0/H:2	CR_LDUAL-DUM_H2	CR_LDUAL-DUH_H2
1520	CR+CIP/LFINF+CDM+LFC:10.0/HBET:6-	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
1521	CR+PC/LDUAL+CDM+LFC:8.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
1522	CR+CIP/LFINF+CDM+LFC:13.0/H:1	CR_LFINF-CDM-15_H1	CR_LFINF-CDH-20_H1
1523	CR+PC/LFM+CDM+LFC:13.0/H:1	CR_LFM-CDM-15_H1	CR_LFM-CDH-20_H1
1524	CR+PC/LDUAL+CDM+LFC:10.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
1525	CR+CIP/LFINF+CDH+LFC:19.0/H:1	CR_LFINF-CDH-20_H1	CR_LFINF-CDH-25_H1
1526	CR+CIP/LFINF+CDH+LFC:19.0/H:2	CR_LFINF-CDH-20_H2	CR_LFINF-CDH-25_H2
1527	CR+CIP/LFINF+CDH+LFC:19.0/HBET:3-5	CR_LFINF-CDH-20_H4	CR_LFINF-CDH-25_H4
1528	CR+PC/LWAL+CDM+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
1529	CR+PC/LFM+CDL+LFC:8.5/HBET:3-5	CR_LFM-CDL-10_H4	CR_LFM-CDH-15_H4
1530	CR+CIP/LFINF+CDM+LFC:6.5/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
1531	CR+CIP/LFINF+CDH+LFC:19.0/HBET:6-	CR_LFINF-CDH-20_H6	CR_LFINF-CDH-25_H6
1532	CR+CIP/LFINF+CDM+LFC:8.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
1533	CR+PC/LFM+CDM+LFC:8.0/HBET:6-	CR_LFM-CDM-10_H6	CR_LFM-CDH-15_H6
1534	CR+PC/LFM+CDL+LFC:4.0/HBET:3-5	CR_LFM-CDL-5_H4	CR_LFM-CDH-10_H4
1535	CR+PC/LDUAL+CDM+LFC:8.0/HBET:6-	CR_LDUAL-DUM_H6	CR_LDUAL-DUH_H6
1536	CR+PC/LFM+CDL+LFC:4.0/HBET:6-	CR_LFM-CDL-5_H6	CR_LFM-CDH-10_H6
1537	CR+CIP/LFINF+CDL+LFC:4.0/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1538	CR+PC/LFM+CDM+LFC:8.0/HBET:3-5	CR_LFM-CDM-10_H4	CR_LFM-CDH-15_H4
1539	CR+PC/LFM+CDM+LFC:8.0/H:1	CR_LFM-CDM-10_H1	CR_LFM-CDH-15_H1
1540	CR+PC/LWAL+CDM+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
1541	CR+CIP/LFINF+CDM+LFC:8.0/H:1	CR_LFINF-CDM-10_H1	CR_LFINF-CDH-15_H1
1542	CR+PC/LFM+CDL+LFC:4.0/H:2	CR_LFM-CDL-5_H2	CR_LFM-CDH-10_H2
1543	CR+PC/LFM+CDL+LFC:8.5/H:2	CR_LFM-CDL-10_H2	CR_LFM-CDH-15_H2
1544	CR+CIP/LFINF+CDM+LFC:13.0/H:2	CR_LFINF-CDM-15_H2	CR_LFINF-CDH-20_H2
1545	CR+PC/LFM+CDM+LFC:13.0/H:2	CR_LFM-CDM-15_H2	CR_LFM-CDH-20_H2
1546	CR+PC/LFM+CDM+LFC:10.0/HBET:6-	CR_LFM-CDM-10_H6	CR_LFM-CDH-15_H6
1547	CR+CIP/LFINF+CDL+LFC:8.5/HBET:6-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1548	CR+PC/LFM+CDL+LFC:8.5/HBET:6-	CR_LFM-CDL-10_H6	CR_LFM-CDH-15_H6
1549	CR+PC/LFM+CDM+LFC:10.0/H:2	CR_LFM-CDM-10_H2	CR_LFM-CDH-15_H2
1550	CR+CIP/LFINF+CDH+LFC:16.0/H:2	CR_LFINF-CDH-15_H2	CR_LFINF-CDH-20_H2
1551	CR+CIP/LFINF+CDH+LFC:16.0/H:1	CR_LFINF-CDH-15_H1	CR_LFINF-CDH-20_H1
1552	CR+CIP/LFINF+CDH+LFC:16.0/HBET:3-5	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
1553	CR+CIP/LFINF+CDH+LFC:16.0/HBET:6-	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
1554	CR+PC/LFM+CDM+LFC:8.0/H:2	CR_LFM-CDM-10_H2	CR_LFM-CDH-15_H2
1555	CR+CIP/LFINF+CDM+LFC:8.0/H:2	CR_LFINF-CDM-10_H2	CR_LFINF-CDH-15_H2
1556	CR+CIP/LFINF+CDH+LFC:14.0/HBET:3-5	CR_LFINF-CDH-15_H4	CR_LFINF-CDH-20_H4
1557	CR+CIP/LFINF+CDH+LFC:14.0/H:2	CR_LFINF-CDH-15_H2	CR_LFINF-CDH-20_H2
1558	CR+CIP/LFINF+CDH+LFC:14.0/H:1	CR_LFINF-CDH-15_H1	CR_LFINF-CDH-20_H1
1559	CR+CIP/LFINF+CDM+LFC:4.0/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
1560	CR+CIP/LFINF+CDH+LFC:14.0/HBET:6-	CR_LFINF-CDH-15_H6	CR_LFINF-CDH-20_H6
1561	CR+CIP/LFINF+CDM+LFC:5.0/HBET:6-	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
1562	CR+PC/LFM+CDM+LFC:6.5/H:2	CR_LFM-CDM-5_H2	CR_LFM-CDH-10_H2
1563	CR+PC/LFM+CDM+LFC:6.5/HBET:6-	CR_LFM-CDM-5_H6	CR_LFM-CDH-10_H6
1564	CR+CIP/LFINF+CDH+LFC:11.0/H:1	CR_LFINF-CDH-10_H1	CR_LFINF-CDH-15_H1
1565	CR+CIP/LFINF+CDH+LFC:11.0/H:2	CR_LFINF-CDH-10_H2	CR_LFINF-CDH-15_H2
1566	CR+CIP/LFINF+CDH+LFC:11.0/HBET:3-5	CR_LFINF-CDH-10_H4	CR_LFINF-CDH-15_H4
1567	CR+CIP/LFINF+CDH+LFC:11.0/HBET:6-	CR_LFINF-CDH-10_H6	CR_LFINF-CDH-15_H6
1568	MUR+CL/LWAL+CDN/HBET:6-	MUR-CL99_LWAL-DNO_H5	MR_LWAL-DUM_H5
1569	MUR+STDRE/LWAL+CDN/HBET:3-5	MUR-STDRE_LWAL-DNO_H4	MR_LWAL-DUM_H4
1570	MUR+STRUB/LWAL+CDN/HBET:3-5	MUR-STRUB_LWAL-DNO_H4	MR_LWAL-DUM_H4
1571	CR/LFINF+CDL+LFC:7.0/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
1572	CR/LFINF+CDL+LFC:7.0/HBET:6-	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1573	CR/LFINF+CDL+LFC:10.0/HBET:6-	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1574	S+SR/LFM+CDH/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
1575	CR+PC/LFM+CDH/H:2	CR_LFM-CDH-0_H2	CR_LFM-CDH-5_H2
1576	CR/LFLS+CDL+LFC:4.0/HBET:3-5	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
1577	CR/LFLS+CDM+LFC:4.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1578	CR/LFLS+CDM+LFC:0.0/HBET:3-5	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
1579	CR/LFLS+CDL+LFC:0.0/HBET:3-5	CR_LFINF-CDL-0_H4	CR_LFINF-CDH-5_H4
1580	CR/LFLS+CDM+LFC:7.0/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1581	CR/LFLS+CDM+LFC:11.0/HBET:3-5	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
1582	CR/LFLS+CDL+LFC:8.0/HBET:3-5	CR_LFINF-CDL-10_H4	CR_LFINF-CDH-15_H4

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1583	CR/LFINF+CDN/H:2/SOS	CR_LFINF-CDN-0_H2	CR_LFINF-CDM-5_H2
1584	CR/LDUAL+CDN/H:2/SOS	CR_LDUAL-DUL_H2	CR_LDUAL-DUH_H2
1585	CR/LDUAL+CDN/HBET:3-5/SOS	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
1586	CR+PC/LFM+CDL/HBET:3-5	CR_LFM-CDL-0_H4	CR_LFM-CDH-5_H4
1587	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:4-6/SOS	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1588	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:7-/SOS	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1589	CR/LWAL+CDL+LFC:15.0/HBET:4-6/SOS	CR_LWAL-DUM_H5	CR_LWAL-DUH_H5
1590	CR/LFINF+CDL+LFC:15.0/HBET:7-/SOS	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1591	CR/LFINF+CDL+LFC:15.0/HBET:4-6/SOS	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1592	CR/LFINF(CL)+CDL+LFC:15.0/HBET:7-/SOS	CR_LFINF-CDL-15_H6	CR_LFINF-CDH-20_H6
1593	CR/LFINF(CL)+CDL+LFC:15.0/HBET:4-6/SOS	CR_LFINF-CDL-15_H5	CR_LFINF-CDH-20_H5
1594	CR/LFINF(CL)+CDL+LFC:0.0/HBET:7-/SOS	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1595	CR/LFINF(CL)+CDL+LFC:0.0/HBET:4-6/SOS	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1596	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:7-/SOS	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1597	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:4-6/SOS	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1598	CR/LWAL+CDL+LFC:0.0/HBET:4-6/SOS	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
1599	CR/LFINF+CDL+LFC:0.0/HBET:7-/SOS	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1600	CR/LFINF+CDL+LFC:0.0/HBET:4-6/SOS	CR_LFINF-CDL-0_H5	CR_LFINF-CDH-5_H5
1601	CR/LFINF(CL)+CDL+LFC:6.0/HBET:7-/SOS	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1602	CR/LFINF(CL)+CDL+LFC:6.0/HBET:4-6/SOS	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1603	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:7-/SOS	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1604	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:4-6/SOS	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1605	CR/LFINF+CDL+LFC:6.0/HBET:4-6/SOS	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1606	CR/LFINF+CDL+LFC:6.0/HBET:7-/SOS	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1607	CR/LWAL+CDL+LFC:6.0/HBET:4-6/SOS	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
1608	CR/LFINF(CL)+CDL+LFC:11.0/HBET:4-6/SOS	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1609	CR/LFINF(CL)+CDL+LFC:11.0/HBET:7-/SOS	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1610	CR/LWAL+CDL+LFC:11.0/HBET:4-6/SOS	CR_LWAL-DUL_H5	CR_LWAL-DUH_H5
1611	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:7-/SOS	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
1612	CR/LFINF+CDL+LFC:19.0/HBET:7-/SOS	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
1613	CR/LWAL+CDL+LFC:19.0/HBET:4-6/SOS	CR_LWAL-DUM_H5	CR_LWAL-DUH_H5
1614	CR/LFINF(CL)+CDL+LFC:19.0/HBET:4-6/SOS	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5
1615	CR/LFINF(CL)+CDL+LFC:19.0/HBET:7-/SOS	CR_LFINF-CDL-20_H6	CR_LFINF-CDH-25_H6
1616	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:4-6/SOS	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5
1617	CR/LFINF+CDL+LFC:19.0/HBET:4-6/SOS	CR_LFINF-CDL-20_H5	CR_LFINF-CDH-25_H5
1618	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:4-6/SOS	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1619	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:7-/SOS	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1620	CR/LFINF+CDL+LFC:11.0/HBET:4-6/SOS	CR_LFINF-CDL-10_H5	CR_LFINF-CDH-15_H5
1621	CR/LFINF+CDL+LFC:11.0/HBET:7-/SOS	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1622	CR+PC/LFM+CDN/HBET:3-5	CR_LFM-CDN-0_H4	CR_LFM-CDM-5_H4
1623	S+SR/LFM+CDH/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
1624	S+SR/LFM+CDN/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
1625	CR/LDUAL+CDL+LFC:0.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
1626	CR/LDUAL+CDH+LFC:18.0/HBET:3-5	CR_LDUAL-DUH_H4	CR_LDUAL-DUH_H4
1627	CR/LDUAL+CDH+LFC:18.0/H:1	CR_LDUAL-DUH_H1	CR_LDUAL-DUH_H1
1628	CR/LDUAL+CDH+LFC:13.0/HBET:3-5	CR_LDUAL-DUM_H4	CR_LDUAL-DUH_H4
1629	CR/LDUAL+CDH+LFC:13.0/H:1	CR_LDUAL-DUM_H1	CR_LDUAL-DUH_H1
1630	CR/LDUAL+CDL+LFC:11.0/H:1	CR_LDUAL-DUL_H1	CR_LDUAL-DUH_H1
1631	CR/LDUAL+CDL+LFC:11.0/HBET:3-5	CR_LDUAL-DUL_H4	CR_LDUAL-DUH_H4
1632	CR/LFINF+CDN/HBET:4-7	CR_LFINF-CDN-0_H5	CR_LFINF-CDM-5_H5
1633	SRC/LFM+CDM/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
1634	SRC/LFM+CDM/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
1635	SRC/LFM+CDH/HBET:6-	S_LFM-DUM_H6	S_LFM-DUH_H6
1636	SRC/LFM+CDH/H:2	S_LFM-DUM_H2	S_LFM-DUH_H2
1637	SRC/LFM+CDH/H:1	S_LFM-DUM_H1	S_LFM-DUH_H1
1638	CR/LFM+CDH+LFC:11.0/HBET:3-5	CR_LFM-CDH-10_H4	CR_LFM-CDH-15_H4
1639	CR/LFM+CDM+LFC:12.0/HBET:3-5	CR_LFM-CDM-10_H4	CR_LFM-CDH-15_H4
1640	CR/LFINF+CDM+LFC:16.5/H:1	CR_LFINF-CDM-15_H1	CR_LFINF-CDH-20_H1
1641	CR/LFINF+CDM+LFC:16.5/H:2	CR_LFINF-CDM-15_H2	CR_LFINF-CDH-20_H2
1642	CR/LFINF+CDM+LFC:16.5/HBET:3-5	CR_LFINF-CDM-15_H4	CR_LFINF-CDH-20_H4
1643	CR/LWAL+CDM+LFC:16.5/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1644	CR/LWAL+CDM+LFC:16.5/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1645	CR/LFM+CDM+LFC:16.5/HBET:3-5	CR_LFM-CDM-15_H4	CR_LFM-CDH-20_H4
1646	CR/LWAL+CDM+LFC:16.5/HBET:3-5	CR_LWAL-DUM_H4	CR_LWAL-DUH_H4
1647	CR/LWAL+CDM+LFC:16.5/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
1648	CR/LWAL+CDM+LFC:9.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1649	CR/LWAL+CDM+LFC:9.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
1650	CR/LWAL+CDH+LFC:6.0/H:2	CR_LWAL-DUM_H2	CR_LWAL-DUH_H2
1651	CR/LWAL+CDH+LFC:6.0/H:1	CR_LWAL-DUM_H1	CR_LWAL-DUH_H1
1652	CR/LFM+CDM+LFC:9.0/HBET:3-5	CR_LFM-CDM-10_H4	CR_LFM-CDH-15_H4
1653	CR/LFM+CDH+LFC:6.0/HBET:3-5	CR_LFM-CDH-5_H4	CR_LFM-CDH-10_H4
1654	CR/LFINF+CDM+LFC:4.5/H:1	CR_LFINF-CDM-5_H1	CR_LFINF-CDH-10_H1

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1655	CR/LWAL+CDM+LFC:4.5/H:2	CR_LWAL-DUL_H2	CR_LWAL-DUH_H2
1656	CR/LWAL+CDM+LFC:4.5/H:1	CR_LWAL-DUL_H1	CR_LWAL-DUH_H1
1657	CR/LWAL+CDM+LFC:4.5/HBET:6-	CR_LWAL-DUL_H6	CR_LWAL-DUH_H6
1658	CR/LWAL+CDM+LFC:4.5/HBET:3-5	CR_LWAL-DUL_H4	CR_LWAL-DUH_H4
1659	CR/LFM+CDM+LFC:4.5/HBET:3-5	CR_LFM-CDM-5_H4	CR_LFM-CDH-5_H4
1660	CR/LFINF+CDM+LFC:4.5/HBET:3-5	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1661	CR/LFINF+CDM+LFC:4.5/H:2	CR_LFINF-CDM-5_H2	CR_LFINF-CDH-10_H2
1662	CR/LWAL+CDH+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6	CR_LWAL-DUH_H6
1663	CR/LFM+CDH+LFC:15.0/HBET:3-5	CR_LFM-CDH-15_H4	CR_LFM-CDH-20_H4
1664	CR/LFINF+CDH+LFC:20.0/H:1	CR_LFINF-CDH-20_H1	CR_LFINF-CDH-25_H1
1665	CR/LFINF+CDH+LFC:20.0/H:2	CR_LFINF-CDH-20_H2	CR_LFINF-CDH-25_H2
1666	CR/LFINF+CDH+LFC:20.0/HBET:3-5	CR_LFINF-CDH-20_H4	CR_LFINF-CDH-25_H4
1667	CR/LFM+CDH+LFC:20.0/HBET:3-5	CR_LFM-CDH-20_H4	CR_LFM-CDH-25_H4
1668	CR/LWAL+CDH+LFC:25.0/HBET:3-5	CR_LWAL-DUH_H4	CR_LWAL-DUH_H4
1669	CR/LFINF+CDH+LFC:25.0/H:2	CR_LFINF-CDH-25_H2	CR_LFINF-CDH-30_H2
1670	CR/LFINF+CDH+LFC:25.0/HBET:3-5	CR_LFINF-CDH-25_H4	CR_LFINF-CDH-30_H4
1671	CR/LWAL+CDH+LFC:25.0/HBET:6-	CR_LWAL-DUH_H6	CR_LWAL-DUH_H6
1672	CR/LFINF+CDH+LFC:25.0/H:1	CR_LFINF-CDH-25_H1	CR_LFINF-CDH-30_H1
1673	CR/LFM+CDH+LFC:25.0/HBET:3-5	CR_LFM-CDH-25_H4	CR_LFM-CDH-30_H4
1674	CR/LWAL+CDH+LFC:25.0/H:1	CR_LWAL-DUH_H1	CR_LWAL-DUH_H1
1675	CR/LWAL+CDH+LFC:25.0/H:2	CR_LWAL-DUH_H2	CR_LWAL-DUH_H2
1676	MUR/LWAL+CDN/H:3/FC	MUR_LWAL-DNO_H3	MR_LWAL-DUM_H3
1677	MUR/LWAL+CDN/H:2/FC	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
1678	MUR/LWAL+CDN/H:1/FC	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
1679	MUR/LWAL+CDN/H:1/FW	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
1680	UNK/CDM/H:1	MR_LWAL-DUM_H1	MR_LWAL-DUH_H1
1681	MUR/LWAL+CDN/H:3/FW	MUR_LWAL-DNO_H3	MR_LWAL-DUM_H3
1682	MUR/LWAL+CDN/H:2/FW	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
1683	MUR/LWAL+CDN/H:6/FC	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1684	MUR/LWAL+CDN/H:4/FW	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4
1685	MUR/LWAL+CDN/H:5/FC	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1686	MUR/LWAL+CDN/H:4/FC	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4
1687	UNK/CDN/H:1	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
1688	CR/LFINF+CDM/H:4	CR_LFINF-CDM-0_H4	CR_LFINF-CDH-5_H4
1689	CR/LFINF+CDM/H:3	CR_LFINF-CDM-0_H3	CR_LFINF-CDH-5_H3
1690	UNK/CDL/H:1	MUR_LWAL-DNO_H1	MR_LWAL-DUM_H1
1691	CR/LFINF+CDL+LFC:5.0/HBET:7-20	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1692	CR/LFINF+CDL+LFC:5.0/H:3	CR_LFINF-CDL-5_H3	CR_LFINF-CDH-10_H3
1693	CR/LFINF+CDL+LFC:5.0/H:5	CR_LFINF-CDL-5_H5	CR_LFINF-CDH-10_H5
1694	CR/LFINF+CDN/HBET:7-20	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
1695	CR/LFINF+CDN/H:4	CR_LFINF-CDN-0_H4	CR_LFINF-CDM-5_H4
1696	CR/LFINF+CDL+LFC:5.0/H:4	CR_LFINF-CDL-5_H4	CR_LFINF-CDH-10_H4
1697	UNK/CDN/H:3	MUR_LWAL-DNO_H3	MR_LWAL-DUM_H3
1698	UNK/CDM/H:2	MR_LWAL-DUM_H2	MR_LWAL-DUH_H2
1699	UNK/CDL/H:3	MUR_LWAL-DNO_H3	MR_LWAL-DUM_H3
1700	UNK/CDL/H:2	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
1701	UNK/CDN/H:2	MUR_LWAL-DNO_H2	MR_LWAL-DUM_H2
1702	MUR/LWAL+CDN/H:5/FW	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1703	CR/LFINF+CDM/HBET:7-20	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1704	CR/LFINF+CDM/H:5	CR_LFINF-CDM-0_H5	CR_LFINF-CDH-5_H5
1705	CR/LFINF+CDM+LFC:12.0/HBET:7-20	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
1706	MUR/LWAL+CDN/HBET:7-20/FC	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1707	CR/LFINF+CDN/H:6	CR_LFINF-CDN-0_H6	CR_LFINF-CDM-5_H6
1708	CR/LFINF+CDM/H:6	CR_LFINF-CDM-0_H6	CR_LFINF-CDH-5_H6
1709	CR/LFINF+CDL+LFC:5.0/H:6	CR_LFINF-CDL-5_H6	CR_LFINF-CDH-10_H6
1710	UNK/CDM/H:3	MR_LWAL-DUM_H3	MR_LWAL-DUH_H3
1711	UNK/CDN/H:4	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4
1712	UNK/CDM/HBET:7-20	MR_LWAL-DUM_H5	MR_LWAL-DUH_H5
1713	UNK/CDL/H:4	MUR_LWAL-DNO_H4	MR_LWAL-DUM_H4
1714	UNK/CDN/H:5	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1715	UNK/CDL/HBET:7-20	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1716	CR/LFINF+CDM+LFC:16.5/H:3	CR_LFINF-CDM-15_H3	CR_LFINF-CDH-20_H3
1717	CR/LFINF+CDM+LFC:16.5/HBET:7-20	CR_LFINF-CDM-15_H6	CR_LFINF-CDH-20_H6
1718	CR/LFINF+CDM+LFC:16.5/H:6	CR_LFINF-CDM-15_H6	CR_LFINF-CDH-20_H6
1719	CR/LFINF+CDM+LFC:16.5/H:5	CR_LFINF-CDM-15_H5	CR_LFINF-CDH-20_H5
1720	CR/LFINF+CDM+LFC:16.5/H:4	CR_LFINF-CDM-15_H4	CR_LFINF-CDH-20_H4
1721	CR/LFINF+CDL+LFC:10.0/HBET:7-20	CR_LFINF-CDL-10_H6	CR_LFINF-CDH-15_H6
1722	UNK/CDM/H:6	MR_LWAL-DUM_H5	MR_LWAL-DUH_H5
1723	UNK/CDM/H:4	MR_LWAL-DUM_H4	MR_LWAL-DUH_H4
1724	UNK/CDN/H:6	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1725	UNK/CDN/HBET:7-20	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1726	UNK/CDM/H:5	MR_LWAL-DUM_H5	MR_LWAL-DUH_H5

No.	Building class	Vulnerability function	
		Existing buildings	Renovated buildings
1727	UNK/CDL/H:6	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1728	UNK/CDL/H:5	MUR_LWAL-DNO_H5	MR_LWAL-DUM_H5
1729	CR/LFINF+CDM+LFC:9.0/H:3	CR_LFINF-CDM-10_H3	CR_LFINF-CDH-15_H3
1730	CR/LFINF+CDM+LFC:9.0/H:4	CR_LFINF-CDM-10_H4	CR_LFINF-CDH-15_H4
1731	CR/LFINF+CDM+LFC:9.0/H:6	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
1732	CR/LFINF+CDM+LFC:9.0/H:5	CR_LFINF-CDM-10_H5	CR_LFINF-CDH-15_H5
1733	CR/LFINF+CDL+LFC:0.0/HBET:7-20	CR_LFINF-CDL-0_H6	CR_LFINF-CDH-5_H6
1734	CR/LFINF+CDM+LFC:9.0/HBET:7-20	CR_LFINF-CDM-10_H6	CR_LFINF-CDH-15_H6
1735	CR/LFINF+CDM+LFC:4.5/H:3	CR_LFINF-CDM-5_H3	CR_LFINF-CDH-10_H3
1736	CR/LFINF+CDM+LFC:4.5/H:5	CR_LFINF-CDM-5_H5	CR_LFINF-CDH-10_H5
1737	CR/LFINF+CDM+LFC:4.5/H:4	CR_LFINF-CDM-5_H4	CR_LFINF-CDH-10_H4
1738	CR/LFINF+CDM+LFC:4.5/H:6	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6
1739	CR/LFINF+CDM+LFC:4.5/HBET:7-20	CR_LFINF-CDM-5_H6	CR_LFINF-CDH-10_H6

([1]) Definitions according to Silva et al. (2022), https://github.com/gem/gem_taxonomy.

Table A. 2. Fragility functions for European building classes. ([1])

No	Fragility class	*IM*	θ_{DS1} (g)	θ_{DS2} (g)	θ_{DS3} (g)	θ_{DS4} (g)	β_{DS}
1	CR_LDUAL-DUH_H12	Sa(T=0.6)	1.672	2.220	2.793	3.329	0.410
2	CR_LDUAL-DUH_H8	Sa(T=0.6)	0.935	1.652	2.400	3.116	0.463
3	CR_LDUAL-DUH_H9	Sa(T=0.6)	1.140	1.812	2.512	3.179	0.440
4	CR_LFINF-CDH-20_H3	Sa(T=0.6)	0.746	1.710	2.662	3.555	0.441
5	CR_LFINF-CDH-20_H5	Sa(T=0.6)	1.012	2.234	3.450	4.591	0.460
6	CR_LFINF-CDH-25_H3	Sa(T=0.6)	0.819	1.950	3.112	4.226	0.462
7	CR_LFINF-CDH-25_H5	Sa(T=0.6)	1.039	2.340	3.642	4.871	0.413
8	CR_LFINF-CDH-30_H1	PGA	1.370	3.343	5.277	7.085	0.488
9	CR_LFINF-CDH-30_H2	Sa(T=0.3)	1.542	3.576	5.575	7.442	0.580
10	CR_LFINF-CDH-30_H4	Sa(T=0.6)	0.991	2.275	3.585	4.833	0.375
11	CR_LFINF-CDH-30_H6	Sa(T=0.6)	1.148	2.625	4.120	5.541	0.422
12	CR_LFM-CDH-10_H1	PGA	1.543	2.420	3.279	4.064	0.469
13	CR_LFM-CDH-10_H2	Sa(T=0.6)	0.972	1.574	2.176	2.735	0.446
14	CR_LFM-CDH-10_H6	Sa(T=1.0)	0.730	1.274	1.842	2.387	0.548
15	CR_LFM-CDH-15_H1	PGA	1.543	2.420	3.279	4.064	0.469
16	CR_LFM-CDH-15_H2	Sa(T=0.6)	0.961	1.573	2.183	2.748	0.449
17	CR_LFM-CDH-15_H6	Sa(T=1.0)	0.855	1.491	2.153	2.786	0.462
18	CR_LFM-CDH-20_H1	PGA	1.545	2.424	3.284	4.071	0.469
19	CR_LFM-CDH-20_H2	Sa(T=0.6)	0.963	1.643	2.324	2.958	0.445
20	CR_LFM-CDH-30_H4	Sa(T=0.6)	1.635	2.773	3.944	5.052	0.389
21	CR_LFM-CDH-5_H1	PGA	1.543	2.420	3.279	4.064	0.469
22	CR_LFM-CDH-5_H2	Sa(T=0.6)	0.977	1.582	2.187	2.751	0.445
23	CR_LFM-CDH-5_H5	Sa(T=1.0)	0.501	0.910	1.341	1.756	0.615
24	CR_LFM-CDH-5_H6	Sa(T=1.0)	0.554	1.012	1.496	1.965	0.670
25	MCF_LWAL-DUH_H1	PGA	1.130	1.603	1.935	2.188	0.346
26	MCF_LWAL-DUH_H2	PGA	0.647	1.181	1.586	1.913	0.430
27	MCF_LWAL-DUH_H3	PGA	0.509	1.024	1.451	1.813	0.531
28	MCF_LWAL-DUH_H4	Sa(T=0.6)	0.373	0.945	1.551	2.143	0.615
29	MCF_LWAL-DUH_H5	Sa(T=0.6)	0.443	1.004	1.592	2.162	0.564
30	MR_LWAL-DUH_H1	PGA	0.608	1.078	1.386	1.621	0.382
31	MR_LWAL-DUH_H2	PGA	0.435	0.914	1.288	1.598	0.501
32	MR_LWAL-DUH_H3	Sa(T=0.3)	0.641	1.658	2.612	3.483	0.610
33	MR_LWAL-DUH_H4	Sa(T=0.6)	0.299	0.833	1.379	1.901	0.568
34	MR_LWAL-DUH_H5	Sa(T=0.6)	0.366	0.907	1.464	2.000	0.516
35	S_LFBR-DUH_H1	PGA	0.682	2.032	3.419	4.754	0.513
36	S_LFBR-DUH_H2	Sa(T=0.3)	1.008	3.057	5.186	7.248	0.382
37	S_LFBR-DUH_H4	Sa(T=0.6)	0.551	1.570	2.646	3.696	0.410
38	S_LFBR-DUH_H6	Sa(T=0.6)	0.645	1.627	2.616	3.555	0.406
39	S_LFINF-DUH_H1	PGA	0.865	1.864	2.649	3.303	0.530
40	S_LFINF-DUH_H2	PGA	0.580	1.276	1.829	2.293	0.550
41	S_LFINF-DUH_H4	Sa(T=0.3)	0.973	2.433	3.755	4.941	0.609
42	S_LFINF-DUH_H6	Sa(T=0.6)	0.524	1.347	2.138	2.870	0.563
43	S_LFM-DUH_H1	PGA	0.533	1.567	2.597	3.572	0.509
44	S_LFM-DUH_H2	Sa(T=0.3)	0.900	2.863	4.927	6.937	0.547
45	S_LFM-DUH_H3	Sa(T=0.6)	0.494	1.492	2.536	3.551	0.427
46	S_LFM-DUH_H4	Sa(T=0.6)	0.549	1.527	2.523	3.474	0.367
47	S_LFM-DUH_H5	Sa(T=0.6)	0.611	1.618	2.629	3.587	0.429
48	S_LFM-DUH_H6	Sa(T=1.0)	0.337	0.943	1.585	2.212	0.376
49	S_LWAL-DUH_H1	PGA	0.600	1.974	3.257	4.433	0.519
50	S_LWAL-DUH_H2	PGA	0.406	1.394	2.311	3.151	0.509
51	S_LWAL-DUH_H4	Sa(T=0.3)	0.675	2.473	4.312	6.080	0.517
52	S_LWAL-DUH_H6	Sa(T=0.6)	0.356	1.327	2.370	3.398	0.493
53	W_LFM-DUH_H6	Sa(T=0.6)	2.089	2.591	3.135	3.644	0.323

([1]) Source: ESRM20 (Romão et al., 2021, available from EFEHR, http://risk.efehr.org)

Table A. 3. Damage-to-loss of life model. (1)

No	Vulneravility class	$P_{lethal|DS\ 4}$	*cf*	$P_{entrapment,\ day}$	$P_{entrapment,\ night}$	$P_{LL\ |entrapment}$
1	CR_LDUAL-DUH_H12	0.01	1	0.95	0.95	0.7
2	CR_LDUAL-DUH_H8	0.01	1	0.95	0.95	0.7
3	CR_LDUAL-DUH_H9	0.01	1	0.95	0.95	0.7
4	CR_LFINF-CDH-20_H3	0.01	1	0.75	0.95	0.4
5	CR_LFINF-CDH-20_H5	0.01	1	0.95	0.95	0.7
6	CR_LFINF-CDH-25_H3	0.01	1	0.75	0.95	0.4
7	CR_LFINF-CDH-25_H5	0.01	1	0.95	0.95	0.7
8	CR_LFINF-CDH-30_H1	0.01	1	0.25	0.95	0.4
9	CR_LFINF-CDH-30_H2	0.01	1	0.5	0.95	0.4
10	CR_LFINF-CDH-30_H4	0.01	1	0.75	0.95	0.4
11	CR_LFINF-CDH-30_H6	0.01	1	0.95	0.95	0.7
12	CR_LFM-CDH-10_H1	0.01	1	0.25	0.95	0.4
13	CR_LFM-CDH-10_H2	0.01	1	0.5	0.95	0.4
14	CR_LFM-CDH-10_H6	0.01	1	0.95	0.95	0.7
15	CR_LFM-CDH-15_H1	0.01	1	0.25	0.95	0.4
16	CR_LFM-CDH-15_H2	0.01	1	0.5	0.95	0.4
17	CR_LFM-CDH-15_H6	0.01	1	0.95	0.95	0.7
18	CR_LFM-CDH-20_H1	0.01	1	0.25	0.95	0.4
19	CR_LFM-CDH-20_H2	0.01	1	0.5	0.95	0.4
20	CR_LFM-CDH-30_H4	0.01	1	0.75	0.95	0.4
21	CR_LFM-CDH-5_H1	0.01	1	0.25	0.95	0.4
22	CR_LFM-CDH-5_H2	0.01	1	0.5	0.95	0.4
23	CR_LFM-CDH-5_H5	0.01	1	0.95	0.95	0.7
24	CR_LFM-CDH-5_H6	0.01	1	0.95	0.95	0.7
25	MCF_LWAL-DUH_H1	0.01	1	0.25	0.95	0.4
26	MCF_LWAL-DUH_H2	0.01	1	0.5	0.95	0.7
27	MCF_LWAL-DUH_H3	0.01	1	0.75	0.95	0.7
28	MCF_LWAL-DUH_H4	0.01	1	0.75	0.95	0.7
29	MCF_LWAL-DUH_H5	0.01	1	0.95	0.95	0.4
30	MR_LWAL-DUH_H1	0.01	1	0.25	0.95	0.4
31	MR_LWAL-DUH_H2	0.01	1	0.5	0.95	0.4
32	MR_LWAL-DUH_H3	0.01	1	0.75	0.95	0.4
33	MR_LWAL-DUH_H4	0.01	1	0.75	0.95	0.4
34	MR_LWAL-DUH_H5	0.01	1	0.95	0.95	0.7
35	S_LFBR-DUH_H1	0.01	0.5	0.25	0.95	0.4
36	S_LFBR-DUH_H2	0.01	0.5	0.5	0.95	0.4
37	S_LFBR-DUH_H4	0.01	0.5	0.75	0.95	0.4
38	S_LFBR-DUH_H6	0.01	0.5	0.95	0.95	0.7
39	S_LFINF-DUH_H1	0.01	0.5	0.25	0.95	0.4
40	S_LFINF-DUH_H2	0.01	0.5	0.5	0.95	0.4
41	S_LFINF-DUH_H4	0.01	0.5	0.75	0.95	0.4
42	S_LFINF-DUH_H6	0.01	0.5	0.95	0.95	0.7
43	S_LFM-DUH_H1	0.01	0.5	0.25	0.95	0.4
44	S_LFM-DUH_H2	0.01	0.5	0.5	0.95	0.4
45	S_LFM-DUH_H3	0.01	0.5	0.75	0.95	0.4
46	S_LFM-DUH_H4	0.01	0.5	0.75	0.95	0.4
47	S_LFM-DUH_H5	0.01	0.5	0.95	0.95	0.7
48	S_LFM-DUH_H6	0.01	0.5	0.95	0.95	0.7
49	S_LWAL-DUH_H1	0.01	0.5	0.25	0.95	0.4
50	S_LWAL-DUH_H2	0.01	0.5	0.5	0.95	0.4
51	S_LWAL-DUH_H4	0.01	0.5	0.75	0.95	0.4
52	S_LWAL-DUH_H6	0.01	0.5	0.95	0.95	0.7
53	W_LFM-DUH_H6	0.01	0.5	0.95	0.95	0.4

(1) Source: ESRM20 (Romão et al., 2021, available from EFEHR, http://risk.efehr.org)

Table A. 4. Target thermal transmittance values of external walls (U_w) and roofs (U_r) for renovated buildings

Country	Climatic zone	U_w (W/m²K)	U_r (W/m²K)	Reference
Austria	All	0.27	0.15	Stadler and Thoma (2020)
Belgium	All	0.24	0.24	Danlois et al. (2020); De Meulenaer and Triest (2016); Fourez et al. (2017)
Bulgaria	All	0.28	0.25	Kulevska and Markovski (2016)
Cyprus	All	0.4	0.4	Hadjinicolaou (2020)
Czech Republic	All	0.3	0.24	Svoboda (2016)
Germany	All	0.28	0.2	Schettler-Köhler et al. (2016)
Denmark	All	0.3	0.2	Thomsen et al. (2020)
Estonia	All	0.25	0.15	Kuusk et al. (2016)
Greece	A	0.6	0.5	Decision (2017/178581) Climatic zones were defined according to the same reference.
	B	0.5	0.45	
	C	0.45	0.4	
	D	0.4	0.35	
Spain	alpha	0.8	0.55	DBHE (2019) Climatic zones were defined according to DBHE (2013).
	A	0.7	0.5	
	B	0.56	0.44	
	C	0.49	0.4	
	D	0.41	0.35	
	E	0.37	0.33	
Finland	All	max (original value · 0.5; 0.17)	max (original value · 0.5; 0.09)	Haakana et al. (2020)
France	H1	0.35	0.22	Bordier et al. (2016) Climatic zones were defined according to Order (2008).
	H2	0.35	0.23	
	H3	0.45	0.25	
Croatia	Continental	0.3	0.25	Marđetko Škoro (2016) Climatic zones were defined according to Eurostat NUTS-2 statistical regions (Continental and Littoral zones).
	Littoral	0.45	0.3	
Hungary	All	0.45	0.25	Csoknyai at al. (2016)
Ireland	All	0.35	0.16	Hughes (2020)
Italy	A, B	0.38	0.34	Costanzo at al. (2016) Climatic zones were defined according to Decree (1993/412).
	C	0.32	0.34	
	D	0.28	0.24	
	E	0.24	0.22	
	F	0.22	0.2	

Country	Climatic zone	U_w [W/m²K]	U_r [W/m²K]	Reference
Lithuania	All	0.2	0.16	Order (2019/D1-23)
Luxembourg	All	0.17	0.17	Grand-Ducal Regulation (2016)
Latvia	All	0.23	0.2	Regulations (2019/280)
Malta	All	1.57	0.59	Technical Document F: Part 1 (2015)
Netherlands	All	0.22	0.17	Van Cruchten (2020)
Poland	All	0.2	0.15	Bekierski et al. (2016)
Portugal	I1	0.5	0.4	Fragoso and Baptista (2016) Climatic zones were defined according to Order (15793-F/2013).
	I2	0.4	0.35	
	I3	0.35	0.3	
Romania	All	0.56	0.2	Ministry of Regional Development and Public Administration of Romania (2019)
Sweden	All	0.18	0.13	Antonsson et al. (2016)
Slovenia	All	0.2	0.18	Šijanec Zavrl et al. (2016)
Slovakia	All	0.22	0.15	Sternova and Magyar (2016)

Annex B Impact metrics of renovation scenarios

Table B. 1. Scenario 1 – seismic retrofit: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, *t* = 35 years			C_{ren} / C_{rep} = 0.12, *t* = 50 years			C_{ren} / C_{rep} = 0.06, *t* = 100 years		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
1	Buzău	RO222	0.38	0.46	0.42	1.08	1.31	1.20	4.32	5.23	4.80
2	Bucureşti	RO321	0.29	0.58	0.25	0.83	1.66	0.72	3.31	6.62	2.90
3	Vrancea	RO226	0.41	0.36	0.33	1.17	1.02	0.95	4.68	4.08	3.80
4	Galați	RO224	0.26	0.30	0.21	0.75	0.86	0.60	3.01	3.46	2.40
5	Prahova	RO316	0.26	0.32	0.28	0.76	0.91	0.80	3.02	3.65	3.21
6	Braşov	RO122	0.12	0.41	0.39	0.35	1.16	1.11	1.40	4.65	4.45
7	Brăila	RO221	0.25	0.28	0.25	0.70	0.81	0.72	2.81	3.26	2.90
8	Bacău	RO211	0.21	0.27	0.25	0.59	0.76	0.71	2.37	3.05	2.84
9	Covasna	RO123	0.12	0.32	0.38	0.35	0.90	1.09	1.41	3.61	4.37
10	Napoli	ITF33	0.07	0.11	0.11	0.21	0.32	0.30	0.86	1.27	1.21
11	Vaslui	RO216	0.13	0.10	0.11	0.37	0.28	0.30	1.48	1.14	1.21
12	Ialomița	RO315	0.22	0.25	0.35	0.62	0.70	1.01	2.46	2.80	4.05
13	Catania	ITG17	0.13	0.21	0.17	0.38	0.59	0.48	1.52	2.35	1.91
14	Catanzaro	ITF63	0.22	0.24	0.17	0.63	0.69	0.50	2.50	2.78	1.98
15	Neamț	RO214	0.09	0.14	0.17	0.25	0.40	0.47	0.99	1.61	1.90
16	Reggio di Calabria	ITF65	0.23	0.23	0.20	0.66	0.65	0.57	2.63	2.61	2.30
17	Dâmbovița	RO313	0.14	0.15	0.25	0.39	0.43	0.71	1.58	1.73	2.84
18	Bologna	ITH55	0.18	0.20	0.17	0.51	0.58	0.48	2.04	2.32	1.90
19	Argeş	RO311	0.10	0.12	0.22	0.28	0.36	0.64	1.13	1.43	2.56
20	Cosenza	ITF61	0.18	0.20	0.18	0.51	0.57	0.53	2.04	2.27	2.11
21	Teleorman	RO317	0.07	0.13	0.14	0.20	0.37	0.39	0.79	1.49	1.58
22	Călăraşi	RO312	0.15	0.14	0.31	0.42	0.39	0.90	1.66	1.55	3.59
23	Achaia	EL632	0.25	0.41	0.23	0.71	1.18	0.66	2.84	4.71	2.62
24	Tulcea	RO225	0.07	0.09	0.13	0.21	0.27	0.36	0.83	1.07	1.46
25	Foggia	ITF46	0.11	0.17	0.14	0.32	0.47	0.40	1.28	1.89	1.61
26	Iaşi	RO213	0.05	0.06	0.05	0.14	0.19	0.13	0.56	0.74	0.53
27	Harghita	RO124	0.05	0.13	0.14	0.14	0.37	0.41	0.56	1.47	1.66
28	Giurgiu	RO314	0.12	0.12	0.21	0.33	0.35	0.60	1.32	1.41	2.41
29	Messina	ITG13	0.13	0.17	0.14	0.38	0.49	0.39	1.52	1.95	1.54
30	Vibo Valentia	ITF64	0.23	0.18	0.15	0.65	0.51	0.42	2.59	2.02	1.68
31	Benevento	ITF32	0.12	0.14	0.12	0.34	0.39	0.33	1.35	1.56	1.34
32	Milano	ITC4C	0.03	0.05	0.04	0.10	0.14	0.10	0.38	0.55	0.42
33	Siracusa	ITG19	0.11	0.15	0.12	0.32	0.42	0.35	1.30	1.70	1.42
34	Modena	ITH54	0.20	0.24	0.21	0.58	0.69	0.60	2.31	2.74	2.39
35	Constanța	RO223	0.04	0.09	0.09	0.12	0.24	0.25	0.46	0.98	0.98
36	Barletta-Andria-Trani	ITF48	0.07	0.06	0.05	0.20	0.18	0.13	0.79	0.72	0.53
37	Caserta	ITF31	0.07	0.10	0.09	0.21	0.27	0.26	0.83	1.09	1.05
38	Avellino	ITF34	0.11	0.11	0.09	0.32	0.33	0.25	1.26	1.31	0.99
39	Crotone	ITF62	0.14	0.17	0.13	0.40	0.47	0.36	1.61	1.89	1.45
40	Olt	RO414	0.05	0.09	0.12	0.14	0.25	0.35	0.55	0.99	1.40
41	Perugia	ITI21	0.20	0.21	0.16	0.56	0.60	0.47	2.24	2.40	1.86
42	Kentrikos Tomeas Athinon	EL303	0.02	0.14	0.07	0.07	0.40	0.21	0.27	1.60	0.84
43	Ileia	EL633	0.25	0.31	0.23	0.73	0.87	0.66	2.91	3.49	2.62
44	Roma	ITI43	0.05	0.08	0.06	0.15	0.24	0.17	0.61	0.97	0.70
45	L'Aquila	ITF11	0.21	0.20	0.17	0.60	0.58	0.49	2.40	2.32	1.95
46	Isernia	ITF21	0.14	0.16	0.14	0.41	0.45	0.40	1.65	1.80	1.61
47	Sibiu	RO126	0.02	0.11	0.09	0.07	0.30	0.26	0.27	1.21	1.05
48	Salerno	ITF35	0.05	0.06	0.05	0.14	0.18	0.15	0.55	0.74	0.58
49	Reggio nell'Emilia	ITH53	0.19	0.22	0.19	0.56	0.62	0.53	2.22	2.49	2.12
50	Palermo	ITG12	0.05	0.05	0.03	0.13	0.15	0.09	0.53	0.62	0.36

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
51	Notios Tomeas Athinon	EL304	0.05	0.26	0.14	0.14	0.74	0.39	0.57	2.95	1.57
52	Silistra	BG325	0.11	0.27	0.26	0.30	0.78	0.75	1.21	3.10	3.01
53	Zakynthos	EL621	0.23	0.38	0.24	0.66	1.10	0.68	2.62	4.39	2.71
54	Ragusa	ITG18	0.09	0.11	0.09	0.26	0.31	0.25	1.03	1.23	1.00
55	Fokida	EL645	0.32	0.20	0.18	0.92	0.58	0.51	3.70	2.32	2.04
56	Aitoloakarnania	EL631	0.20	0.22	0.17	0.56	0.63	0.49	2.26	2.53	1.94
57	Larisa	EL612	0.10	0.26	0.14	0.27	0.73	0.39	1.10	2.94	1.58
58	Caltanissetta	ITG15	0.07	0.08	0.06	0.20	0.22	0.18	0.79	0.89	0.70
59	Florina	EL533	0.10	0.07	0.06	0.27	0.20	0.17	1.10	0.80	0.68
60	Ruse	BG323	0.08	0.24	0.17	0.24	0.68	0.49	0.97	2.74	1.97
61	Lesvos, Limnos	EL411	0.28	0.16	0.14	0.79	0.44	0.40	3.17	1.78	1.58
62	Enna	ITG16	0.07	0.06	0.05	0.21	0.18	0.16	0.83	0.73	0.62
63	Torino	ITC11	0.03	0.04	0.03	0.10	0.12	0.09	0.38	0.47	0.36
64	Plovdiv	BG421	0.07	0.10	0.04	0.21	0.28	0.12	0.84	1.13	0.48
65	Ravenna	ITH57	0.20	0.24	0.20	0.58	0.68	0.58	2.31	2.73	2.33
66	Kastoria	EL532	0.08	0.06	0.05	0.22	0.18	0.14	0.88	0.72	0.56
67	Firenze	ITI14	0.10	0.10	0.08	0.29	0.28	0.22	1.17	1.13	0.87
68	Potenza	ITF51	0.11	0.11	0.09	0.31	0.31	0.26	1.22	1.24	1.05
69	Lefkada	EL624	0.38	0.30	0.22	1.08	0.86	0.64	4.33	3.46	2.56
70	Parma	ITH52	0.15	0.20	0.17	0.44	0.59	0.48	1.77	2.34	1.91
71	Lakonia, Messinia	EL653	0.25	0.26	0.22	0.70	0.74	0.62	2.81	2.96	2.47
72	Fthiotida	EL644	0.13	0.21	0.14	0.38	0.59	0.39	1.51	2.36	1.55
73	Pazardzhik	BG423	0.06	0.07	0.03	0.17	0.19	0.09	0.68	0.74	0.34
74	Ferrara	ITH56	0.18	0.25	0.22	0.52	0.71	0.63	2.10	2.83	2.51
75	Stara Zagora	BG344	0.05	0.06	0.04	0.13	0.18	0.12	0.53	0.70	0.48
76	Razgrad	BG324	0.08	0.23	0.21	0.21	0.66	0.59	0.86	2.62	2.38
77	Korinthia	EL652	0.25	0.28	0.19	0.72	0.81	0.53	2.87	3.24	2.14
78	Arta, Preveza	EL541	0.19	0.29	0.21	0.54	0.83	0.60	2.15	3.33	2.42
79	Pescara	ITF13	0.09	0.09	0.07	0.25	0.25	0.19	1.00	0.99	0.76
80	Ikaria, Samos	EL412	0.24	0.18	0.14	0.69	0.50	0.41	2.76	2.01	1.63
81	Lodi	ITC49	0.09	0.11	0.09	0.26	0.32	0.26	1.04	1.28	1.06
82	Thessaloniki	EL522	0.05	0.15	0.08	0.16	0.43	0.24	0.62	1.73	0.96
83	Agrigento	ITG14	0.05	0.05	0.04	0.13	0.14	0.12	0.54	0.55	0.47
84	Rodopi	EL513	0.05	0.07	0.08	0.13	0.20	0.23	0.54	0.79	0.91
85	Forlì-Cesena	ITH58	0.17	0.20	0.17	0.48	0.56	0.49	1.94	2.24	1.95
86	Ithaki, Kefallinia	EL623	0.17	0.34	0.25	0.48	0.96	0.71	1.92	3.86	2.84
87	Brescia	ITC47	0.08	0.11	0.09	0.24	0.31	0.26	0.97	1.24	1.04
88	Mantova	ITC4B	0.13	0.12	0.11	0.38	0.35	0.31	1.51	1.39	1.22
89	Ioannina	EL543	0.15	0.23	0.15	0.44	0.66	0.42	1.75	2.64	1.69
90	Treviso	ITH34	0.12	0.14	0.12	0.34	0.41	0.35	1.34	1.64	1.40
91	Grevena, Kozani	EL531	0.08	0.08	0.06	0.22	0.22	0.17	0.89	0.87	0.69
92	Cremona	ITC4A	0.11	0.13	0.10	0.31	0.37	0.28	1.26	1.47	1.13
93	Irakleio	EL431	0.16	0.31	0.18	0.47	0.89	0.52	1.88	3.57	2.08
94	Evros	EL511	0.07	0.09	0.10	0.19	0.27	0.30	0.77	1.08	1.18
95	Matera	ITF52	0.05	0.06	0.04	0.14	0.17	0.13	0.57	0.70	0.50
96	Haskovo	BG422	0.05	0.07	0.04	0.16	0.21	0.12	0.63	0.83	0.48
97	Kerkyra	EL622	0.19	0.18	0.15	0.55	0.53	0.42	2.22	2.11	1.68
98	Chios	EL413	0.21	0.14	0.09	0.59	0.39	0.27	2.36	1.56	1.06
99	Campobasso	ITF22	0.09	0.09	0.07	0.25	0.25	0.19	0.99	0.99	0.75
100	Vicenza	ITH32	0.10	0.11	0.10	0.27	0.33	0.27	1.09	1.31	1.09

Table B. 2. Scenario 1 – energy efficiency upgrading: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	**NUTS-3**		**C_{ren} / C_{rep} = 0.24, *t* = 35 years**			**C_{ren} / C_{rep} = 0.12, *t* = 50 years**			**C_{ren} / C_{rep} = 0.06, *t* = 100 years**		
	Name	**ID**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**
			CDN	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**
1	Buzău	RO222	0.63	0.61	0.50	1.81	1.75	1.42	7.25	7.02	5.66
2	Bucureşti	RO321	0.58	0.63	0.54	1.66	1.81	1.55	6.63	7.24	6.21
3	Vrancea	RO226	0.67	0.62	0.47	1.91	1.78	1.33	7.64	7.11	5.34
4	Galați	RO224	0.64	0.63	0.52	1.82	1.79	1.48	7.26	7.16	5.92
5	Prahova	RO316	0.65	0.63	0.50	1.86	1.81	1.44	7.45	7.22	5.75
6	Braşov	RO122	0.79	0.82	0.62	2.26	2.34	1.78	9.05	9.35	7.13
7	Brăila	RO221	0.59	0.57	0.51	1.67	1.64	1.47	6.70	6.56	5.88
8	Bacău	RO211	0.71	0.67	0.48	2.03	1.91	1.37	8.11	7.63	5.47
9	Covasna	RO123	0.89	0.88	0.62	2.54	2.51	1.76	10.15	10.04	7.04
10	Napoli	ITF33	0.23	0.17	0.11	0.64	0.50	0.32	2.57	1.99	1.29
11	Vaslui	RO216	0.90	0.82	0.65	2.57	2.34	1.86	10.28	9.35	7.43
12	Ialomița	RO315	0.55	0.53	0.42	1.57	1.50	1.20	6.26	6.01	4.79
13	Catania	ITG17	0.21	0.16	0.11	0.61	0.47	0.30	2.44	1.87	1.20
14	Catanzaro	ITF63	0.21	0.15	0.10	0.59	0.43	0.28	2.38	1.73	1.12
15	Neamț	RO214	0.78	0.76	0.52	2.22	2.18	1.49	8.86	8.72	5.97
16	Reggio di Calabria	ITF65	0.18	0.14	0.09	0.53	0.39	0.26	2.11	1.57	1.04
17	Dâmbovița	RO313	0.58	0.56	0.49	1.66	1.59	1.39	6.63	6.37	5.56
18	Bologna	ITH55	0.37	0.32	0.19	1.07	0.91	0.54	4.28	3.64	2.14
19	Argeş	RO311	0.65	0.63	0.48	1.86	1.80	1.36	7.43	7.20	5.43
20	Cosenza	ITF61	0.21	0.16	0.11	0.61	0.45	0.31	2.45	1.82	1.24
21	Teleorman	RO317	0.71	0.68	0.58	2.02	1.95	1.66	8.09	7.79	6.64
22	Călăraşi	RO312	0.52	0.49	0.40	1.50	1.39	1.13	5.99	5.57	4.53
23	Achaia	EL632	0.28	0.29	0.15	0.80	0.82	0.42	3.18	3.27	1.66
24	Tulcea	RO225	0.53	0.51	0.44	1.51	1.46	1.25	6.03	5.82	5.01
25	Foggia	ITF46	0.23	0.18	0.12	0.66	0.52	0.35	2.64	2.08	1.39
26	Iaşi	RO213	0.70	0.72	0.59	1.99	2.07	1.69	7.97	8.28	6.75
27	Harghita	RO124	0.97	0.96	0.65	2.76	2.74	1.86	11.04	10.97	7.45
28	Giurgiu	RO314	0.50	0.47	0.40	1.44	1.35	1.13	5.76	5.40	4.52
29	Messina	ITG13	0.19	0.15	0.10	0.55	0.42	0.28	2.21	1.70	1.13
30	Vibo Valentia	ITF64	0.16	0.12	0.08	0.46	0.34	0.22	1.86	1.37	0.89
31	Benevento	ITF32	0.21	0.19	0.12	0.59	0.53	0.35	2.35	2.11	1.40
32	Milano	ITC4C	0.36	0.31	0.19	1.03	0.88	0.56	4.12	3.53	2.23
33	Siracusa	ITG19	0.17	0.13	0.09	0.48	0.36	0.25	1.92	1.46	1.00
34	Modena	ITH54	0.37	0.31	0.18	1.07	0.88	0.53	4.27	3.50	2.10
35	Constanța	RO223	0.41	0.41	0.33	1.17	1.18	0.93	4.66	4.70	3.74
36	Barletta-Andria-Trani	ITF48	0.22	0.20	0.13	0.64	0.57	0.38	2.56	2.27	1.53
37	Caserta	ITF31	0.23	0.18	0.12	0.67	0.50	0.35	2.68	2.01	1.42
38	Avellino	ITF34	0.21	0.17	0.12	0.59	0.49	0.35	2.38	1.97	1.39
39	Crotone	ITF62	0.14	0.10	0.06	0.39	0.28	0.18	1.57	1.12	0.71
40	Olt	RO414	0.52	0.51	0.41	1.48	1.45	1.17	5.91	5.80	4.69
41	Perugia	ITI21	0.34	0.28	0.17	0.98	0.80	0.47	3.91	3.21	1.89
42	Kentrikos Tomeas Athinon	EL303	0.28	0.30	0.14	0.81	0.84	0.41	3.24	3.37	1.65
43	Ileia	EL633	0.20	0.17	0.10	0.57	0.48	0.27	2.29	1.93	1.10
44	Roma	ITI43	0.25	0.19	0.13	0.73	0.54	0.36	2.91	2.18	1.43
45	L'Aquila	ITF11	0.26	0.21	0.12	0.74	0.60	0.36	2.95	2.41	1.42
46	Isernia	ITF21	0.25	0.20	0.13	0.72	0.58	0.36	2.86	2.32	1.45
47	Sibiu	RO126	0.71	0.76	0.56	2.02	2.18	1.60	8.10	8.72	6.41
48	Salerno	ITF35	0.22	0.16	0.11	0.61	0.46	0.30	2.46	1.85	1.22
49	Reggio nell'Emilia	ITH53	0.39	0.31	0.19	1.11	0.89	0.54	4.44	3.54	2.17
50	Palermo	ITG12	0.21	0.16	0.10	0.59	0.45	0.28	2.36	1.78	1.12

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
51	Notios Tomeas Athinon	EL304	0.21	0.28	0.14	0.60	0.80	0.41	2.39	3.21	1.64
52	Silistra	BG325	0.33	0.30	0.17	0.95	0.85	0.50	3.78	3.39	1.99
53	Zakynthos	EL621	0.21	0.18	0.09	0.61	0.52	0.27	2.43	2.08	1.07
54	Ragusa	ITG18	0.13	0.10	0.07	0.38	0.29	0.19	1.52	1.17	0.77
55	Fokida	EL645	0.26	0.23	0.13	0.75	0.65	0.36	3.01	2.59	1.45
56	Aitoloakarnania	EL631	0.23	0.20	0.12	0.64	0.57	0.35	2.58	2.29	1.40
57	Larisa	EL612	0.36	0.34	0.18	1.02	0.98	0.51	4.07	3.91	2.03
58	Caltanissetta	ITG15	0.16	0.13	0.08	0.47	0.36	0.23	1.87	1.43	0.93
59	Florina	EL533	0.62	0.55	0.24	1.76	1.56	0.68	7.03	6.23	2.71
60	Ruse	BG323	0.30	0.28	0.16	0.84	0.79	0.45	3.37	3.17	1.80
61	Lesvos, Limnos	EL411	0.19	0.15	0.09	0.55	0.44	0.25	2.19	1.77	1.02
62	Enna	ITG16	0.19	0.15	0.10	0.56	0.44	0.28	2.23	1.74	1.11
63	Torino	ITC11	0.60	0.47	0.22	1.70	1.34	0.63	6.81	5.38	2.51
64	Plovdiv	BG421	0.29	0.27	0.14	0.83	0.78	0.39	3.34	3.11	1.56
65	Ravenna	ITH57	0.28	0.24	0.15	0.79	0.68	0.42	3.16	2.73	1.70
66	Kastoria	EL532	0.60	0.52	0.21	1.72	1.49	0.61	6.88	5.96	2.44
67	Firenze	ITI14	0.31	0.28	0.17	0.88	0.80	0.50	3.51	3.19	2.00
68	Potenza	ITF51	0.23	0.20	0.13	0.65	0.57	0.37	2.62	2.28	1.48
69	Lefkada	EL624	0.16	0.14	0.08	0.45	0.39	0.23	1.79	1.55	0.93
70	Parma	ITH52	0.37	0.30	0.17	1.07	0.87	0.47	4.28	3.49	1.89
71	Lakonia, Messinia	EL653	0.22	0.17	0.09	0.62	0.50	0.27	2.48	1.99	1.07
72	Fthiotida	EL644	0.30	0.27	0.15	0.87	0.77	0.44	3.48	3.07	1.75
73	Pazardzhik	BG423	0.38	0.33	0.18	1.08	0.93	0.50	4.30	3.74	2.01
74	Ferrara	ITH56	0.28	0.24	0.15	0.79	0.69	0.42	3.17	2.75	1.68
75	Stara Zagora	BG344	0.25	0.23	0.13	0.70	0.66	0.38	2.80	2.64	1.52
76	Razgrad	BG324	0.30	0.28	0.16	0.84	0.79	0.46	3.38	3.14	1.85
77	Korinthia	EL652	0.19	0.18	0.09	0.55	0.51	0.26	2.18	2.03	1.04
78	Arta, Preveza	EL541	0.26	0.23	0.13	0.76	0.65	0.37	3.02	2.58	1.47
79	Pescara	ITF13	0.28	0.21	0.15	0.79	0.61	0.42	3.15	2.46	1.67
80	Ikaria, Samos	EL412	0.17	0.13	0.07	0.48	0.38	0.20	1.94	1.52	0.79
81	Lodi	ITC49	0.36	0.29	0.19	1.03	0.83	0.55	4.11	3.33	2.18
82	Thessaloniki	EL522	0.40	0.39	0.19	1.15	1.11	0.55	4.59	4.45	2.20
83	Agrigento	ITG14	0.15	0.11	0.07	0.42	0.31	0.21	1.67	1.25	0.85
84	Rodopi	EL513	0.42	0.38	0.21	1.21	1.09	0.59	4.84	4.37	2.36
85	Forlì-Cesena	ITH58	0.33	0.28	0.17	0.95	0.80	0.49	3.81	3.21	1.98
86	Ithaki, Kefallinia	EL623	0.16	0.14	0.07	0.45	0.39	0.20	1.82	1.56	0.81
87	Brescia	ITC47	0.47	0.36	0.19	1.36	1.03	0.53	5.42	4.12	2.12
88	Mantova	ITC4B	0.35	0.29	0.18	0.99	0.82	0.50	3.96	3.27	2.01
89	Ioannina	EL543	0.41	0.31	0.15	1.18	0.89	0.43	4.70	3.56	1.71
90	Treviso	ITH34	0.31	0.25	0.16	0.89	0.72	0.46	3.57	2.89	1.83
91	Grevena, Kozani	EL531	0.49	0.43	0.20	1.41	1.22	0.58	5.62	4.87	2.32
92	Cremona	ITC4A	0.35	0.30	0.18	1.01	0.86	0.51	4.06	3.43	2.05
93	Irakleio	EL431	0.20	0.15	0.08	0.56	0.43	0.23	2.23	1.71	0.90
94	Evros	EL511	0.33	0.29	0.15	0.95	0.84	0.44	3.80	3.37	1.76
95	Matera	ITF52	0.25	0.20	0.13	0.72	0.56	0.37	2.88	2.24	1.49
96	Haskovo	BG422	0.21	0.21	0.13	0.61	0.61	0.36	2.42	2.44	1.44
97	Kerkyra	EL622	0.15	0.12	0.07	0.42	0.34	0.19	1.69	1.36	0.76
98	Chios	EL413	0.18	0.15	0.09	0.51	0.44	0.25	2.03	1.75	0.98
99	Campobasso	ITF22	0.20	0.17	0.11	0.56	0.48	0.31	2.24	1.92	1.24
100	Vicenza	ITH32	0.41	0.31	0.17	1.18	0.89	0.49	4.73	3.57	1.95

Table B. 3. Scenario 1 – integrated renovation: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**
1	Buzău	RO222	0.69	0.73	0.62	1.98	2.07	1.76	7.93	8.30	7.04
2	București	RO321	0.60	0.81	0.55	1.72	2.32	1.58	6.87	9.29	6.32
3	Vrancea	RO226	0.74	0.67	0.54	2.11	1.92	1.55	8.43	7.69	6.21
4	Galați	RO224	0.63	0.64	0.51	1.79	1.84	1.45	7.16	7.35	5.81
5	Prahova	RO316	0.64	0.66	0.54	1.83	1.88	1.54	7.31	7.51	6.16
6	Brașov	RO122	0.66	0.85	0.69	1.88	2.42	1.98	7.53	9.69	7.92
7	Brăila	RO221	0.58	0.59	0.53	1.66	1.70	1.52	6.62	6.79	6.07
8	Bacău	RO211	0.65	0.65	0.50	1.85	1.86	1.43	7.41	7.46	5.74
9	Covasna	RO123	0.73	0.84	0.68	2.09	2.39	1.95	8.36	9.58	7.80
10	Napoli	ITF33	0.21	0.20	0.15	0.60	0.56	0.42	2.41	2.23	1.68
11	Vaslui	RO216	0.74	0.66	0.54	2.12	1.90	1.55	8.49	7.60	6.22
12	Ialomița	RO315	0.53	0.53	0.52	1.52	1.53	1.49	6.10	6.11	5.95
13	Catania	ITG17	0.24	0.24	0.18	0.68	0.70	0.51	2.71	2.78	2.02
14	Catanzaro	ITF63	0.28	0.26	0.18	0.81	0.73	0.50	3.24	2.92	2.00
15	Neamț	RO214	0.63	0.65	0.49	1.79	1.85	1.39	7.15	7.41	5.55
16	Reggio di Calabria	ITF65	0.27	0.24	0.19	0.78	0.68	0.53	3.12	2.71	2.13
17	Dâmbovița	RO313	0.51	0.50	0.51	1.46	1.43	1.45	5.84	5.74	5.80
18	Bologna	ITH55	0.38	0.36	0.24	1.09	1.02	0.68	4.38	4.07	2.71
19	Argeș	RO311	0.54	0.54	0.48	1.54	1.55	1.38	6.17	6.18	5.54
20	Cosenza	ITF61	0.26	0.24	0.19	0.76	0.67	0.54	3.03	2.69	2.16
21	Teleorman	RO317	0.57	0.58	0.51	1.61	1.66	1.46	6.46	6.65	5.85
22	Călărași	RO312	0.47	0.44	0.48	1.36	1.26	1.37	5.42	5.04	5.48
23	Achaia	EL632	0.35	0.46	0.24	1.01	1.30	0.70	4.04	5.21	2.78
24	Tulcea	RO225	0.43	0.43	0.40	1.24	1.24	1.14	4.96	4.95	4.58
25	Foggia	ITF46	0.24	0.23	0.17	0.68	0.66	0.50	2.72	2.66	1.98
26	Iași	RO213	0.55	0.58	0.47	1.56	1.64	1.33	6.23	6.57	5.31
27	Harghita	RO124	0.74	0.79	0.57	2.13	2.25	1.63	8.51	8.99	6.50
28	Giurgiu	RO314	0.44	0.42	0.42	1.26	1.21	1.19	5.05	4.84	4.78
29	Messina	ITG13	0.22	0.21	0.15	0.63	0.60	0.44	2.54	2.41	1.75
30	Vibo Valentia	ITF64	0.25	0.19	0.14	0.73	0.55	0.41	2.91	2.22	1.65
31	Benevento	ITF32	0.22	0.22	0.16	0.64	0.62	0.46	2.54	2.49	1.83
32	Milano	ITC4C	0.29	0.26	0.17	0.82	0.74	0.47	3.28	2.95	1.90
33	Siracusa	ITG19	0.19	0.18	0.14	0.55	0.52	0.39	2.19	2.09	1.58
34	Modena	ITH54	0.40	0.37	0.26	1.13	1.05	0.74	4.53	4.22	2.97
35	Constanța	RO223	0.33	0.36	0.29	0.93	1.02	0.84	3.73	4.06	3.35
36	Barletta-Andria-Trani	ITF48	0.21	0.18	0.13	0.59	0.53	0.36	2.36	2.11	1.45
37	Caserta	ITF31	0.22	0.19	0.15	0.62	0.53	0.42	2.47	2.13	1.67
38	Avellino	ITF34	0.22	0.20	0.14	0.63	0.56	0.40	2.51	2.23	1.61
39	Crotone	ITF62	0.19	0.17	0.12	0.53	0.49	0.35	2.11	1.95	1.39
40	Olt	RO414	0.41	0.43	0.38	1.17	1.22	1.08	4.70	4.89	4.31
41	Perugia	ITI21	0.37	0.33	0.22	1.06	0.95	0.63	4.22	3.80	2.50
42	Kentrikos Tomeas Athinon	EL303	0.22	0.30	0.15	0.64	0.86	0.43	2.56	3.45	1.72
43	Ileia	EL633	0.30	0.31	0.21	0.85	0.88	0.59	3.42	3.50	2.37
44	Roma	ITI43	0.22	0.19	0.13	0.63	0.55	0.37	2.52	2.19	1.47
45	L'Aquila	ITF11	0.32	0.28	0.19	0.90	0.79	0.55	3.61	3.16	2.21
46	Isernia	ITF21	0.27	0.24	0.18	0.78	0.70	0.51	3.10	2.79	2.03
47	Sibiu	RO126	0.54	0.63	0.47	1.54	1.79	1.34	6.16	7.18	5.37
48	Salerno	ITF35	0.19	0.16	0.11	0.54	0.45	0.31	2.15	1.81	1.25
49	Reggio nell'Emilia	ITH53	0.40	0.36	0.25	1.15	1.02	0.72	4.60	4.10	2.86
50	Palermo	ITG12	0.18	0.15	0.09	0.52	0.42	0.26	2.06	1.69	1.04

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
51	Notios Tomeas Athinon	EL304	0.18	0.36	0.19	0.53	1.03	0.54	2.11	4.13	2.14
52	Silistra	BG325	0.31	0.38	0.28	0.88	1.09	0.81	3.52	4.35	3.26
53	Zakynthos	EL621	0.29	0.36	0.21	0.84	1.04	0.60	3.35	4.14	2.40
54	Ragusa	ITG18	0.15	0.14	0.10	0.43	0.40	0.29	1.74	1.60	1.16
55	Fokida	EL645	0.39	0.29	0.20	1.11	0.82	0.57	4.42	3.29	2.29
56	Aitoloakarnania	EL631	0.28	0.28	0.19	0.81	0.80	0.55	3.25	3.20	2.19
57	Larisa	EL612	0.32	0.41	0.21	0.92	1.16	0.61	3.66	4.64	2.44
58	Caltanissetta	ITG15	0.16	0.14	0.10	0.46	0.40	0.28	1.85	1.59	1.10
59	Florina	EL533	0.51	0.45	0.21	1.46	1.27	0.60	5.86	5.09	2.41
60	Ruse	BG323	0.27	0.35	0.22	0.77	0.99	0.63	3.07	3.97	2.50
61	Lesvos, Limnos	EL411	0.31	0.21	0.15	0.87	0.59	0.42	3.50	2.36	1.69
62	Enna	ITG16	0.19	0.15	0.10	0.54	0.43	0.30	2.14	1.72	1.19
63	Torino	ITC11	0.46	0.37	0.18	1.32	1.07	0.52	5.27	4.26	2.07
64	Plovdiv	BG421	0.26	0.26	0.13	0.74	0.74	0.36	2.97	2.97	1.44
65	Ravenna	ITH57	0.32	0.32	0.23	0.93	0.91	0.66	3.71	3.64	2.64
66	Kastoria	EL532	0.49	0.42	0.19	1.40	1.21	0.53	5.62	4.84	2.14
67	Firenze	ITI14	0.29	0.27	0.17	0.82	0.76	0.50	3.30	3.03	2.00
68	Potenza	ITF51	0.23	0.21	0.15	0.67	0.61	0.43	2.67	2.43	1.72
69	Lefkada	EL624	0.34	0.28	0.19	0.97	0.80	0.55	3.89	3.20	2.21
70	Parma	ITH52	0.37	0.35	0.22	1.05	0.99	0.63	4.22	3.97	2.53
71	Lakonia, Messinia	EL653	0.31	0.28	0.20	0.88	0.81	0.56	3.50	3.23	2.26
72	Fthiotida	EL644	0.30	0.32	0.19	0.87	0.92	0.55	3.47	3.68	2.21
73	Pazardzhik	BG423	0.31	0.28	0.15	0.90	0.80	0.42	3.59	3.21	1.69
74	Ferrara	ITH56	0.31	0.32	0.24	0.90	0.93	0.68	3.59	3.71	2.73
75	Stara Zagora	BG344	0.21	0.21	0.12	0.60	0.59	0.35	2.39	2.37	1.41
76	Razgrad	BG324	0.26	0.34	0.24	0.75	0.97	0.70	3.01	3.88	2.78
77	Korinthia	EL652	0.29	0.30	0.18	0.83	0.86	0.51	3.32	3.42	2.04
78	Arta, Preveza	EL541	0.31	0.34	0.22	0.88	0.97	0.63	3.51	3.89	2.52
79	Pescara	ITF13	0.26	0.21	0.15	0.73	0.60	0.42	2.93	2.41	1.68
80	Ikaria, Samos	EL412	0.27	0.20	0.14	0.77	0.58	0.39	3.07	2.32	1.55
81	Lodi	ITC49	0.32	0.28	0.20	0.91	0.81	0.56	3.66	3.22	2.24
82	Thessaloniki	EL522	0.33	0.38	0.19	0.94	1.08	0.55	3.77	4.32	2.20
83	Agrigento	ITG14	0.14	0.11	0.08	0.39	0.31	0.23	1.56	1.25	0.91
84	Rodopi	EL513	0.34	0.32	0.20	0.98	0.93	0.57	3.91	3.71	2.29
85	Forlì-Cesena	ITH58	0.35	0.32	0.23	0.99	0.93	0.65	3.97	3.71	2.62
86	Ithaki, Kefallinia	EL623	0.22	0.30	0.20	0.62	0.86	0.57	2.48	3.44	2.28
87	Brescia	ITC47	0.40	0.33	0.19	1.15	0.95	0.55	4.59	3.79	2.19
88	Mantova	ITC4B	0.34	0.28	0.19	0.96	0.81	0.55	3.83	3.24	2.21
89	Ioannina	EL543	0.40	0.37	0.20	1.13	1.05	0.57	4.52	4.20	2.27
90	Treviso	ITH34	0.30	0.27	0.19	0.86	0.78	0.55	3.44	3.12	2.18
91	Grevena, Kozani	EL531	0.41	0.36	0.19	1.17	1.03	0.53	4.69	4.12	2.13
92	Cremona	ITC4A	0.33	0.30	0.19	0.94	0.85	0.55	3.75	3.41	2.19
93	Irakleio	EL431	0.24	0.30	0.17	0.69	0.85	0.48	2.77	3.38	1.90
94	Evros	EL511	0.29	0.27	0.18	0.82	0.78	0.50	3.27	3.14	2.00
95	Matera	ITF52	0.22	0.18	0.12	0.62	0.52	0.35	2.47	2.07	1.40
96	Haskovo	BG422	0.19	0.20	0.12	0.54	0.57	0.34	2.16	2.30	1.35
97	Kerkyra	EL622	0.22	0.20	0.14	0.64	0.56	0.39	2.57	2.25	1.55
98	Chios	EL413	0.25	0.19	0.12	0.73	0.56	0.34	2.91	2.22	1.36
99	Campobasso	ITF22	0.20	0.18	0.12	0.56	0.50	0.34	2.25	2.00	1.37
100	Vicenza	ITH32	0.36	0.30	0.18	1.04	0.86	0.52	4.15	3.42	2.09

Table B. 4. Scenario 1 – seismic retrofit: benefit in terms of average annual economic loss (Δ*AAEL*), average annual loss of life (Δ*AALL*), average annual energy consumption (Δ*AAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.12 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Δ*AAEL* (10^6 €)			Δ*AALL* (fatalities)			Δ*AAEC* (GWh)		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
1	Buzău	RO222	7.01	5.87	3.05	1.8	1.6	0.4	–	–	–
2	Bucureşti	RO321	18.02	34.08	11.26	18.4	13.2	1.6	–	–	–
3	Vrancea	RO226	5.17	3.68	1.95	1.3	0.9	0.2	–	–	–
4	Galați	RO224	4.29	2.87	1.17	1.4	1.3	0.3	–	–	–
5	Prahova	RO316	5.57	10.35	3.11	1.8	2.8	0.4	–	–	–
6	Braşov	RO122	1.91	6.57	3.56	1.2	2.1	0.6	–	–	–
7	Brăila	RO221	2.72	1.63	0.80	0.8	0.6	0.2	–	–	–
8	Bacău	RO211	3.92	4.97	2.21	1.2	1.7	0.3	–	–	–
9	Covasna	RO123	0.65	2.54	0.89	0.2	0.7	0.1	–	–	–
10	Napoli	ITF33	32.99	66.15	2.36	2.6	4.7	0.1	–	–	–
11	Vaslui	RO216	1.80	0.58	0.18	0.6	0.2	0.0	–	–	–
12	Ialomița	RO315	2.47	1.45	0.85	0.6	0.4	0.1	–	–	–
13	Catania	ITG17	19.14	59.04	4.26	1.0	3.1	0.1	–	–	–
14	Catanzaro	ITF63	9.76	24.75	1.29	0.5	1.2	0.0	–	–	–
15	Neamț	RO214	1.88	1.35	0.93	0.4	0.4	0.1	–	–	–
16	Reggio di Calabria	ITF65	16.04	35.47	1.78	0.9	1.8	0.0	–	–	–
17	Dâmbovița	RO313	1.52	4.29	0.84	0.4	1.0	0.1	–	–	–
18	Bologna	ITH55	46.25	37.01	4.20	2.2	1.7	0.1	–	–	–
19	Argeş	RO311	1.31	3.40	2.04	0.4	0.9	0.3	–	–	–
20	Cosenza	ITF61	25.29	30.46	3.74	1.3	1.4	0.1	–	–	–
21	Teleorman	RO317	1.17	0.56	0.25	0.3	0.2	0.1	–	–	–
22	Călăraşi	RO312	1.86	0.91	0.65	0.5	0.3	0.1	–	–	–
23	Achaia	EL632	2.82	15.70	3.04	0.2	1.6	0.1	–	–	–
24	Tulcea	RO225	0.76	0.33	0.21	0.1	0.1	0.0	–	–	–
25	Foggia	ITF46	11.08	20.90	2.18	0.6	1.1	0.1	–	–	–
26	Iaşi	RO213	1.50	1.16	0.29	0.3	0.4	0.0	–	–	–
27	Harghita	RO124	0.72	0.80	0.59	0.2	0.2	0.1	–	–	–
28	Giurgiu	RO314	1.41	0.95	0.45	0.3	0.2	0.1	–	–	–
29	Messina	ITG13	12.35	28.18	1.83	0.6	1.4	0.0	–	–	–
30	Vibo Valentia	ITF64	5.41	6.52	0.61	0.3	0.3	0.0	–	–	–
31	Benevento	ITF32	9.59	4.94	0.55	0.5	0.2	0.0	–	–	–
32	Milano	ITC4C	15.49	47.00	3.53	0.5	1.9	0.1	–	–	–
33	Siracusa	ITG19	8.11	14.22	1.26	0.4	0.6	0.0	–	–	–
34	Modena	ITH54	47.56	18.75	2.57	2.4	0.9	0.1	–	–	–
35	Constanța	RO223	0.92	1.58	1.16	0.2	0.4	0.1	–	–	–
36	Barletta-Andria-Trani	ITF48	2.54	6.27	0.56	0.1	0.3	0.0	–	–	–
37	Caserta	ITF31	14.42	12.36	2.03	0.7	0.6	0.1	–	–	–
38	Avellino	ITF34	9.47	9.86	0.85	0.5	0.5	0.0	–	–	–
39	Crotone	ITF62	1.96	8.82	0.51	0.1	0.4	0.0	–	–	–
40	Olt	RO414	0.75	1.27	0.52	0.2	0.2	0.1	–	–	–
41	Perugia	ITI21	38.15	18.51	3.41	2.1	0.9	0.1	–	–	–
42	Kentrikos Tomeas Athinon	EL303	1.02	34.09	2.93	0.2	2.6	0.1	–	–	–
43	Ileia	EL633	2.02	4.96	1.38	0.2	0.4	0.1	–	–	–
44	Roma	ITI43	37.85	110.79	6.28	1.7	4.6	0.1	–	–	–
45	L'Aquila	ITF11	11.90	12.73	1.34	0.7	0.7	0.0	–	–	–
46	Isernia	ITF21	3.55	2.13	0.28	0.2	0.1	0.0	–	–	–
47	Sibiu	RO126	0.56	0.51	0.37	0.2	0.1	0.0	–	–	–
48	Salerno	ITF35	8.84	14.79	1.03	0.4	0.7	0.0	–	–	–
49	Reggio nell'Emilia	ITH53	32.73	12.49	2.46	1.6	0.6	0.1	–	–	–
50	Palermo	ITG12	7.11	20.01	0.53	0.3	0.9	0.0	–	–	–

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
51	Notios Tomeas Athinon	EL304	0.32	22.49	4.85	0.1	1.8	0.2	–	–	–
52	Silistra	BG325	0.91	1.34	0.38	0.1	0.2	0.0	–	–	–
53	Zakynthos	EL621	0.65	1.34	0.49	0.1	0.1	0.0	–	–	–
54	Ragusa	ITG18	5.60	7.33	0.78	0.2	0.3	0.0	–	–	–
55	Fokida	EL645	1.29	0.89	0.21	0.1	0.1	0.0	–	–	–
56	Aitoloakarnania	EL631	2.41	5.20	0.99	0.2	0.5	0.0	–	–	–
57	Larisa	EL612	1.03	8.75	1.60	0.1	0.8	0.1	–	–	–
58	Caltanissetta	ITG15	3.94	4.09	0.28	0.2	0.2	0.0	–	–	–
59	Florina	EL533	0.27	0.26	0.06	0.0	0.0	0.0	–	–	–
60	Ruse	BG323	1.46	2.41	0.78	0.1	0.3	0.0	–	–	–
61	Lesvos, Limnos	EL411	3.32	1.73	0.28	0.2	0.1	0.0	–	–	–
62	Enna	ITG16	3.27	1.45	0.17	0.1	0.1	0.0	–	–	–
63	Torino	ITC11	12.37	24.30	2.05	0.6	1.3	0.1	–	–	–
64	Plovdiv	BG421	1.93	3.63	0.56	0.3	1.0	0.1	–	–	–
65	Ravenna	ITH57	26.25	13.74	2.23	1.1	0.6	0.1	–	–	–
66	Kastoria	EL532	0.17	0.33	0.06	0.0	0.0	0.0	–	–	–
67	Firenze	ITI14	24.78	17.73	1.26	1.1	0.8	0.0	–	–	–
68	Potenza	ITF51	8.33	6.86	0.74	0.5	0.4	0.0	–	–	–
69	Lefkada	EL624	0.76	0.85	0.27	0.0	0.0	0.0	–	–	–
70	Parma	ITH52	19.68	15.25	2.08	0.9	0.7	0.0	–	–	–
71	Lakonia, Messinia	EL653	5.23	7.13	1.96	0.3	0.6	0.1	–	–	–
72	Fthiotida	EL644	1.01	4.11	0.79	0.1	0.3	0.0	–	–	–
73	Pazardzhik	BG423	0.87	1.53	0.18	0.1	0.2	0.0	–	–	–
74	Ferrara	ITH56	24.53	10.14	1.39	1.2	0.5	0.0	–	–	–
75	Stara Zagora	BG344	0.90	0.78	0.22	0.2	0.1	0.0	–	–	–
76	Razgrad	BG324	0.81	1.04	0.32	0.1	0.1	0.0	–	–	–
77	Korinthia	EL652	1.82	5.60	1.11	0.1	0.4	0.0	–	–	–
78	Arta, Preveza	EL541	1.18	3.85	0.89	0.1	0.3	0.0	–	–	–
79	Pescara	ITF13	5.09	5.83	1.09	0.2	0.2	0.0	–	–	–
80	Ikaria, Samos	EL412	1.09	0.97	0.27	0.1	0.1	0.0	–	–	–
81	Lodi	ITC49	4.70	4.24	0.68	0.3	0.2	0.0	–	–	–
82	Thessaloniki	EL522	1.35	21.65	5.12	0.2	1.9	0.3	–	–	–
83	Agrigento	ITG14	4.34	4.44	0.34	0.3	0.2	0.0	–	–	–
84	Rodopi	EL513	0.37	0.55	0.11	0.0	0.1	0.0	–	–	–
85	Forlì-Cesena	ITH58	16.17	13.82	2.34	0.8	0.6	0.1	–	–	–
86	Ithaki, Kefallinia	EL623	0.78	1.08	0.43	0.1	0.1	0.0	–	–	–
87	Brescia	ITC47	26.84	22.06	2.55	1.5	1.1	0.1	–	–	–
88	Mantova	ITC4B	20.65	4.60	0.84	0.8	0.2	0.0	–	–	–
89	Ioannina	EL543	1.55	4.01	0.88	0.1	0.3	0.0	–	–	–
90	Treviso	ITH34	36.08	14.16	2.60	1.7	0.6	0.1	–	–	–
91	Grevena, Kozani	EL531	0.53	1.25	0.34	0.0	0.1	0.0	–	–	–
92	Cremona	ITC4A	13.46	4.68	0.57	0.5	0.2	0.0	–	–	–
93	Irakleio	EL431	2.34	11.92	2.35	0.2	0.9	0.1	–	–	–
94	Evros	EL511	0.45	1.65	0.43	0.0	0.1	0.0	–	–	–
95	Matera	ITF52	1.92	2.22	0.25	0.1	0.1	0.0	–	–	–
96	Haskovo	BG422	0.92	1.00	0.27	0.1	0.2	0.0	–	–	–
97	Kerkyra	EL622	1.77	2.02	0.44	0.2	0.2	0.0	–	–	–
98	Chios	EL413	0.93	0.89	0.13	0.1	0.1	0.0	–	–	–
99	Campobasso	ITF22	4.42	3.75	0.41	0.2	0.2	0.0	–	–	–
100	Vicenza	ITH32	26.14	14.05	1.94	1.4	0.6	0.0	–	–	–

Table B. 5. Scenario 1 – energy efficiency upgrading: benefit in terms of average annual economic loss (*ΔAAEL*), average annual loss of life (*ΔAALL*), average annual energy consumption (*ΔAAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.15 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^{*}_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
1	Buzău	RO222	14.69	9.84	4.49	–	–	–	189.56	126.96	57.96
2	București	RO321	45.17	46.54	30.22	–	–	–	582.92	600.51	389.94
3	Vrancea	RO226	10.56	8.01	3.42	–	–	–	136.23	103.35	44.10
4	Galați	RO224	12.94	7.43	3.62	–	–	–	166.97	95.83	46.65
5	Prahova	RO316	17.14	25.57	6.96	–	–	–	221.18	329.98	89.77
6	Brașov	RO122	15.44	16.52	7.13	–	–	–	199.27	213.17	91.97
7	Brăila	RO221	8.12	4.11	2.03	–	–	–	104.75	53.03	26.16
8	Bacău	RO211	16.77	15.56	5.31	–	–	–	216.36	200.75	68.50
9	Covasna	RO123	5.87	8.82	1.79	–	–	–	75.71	113.86	23.13
10	Napoli	ITF33	123.90	129.82	3.14	–	–	–	1297.37	1359.34	32.93
11	Vaslui	RO216	15.65	6.00	1.42	–	–	–	201.95	77.40	18.35
12	Ialomița	RO315	7.83	3.89	1.25	–	–	–	101.06	50.25	16.17
13	Catania	ITG17	38.43	58.86	3.35	–	–	–	402.37	616.29	35.04
14	Catanzaro	ITF63	11.59	19.26	0.91	–	–	–	121.36	201.68	9.52
15	Neamț	RO214	21.06	9.16	3.65	–	–	–	271.80	118.21	47.14
16	Reggio di Calabria	ITF65	16.05	26.69	1.00	–	–	–	168.05	279.51	10.50
17	Dâmbovița	RO313	7.96	19.77	2.05	–	–	–	102.73	255.08	26.51
18	Bologna	ITH55	121.07	72.68	5.92	–	–	–	1267.77	761.06	61.97
19	Argeș	RO311	10.80	21.43	5.43	–	–	–	139.34	276.58	70.01
20	Cosenza	ITF61	37.93	30.56	2.75	–	–	–	397.17	320.01	28.76
21	Teleorman	RO317	14.89	3.66	1.33	–	–	–	192.19	47.17	17.20
22	Călărași	RO312	8.35	4.10	1.03	–	–	–	107.79	52.90	13.32
23	Achaia	EL632	3.94	13.60	2.41	–	–	–	41.42	142.92	25.33
24	Tulcea	RO225	6.92	2.24	0.89	–	–	–	89.25	28.90	11.50
25	Foggia	ITF46	28.55	28.68	2.35	–	–	–	298.92	300.34	24.62
26	Iași	RO213	26.65	16.22	4.61	–	–	–	343.92	209.35	59.54
27	Harghita	RO124	17.72	7.52	3.30	–	–	–	228.67	97.07	42.62
28	Giurgiu	RO314	7.69	4.54	1.05	–	–	–	99.25	58.54	13.52
29	Messina	ITG13	22.53	30.72	1.68	–	–	–	235.90	321.71	17.57
30	Vibo Valentia	ITF64	4.85	5.53	0.40	–	–	–	50.82	57.88	4.23
31	Benevento	ITF32	20.93	8.36	0.72	–	–	–	219.19	87.49	7.51
32	Milano	ITC4C	208.21	375.04	23.49	–	–	–	2180.22	3927.08	245.97
33	Siracusa	ITG19	14.98	15.26	1.10	–	–	–	156.87	159.76	11.57
34	Modena	ITH54	109.78	29.94	2.83	–	–	–	1149.53	313.45	29.66
35	Constanța	RO223	11.59	9.55	5.54	–	–	–	149.49	123.27	71.49
36	Barletta-Andria-Trani	ITF48	10.36	24.71	2.02	–	–	–	108.50	258.72	21.12
37	Caserta	ITF31	58.48	28.36	3.43	–	–	–	612.30	296.92	35.88
38	Avellino	ITF34	22.34	18.47	1.49	–	–	–	233.88	193.42	15.61
39	Crotone	ITF62	2.39	6.56	0.32	–	–	–	25.07	68.70	3.31
40	Olt	RO414	10.18	9.26	2.16	–	–	–	131.33	119.51	27.84
41	Perugia	ITI21	83.25	30.92	4.31	–	–	–	871.68	323.79	45.18
42	Kentrikos Tomeas Athinon	EL303	15.36	89.86	7.18	–	–	–	161.39	944.21	75.45
43	Ileia	EL633	1.98	3.43	0.72	–	–	–	20.81	36.09	7.57
44	Roma	ITI43	227.36	310.98	16.13	–	–	–	2380.65	3256.25	168.91
45	L'Aquila	ITF11	18.24	16.55	1.23	–	–	–	190.99	173.29	12.83
46	Isernia	ITF21	7.69	3.44	0.32	–	–	–	80.47	35.97	3.32
47	Sibiu	RO126	21.27	4.61	2.82	–	–	–	274.44	59.45	36.41
48	Salerno	ITF35	49.26	46.18	2.70	–	–	–	515.84	483.56	28.29
49	Reggio nell'Emilia	ITH53	81.69	22.25	3.15	–	–	–	855.34	233.02	32.95
50	Palermo	ITG12	39.25	72.02	2.03	–	–	–	411.02	754.09	21.27

No.	NUTS-3		ΔAAEL (10⁶ €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
51	Notios Tomeas Athinon	EL304	1.71	30.56	6.30	–	–	–	17.92	321.06	66.18
52	Silistra	BG325	3.56	1.83	0.32	–	–	–	56.69	29.17	5.02
53	Zakynthos	EL621	0.75	0.79	0.24	–	–	–	7.87	8.34	2.57
54	Ragusa	ITG18	10.30	8.75	0.76	–	–	–	107.82	91.59	7.91
55	Fokida	EL645	1.31	1.24	0.19	–	–	–	13.82	13.08	1.95
56	Aitoloakarnania	EL631	3.44	5.88	0.89	–	–	–	36.19	61.77	9.39
57	Larisa	EL612	4.78	14.55	2.57	–	–	–	50.21	152.87	26.98
58	Caltanissetta	ITG15	11.66	8.25	0.46	–	–	–	122.12	86.37	4.84
59	Florina	EL533	2.18	2.48	0.31	–	–	–	22.94	26.08	3.30
60	Ruse	BG323	6.35	3.49	0.89	–	–	–	101.04	55.45	14.11
61	Lesvos, Limnos	EL411	2.87	2.15	0.22	–	–	–	30.16	22.57	2.33
62	Enna	ITG16	10.96	4.32	0.38	–	–	–	114.81	45.26	3.93
63	Torino	ITC11	276.44	346.31	17.81	–	–	–	2894.63	3626.26	186.51
64	Plovdiv	BG421	9.58	12.43	2.24	–	–	–	152.28	197.63	35.63
65	Ravenna	ITH57	44.80	17.21	2.03	–	–	–	469.07	180.17	21.23
66	Kastoria	EL532	1.68	3.45	0.33	–	–	–	17.61	36.26	3.51
67	Firenze	ITI14	92.53	62.46	3.62	–	–	–	968.84	654.07	37.86
68	Potenza	ITF51	22.27	15.72	1.29	–	–	–	233.16	164.56	13.55
69	Lefkada	EL624	0.39	0.47	0.12	–	–	–	4.14	4.99	1.27
70	Parma	ITH52	59.54	28.37	2.58	–	–	–	623.47	297.08	26.98
71	Lakonia, Messinia	EL653	5.76	5.99	1.06	–	–	–	60.55	62.95	11.16
72	Fthiotida	EL644	2.91	6.67	1.12	–	–	–	30.60	70.10	11.80
73	Pazardzhik	BG423	6.86	9.58	1.34	–	–	–	109.16	152.37	21.24
74	Ferrara	ITH56	46.35	12.32	1.16	–	–	–	485.31	128.98	12.17
75	Stara Zagora	BG344	5.94	3.68	0.87	–	–	–	94.52	58.51	13.76
76	Razgrad	BG324	3.98	1.55	0.32	–	–	–	63.29	24.65	5.03
77	Korinthia	EL652	1.73	4.38	0.68	–	–	–	18.21	46.03	7.12
78	Arta, Preveza	EL541	2.08	3.74	0.67	–	–	–	21.84	39.29	7.09
79	Pescara	ITF13	20.00	18.10	3.00	–	–	–	209.45	189.50	31.38
80	Ikaria, Samos	EL412	0.96	0.92	0.16	–	–	–	10.08	9.62	1.69
81	Lodi	ITC49	23.11	13.79	1.76	–	–	–	241.99	144.42	18.43
82	Thessaloniki	EL522	12.47	69.62	14.67	–	–	–	131.07	731.53	154.10
83	Agrigento	ITG14	16.81	12.50	0.76	–	–	–	176.04	130.89	7.97
84	Rodopi	EL513	4.12	3.80	0.35	–	–	–	43.27	39.95	3.65
85	Forlì-Cesena	ITH58	39.73	24.70	2.97	–	–	–	415.97	258.61	31.09
86	Ithaki, Kefallinia	EL623	0.92	0.55	0.15	–	–	–	9.68	5.73	1.62
87	Brescia	ITC47	187.79	91.42	6.53	–	–	–	1966.35	957.24	68.43
88	Mantova	ITC4B	67.83	13.54	1.72	–	–	–	710.22	141.74	17.98
89	Ioannina	EL543	5.23	6.76	1.11	–	–	–	54.98	71.05	11.71
90	Treviso	ITH34	119.73	31.24	4.26	–	–	–	1253.65	327.09	44.65
91	Grevena, Kozani	EL531	4.18	8.82	1.43	–	–	–	43.90	92.65	15.01
92	Cremona	ITC4A	54.22	13.59	1.28	–	–	–	567.76	142.35	13.45
93	Irakleio	EL431	3.46	7.15	1.28	–	–	–	36.39	75.14	13.42
94	Evros	EL511	2.75	6.42	0.80	–	–	–	28.88	67.48	8.40
95	Matera	ITF52	12.00	8.87	0.92	–	–	–	125.69	92.89	9.63
96	Haskovo	BG422	4.45	3.69	1.00	–	–	–	70.81	58.73	15.95
97	Kerkyra	EL622	1.69	1.63	0.25	–	–	–	17.80	17.13	2.63
98	Chios	EL413	1.00	1.24	0.15	–	–	–	10.52	13.05	1.56
99	Campobasso	ITF22	12.48	9.11	0.85	–	–	–	130.70	95.44	8.94
100	Vicenza	ITH32	141.45	48.06	4.36	–	–	–	1481.13	503.19	45.70

Table B. 6. Scenario 1 – integrated renovation: benefit in terms of average annual economic loss (*ΔAAEL*), average annual loss of life (*ΔAALL*), average annual energy consumption (*ΔAAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.21 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
1	Buzău	RO222	21.70	15.71	7.54	1.8	1.6	0.4	189.56	126.96	57.96
2	Bucureşti	RO321	63.19	80.61	41.48	18.4	13.2	1.6	582.92	600.51	389.94
3	Vrancea	RO226	15.73	11.69	5.37	1.3	0.9	0.2	136.23	103.35	44.10
4	Galați	RO224	17.23	10.29	4.79	1.4	1.3	0.3	166.97	95.83	46.65
5	Prahova	RO316	22.71	35.92	10.07	1.8	2.8	0.4	221.18	329.98	89.77
6	Braşov	RO122	17.35	23.10	10.69	1.2	2.1	0.6	199.27	213.17	91.97
7	Brăila	RO221	10.84	5.74	2.83	0.8	0.6	0.2	104.75	53.03	26.16
8	Bacău	RO211	20.69	20.53	7.52	1.2	1.7	0.3	216.36	200.75	68.50
9	Covasna	RO123	6.52	11.36	2.68	0.2	0.7	0.1	75.71	113.86	23.13
10	Napoli	ITF33	156.90	195.97	5.51	2.6	4.7	0.1	1297.37	1359.34	32.93
11	Vaslui	RO216	17.45	6.58	1.61	0.6	0.2	0.0	201.95	77.40	18.35
12	Ialomița	RO315	10.30	5.35	2.10	0.6	0.4	0.1	101.06	50.25	16.17
13	Catania	ITG17	57.57	117.89	7.60	1.0	3.1	0.1	402.37	616.29	35.04
14	Catanzaro	ITF63	21.35	44.02	2.20	0.5	1.2	0.0	121.36	201.68	9.52
15	Neamț	RO214	22.95	10.51	4.58	0.4	0.4	0.1	271.80	118.21	47.14
16	Reggio di Calabria	ITF65	32.09	62.16	2.78	0.9	1.8	0.0	168.05	279.51	10.50
17	Dâmbovița	RO313	9.48	24.06	2.89	0.4	1.0	0.1	102.73	255.08	26.51
18	Bologna	ITH55	167.32	109.69	10.12	2.2	1.7	0.1	1267.77	761.06	61.97
19	Argeş	RO311	12.11	24.83	7.47	0.4	0.9	0.3	139.34	276.58	70.01
20	Cosenza	ITF61	63.22	61.02	6.49	1.3	1.4	0.1	397.17	320.01	28.76
21	Teleorman	RO317	16.06	4.21	1.59	0.3	0.2	0.1	192.19	47.17	17.20
22	Călăraşi	RO312	10.21	5.01	1.69	0.5	0.3	0.1	107.79	52.90	13.32
23	Achaia	EL632	6.76	29.30	5.45	0.2	1.6	0.1	41.42	142.92	25.33
24	Tulcea	RO225	7.68	2.57	1.10	0.1	0.1	0.0	89.25	28.90	11.50
25	Foggia	ITF46	39.63	49.59	4.53	0.6	1.1	0.1	298.92	300.34	24.62
26	Iaşi	RO213	28.15	17.39	4.90	0.3	0.4	0.0	343.92	209.35	59.54
27	Harghita	RO124	18.44	8.33	3.89	0.2	0.2	0.1	228.67	97.07	42.62
28	Giurgiu	RO314	9.10	5.49	1.49	0.3	0.2	0.1	99.25	58.54	13.52
29	Messina	ITG13	34.88	58.90	3.51	0.6	1.4	0.0	235.90	321.71	17.57
30	Vibo Valentia	ITF64	10.26	12.05	1.01	0.3	0.3	0.0	50.82	57.88	4.23
31	Benevento	ITF32	30.53	13.30	1.27	0.5	0.2	0.0	219.19	87.49	7.51
32	Milano	ITC4C	223.70	422.04	27.02	0.5	1.9	0.1	2180.22	3927.08	245.97
33	Siracusa	ITG19	23.09	29.48	2.36	0.4	0.6	0.0	156.87	159.76	11.57
34	Modena	ITH54	157.34	48.69	5.40	2.4	0.9	0.1	1149.53	313.45	29.66
35	Constanța	RO223	12.51	11.14	6.71	0.2	0.4	0.1	149.49	123.27	71.49
36	Barletta-Andria-Trani	ITF48	12.91	30.98	2.57	0.1	0.3	0.0	108.50	258.72	21.12
37	Caserta	ITF31	72.89	40.72	5.45	0.7	0.6	0.1	612.30	296.92	35.88
38	Avellino	ITF34	31.80	28.33	2.34	0.5	0.5	0.0	233.88	193.42	15.61
39	Crotone	ITF62	4.35	15.38	0.83	0.1	0.4	0.0	25.07	68.70	3.31
40	Olt	RO414	10.93	10.53	2.67	0.2	0.2	0.1	131.33	119.51	27.84
41	Perugia	ITI21	121.40	49.43	7.72	2.1	0.9	0.1	871.68	323.79	45.18
42	Kentrikos Tomeas Athinon	EL303	16.38	123.95	10.11	0.2	2.6	0.1	161.39	944.21	75.45
43	Ileia	EL633	4.00	8.39	2.10	0.2	0.4	0.1	20.81	36.09	7.57
44	Roma	ITI43	265.21	421.76	22.41	1.7	4.6	0.1	2380.65	3256.25	168.91
45	L'Aquila	ITF11	30.14	29.28	2.57	0.7	0.7	0.0	190.99	173.29	12.83
46	Isernia	ITF21	11.23	5.57	0.60	0.2	0.1	0.0	80.47	35.97	3.32
47	Sibiu	RO126	21.83	5.12	3.19	0.2	0.1	0.0	274.44	59.45	36.41
48	Salerno	ITF35	58.10	60.97	3.74	0.4	0.7	0.0	515.84	483.56	28.29
49	Reggio nell'Emilia	ITH53	114.42	34.75	5.61	1.6	0.6	0.1	855.34	233.02	32.95
50	Palermo	ITG12	46.37	92.02	2.56	0.3	0.9	0.0	411.02	754.09	21.27

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	**ID**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**	**Sub-scenario 1.1**	**Sub-scenario 1.2**	**Sub-scenario 1.3**
			CDN	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**
51	Notios Tomeas Athinon	EL304	2.03	53.05	11.15	0.1	1.8	0.2	17.92	321.06	66.18
52	Silistra	BG325	4.47	3.18	0.70	0.1	0.2	0.0	56.69	29.17	5.02
53	Zakynthos	EL621	1.40	2.13	0.74	0.1	0.1	0.0	7.87	8.34	2.57
54	Ragusa	ITG18	15.89	16.08	1.53	0.2	0.3	0.0	107.82	91.59	7.91
55	Fokida	EL645	2.61	2.14	0.39	0.1	0.1	0.0	13.82	13.08	1.95
56	Aitoloakarnania	EL631	5.85	11.08	1.89	0.2	0.5	0.0	36.19	61.77	9.39
57	Larisa	EL612	5.81	23.30	4.16	0.1	0.8	0.1	50.21	152.87	26.98
58	Caltanissetta	ITG15	15.60	12.34	0.74	0.2	0.2	0.0	122.12	86.37	4.84
59	Florina	EL533	2.46	2.74	0.38	0.0	0.0	0.0	22.94	26.08	3.30
60	Ruse	BG323	7.82	5.90	1.66	0.1	0.3	0.0	101.04	55.45	14.11
61	Lesvos, Limnos	EL411	6.19	3.87	0.50	0.2	0.1	0.0	30.16	22.57	2.33
62	Enna	ITG16	14.24	5.78	0.54	0.1	0.1	0.0	114.81	45.26	3.93
63	Torino	ITC11	288.82	370.61	19.86	0.6	1.3	0.1	2894.63	3626.26	186.51
64	Plovdiv	BG421	11.50	16.06	2.80	0.3	1.0	0.1	152.28	197.63	35.63
65	Ravenna	ITH57	71.05	30.95	4.26	1.1	0.6	0.1	469.07	180.17	21.23
66	Kastoria	EL532	1.85	3.78	0.39	0.0	0.0	0.0	17.61	36.26	3.51
67	Firenze	ITI14	117.30	80.20	4.87	1.1	0.8	0.0	968.84	654.07	37.86
68	Potenza	ITF51	30.60	22.58	2.03	0.5	0.4	0.0	233.16	164.56	13.55
69	Lefkada	EL624	1.16	1.32	0.39	0.0	0.0	0.0	4.14	4.99	1.27
70	Parma	ITH52	79.22	43.62	4.66	0.9	0.7	0.0	623.47	297.08	26.98
71	Lakonia, Messinia	EL653	10.99	13.12	3.02	0.3	0.6	0.1	60.55	62.95	11.16
72	Fthiotida	EL644	3.92	10.78	1.92	0.1	0.3	0.0	30.60	70.10	11.80
73	Pazardzhik	BG423	7.73	11.11	1.52	0.1	0.2	0.0	109.16	152.37	21.24
74	Ferrara	ITH56	70.88	22.46	2.55	1.2	0.5	0.0	485.31	128.98	12.17
75	Stara Zagora	BG344	6.84	4.46	1.08	0.2	0.1	0.0	94.52	58.51	13.76
76	Razgrad	BG324	4.79	2.59	0.64	0.1	0.1	0.0	63.29	24.65	5.03
77	Korinthia	EL652	3.56	9.98	1.79	0.1	0.4	0.0	18.21	46.03	7.12
78	Arta, Preveza	EL541	3.26	7.59	1.56	0.1	0.3	0.0	21.84	39.29	7.09
79	Pescara	ITF13	25.10	23.92	4.08	0.2	0.2	0.0	209.45	189.50	31.38
80	Ikaria, Samos	EL412	2.05	1.89	0.43	0.1	0.1	0.0	10.08	9.62	1.69
81	Lodi	ITC49	27.81	18.03	2.44	0.3	0.2	0.0	241.99	144.42	18.43
82	Thessaloniki	EL522	13.82	91.27	19.79	0.2	1.9	0.3	131.07	731.53	154.10
83	Agrigento	ITG14	21.16	16.94	1.10	0.3	0.2	0.0	176.04	130.89	7.97
84	Rodopi	EL513	4.48	4.35	0.45	0.0	0.1	0.0	43.27	39.95	3.65
85	Forlì-Cesena	ITH58	55.90	38.51	5.31	0.8	0.6	0.1	415.97	258.61	31.09
86	Ithaki, Kefallinia	EL623	1.70	1.63	0.58	0.1	0.1	0.0	9.68	5.73	1.62
87	Brescia	ITC47	214.63	113.48	9.09	1.5	1.1	0.1	1966.35	957.24	68.43
88	Mantova	ITC4B	88.47	18.14	2.55	0.8	0.2	0.0	710.22	141.74	17.98
89	Ioannina	EL543	6.79	10.77	2.00	0.1	0.3	0.0	54.98	71.05	11.71
90	Treviso	ITH34	155.81	45.40	6.87	1.7	0.6	0.1	1253.65	327.09	44.65
91	Grevena, Kozani	EL531	4.71	10.07	1.77	0.0	0.1	0.0	43.90	92.65	15.01
92	Cremona	ITC4A	67.68	18.27	1.85	0.5	0.2	0.0	567.76	142.35	13.45
93	Irakleio	EL431	5.80	19.07	3.63	0.2	0.9	0.1	36.39	75.14	13.42
94	Evros	EL511	3.19	8.08	1.23	0.0	0.1	0.0	28.88	67.48	8.40
95	Matera	ITF52	13.92	11.09	1.17	0.1	0.1	0.0	125.69	92.89	9.63
96	Haskovo	BG422	5.37	4.69	1.27	0.1	0.2	0.0	70.81	58.73	15.95
97	Kerkyra	EL622	3.47	3.65	0.70	0.2	0.2	0.0	17.80	17.13	2.63
98	Chios	EL413	1.93	2.13	0.28	0.1	0.1	0.0	10.52	13.05	1.56
99	Campobasso	ITF22	16.90	12.86	1.27	0.2	0.2	0.0	130.70	95.44	8.94
100	Vicenza	ITH32	167.59	62.11	6.31	1.4	0.6	0.0	1481.13	503.19	45.70

Table B. 7. Scenario 1: Renovated buildings, replacement cost, and average number of occupants within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	CDL	CDM	CDN	CDL	CDM	CDN	CDL	CDM
1	Buzău	RO222	97223	42656	7540	2660.41	1840.49	1041.47	119151	80411	47399
2	Bucureşti	RO321	79732	32822	10027	8939.15	8439.11	6383.28	390072	408467	326855
3	Vrancea	RO226	65720	34703	9051	1813.38	1477.72	840.61	79492	63254	39339
4	Galați	RO224	84753	25738	4529	2338.93	1361.15	801.61	131526	91205	65329
5	Prahova	RO316	97652	95615	15046	3020.31	4648.54	1587.89	139041	200701	73763
6	Braşov	RO122	56027	29138	6274	2239.33	2317.95	1312.00	110190	116893	67987
7	Brăila	RO221	57820	17158	1989	1590.89	822.13	452.59	93210	50199	31985
8	Bacău	RO211	90909	60514	16069	2714.57	2675.99	1273.65	128065	131234	69302
9	Covasna	RO123	24174	26100	4691	758.60	1153.11	334.37	36463	59886	17930
10	Napoli	ITF33	165016	119232	7427	63203.81	85459.93	3195.50	789001	962214	37433
11	Vaslui	RO216	96255	28165	2439	1998.37	842.41	251.27	132660	60950	23506
12	Ialomița	RO315	59994	19954	3303	1641.46	850.89	343.12	84304	45306	20591
13	Catania	ITG17	104021	102290	11418	20685.16	41207.09	3653.11	209633	386985	34470
14	Catanzaro	ITF63	46023	46109	4169	6399.12	14631.35	1068.55	66595	134781	9606
15	Neamț	RO214	96893	32240	12764	3120.37	1379.49	802.88	139794	67878	42163
16	Reggio di Calabria	ITF65	62121	88415	4731	9997.57	22283.72	1266.68	105112	205865	11340
17	Dâmbovița	RO313	53643	104514	4080	1576.88	4076.20	485.22	74114	188385	25249
18	Bologna	ITH55	91295	24594	3916	37152.70	26197.46	3624.25	320289	215351	33764
19	Argeş	RO311	59080	91857	16867	1908.04	3906.37	1310.90	78466	171589	67772
20	Cosenza	ITF61	123127	61182	7889	20297.77	22056.13	2914.27	202713	190802	24867
21	Teleorman	RO317	115299	18158	3599	2417.65	615.63	263.60	149340	40915	19618
22	Călăraşi	RO312	67069	25840	3564	1830.42	966.26	298.80	95695	52602	19153
23	Achaia	EL632	22224	38863	12469	1626.23	5465.80	1903.47	24925	82646	28910
24	Tulcea	RO225	54901	9473	1528	1505.00	504.89	233.36	74106	27214	14541
25	Foggia	ITF46	76504	26548	3853	14167.03	18133.03	2223.22	160943	182459	23632
26	Iaşi	RO213	143794	34648	2223	4391.13	2572.35	896.71	231583	145469	58491
27	Harghita	RO124	55341	22688	8198	2106.67	900.22	581.75	97174	44456	28676
28	Giurgiu	RO314	62923	29474	4415	1751.32	1102.53	304.06	82097	54160	16385
29	Messina	ITG13	88136	76524	6424	13362.52	23741.81	1949.79	137747	223428	18355
30	Vibo Valentia	ITF64	27817	22664	2403	3428.45	5283.39	596.48	38107	51540	5779
31	Benevento	ITF32	64629	12148	2135	11676.74	5186.38	673.01	113246	47165	6166
32	Milano	ITC4C	103112	105182	13287	66385.01	139275.90	13837.90	546833	1103898	122492
33	Siracusa	ITG19	62671	37136	3946	10262.72	13730.48	1457.18	99964	120515	13719
34	Modena	ITH54	96049	15501	2072	33777.52	11225.03	1767.58	291467	92959	15924
35	Constanța	RO223	87300	26788	7721	3262.49	2665.01	1946.98	156995	115395	83562
36	Barletta-Andria-Trani	ITF48	26974	20950	2352	5317.35	14304.50	1727.05	60952	148863	19458
37	Caserta	ITF31	125072	42659	7252	28665.82	18561.78	3167.31	313657	182892	32887
38	Avellino	ITF34	72411	39115	4749	12319.56	12333.92	1412.51	124538	113070	13375
39	Crotone	ITF62	14323	31304	2043	2001.67	7665.57	582.99	21115	73141	5632
40	Olt	RO414	76153	57849	7989	2261.90	2094.02	603.39	107821	97407	34206
41	Perugia	ITI21	114950	22788	8183	27953.30	12630.60	3003.20	248919	107242	26773
42	Kentrikos Tomeas Athinon	EL303	16887	54105	8205	6217.46	34956.32	5722.68	58322	338299	60370
43	Ileia	EL633	17573	28226	9342	1137.09	2330.41	861.94	21093	39591	15457
44	Roma	ITI43	221551	145078	22186	102499.63	187621.78	14785.02	854817	1338610	122752
45	L'Aquila	ITF11	58348	30967	3757	8116.88	9001.18	1129.55	80342	83048	9865
46	Isernia	ITF21	22558	5686	793	3521.48	1939.63	287.03	32742	16341	2409
47	Sibiu	RO126	80668	8757	3166	3446.82	693.13	577.77	155960	32954	27376
48	Salerno	ITF35	116365	73014	8968	26314.37	32819.35	2906.78	283526	325495	29911
49	Reggio nell'Emilia	ITH53	76036	15783	3181	24165.05	8245.23	1906.03	215185	69777	17092
50	Palermo	ITG12	113522	113877	9355	21872.75	52969.30	2383.67	224953	481086	22179

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3	Sub-scenario 1.1	Sub-scenario 1.2	Sub-scenario 1.3
			CDN	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**	**CDN**	**CDL**	**CDM**
51	Notios Tomeas Athinon	EL304	6250	32762	9854	935.08	12490.22	5054.70	10392	141792	57847
52	Silistra	BG325	31787	6388	1177	1236.69	709.34	208.83	36500	21312	5568
53	Zakynthos	EL621	6011	5588	3131	405.47	500.10	298.79	6279	7627	4647
54	Ragusa	ITG18	61487	33303	4768	8903.17	9797.53	1282.93	83473	85175	11589
55	Fokida	EL645	9312	7878	2020	572.79	631.72	167.36	8515	8719	2322
56	Aitoloakarnania	EL631	25944	35236	6966	1753.34	3364.46	839.09	30723	54716	14076
57	Larisa	EL612	22238	34149	8421	1540.77	4884.47	1661.85	27922	71289	23496
58	Caltanissetta	ITG15	54211	18555	2339	8178.32	7561.59	654.41	84174	70076	6205
59	Florina	EL533	6508	5261	1339	407.51	522.83	151.84	8429	9834	2961
60	Ruse	BG323	50367	10649	3563	2473.11	1445.69	645.54	69878	38278	16644
61	Lesvos, Limnos	EL411	26429	18800	3203	1721.93	1593.74	286.59	27372	21497	4110
62	Enna	ITG16	47480	9860	1463	6458.12	3259.14	445.71	66947	30324	4215
63	Torino	ITC11	172341	111984	16037	53251.14	84517.31	9306.55	484126	739288	87979
64	Plovdiv	BG421	93433	45784	10700	3767.44	5251.74	1889.21	118641	184343	59359
65	Ravenna	ITH57	67470	19054	3102	18629.39	8272.17	1568.74	146012	64602	13698
66	Kastoria	EL532	4651	6752	1598	319.60	760.04	179.64	6011	13641	3264
67	Firenze	ITI14	95970	30321	3335	34599.34	25729.55	2373.67	314909	229099	23889
68	Potenza	ITF51	75781	25331	4244	11160.12	9042.82	1146.91	120330	89437	11677
69	Lefkada	EL624	4631	4703	1543	289.84	401.12	170.74	3527	4475	2000
70	Parma	ITH52	63337	16269	2507	18255.99	10683.07	1789.66	150257	83921	15301
71	Lakonia, Messinia	EL653	47485	44857	11622	3051.92	3950.12	1302.30	45496	55487	19682
72	Fthiotida	EL644	15744	28558	7414	1098.60	2850.78	841.93	18455	42453	12664
73	Pazardzhik	BG423	52694	28929	4992	2094.56	3363.53	871.12	48800	78253	19124
74	Ferrara	ITH56	72121	10758	1622	19171.63	5888.79	906.31	153950	44636	7527
75	Stara Zagora	BG344	67921	16230	4796	2784.57	1827.96	745.25	100633	53383	22780
76	Razgrad	BG324	35890	5611	1289	1546.44	647.31	223.89	44087	16734	5592
77	Korinthia	EL652	14918	28413	9124	1041.62	2834.27	851.99	14895	38480	11725
78	Arta, Preveza	EL541	14299	22238	6320	903.06	1899.46	603.65	15413	32111	10632
79	Pescara	ITF13	36501	17235	4190	8341.16	9668.93	2359.16	80645	82540	21160
80	Ikaria, Samos	EL412	10100	9475	2911	650.18	791.27	267.49	8490	9156	3253
81	Lodi	ITC49	23111	10541	1812	7387.54	5439.64	1059.38	71542	49064	10127
82	Thessaloniki	EL522	22837	74070	27052	3567.65	20532.58	8746.85	48335	259879	118580
83	Agrigento	ITG14	88084	42260	3921	13218.16	13134.99	1182.43	132710	117828	11332
84	Rodopi	EL513	17488	11299	1322	1115.56	1140.58	192.90	24117	20537	3645
85	Forlì-Cesena	ITH58	51378	20745	3496	13699.97	10100.82	1970.39	123391	85580	18413
86	Ithaki, Kefallinia	EL623	9661	5509	2564	665.75	459.36	248.08	7589	5201	2925
87	Brescia	ITC47	150768	61930	8056	45466.00	29099.60	4041.69	425752	256665	39427
88	Mantova	ITC4B	80695	10930	2044	22456.73	5437.81	1121.14	184267	43469	9807
89	Ioannina	EL543	21795	20737	4824	1459.90	2493.19	856.20	21797	36019	12944
90	Treviso	ITH34	155469	33575	5960	44026.22	14164.69	3059.94	371777	112753	26034
91	Grevena, Kozani	EL531	15041	23235	6330	974.98	2374.17	807.58	17272	40824	14644
92	Cremona	ITC4A	59065	9021	1809	17544.02	5207.48	822.05	155741	44202	7518
93	Irakleio	EL431	26184	41621	12841	2035.64	5480.30	1853.92	32996	79749	27367
94	Evros	EL511	13340	23490	3782	950.00	2503.63	597.61	17074	39316	9053
95	Matera	ITF52	31160	9037	1464	5474.30	5203.54	809.17	59041	50418	7983
96	Haskovo	BG422	52872	14332	4822	2413.39	1986.63	916.43	61579	47804	21245
97	Kerkyra	EL622	18688	17948	5281	1312.70	1575.33	434.68	22073	23809	6739
98	Chios	EL413	9376	10439	2073	646.09	931.49	198.46	10069	12846	2851
99	Campobasso	ITF22	46693	13044	2142	7305.82	6239.75	902.34	70020	55300	7809
100	Vicenza	ITH32	135662	44654	6268	39255.55	17650.34	2933.93	331662	142359	25192

Table B. 8. Scenario 2 – seismic retrofit: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
1	Buzău	RO222	1.04	0.90	0.40	2.97	2.58	1.14	11.89	10.34	4.58
2	Bucureşti	RO321	0.91	0.80	0.36	2.59	2.28	1.04	10.35	9.13	4.14
3	Vrancea	RO226	0.93	0.82	0.36	2.65	2.35	1.01	10.62	9.40	4.06
4	Galați	RO224	0.67	0.58	0.25	1.93	1.65	0.72	7.70	6.59	2.89
5	Prahova	RO316	0.88	0.77	0.28	2.50	2.19	0.81	10.01	8.76	3.24
6	Braşov	RO122	0.82	0.61	0.28	2.34	1.75	0.80	9.37	7.00	3.21
7	Brăila	RO221	0.69	0.59	0.25	1.98	1.68	0.72	7.92	6.72	2.87
8	Bacău	RO211	0.61	0.54	0.23	1.74	1.54	0.65	6.97	6.18	2.58
9	Covasna	RO123	0.62	0.53	0.25	1.77	1.50	0.72	7.09	6.02	2.88
10	Napoli	ITF33	0.16	0.15	0.10	0.46	0.42	0.27	1.86	1.69	1.10
11	Vaslui	RO216	0.27	0.23	0.12	0.78	0.67	0.33	3.11	2.67	1.33
12	Ialomița	RO315	0.57	0.49	0.23	1.62	1.41	0.67	6.49	5.64	2.67
13	Catania	ITG17	0.28	0.26	0.18	0.79	0.73	0.52	3.15	2.94	2.06
14	Catanzaro	ITF63	0.34	0.33	0.23	0.97	0.94	0.66	3.88	3.76	2.66
15	Neamț	RO214	0.34	0.29	0.11	0.98	0.84	0.30	3.90	3.36	1.21
16	Reggio di Calabria	ITF65	0.34	0.33	0.23	0.97	0.94	0.65	3.87	3.77	2.61
17	Dâmbovița	RO313	0.49	0.32	0.15	1.40	0.92	0.44	5.60	3.67	1.75
18	Bologna	ITH55	0.29	0.28	0.19	0.82	0.79	0.54	3.29	3.16	2.14
19	Argeş	RO311	0.40	0.30	0.13	1.14	0.86	0.36	4.58	3.44	1.45
20	Cosenza	ITF61	0.28	0.27	0.19	0.81	0.78	0.54	3.25	3.11	2.16
21	Teleorman	RO317	0.21	0.17	0.08	0.60	0.50	0.24	2.42	1.99	0.96
22	Călăraşi	RO312	0.43	0.36	0.15	1.22	1.02	0.44	4.86	4.06	1.76
23	Achaia	EL632	0.65	0.59	0.27	1.85	1.69	0.78	7.39	6.74	3.14
24	Tulcea	RO225	0.19	0.16	0.08	0.54	0.46	0.23	2.16	1.85	0.92
25	Foggia	ITF46	0.18	0.18	0.14	0.53	0.52	0.41	2.10	2.08	1.62
26	Iaşi	RO213	0.15	0.13	0.05	0.42	0.37	0.15	1.66	1.47	0.61
27	Harghita	RO124	0.25	0.19	0.08	0.71	0.55	0.23	2.86	2.21	0.93
28	Giurgiu	RO314	0.37	0.30	0.12	1.05	0.84	0.35	4.20	3.37	1.40
29	Messina	ITG13	0.24	0.23	0.16	0.69	0.66	0.44	2.76	2.65	1.78
30	Vibo Valentia	ITF64	0.28	0.27	0.19	0.81	0.76	0.55	3.24	3.04	2.21
31	Benevento	ITF32	0.16	0.16	0.12	0.46	0.45	0.35	1.85	1.81	1.41
32	Milano	ITC4C	0.07	0.06	0.04	0.19	0.17	0.12	0.76	0.67	0.49
33	Siracusa	ITG19	0.22	0.19	0.13	0.62	0.53	0.38	2.49	2.14	1.52
34	Modena	ITH54	0.32	0.32	0.21	0.93	0.93	0.60	3.71	3.71	2.42
35	Constanța	RO223	0.16	0.14	0.06	0.45	0.41	0.18	1.81	1.63	0.70
36	Barletta-Andria-Trani	ITF48	0.11	0.10	0.06	0.32	0.28	0.18	1.29	1.11	0.72
37	Caserta	ITF31	0.16	0.12	0.08	0.44	0.36	0.23	1.77	1.43	0.94
38	Avellino	ITF34	0.17	0.16	0.11	0.49	0.45	0.32	1.98	1.80	1.27
39	Crotone	ITF62	0.24	0.23	0.16	0.68	0.66	0.45	2.71	2.63	1.81
40	Olt	RO414	0.23	0.19	0.07	0.67	0.55	0.20	2.66	2.20	0.82
41	Perugia	ITI21	0.27	0.27	0.20	0.76	0.76	0.57	3.04	3.04	2.26
42	Kentrikos Tomeas Athinon	EL303	0.19	0.19	0.09	0.55	0.54	0.27	2.19	2.14	1.07
43	Ileia	EL633	0.57	0.49	0.24	1.63	1.41	0.68	6.54	5.63	2.72
44	Roma	ITI43	0.11	0.10	0.07	0.31	0.28	0.21	1.24	1.13	0.83
45	L'Aquila	ITF11	0.30	0.29	0.20	0.86	0.82	0.58	3.45	3.26	2.33
46	Isernia	ITF21	0.19	0.19	0.15	0.55	0.54	0.43	2.21	2.15	1.70
47	Sibiu	RO126	0.12	0.09	0.04	0.33	0.24	0.12	1.33	0.97	0.49
48	Salerno	ITF35	0.09	0.09	0.06	0.26	0.25	0.16	1.06	1.00	0.65
49	Reggio nell'Emilia	ITH53	0.30	0.30	0.20	0.85	0.85	0.57	3.41	3.41	2.28
50	Palermo	ITG12	0.07	0.07	0.05	0.20	0.19	0.15	0.81	0.75	0.59

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 2.1 10%	Sub-scenario 2.2 20%	100%	Sub-scenario 2.1 10%	Sub-scenario 2.2 20%	100%	Sub-scenario 2.1 10%	Sub-scenario 2.2 20%	100%
51	Notios Tomeas Athinon	EL304	0.38	0.36	0.15	1.08	1.02	0.44	4.33	4.08	1.75
52	Silistra	BG325	0.40	0.33	0.18	1.15	0.95	0.50	4.62	3.80	2.01
53	Zakynthos	EL621	0.63	0.54	0.24	1.79	1.54	0.68	7.16	6.17	2.73
54	Ragusa	ITG18	0.16	0.14	0.10	0.45	0.41	0.28	1.80	1.64	1.13
55	Fokida	EL645	0.50	0.41	0.22	1.44	1.17	0.62	5.74	4.66	2.48
56	Aitoloakarnania	EL631	0.45	0.37	0.18	1.28	1.04	0.50	5.12	4.18	2.01
57	Larisa	EL612	0.41	0.34	0.15	1.16	0.98	0.44	4.65	3.94	1.76
58	Caltanissetta	ITG15	0.13	0.12	0.07	0.36	0.33	0.21	1.43	1.34	0.83
59	Florina	EL533	0.14	0.12	0.06	0.41	0.34	0.17	1.64	1.36	0.67
60	Ruse	BG323	0.30	0.28	0.15	0.84	0.80	0.42	3.38	3.19	1.67
61	Lesvos, Limnos	EL411	0.42	0.41	0.19	1.20	1.18	0.55	4.80	4.73	2.20
62	Enna	ITG16	0.11	0.11	0.07	0.32	0.32	0.20	1.29	1.29	0.79
63	Torino	ITC11	0.05	0.05	0.04	0.13	0.13	0.11	0.53	0.52	0.43
64	Plovdiv	BG421	0.23	0.18	0.08	0.67	0.52	0.23	2.68	2.06	0.92
65	Ravenna	ITH57	0.36	0.31	0.21	1.02	0.88	0.61	4.07	3.53	2.43
66	Kastoria	EL532	0.11	0.10	0.05	0.31	0.28	0.15	1.23	1.13	0.61
67	Firenze	ITI14	0.15	0.13	0.10	0.42	0.39	0.29	1.68	1.54	1.15
68	Potenza	ITF51	0.17	0.16	0.11	0.49	0.45	0.31	1.95	1.82	1.22
69	Lefkada	EL624	0.61	0.54	0.23	1.75	1.55	0.67	7.00	6.18	2.69
70	Parma	ITH52	0.25	0.25	0.17	0.71	0.71	0.49	2.85	2.85	1.98
71	Lakonia, Messinia	EL653	0.53	0.46	0.22	1.51	1.30	0.62	6.05	5.21	2.47
72	Fthiotida	EL644	0.37	0.31	0.15	1.07	0.87	0.42	4.27	3.49	1.69
73	Pazardzhik	BG423	0.12	0.12	0.06	0.35	0.33	0.17	1.39	1.32	0.67
74	Ferrara	ITH56	0.32	0.28	0.20	0.92	0.81	0.57	3.67	3.26	2.28
75	Stara Zagora	BG344	0.09	0.09	0.05	0.27	0.25	0.15	1.07	1.00	0.58
76	Razgrad	BG324	0.29	0.27	0.13	0.84	0.77	0.37	3.35	3.07	1.47
77	Korinthia	EL652	0.49	0.43	0.21	1.40	1.22	0.60	5.59	4.89	2.41
78	Arta, Preveza	EL541	0.50	0.44	0.21	1.43	1.27	0.60	5.72	5.07	2.41
79	Pescara	ITF13	0.14	0.13	0.08	0.41	0.38	0.24	1.65	1.51	0.97
80	Ikaria, Samos	EL412	0.41	0.35	0.17	1.17	1.01	0.49	4.67	4.02	1.95
81	Lodi	ITC49	0.17	0.14	0.10	0.48	0.40	0.28	1.94	1.62	1.14
82	Thessaloniki	EL522	0.21	0.20	0.09	0.59	0.56	0.26	2.37	2.23	1.02
83	Agrigento	ITG14	0.07	0.07	0.05	0.21	0.20	0.14	0.83	0.82	0.54
84	Rodopi	EL513	0.13	0.11	0.05	0.38	0.32	0.13	1.52	1.27	0.54
85	Forlì-Cesena	ITH58	0.27	0.25	0.18	0.77	0.71	0.51	3.07	2.82	2.06
86	Ithaki, Kefallinia	EL623	0.52	0.44	0.17	1.50	1.27	0.49	5.98	5.08	1.98
87	Brescia	ITC47	0.15	0.14	0.09	0.42	0.39	0.27	1.69	1.55	1.07
88	Mantova	ITC4B	0.24	0.20	0.13	0.70	0.56	0.37	2.80	2.26	1.47
89	Ioannina	EL543	0.41	0.32	0.15	1.17	0.91	0.43	4.67	3.62	1.71
90	Treviso	ITH34	0.22	0.19	0.12	0.63	0.55	0.35	2.50	2.21	1.42
91	Grevena, Kozani	EL531	0.14	0.11	0.05	0.39	0.32	0.15	1.56	1.29	0.61
92	Cremona	ITC4A	0.21	0.18	0.11	0.61	0.50	0.33	2.44	2.01	1.30
93	Irakleio	EL431	0.54	0.42	0.21	1.53	1.19	0.60	6.14	4.76	2.40
94	Evros	EL511	0.20	0.17	0.07	0.58	0.48	0.20	2.34	1.92	0.81
95	Matera	ITF52	0.10	0.08	0.05	0.29	0.23	0.16	1.15	0.93	0.63
96	Haskovo	BG422	0.11	0.11	0.06	0.33	0.31	0.17	1.31	1.25	0.67
97	Kerkyra	EL622	0.36	0.32	0.16	1.02	0.90	0.47	4.08	3.60	1.88
98	Chios	EL413	0.35	0.29	0.14	1.00	0.84	0.39	3.99	3.35	1.57
99	Campobasso	ITF22	0.12	0.12	0.09	0.34	0.34	0.24	1.37	1.37	0.97
100	Vicenza	ITH32	0.15	0.15	0.10	0.43	0.43	0.29	1.74	1.71	1.16

Table B. 9. Scenario 2 – energy efficiency upgrading: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	**ID**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
			10%	**20%**		**10%**	**20%**		**10%**	**20%**	
1	Buzău	RO222	0.77	0.71	0.59	2.20	2.03	1.69	8.80	8.12	6.76
2	Bucureşti	RO321	0.71	0.67	0.57	2.02	1.92	1.63	8.07	7.70	6.53
3	Vrancea	RO226	0.77	0.73	0.59	2.21	2.08	1.69	8.83	8.31	6.77
4	Galați	RO224	0.78	0.75	0.60	2.22	2.13	1.70	8.88	8.54	6.81
5	Prahova	RO316	0.80	0.73	0.60	2.28	2.09	1.72	9.13	8.38	6.88
6	Braşov	RO122	0.95	0.93	0.74	2.73	2.65	2.13	10.91	10.61	8.50
7	Brăila	RO221	0.72	0.67	0.56	2.05	1.92	1.61	8.19	7.68	6.42
8	Bacău	RO211	0.85	0.79	0.63	2.44	2.26	1.79	9.74	9.03	7.17
9	Covasna	RO123	1.03	1.00	0.82	2.95	2.85	2.36	11.81	11.40	9.43
10	Napoli	ITF33	0.24	0.23	0.19	0.69	0.67	0.56	2.77	2.68	2.22
11	Vaslui	RO216	1.01	1.00	0.84	2.90	2.86	2.41	11.60	11.43	9.65
12	Ialomița	RO315	0.65	0.60	0.52	1.86	1.70	1.48	7.44	6.81	5.90
13	Catania	ITG17	0.23	0.22	0.18	0.67	0.64	0.50	2.68	2.54	2.02
14	Catanzaro	ITF63	0.23	0.22	0.17	0.65	0.63	0.47	2.61	2.50	1.89
15	Neamț	RO214	0.91	0.87	0.71	2.60	2.48	2.02	10.40	9.90	8.09
16	Reggio di Calabria	ITF65	0.20	0.19	0.15	0.56	0.54	0.43	2.23	2.15	1.71
17	Dâmbovița	RO313	0.68	0.65	0.55	1.94	1.85	1.58	7.76	7.41	6.32
18	Bologna	ITH55	0.42	0.42	0.34	1.20	1.20	0.98	4.82	4.78	3.91
19	Argeş	RO311	0.75	0.71	0.58	2.15	2.03	1.67	8.61	8.13	6.67
20	Cosenza	ITF61	0.23	0.23	0.18	0.67	0.66	0.52	2.67	2.65	2.07
21	Teleorman	RO317	0.82	0.78	0.68	2.34	2.23	1.96	9.38	8.90	7.82
22	Călăraşi	RO312	0.61	0.57	0.49	1.74	1.63	1.40	6.94	6.50	5.62
23	Achaia	EL632	0.43	0.37	0.22	1.22	1.05	0.62	4.88	4.20	2.48
24	Tulcea	RO225	0.61	0.60	0.51	1.75	1.70	1.44	6.99	6.81	5.77
25	Foggia	ITF46	0.25	0.25	0.20	0.72	0.71	0.57	2.89	2.83	2.27
26	Iaşi	RO213	0.89	0.81	0.69	2.54	2.31	1.98	10.18	9.26	7.91
27	Harghita	RO124	1.09	1.06	0.89	3.10	3.04	2.55	12.42	12.14	10.22
28	Giurgiu	RO314	0.59	0.55	0.47	1.68	1.58	1.35	6.73	6.31	5.40
29	Messina	ITG13	0.21	0.20	0.16	0.61	0.59	0.46	2.45	2.34	1.85
30	Vibo Valentia	ITF64	0.18	0.17	0.13	0.51	0.48	0.38	2.04	1.93	1.52
31	Benevento	ITF32	0.26	0.25	0.20	0.74	0.71	0.56	2.96	2.84	2.25
32	Milano	ITC4C	0.42	0.39	0.32	1.19	1.11	0.91	4.78	4.42	3.63
33	Siracusa	ITG19	0.19	0.18	0.14	0.54	0.51	0.40	2.15	2.03	1.62
34	Modena	ITH54	0.42	0.42	0.35	1.19	1.19	1.00009	4.78	4.78	4.00
35	Constanța	RO223	0.53	0.48	0.37	1.51	1.37	1.06	6.02	5.50	4.26
36	Barletta-Andria-Trani	ITF48	0.27	0.25	0.20	0.76	0.71	0.57	3.05	2.84	2.28
37	Caserta	ITF31	0.26	0.25	0.21	0.75	0.71	0.59	3.00	2.86	2.35
38	Avellino	ITF34	0.26	0.24	0.19	0.74	0.68	0.53	2.96	2.70	2.13
39	Crotone	ITF62	0.15	0.14	0.10	0.43	0.40	0.30	1.71	1.60	1.19
40	Olt	RO414	0.60	0.57	0.49	1.71	1.63	1.41	6.86	6.53	5.64
41	Perugia	ITI21	0.39	0.39	0.31	1.13	1.13	0.89	4.51	4.51	3.57
42	Kentrikos Tomeas Athinon	EL303	0.36	0.35	0.24	1.02	0.996	0.67	4.07	3.98	2.70
43	Ileia	EL633	0.23	0.22	0.15	0.67	0.63	0.42	2.67	2.53	1.69
44	Roma	ITI43	0.29	0.26	0.21	0.82	0.76	0.60	3.29	3.03	2.39
45	L'Aquila	ITF11	0.30	0.30	0.23	0.87	0.87	0.65	3.47	3.46	2.59
46	Isernia	ITF21	0.29	0.29	0.23	0.82	0.82	0.65	3.30	3.30	2.61
47	Sibiu	RO126	0.82	0.80	0.68	2.35	2.30	1.95	9.40	9.18	7.82
48	Salerno	ITF35	0.24	0.23	0.18	0.68	0.65	0.52	2.73	2.59	2.08
49	Reggio nell'Emilia	ITH53	0.44	0.44	0.36	1.25	1.25	1.02	5.01	5.01	4.10
50	Palermo	ITG12	0.22	0.22	0.17	0.64	0.63	0.48	2.55	2.51	1.93

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
51	Notios Tomeas Athinon	EL304	0.36	0.33	0.19	1.04	0.95	0.55	4.17	3.81	2.21
52	Silistra	BG325	0.37	0.36	0.30	1.07	1.04	0.87	4.28	4.17	3.48
53	Zakynthos	EL621	0.23	0.22	0.15	0.66	0.64	0.42	2.64	2.56	1.69
54	Ragusa	ITG18	0.15	0.14	0.11	0.43	0.40	0.33	1.72	1.61	1.30
55	Fokida	EL645	0.30	0.29	0.21	0.86	0.82	0.59	3.43	3.29	2.37
56	Aitoloakarnania	EL631	0.28	0.27	0.18	0.80	0.76	0.51	3.20	3.04	2.02
57	Larisa	EL612	0.51	0.48	0.26	1.45	1.36	0.74	5.80	5.43	2.95
58	Caltanissetta	ITG15	0.18	0.18	0.14	0.50	0.50	0.41	2.02	2.02	1.63
59	Florina	EL533	0.71	0.68	0.42	2.03	1.96	1.21	8.12	7.83	4.84
60	Ruse	BG323	0.35	0.34	0.27	1.01	0.97	0.77	4.03	3.88	3.08
61	Lesvos, Limnos	EL411	0.22	0.21	0.16	0.63	0.60	0.44	2.52	2.40	1.78
62	Enna	ITG16	0.21	0.21	0.18	0.60	0.60	0.51	2.42	2.42	2.02
63	Torino	ITC11	0.67	0.64	0.50	1.91	1.83	1.43	7.64	7.34	5.72
64	Plovdiv	BG421	0.35	0.34	0.26	1.00	0.96	0.73	3.99	3.86	2.92
65	Ravenna	ITH57	0.34	0.31	0.26	0.98	0.90	0.74	3.90	3.59	2.95
66	Kastoria	EL532	0.67	0.65	0.43	1.91	1.85	1.22	7.64	7.39	4.87
67	Firenze	ITI14	0.35	0.35	0.29	1.01	1.01	0.83	4.05	4.04	3.32
68	Potenza	ITF51	0.28	0.27	0.21	0.80	0.78	0.60	3.21	3.12	2.41
69	Lefkada	EL624	0.18	0.17	0.11	0.50	0.49	0.31	2.02	1.95	1.25
70	Parma	ITH52	0.43	0.43	0.34	1.22	1.22	0.97	4.87	4.87	3.87
71	Lakonia, Messinia	EL653	0.24	0.23	0.16	0.70	0.67	0.46	2.79	2.68	1.83
72	Fthiotida	EL644	0.36	0.35	0.23	1.04	1.00	0.65	4.16	4.02	2.61
73	Pazardzhik	BG423	0.43	0.42	0.32	1.24	1.20	0.92	4.97	4.79	3.69
74	Ferrara	ITH56	0.34	0.31	0.26	0.96	0.89	0.76	3.84	3.55	3.02
75	Stara Zagora	BG344	0.29	0.28	0.22	0.83	0.80	0.64	3.34	3.22	2.57
76	Razgrad	BG324	0.35	0.33	0.28	0.99	0.95	0.79	3.96	3.82	3.17
77	Korinthia	EL652	0.26	0.24	0.14	0.73	0.68	0.41	2.93	2.72	1.63
78	Arta, Preveza	EL541	0.30	0.29	0.20	0.85	0.82	0.56	3.39	3.29	2.23
79	Pescara	ITF13	0.31	0.29	0.23	0.87	0.84	0.66	3.50	3.36	2.65
80	Ikaria, Samos	EL412	0.18	0.18	0.12	0.51	0.50	0.35	2.04	2.01	1.42
81	Lodi	ITC49	0.43	0.39	0.32	1.22	1.12	0.91	4.87	4.47	3.65
82	Thessaloniki	EL522	0.50	0.46	0.27	1.42	1.30	0.77	5.67	5.21	3.09
83	Agrigento	ITG14	0.16	0.16	0.13	0.45	0.45	0.36	1.80	1.80	1.43
84	Rodopi	EL513	0.52	0.50	0.32	1.49	1.42	0.92	5.98	5.67	3.70
85	Forlì-Cesena	ITH58	0.39	0.38	0.30	1.12	1.09	0.86	4.50	4.34	3.43
86	Ithaki, Kefallinia	EL623	0.18	0.17	0.11	0.51	0.48	0.31	2.03	1.93	1.24
87	Brescia	ITC47	0.55	0.54	0.42	1.58	1.55	1.19	6.31	6.21	4.77
88	Mantova	ITC4B	0.43	0.40	0.33	1.21	1.13	0.94	4.86	4.53	3.76
89	Ioannina	EL543	0.46	0.44	0.26	1.31	1.27	0.73	5.24	5.06	2.93
90	Treviso	ITH34	0.39	0.37	0.29	1.12	1.06	0.83	4.49	4.24	3.33
91	Grevena, Kozani	EL531	0.56	0.55	0.32	1.61	1.56	0.92	6.45	6.23	3.68
92	Cremona	ITC4A	0.43	0.40	0.34	1.23	1.14	0.96	4.91	4.57	3.85
93	Irakleio	EL431	0.23	0.22	0.13	0.66	0.63	0.36	2.63	2.52	1.45
94	Evros	EL511	0.39	0.37	0.24	1.10	1.06	0.68	4.41	4.26	2.72
95	Matera	ITF52	0.28	0.28	0.22	0.80	0.79	0.62	3.19	3.15	2.49
96	Haskovo	BG422	0.28	0.26	0.20	0.80	0.74	0.56	3.19	2.95	2.26
97	Kerkyra	EL622	0.17	0.16	0.11	0.50	0.47	0.33	1.99	1.88	1.31
98	Chios	EL413	0.22	0.20	0.14	0.61	0.58	0.40	2.46	2.33	1.60
99	Campobasso	ITF22	0.23	0.23	0.18	0.67	0.67	0.51	2.66	2.66	2.04
100	Vicenza	ITH32	0.49	0.49	0.37	1.39	1.39	1.06	5.57	5.56	4.25

Table B. 10. Scenario 2 – integrated renovation: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
1	Buzău	RO222	1.16	1.03	0.68	3.32	2.94	1.93	13.30	11.74	7.72
2	Bucureşti	RO321	0.94	0.91	0.64	2.67	2.59	1.82	10.69	10.35	7.29
3	Vrancea	RO226	1.03	0.97	0.65	2.94	2.77	1.85	11.77	11.07	7.42
4	Galați	RO224	0.88	0.82	0.59	2.52	2.34	1.69	10.07	9.37	6.76
5	Prahova	RO316	1.06	0.97	0.61	3.02	2.78	1.75	12.09	11.11	7.01
6	Braşov	RO122	1.09	0.94	0.72	3.11	2.68	2.05	12.44	10.71	8.20
7	Brăila	RO221	0.87	0.79	0.56	2.48	2.25	1.61	9.93	9.00	6.45
8	Bacău	RO211	0.96	0.88	0.60	2.73	2.52	1.71	10.93	10.07	6.85
9	Covasna	RO123	1.07	0.98	0.76	3.07	2.80	2.17	12.27	11.18	8.69
10	Napoli	ITF33	0.27	0.24	0.20	0.77	0.68	0.57	3.07	2.73	2.29
11	Vaslui	RO216	0.88	0.84	0.69	2.51	2.41	1.98	10.05	9.65	7.94
12	Ialomița	RO315	0.77	0.70	0.52	2.19	2.01	1.49	8.76	8.03	5.96
13	Catania	ITG17	0.32	0.29	0.24	0.91	0.83	0.68	3.65	3.34	2.72
14	Catanzaro	ITF63	0.34	0.33	0.26	0.99	0.95	0.74	3.94	3.82	2.97
15	Neamț	RO214	0.79	0.76	0.59	2.26	2.16	1.68	9.04	8.66	6.71
16	Reggio di Calabria	ITF65	0.34	0.31	0.25	0.97	0.90	0.70	3.90	3.59	2.81
17	Dâmbovița	RO313	0.76	0.68	0.50	2.17	1.95	1.43	8.70	7.82	5.72
18	Bologna	ITH55	0.48	0.47	0.36	1.38	1.34	1.04	5.52	5.34	4.17
19	Argeş	RO311	0.71	0.68	0.51	2.04	1.95	1.45	8.16	7.78	5.80
20	Cosenza	ITF61	0.32	0.31	0.25	0.90	0.88	0.70	3.60	3.52	2.81
21	Teleorman	RO317	0.70	0.66	0.56	1.99	1.89	1.59	7.95	7.58	6.37
22	Călăraşi	RO312	0.65	0.60	0.46	1.85	1.72	1.30	7.39	6.89	5.20
23	Achaia	EL632	0.64	0.56	0.32	1.83	1.61	0.92	7.32	6.45	3.70
24	Tulcea	RO225	0.53	0.50	0.42	1.52	1.44	1.20	6.07	5.75	4.82
25	Foggia	ITF46	0.29	0.27	0.23	0.82	0.77	0.66	3.30	3.07	2.64
26	Iaşi	RO213	0.70	0.67	0.54	2.01	1.91	1.56	8.03	7.63	6.22
27	Harghita	RO124	0.91	0.85	0.71	2.60	2.42	2.03	10.40	9.68	8.12
28	Giurgiu	RO314	0.60	0.56	0.42	1.72	1.60	1.21	6.88	6.39	4.83
29	Messina	ITG13	0.29	0.27	0.21	0.83	0.77	0.61	3.31	3.07	2.42
30	Vibo Valentia	ITF64	0.30	0.28	0.21	0.85	0.81	0.61	3.41	3.25	2.44
31	Benevento	ITF32	0.29	0.26	0.22	0.82	0.76	0.62	3.28	3.03	2.50
32	Milano	ITC4C	0.34	0.32	0.26	0.98	0.90	0.74	3.93	3.61	2.98
33	Siracusa	ITG19	0.25	0.23	0.18	0.73	0.65	0.52	2.91	2.60	2.10
34	Modena	ITH54	0.50	0.50	0.38	1.43	1.43	1.10	5.73	5.73	4.40
35	Constanța	RO223	0.43	0.41	0.31	1.22	1.18	0.89	4.88	4.72	3.57
36	Barletta-Andria-Trani	ITF48	0.26	0.23	0.19	0.73	0.66	0.53	2.93	2.66	2.12
37	Caserta	ITF31	0.28	0.25	0.20	0.80	0.70	0.57	3.20	2.81	2.30
38	Avellino	ITF34	0.29	0.25	0.20	0.82	0.72	0.58	3.27	2.87	2.33
39	Crotone	ITF62	0.23	0.22	0.17	0.66	0.64	0.49	2.64	2.56	1.95
40	Olt	RO414	0.53	0.50	0.41	1.52	1.42	1.17	6.08	5.69	4.66
41	Perugia	ITI21	0.45	0.45	0.35	1.29	1.29	0.996	5.14	5.14	3.98
42	Kentrikos Tomeas Athinon	EL303	0.38	0.34	0.23	1.07	0.96	0.66	4.29	3.83	2.63
43	Ileia	EL633	0.50	0.44	0.25	1.43	1.25	0.71	5.71	5.02	2.86
44	Roma	ITI43	0.28	0.26	0.20	0.79	0.73	0.57	3.17	2.93	2.26
45	L'Aquila	ITF11	0.38	0.37	0.29	1.08	1.06	0.83	4.30	4.26	3.30
46	Isernia	ITF21	0.32	0.32	0.26	0.91	0.91	0.74	3.64	3.64	2.94
47	Sibiu	RO126	0.63	0.62	0.53	1.80	1.76	1.52	7.21	7.04	6.08
48	Salerno	ITF35	0.23	0.21	0.17	0.65	0.59	0.48	2.61	2.37	1.92
49	Reggio nell'Emilia	ITH53	0.50	0.50	0.38	1.43	1.43	1.10	5.73	5.73	4.38
50	Palermo	ITG12	0.21	0.20	0.16	0.59	0.56	0.44	2.37	2.25	1.77

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
51	Notios Tomeas Athinon	EL304	0.47	0.44	0.23	1.35	1.25	0.67	5.39	5.01	2.67
52	Silistra	BG325	0.47	0.42	0.33	1.34	1.21	0.94	5.35	4.83	3.77
53	Zakynthos	EL621	0.53	0.48	0.25	1.51	1.37	0.72	6.03	5.46	2.87
54	Ragusa	ITG18	0.20	0.19	0.14	0.56	0.54	0.41	2.25	2.15	1.63
55	Fokida	EL645	0.50	0.45	0.28	1.42	1.30	0.81	5.68	5.19	3.23
56	Aitoloakarnania	EL631	0.45	0.40	0.24	1.29	1.14	0.67	5.16	4.57	2.69
57	Larisa	EL612	0.54	0.51	0.28	1.55	1.46	0.81	6.20	5.83	3.23
58	Caltanissetta	ITG15	0.19	0.19	0.15	0.56	0.55	0.43	2.22	2.22	1.70
59	Florina	EL533	0.61	0.57	0.35	1.73	1.64	1.00	6.93	6.56	3.98
60	Ruse	BG323	0.39	0.38	0.29	1.12	1.09	0.82	4.49	4.35	3.27
61	Lesvos, Limnos	EL411	0.40	0.39	0.23	1.15	1.12	0.66	4.59	4.46	2.62
62	Enna	ITG16	0.22	0.22	0.17	0.64	0.64	0.49	2.56	2.56	1.97
63	Torino	ITC11	0.52	0.50	0.39	1.49	1.42	1.12	5.97	5.68	4.49
64	Plovdiv	BG421	0.33	0.32	0.24	0.95	0.92	0.68	3.79	3.68	2.71
65	Ravenna	ITH57	0.46	0.41	0.32	1.32	1.16	0.91	5.26	4.63	3.63
66	Kastoria	EL532	0.55	0.54	0.35	1.57	1.53	0.99	6.28	6.12	3.97
67	Firenze	ITI14	0.35	0.34	0.27	1.00	0.97	0.78	3.99	3.87	3.14
68	Potenza	ITF51	0.30	0.28	0.22	0.86	0.80	0.63	3.45	3.20	2.51
69	Lefkada	EL624	0.48	0.44	0.22	1.37	1.26	0.63	5.49	5.05	2.52
70	Parma	ITH52	0.46	0.46	0.35	1.32	1.32	1.01	5.30	5.30	4.03
71	Lakonia, Messinia	EL653	0.48	0.43	0.25	1.36	1.23	0.71	5.43	4.93	2.82
72	Fthiotida	EL644	0.47	0.42	0.26	1.35	1.20	0.73	5.40	4.81	2.94
73	Pazardzhik	BG423	0.36	0.35	0.27	1.03	0.99	0.78	4.11	3.96	3.13
74	Ferrara	ITH56	0.44	0.38	0.31	1.25	1.10	0.90	5.01	4.39	3.59
75	Stara Zagora	BG344	0.25	0.25	0.20	0.72	0.70	0.56	2.88	2.81	2.25
76	Razgrad	BG324	0.38	0.36	0.28	1.08	1.02	0.81	4.32	4.08	3.22
77	Korinthia	EL652	0.46	0.41	0.23	1.33	1.17	0.66	5.31	4.68	2.63
78	Arta, Preveza	EL541	0.51	0.44	0.27	1.47	1.26	0.77	5.88	5.05	3.08
79	Pescara	ITF13	0.31	0.29	0.22	0.89	0.83	0.63	3.55	3.31	2.53
80	Ikaria, Samos	EL412	0.37	0.33	0.19	1.06	0.95	0.55	4.25	3.79	2.21
81	Lodi	ITC49	0.40	0.36	0.30	1.15	1.03	0.85	4.61	4.11	3.38
82	Thessaloniki	EL522	0.46	0.43	0.25	1.31	1.24	0.72	5.24	4.97	2.90
83	Agrigento	ITG14	0.16	0.16	0.12	0.46	0.45	0.35	1.82	1.82	1.38
84	Rodopi	EL513	0.46	0.42	0.27	1.30	1.21	0.76	5.22	4.84	3.06
85	Forlì-Cesena	ITH58	0.45	0.41	0.33	1.29	1.18	0.94	5.15	4.73	3.76
86	Ithaki, Kefallinia	EL623	0.43	0.39	0.18	1.24	1.10	0.52	4.95	4.41	2.09
87	Brescia	ITC47	0.50	0.47	0.36	1.42	1.35	1.04	5.68	5.41	4.17
88	Mantova	ITC4B	0.46	0.41	0.32	1.31	1.16	0.91	5.26	4.64	3.66
89	Ioannina	EL543	0.51	0.48	0.28	1.47	1.38	0.79	5.87	5.53	3.18
90	Treviso	ITH34	0.42	0.38	0.29	1.20	1.08	0.83	4.81	4.32	3.30
91	Grevena, Kozani	EL531	0.49	0.47	0.27	1.41	1.34	0.77	5.65	5.37	3.08
92	Cremona	ITC4A	0.44	0.39	0.32	1.27	1.12	0.91	5.09	4.49	3.62
93	Irakleio	EL431	0.44	0.40	0.22	1.24	1.14	0.62	4.98	4.57	2.50
94	Evros	EL511	0.40	0.37	0.22	1.14	1.05	0.62	4.56	4.20	2.50
95	Matera	ITF52	0.27	0.25	0.19	0.76	0.70	0.55	3.04	2.80	2.22
96	Haskovo	BG422	0.23	0.23	0.18	0.66	0.65	0.52	2.66	2.60	2.07
97	Kerkyra	EL622	0.32	0.30	0.18	0.92	0.85	0.52	3.70	3.41	2.08
98	Chios	EL413	0.36	0.32	0.19	1.01	0.92	0.53	4.06	3.69	2.12
99	Campobasso	ITF22	0.24	0.24	0.18	0.70	0.70	0.52	2.79	2.79	2.09
100	Vicenza	ITH32	0.45	0.45	0.34	1.29	1.27	0.96	5.15	5.09	3.83

Table B. 11. Scenario 2 – seismic retrofit: benefit in terms of average annual economic loss (Δ*AAEL*), average annual loss of life (Δ*AALL*), average annual energy consumption (Δ*AAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.12 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Δ*AAEL* (10^6 €)			Δ*AALL* (fatalities)			Δ*AAEC* (GWh)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
1	Buzău	RO222	7.88	9.40	15.96	2.0	2.3	3.7	–	–	–
2	București	RO321	35.64	40.90	63.72	22.3	23.6	33.3	–	–	–
3	Vrancea	RO226	4.65	5.89	10.84	1.2	1.4	2.4	–	–	–
4	Galați	RO224	3.34	4.15	8.35	1.4	1.6	2.9	–	–	–
5	Prahova	RO316	9.54	11.42	19.12	2.8	3.2	5.0	–	–	–
6	Brașov	RO122	6.96	9.20	12.09	2.0	2.7	3.9	–	–	–
7	Brăila	RO221	2.06	2.61	5.17	0.7	0.8	1.6	–	–	–
8	Bacău	RO211	6.20	7.32	11.15	2.1	2.3	3.2	–	–	–
9	Covasna	RO123	3.17	3.34	4.09	0.9	1.0	1.1	–	–	–
10	Napoli	ITF33	17.11	31.45	101.51	1.3	2.3	7.3	–	–	–
11	Vaslui	RO216	0.75	1.08	2.57	0.3	0.3	0.9	–	–	–
12	Ialomița	RO315	2.27	2.76	4.78	0.6	0.7	1.2	–	–	–
13	Catania	ITG17	16.92	30.04	82.43	0.9	1.6	4.1	–	–	–
14	Catanzaro	ITF63	15.84	20.60	35.81	0.8	1.0	1.7	–	–	–
15	Neamț	RO214	2.07	2.60	4.19	0.5	0.6	1.0	–	–	–
16	Reggio di Calabria	ITF65	7.58	17.42	53.28	0.5	0.9	2.8	–	–	–
17	Dâmbovița	RO313	4.15	4.98	6.66	1.1	1.3	1.5	–	–	–
18	Bologna	ITH55	8.64	18.60	87.46	0.5	0.9	4.0	–	–	–
19	Argeș	RO311	4.08	5.44	6.81	1.0	1.3	1.6	–	–	–
20	Cosenza	ITF61	21.33	27.35	59.49	1.0	1.3	2.7	–	–	–
21	Teleorman	RO317	0.91	1.10	1.98	0.3	0.3	0.5	–	–	–
22	Călărași	RO312	1.66	2.05	3.43	0.4	0.5	0.8	–	–	–
23	Achaia	EL632	10.82	12.63	22.02	1.3	1.4	2.0	–	–	–
24	Tulcea	RO225	0.52	0.65	1.30	0.1	0.1	0.3	–	–	–
25	Foggia	ITF46	17.06	19.77	34.17	0.9	1.0	1.7	–	–	–
26	Iași	RO213	1.18	1.47	2.95	0.4	0.4	0.7	–	–	–
27	Harghita	RO124	1.79	1.88	2.12	0.4	0.5	0.5	–	–	–
28	Giurgiu	RO314	1.39	1.68	2.82	0.3	0.4	0.6	–	–	–
29	Messina	ITG13	18.06	22.10	42.36	0.9	1.1	2.0	–	–	–
30	Vibo Valentia	ITF64	1.94	3.91	12.53	0.1	0.2	0.6	–	–	–
31	Benevento	ITF32	1.85	6.24	15.08	0.1	0.3	0.8	–	–	–
32	Milano	ITC4C	5.69	12.62	66.02	0.2	0.5	2.4	–	–	–
33	Siracusa	ITG19	4.17	14.25	23.59	0.2	0.7	1.0	–	–	–
34	Modena	ITH54	7.93	15.85	68.88	0.4	0.8	3.3	–	–	–
35	Constanța	RO223	2.30	2.49	3.69	0.4	0.5	0.7	–	–	–
36	Barletta-Andria-Trani	ITF48	1.68	2.78	9.37	0.1	0.2	0.5	–	–	–
37	Caserta	ITF31	6.35	17.04	28.81	0.3	0.8	1.4	–	–	–
38	Avellino	ITF34	3.00	5.34	20.18	0.2	0.3	1.0	–	–	–
39	Crotone	ITF62	4.92	6.04	11.30	0.3	0.3	0.6	–	–	–
40	Olt	RO414	1.30	1.68	2.54	0.2	0.3	0.5	–	–	–
41	Perugia	ITI21	6.73	13.46	60.06	0.4	0.8	3.1	–	–	–
42	Kentrikos Tomeas Athinon	EL303	20.94	27.52	38.43	1.8	2.3	2.9	–	–	–
43	Ileia	EL633	2.94	4.28	8.46	0.3	0.4	0.6	–	–	–
44	Roma	ITI43	11.85	31.20	154.92	0.6	1.4	6.4	–	–	–
45	L'Aquila	ITF11	7.76	9.99	25.97	0.4	0.5	1.4	–	–	–
46	Isernia	ITF21	1.25	1.76	5.96	0.1	0.1	0.3	–	–	–
47	Sibiu	RO126	1.20	1.36	1.45	0.2	0.3	0.4	–	–	–
48	Salerno	ITF35	3.45	7.40	24.66	0.2	0.4	1.2	–	–	–
49	Reggio nell'Emilia	ITH53	5.82	11.64	47.69	0.3	0.6	2.2	–	–	–
50	Palermo	ITG12	1.92	11.85	27.65	0.1	0.6	1.2	–	–	–

No.	NUTS-3		ΔAAEL (10[6] €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
51	Notios Tomeas Athinon	EL304	14.25	17.98	28.13	1.4	1.6	2.1	–	–	–
52	Silistra	BG325	1.41	1.73	2.63	0.2	0.2	0.3	–	–	–
53	Zakynthos	EL621	0.89	1.19	2.49	0.1	0.1	0.2	–	–	–
54	Ragusa	ITG18	2.72	4.84	13.71	0.1	0.2	0.6	–	–	–
55	Fokida	EL645	0.43	0.97	2.42	0.0	0.1	0.1	–	–	–
56	Aitoloakarnania	EL631	3.33	4.64	8.72	0.3	0.4	0.7	–	–	–
57	Larisa	EL612	7.68	9.11	11.63	0.7	0.8	1.0	–	–	–
58	Caltanissetta	ITG15	1.20	1.94	8.32	0.1	0.1	0.4	–	–	–
59	Florina	EL533	0.13	0.27	0.61	0.0	0.0	0.1	–	–	–
60	Ruse	BG323	2.70	2.97	4.65	0.3	0.3	0.5	–	–	–
61	Lesvos, Limnos	EL411	1.26	2.13	5.36	0.1	0.1	0.3	–	–	–
62	Enna	ITG16	0.60	1.19	4.89	0.0	0.1	0.2	–	–	–
63	Torino	ITC11	2.32	19.54	38.72	0.1	1.0	1.9	–	–	–
64	Plovdiv	BG421	1.74	2.51	6.12	0.5	0.6	1.4	–	–	–
65	Ravenna	ITH57	8.31	18.62	42.23	0.4	0.8	1.8	–	–	–
66	Kastoria	EL532	0.15	0.27	0.58	0.0	0.0	0.0	–	–	–
67	Firenze	ITI14	5.17	12.79	43.77	0.2	0.6	1.9	–	–	–
68	Potenza	ITF51	2.89	4.71	15.93	0.2	0.3	0.8	–	–	–
69	Lefkada	EL624	0.33	0.83	1.88	0.0	0.0	0.1	–	–	–
70	Parma	ITH52	3.69	7.38	37.01	0.2	0.4	1.7	–	–	–
71	Lakonia, Messinia	EL653	4.53	6.94	14.51	0.4	0.6	1.0	–	–	–
72	Fthiotida	EL644	2.40	3.28	6.01	0.2	0.3	0.4	–	–	–
73	Pazardzhik	BG423	0.85	1.04	2.58	0.1	0.1	0.3	–	–	–
74	Ferrara	ITH56	6.95	17.48	36.06	0.4	0.8	1.7	–	–	–
75	Stara Zagora	BG344	0.56	0.69	1.90	0.1	0.1	0.4	–	–	–
76	Razgrad	BG324	1.20	1.36	2.17	0.1	0.1	0.2	–	–	–
77	Korinthia	EL652	3.38	4.57	8.69	0.3	0.4	0.6	–	–	–
78	Arta, Preveza	EL541	2.69	3.41	6.03	0.2	0.3	0.5	–	–	–
79	Pescara	ITF13	1.60	2.71	12.01	0.1	0.1	0.5	–	–	–
80	Ikaria, Samos	EL412	0.42	0.93	2.36	0.0	0.1	0.1	–	–	–
81	Lodi	ITC49	1.97	4.77	9.62	0.1	0.2	0.5	–	–	–
82	Thessaloniki	EL522	15.16	19.18	29.03	1.5	1.7	2.4	–	–	–
83	Agrigento	ITG14	0.95	2.06	9.12	0.1	0.1	0.5	–	–	–
84	Rodopi	EL513	0.52	0.63	1.06	0.1	0.1	0.1	–	–	–
85	Forlì-Cesena	ITH58	4.57	13.85	32.33	0.2	0.7	1.5	–	–	–
86	Ithaki, Kefallinia	EL623	0.75	1.27	2.30	0.0	0.1	0.1	–	–	–
87	Brescia	ITC47	6.76	19.59	51.45	0.4	1.1	2.7	–	–	–
88	Mantova	ITC4B	5.22	11.25	26.08	0.2	0.4	1.0	–	–	–
89	Ioannina	EL543	2.75	4.22	6.64	0.2	0.3	0.4	–	–	–
90	Treviso	ITH34	8.62	21.51	52.85	0.5	1.1	2.4	–	–	–
91	Grevena, Kozani	EL531	0.89	1.23	2.17	0.1	0.1	0.2	–	–	–
92	Cremona	ITC4A	3.70	8.84	18.71	0.2	0.4	0.8	–	–	–
93	Irakleio	EL431	8.17	11.83	16.89	0.7	0.9	1.2	–	–	–
94	Evros	EL511	1.57	1.83	2.60	0.1	0.1	0.2	–	–	–
95	Matera	ITF52	0.59	1.53	4.38	0.0	0.1	0.2	–	–	–
96	Haskovo	BG422	0.68	0.84	2.19	0.1	0.1	0.3	–	–	–
97	Kerkyra	EL622	1.15	1.85	4.28	0.1	0.2	0.4	–	–	–
98	Chios	EL413	0.35	0.91	1.97	0.0	0.1	0.1	–	–	–
99	Campobasso	ITF22	0.74	1.49	8.58	0.0	0.1	0.4	–	–	–
100	Vicenza	ITH32	5.18	10.59	42.14	0.3	0.6	2.1	–	–	–

Table B. 12. Scenario 2 – energy efficiency upgrading: benefit in terms of average annual economic loss (*ΔAAEL*), average annual loss of life (*ΔAALL*), average annual energy consumption (*ΔAAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.15 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		***ΔAAEL*** **(10^6 €)**			***ΔAALL*** **(fatalities)**			***ΔAAEC*** **(GWh)**		
	Name	**ID**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
			10%	**20%**		**10%**	**20%**		**10%**	**20%**	
1	Buzău	RO222	4.31	8.38	29.44	–	–	–	55.63	108.14	379.85
2	Bucureşti	RO321	82.89	93.06	125.51	–	–	–	1069.55	1200.81	1619.56
3	Vrancea	RO226	2.58	5.10	22.60	–	–	–	33.34	65.82	291.58
4	Galați	RO224	3.85	5.80	24.56	–	–	–	49.72	74.85	316.90
5	Prahova	RO316	7.76	13.85	50.77	–	–	–	100.07	178.73	655.09
6	Braşov	RO122	8.69	10.74	40.04	–	–	–	112.15	138.61	516.66
7	Brăila	RO221	1.97	4.24	14.49	–	–	–	25.37	54.69	186.97
8	Bacău	RO211	5.28	9.23	38.72	–	–	–	68.13	119.08	499.59
9	Covasna	RO123	3.04	4.40	16.77	–	–	–	39.24	56.80	216.33
10	Napoli	ITF33	34.58	92.65	256.87	–	–	–	362.11	970.15	2689.64
11	Vaslui	RO216	2.71	4.98	23.34	–	–	–	34.93	64.30	301.11
12	Ialomița	RO315	1.91	3.99	13.19	–	–	–	24.66	51.49	170.16
13	Catania	ITG17	12.82	27.81	100.63	–	–	–	134.24	291.15	1053.69
14	Catanzaro	ITF63	2.82	6.65	31.76	–	–	–	29.50	69.67	332.56
15	Neamț	RO214	5.24	8.29	34.89	–	–	–	67.60	106.99	450.19
16	Reggio di Calabria	ITF65	8.23	12.86	43.75	–	–	–	86.21	134.67	458.06
17	Dâmbovița	RO313	4.85	7.13	30.04	–	–	–	62.59	91.95	387.67
18	Bologna	ITH55	15.80	38.16	199.67	–	–	–	165.46	399.55	2090.79
19	Argeş	RO311	6.25	10.67	39.14	–	–	–	80.66	137.66	505.10
20	Cosenza	ITF61	7.50	17.73	71.24	–	–	–	78.53	185.66	745.94
21	Teleorman	RO317	2.93	5.85	20.09	–	–	–	37.86	75.53	259.25
22	Călăraşi	RO312	1.75	3.69	13.72	–	–	–	22.62	47.58	176.99
23	Achaia	EL632	7.41	10.83	21.74	–	–	–	77.84	113.82	228.46
24	Tulcea	RO225	1.53	2.45	10.23	–	–	–	19.76	31.61	131.96
25	Foggia	ITF46	5.05	14.78	59.58	–	–	–	52.83	154.81	623.87
26	Iaşi	RO213	8.51	14.99	47.62	–	–	–	109.87	193.46	614.40
27	Harghita	RO124	4.59	6.92	29.01	–	–	–	59.29	89.32	374.27
28	Giurgiu	RO314	1.87	3.62	13.55	–	–	–	24.15	46.72	174.86
29	Messina	ITG13	5.34	13.73	54.93	–	–	–	55.92	143.73	575.18
30	Vibo Valentia	ITF64	1.64	2.83	10.79	–	–	–	17.17	29.59	112.94
31	Benevento	ITF32	3.66	8.99	30.01	–	–	–	38.36	94.16	314.19
32	Milano	ITC4C	42.58	105.60	606.75	–	–	–	445.88	1105.74	6353.26
33	Siracusa	ITG19	3.54	7.82	31.34	–	–	–	37.09	81.90	328.20
34	Modena	ITH54	12.77	25.53	142.55	–	–	–	133.67	267.34	1492.64
35	Constanța	RO223	5.11	9.09	28.01	–	–	–	65.91	117.35	361.44
36	Barletta-Andria-Trani	ITF48	3.20	10.92	37.09	–	–	–	33.51	114.34	388.34
37	Caserta	ITF31	13.35	25.45	90.26	–	–	–	139.76	266.46	945.10
38	Avellino	ITF34	6.12	15.80	42.30	–	–	–	64.04	165.46	442.91
39	Crotone	ITF62	1.08	2.03	9.27	–	–	–	11.33	21.24	97.07
40	Olt	RO414	3.79	6.21	21.90	–	–	–	48.90	80.17	282.55
41	Perugia	ITI21	12.48	24.95	118.48	–	–	–	130.64	261.28	1240.65
42	Kentrikos Tomeas Athinon	EL303	53.13	84.00	121.23	–	–	–	558.30	882.66	1273.78
43	Ileia	EL633	1.36	2.04	6.57	–	–	–	14.25	21.45	69.02
44	Roma	ITI43	37.95	131.78	554.46	–	–	–	397.42	1379.89	5805.80
45	L'Aquila	ITF11	3.51	7.67	36.01	–	–	–	36.71	80.35	377.11
46	Isernia	ITF21	1.03	2.07	11.44	–	–	–	10.83	21.66	119.76
47	Sibiu	RO126	8.20	9.98	29.22	–	–	–	105.76	128.79	377.01
48	Salerno	ITF35	10.26	29.72	98.15	–	–	–	107.40	311.16	1027.69
49	Reggio nell'Emilia	ITH53	10.69	21.38	107.09	–	–	–	111.94	223.88	1121.31
50	Palermo	ITG12	7.51	20.94	113.30	–	–	–	78.65	219.29	1186.39

No.	NUTS-3		***ΔAAEL*** **(10⁶ €)**			***ΔAALL*** **(fatalities)**			***ΔAAEC*** **(GWh)**		
	Name	**ID**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
			10%	**20%**		**10%**	**20%**		**10%**	**20%**	
51	Notios Tomeas Athinon	EL304	20.82	24.30	44.28	–	–	–	218.79	255.31	465.25
52	Silistra	BG325	0.62	1.01	5.71	–	–	–	9.88	16.04	90.88
53	Zakynthos	EL621	0.23	0.65	1.93	–	–	–	2.37	6.80	20.24
54	Ragusa	ITG18	2.38	5.24	19.80	–	–	–	24.91	54.84	207.31
55	Fokida	EL645	0.62	0.91	2.90	–	–	–	6.47	9.55	30.45
56	Aitoloakarnania	EL631	2.94	3.86	10.95	–	–	–	30.85	40.60	115.10
57	Larisa	EL612	7.18	8.76	24.32	–	–	–	75.45	92.03	255.57
58	Caltanissetta	ITG15	1.54	3.08	20.37	–	–	–	16.12	32.24	213.33
59	Florina	EL533	1.54	2.04	5.49	–	–	–	16.19	21.47	57.65
60	Ruse	BG323	1.12	1.71	10.73	–	–	–	17.77	27.27	170.60
61	Lesvos, Limnos	EL411	1.23	1.76	5.41	–	–	–	12.96	18.51	56.87
62	Enna	ITG16	1.39	2.78	15.66	–	–	–	14.57	29.15	164.00
63	Torino	ITC11	41.03	160.75	640.57	–	–	–	429.60	1683.27	6707.40
64	Plovdiv	BG421	3.50	4.83	24.24	–	–	–	55.67	76.76	385.55
65	Ravenna	ITH57	10.69	26.29	64.03	–	–	–	111.97	275.27	670.48
66	Kastoria	EL532	0.99	2.12	5.78	–	–	–	10.36	22.26	60.69
67	Firenze	ITI14	15.63	38.50	158.61	–	–	–	163.63	403.13	1660.76
68	Potenza	ITF51	4.08	10.63	39.28	–	–	–	42.77	111.29	411.27
69	Lefkada	EL624	0.24	0.35	1.10	–	–	–	2.53	3.67	11.51
70	Parma	ITH52	7.87	15.74	90.49	–	–	–	82.38	164.77	947.53
71	Lakonia, Messinia	EL653	2.07	3.39	13.45	–	–	–	21.73	35.58	141.36
72	Fthiotida	EL644	3.32	4.31	11.60	–	–	–	34.85	45.33	121.86
73	Pazardzhik	BG423	1.84	2.83	17.78	–	–	–	29.31	44.94	282.77
74	Ferrara	ITH56	9.09	24.64	59.83	–	–	–	95.18	258.00	626.46
75	Stara Zagora	BG344	1.37	2.02	10.49	–	–	–	21.82	32.17	166.80
76	Razgrad	BG324	0.60	0.98	5.85	–	–	–	9.51	15.58	92.97
77	Korinthia	EL652	2.31	2.99	7.35	–	–	–	24.25	31.42	77.25
78	Arta, Preveza	EL541	1.58	2.26	6.97	–	–	–	16.59	23.78	73.25
79	Pescara	ITF13	3.93	8.80	41.10	–	–	–	41.12	92.16	430.33
80	Ikaria, Samos	EL412	0.27	0.50	2.14	–	–	–	2.84	5.25	22.44
81	Lodi	ITC49	7.18	17.03	38.66	–	–	–	75.22	178.32	404.85
82	Thessaloniki	EL522	56.14	67.98	109.48	–	–	–	589.93	714.34	1150.31
83	Agrigento	ITG14	2.58	5.23	30.07	–	–	–	27.03	54.80	314.91
84	Rodopi	EL513	2.12	2.92	9.10	–	–	–	22.26	30.65	95.58
85	Forlì-Cesena	ITH58	8.37	21.32	67.39	–	–	–	87.59	223.23	705.67
86	Ithaki, Kefallinia	EL623	0.23	0.55	1.81	–	–	–	2.42	5.77	19.02
87	Brescia	ITC47	31.50	70.09	285.74	–	–	–	329.82	733.94	2992.02
88	Mantova	ITC4B	11.34	29.53	83.08	–	–	–	118.73	309.17	869.95
89	Ioannina	EL543	2.05	3.31	14.25	–	–	–	21.52	34.74	149.74
90	Treviso	ITH34	19.31	52.27	155.23	–	–	–	202.19	547.31	1625.39
91	Grevena, Kozani	EL531	4.92	6.42	16.31	–	–	–	51.67	67.47	171.32
92	Cremona	ITC4A	9.29	27.29	69.10	–	–	–	97.27	285.78	723.55
93	Irakleio	EL431	1.65	3.12	12.79	–	–	–	17.39	32.73	134.35
94	Evros	EL511	2.92	3.82	10.89	–	–	–	30.65	40.19	114.45
95	Matera	ITF52	2.04	5.11	21.79	–	–	–	21.39	53.50	228.21
96	Haskovo	BG422	1.24	1.79	9.15	–	–	–	19.68	28.44	145.49
97	Kerkyra	EL622	1.08	1.42	3.72	–	–	–	11.34	14.97	39.09
98	Chios	EL413	0.66	0.88	2.51	–	–	–	6.90	9.29	26.36
99	Campobasso	ITF22	1.80	3.60	22.45	–	–	–	18.86	37.73	235.08
100	Vicenza	ITH32	20.61	42.91	193.87	–	–	–	215.84	449.33	2030.02

Table B. 13. Scenario 2 – integrated renovation: benefit in terms of average annual economic loss ($\Delta AAEL$), average annual loss of life ($\Delta AALL$), average annual energy consumption ($\Delta AAEC$) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.21 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
1	Buzău	RO222	12.17	17.28	45.40	1.8	2.3	3.7	69.10	105.98	379.85
2	Bucureşti	RO321	105.83	112.77	189.24	25.3	26.0	33.3	775.21	823.27	1619.56
3	Vrancea	RO226	8.91	11.92	33.44	1.2	1.4	2.4	55.09	77.84	291.58
4	Galați	RO224	8.37	11.53	32.91	1.4	1.7	2.9	65.04	91.99	316.90
5	Prahova	RO316	17.88	23.11	69.89	2.7	3.1	5.0	115.93	157.87	655.09
6	Braşov	RO122	16.23	26.50	52.13	2.2	2.9	3.9	124.08	218.16	516.66
7	Brăila	RO221	4.60	6.87	19.66	0.6	0.9	1.6	33.11	51.62	186.97
8	Bacău	RO211	11.98	16.08	49.87	1.8	2.0	3.2	89.35	127.82	499.59
9	Covasna	RO123	7.39	9.77	20.86	0.9	0.9	1.1	59.13	84.75	216.33
10	Napoli	ITF33	44.88	124.07	358.37	1.3	2.7	7.3	305.07	920.86	2689.64
11	Vaslui	RO216	3.84	6.33	25.91	0.3	0.3	0.9	41.00	70.53	301.11
12	Ialomița	RO315	4.64	6.76	17.96	0.6	0.7	1.2	33.48	51.45	170.16
13	Catania	ITG17	28.31	74.32	183.06	0.8	2.0	4.1	146.15	390.70	1053.69
14	Catanzaro	ITF63	8.23	27.08	67.57	0.2	0.8	1.7	40.11	119.36	332.56
15	Neamț	RO214	7.75	11.00	39.07	0.5	0.6	1.0	78.53	114.53	450.19
16	Reggio di Calabria	ITF65	12.88	34.83	97.03	0.5	1.1	2.8	55.50	145.96	458.06
17	Dâmbovița	RO313	10.51	13.77	36.70	1.1	1.2	1.5	83.03	119.39	387.67
18	Bologna	ITH55	24.44	52.05	287.13	0.5	0.9	4.0	165.46	353.83	2090.79
19	Argeş	RO311	12.86	16.38	45.95	1.1	1.2	1.6	116.78	153.63	505.10
20	Cosenza	ITF61	17.16	46.57	130.73	0.4	1.2	2.7	95.12	239.65	745.94
21	Teleorman	RO317	4.01	6.44	22.07	0.2	0.3	0.5	43.74	71.75	259.25
22	Călăraşi	RO312	4.04	5.69	17.15	0.4	0.5	0.8	31.77	47.87	176.99
23	Achaia	EL632	18.58	24.17	43.76	1.3	1.5	2.0	80.06	112.95	228.46
24	Tulcea	RO225	2.28	3.71	11.53	0.1	0.1	0.3	23.97	40.21	131.96
25	Foggia	ITF46	7.75	34.97	93.75	0.2	0.7	1.7	52.83	225.38	623.87
26	Iaşi	RO213	11.06	14.61	50.56	0.4	0.4	0.7	128.79	170.88	614.40
27	Harghita	RO124	6.61	10.96	31.12	0.3	0.4	0.5	70.73	123.42	374.27
28	Giurgiu	RO314	3.66	5.18	16.37	0.3	0.4	0.6	29.97	45.92	174.86
29	Messina	ITG13	16.95	39.61	97.29	0.4	1.0	2.0	84.83	201.67	575.18
30	Vibo Valentia	ITF64	3.31	5.10	23.32	0.1	0.2	0.6	15.08	23.31	112.94
31	Benevento	ITF32	5.50	16.91	45.09	0.1	0.3	0.8	38.45	117.39	314.19
32	Milano	ITC4C	46.13	116.42	672.77	0.2	0.4	2.4	427.55	1105.74	6353.26
33	Siracusa	ITG19	8.75	24.77	54.93	0.2	0.6	1.0	46.54	133.84	328.20
34	Modena	ITH54	20.69	41.38	211.43	0.4	0.8	3.3	133.67	267.34	1492.64
35	Constanța	RO223	9.40	11.14	31.70	0.4	0.4	0.7	99.43	119.35	361.44
36	Barletta-Andria-Trani	ITF48	4.63	13.85	46.46	0.1	0.2	0.5	36.49	113.44	388.34
37	Caserta	ITF31	19.06	43.34	119.06	0.3	0.7	1.4	135.45	319.82	945.10
38	Avellino	ITF34	8.34	22.80	62.48	0.2	0.4	1.0	56.92	161.02	442.91
39	Crotone	ITF62	3.25	8.44	20.57	0.1	0.3	0.6	14.67	35.60	97.07
40	Olt	RO414	5.23	8.02	24.44	0.3	0.3	0.5	52.06	82.36	282.55
41	Perugia	ITI21	19.21	38.42	178.55	0.4	0.8	3.1	130.64	261.28	1240.65
42	Kentrikos Tomeas Athinon	EL303	69.87	109.16	159.66	1.8	2.2	2.9	512.67	882.42	1273.78
43	Ileia	EL633	4.07	5.93	15.03	0.3	0.3	0.6	13.63	20.85	69.02
44	Roma	ITI43	50.16	79.12	709.38	0.6	0.8	6.4	403.21	653.86	5805.80
45	L'Aquila	ITF11	11.37	17.65	61.98	0.3	0.5	1.4	63.28	102.81	377.11
46	Isernia	ITF21	1.54	3.08	17.40	0.0	0.1	0.3	10.83	21.66	119.76
47	Sibiu	RO126	12.08	14.31	30.67	0.3	0.3	0.4	142.30	170.86	377.01
48	Salerno	ITF35	13.23	35.32	122.81	0.1	0.3	1.2	107.12	293.88	1027.69
49	Reggio nell'Emilia	ITH53	16.51	33.02	154.77	0.3	0.6	2.2	111.94	223.88	1121.31
50	Palermo	ITG12	9.43	25.35	140.95	0.1	0.2	1.2	78.65	219.29	1186.39

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
51	Notios Tomeas Athinon	EL304	30.95	38.15	72.41	1.4	1.6	2.1	171.61	208.13	465.25
52	Silistra	BG325	2.11	3.13	8.35	0.1	0.2	0.3	16.07	25.99	90.88
53	Zakynthos	EL621	1.26	1.77	4.41	0.1	0.1	0.2	3.92	6.12	20.24
54	Ragusa	ITG18	5.33	7.80	33.50	0.1	0.2	0.6	29.43	43.93	207.31
55	Fokida	EL645	0.75	1.75	5.32	0.0	0.1	0.1	3.25	8.53	30.45
56	Aitoloakarnania	EL631	5.96	8.20	19.68	0.3	0.4	0.7	26.64	40.05	115.10
57	Larisa	EL612	16.80	18.84	35.95	0.7	0.8	1.0	101.21	118.15	255.57
58	Caltanissetta	ITG15	2.60	4.87	28.69	0.0	0.1	0.4	17.76	33.88	213.33
59	Florina	EL533	1.55	2.24	6.09	0.0	0.0	0.1	14.26	20.83	57.65
60	Ruse	BG323	4.53	5.34	15.37	0.3	0.3	0.5	38.55	47.31	170.60
61	Lesvos, Limnos	EL411	1.96	3.82	10.78	0.1	0.1	0.3	7.82	15.84	56.87
62	Enna	ITG16	1.99	3.97	20.56	0.0	0.1	0.2	14.57	29.15	164.00
63	Torino	ITC11	43.31	171.04	679.29	0.1	0.4	1.9	429.60	1709.32	6707.40
64	Plovdiv	BG421	6.17	7.85	30.36	0.5	0.6	1.4	68.34	89.43	385.55
65	Ravenna	ITH57	17.94	40.61	106.26	0.4	0.8	1.8	101.67	238.95	670.48
66	Kastoria	EL532	1.33	2.36	6.35	0.0	0.0	0.0	12.35	22.07	60.69
67	Firenze	ITI14	20.80	49.77	202.37	0.2	0.5	1.9	163.63	403.13	1660.76
68	Potenza	ITF51	5.92	16.91	55.21	0.1	0.3	0.8	42.77	125.18	411.27
69	Lefkada	EL624	0.44	1.15	2.98	0.0	0.0	0.1	1.12	3.32	11.51
70	Parma	ITH52	11.56	23.11	127.50	0.2	0.4	1.7	82.38	164.77	947.53
71	Lakonia, Messinia	EL653	6.81	10.37	27.96	0.4	0.5	1.0	24.29	40.54	141.36
72	Fthiotida	EL644	5.22	7.39	17.60	0.2	0.3	0.4	31.20	45.91	121.86
73	Pazardzhik	BG423	1.81	3.84	20.36	0.0	0.1	0.3	25.61	51.90	282.77
74	Ferrara	ITH56	16.04	40.69	95.89	0.4	0.8	1.7	95.18	243.00	626.46
75	Stara Zagora	BG344	1.71	2.49	12.38	0.0	0.1	0.4	21.94	32.29	166.80
76	Razgrad	BG324	2.06	2.80	8.02	0.1	0.1	0.2	18.02	25.68	92.97
77	Korinthia	EL652	5.35	7.42	16.04	0.3	0.4	0.6	20.99	31.39	77.25
78	Arta, Preveza	EL541	3.94	5.71	13.00	0.2	0.3	0.5	16.45	24.90	73.25
79	Pescara	ITF13	5.39	11.19	53.10	0.1	0.1	0.5	41.12	88.16	430.33
80	Ikaria, Samos	EL412	0.65	1.48	4.49	0.0	0.1	0.1	2.39	5.91	22.44
81	Lodi	ITC49	8.97	21.21	48.29	0.1	0.2	0.5	72.62	178.66	404.85
82	Thessaloniki	EL522	70.22	82.28	138.51	1.5	1.7	2.4	588.95	682.24	1150.31
83	Agrigento	ITG14	3.53	7.18	39.20	0.1	0.1	0.5	27.03	55.19	314.91
84	Rodopi	EL513	2.54	3.41	10.15	0.1	0.1	0.1	22.49	30.89	95.58
85	Forlì-Cesena	ITH58	12.93	35.53	99.72	0.2	0.6	1.5	87.59	245.69	705.67
86	Ithaki, Kefallinia	EL623	1.03	1.69	4.11	0.0	0.1	0.1	3.08	5.54	19.02
87	Brescia	ITC47	38.26	87.79	337.20	0.4	0.8	2.7	329.82	771.80	2992.02
88	Mantova	ITC4B	16.56	38.53	109.16	0.2	0.4	1.0	118.73	289.95	869.95
89	Ioannina	EL543	5.74	7.43	20.90	0.2	0.2	0.4	33.87	47.47	149.74
90	Treviso	ITH34	27.93	67.34	208.07	0.5	1.0	2.4	202.19	499.83	1625.39
91	Grevena, Kozani	EL531	5.36	7.28	18.47	0.1	0.1	0.2	47.77	65.77	171.32
92	Cremona	ITC4A	12.99	33.31	87.81	0.2	0.4	0.8	97.27	259.09	723.55
93	Irakleio	EL431	11.29	13.67	29.67	0.7	0.8	1.2	32.30	44.93	134.35
94	Evros	EL511	4.21	5.22	13.49	0.1	0.1	0.2	31.25	40.83	114.45
95	Matera	ITF52	2.63	6.95	26.18	0.0	0.1	0.2	21.39	59.44	228.21
96	Haskovo	BG422	2.47	3.07	11.33	0.1	0.1	0.3	29.96	37.32	145.49
97	Kerkyra	EL622	1.99	3.21	8.00	0.1	0.2	0.4	8.19	13.21	39.09
98	Chios	EL413	0.70	1.66	4.48	0.0	0.1	0.1	3.17	8.10	26.36
99	Campobasso	ITF22	2.55	5.09	31.03	0.0	0.1	0.4	18.86	37.73	235.08
100	Vicenza	ITH32	25.73	53.04	236.01	0.3	0.6	2.1	215.85	447.77	2030.02

Table B. 14. Scenario 2 – seismic retrofit: renovated buildings, replacement cost, and average number of occupants for renovation to replacement cost ratio C_{ren} / C_{rep} = 0.12 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
1	Buzău	RO222	15176	30352	151759	1086.79	1491.34	5719.11	49267	67342	254589
2	Bucureşti	RO321	12895	25790	128948	5649.68	7349.13	25243.60	298329	365749	1188883
3	Vrancea	RO226	11574	23148	115742	718.21	1029.13	4382.59	33433	46832	192099
4	Galați	RO224	12037	24074	120372	711.08	1033.37	4734.33	52091	68757	302657
5	Prahova	RO316	21564	43128	215640	1562.93	2137.63	9688.52	74494	102640	430579
6	Braşov	RO122	9624	19247	96236	1219.42	2156.90	6180.10	63248	110803	310113
7	Brăila	RO221	7858	15715	78576	427.17	636.58	2961.65	27212	38522	181319
8	Bacău	RO211	17666	35331	176656	1457.67	1944.65	7082.54	81858	104043	347817
9	Covasna	RO123	5713	11427	57134	733.13	909.80	2333.77	41187	50102	118641
10	Napoli	ITF33	29167	58335	291675	15120.73	30621.79	151859.24	193077	374525	1788647
11	Vaslui	RO216	12928	25856	129280	395.96	661.91	3172.46	30101	46821	223253
12	Ialomița	RO315	8566	17131	85655	573.74	803.63	2931.41	33303	44709	155361
13	Catania	ITG17	21773	43546	217728	8809.22	16782.35	65545.36	87910	165707	631088
14	Catanzaro	ITF63	9630	19260	96301	6695.63	8981.28	22099.02	60630	82720	210983
15	Neamț	RO214	14906	29813	149063	869.15	1271.69	5663.57	47132	64837	265740
16	Reggio di Calabria	ITF65	15527	31054	155268	3212.26	7570.42	33547.97	32487	73148	322317
17	Dâmbovița	RO313	16409	32819	164093	1215.84	2228.46	6241.30	62073	109426	292823
18	Bologna	ITH55	11980	23961	119804	4305.41	9650.86	66974.41	38276	85559	569404
19	Argeş	RO311	17697	35394	176970	1463.21	2590.61	7698.62	74514	132566	345310
20	Cosenza	ITF61	19220	38440	192199	10761.42	14446.02	45268.17	93838	130540	418382
21	Teleorman	RO317	13936	27872	139358	614.47	901.19	3370.84	43064	60064	214573
22	Călăraşi	RO312	9939	19879	99393	560.29	827.17	3204.49	33605	47064	173085
23	Achaia	EL632	9001	18002	90011	2402.99	3073.47	11513.86	38221	48182	174960
24	Tulcea	RO225	6754	13507	67537	396.25	579.96	2325.03	22016	30565	120282
25	Foggia	ITF46	10691	21381	106905	13322.75	15610.27	34523.29	132908	159406	367034
26	Iaşi	RO213	18135	36270	181352	1160.75	1648.20	7900.69	68581	93994	437833
27	Harghita	RO124	8919	17838	89188	1025.97	1397.34	3725.01	52250	70549	176498
28	Giurgiu	RO314	9995	19990	99952	543.85	814.72	3295.14	29010	40960	158858
29	Messina	ITG13	17108	34217	171085	10746.10	13704.90	39054.12	99549	129781	379529
30	Vibo Valentia	ITF64	5288	10577	52884	981.82	2107.09	9308.33	10308	21649	95425
31	Benevento	ITF32	7891	15782	78912	1639.49	5656.54	17536.13	15901	53144	166577
32	Milano	ITC4C	22158	44316	221581	12370.69	30754.14	219498.82	113859	267714	1773224
33	Siracusa	ITG19	10375	20750	103752	2748.89	10931.21	25450.38	27708	98656	234197
34	Modena	ITH54	11362	22724	113622	3508.10	7016.20	46770.14	30784	61568	400350
35	Constanța	RO223	13106	26213	131063	2082.50	2503.64	8634.01	90462	111861	386222
36	Barletta-Andria-Trani	ITF48	5028	10055	50276	2138.61	4107.54	21348.91	25176	46105	229273
37	Caserta	ITF31	17498	34996	174982	5875.42	19568.54	50394.90	65532	198603	529436
38	Avellino	ITF34	11627	23255	116275	2487.03	4867.71	26065.99	24540	48369	250983
39	Crotone	ITF62	4767	9534	47671	2983.86	3768.81	10250.23	28465	36477	99888
40	Olt	RO414	14516	29032	145160	798.24	1253.55	5093.20	41305	63634	246341
41	Perugia	ITI21	14592	29184	145921	3632.43	7264.86	43587.10	32910	65820	382934
42	Kentrikos Tomeas Athinon	EL303	9041	18081	90406	15677.39	21091.25	59033.19	148032	202488	581623
43	Ileia	EL633	6317	12634	63168	738.86	1247.70	5111.21	13973	23111	89996
44	Roma	ITI43	38881	77763	388815	15684.77	45369.38	304906.43	149817	384394	2316179
45	L'Aquila	ITF11	9307	18614	93072	3695.69	5022.99	18247.62	33402	46389	173254
46	Isernia	ITF21	2904	5807	29037	926.43	1338.32	5748.14	8254	12138	51492
47	Sibiu	RO126	9465	18929	94645	1489.36	2292.10	4903.97	70870	108822	224282
48	Salerno	ITF35	19835	39670	198348	5343.86	12199.12	62040.50	59059	129043	638933
49	Reggio nell'Emilia	ITH53	9500	19000	95000	2800.19	5600.37	34316.32	25403	50806	302054
50	Palermo	ITG12	23675	47351	236755	3871.24	26089.16	77225.73	41501	243436	728218
51	Notios Tomeas Athinon	EL304	6013	12026	60128	5398.57	7221.63	26342.05	58780	81320	299323
52	Silistra	BG325	3935	7870	39352	502.25	747.10	2154.87	13835	21468	63380
53	Zakynthos	EL621	1795	3590	17948	202.79	317.00	1493.50	3411	5187	23027
54	Ragusa	ITG18	9956	19912	99558	2479.08	4860.37	19983.63	23566	44729	180238
55	Fokida	EL645	2182	4364	21818	123.26	339.89	1602.42	1875	5286	22792

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
56	Aitoloakarnania	EL631	7643	15286	76428	1066.46	1821.45	7106.47	19642	32340	119092
57	Larisa	EL612	7562	15124	75618	2707.76	3793.05	10833.48	36633	52055	160628
58	Caltanissetta	ITG15	7510	15021	75105	1383.45	2385.67	16394.32	14097	24790	160455
59	Florina	EL533	1601	3203	16014	125.52	327.13	1486.57	2714	6774	29046
60	Ruse	BG323	6458	12916	64579	1311.05	1524.97	4564.34	33915	40432	124800
61	Lesvos, Limnos	EL411	5290	10579	52896	429.42	737.72	3992.82	6928	11973	58584
62	Enna	ITG16	5880	11761	58803	755.63	1511.26	10162.97	7948	15896	101486
63	Torino	ITC11	30036	60073	300363	7143.81	61786.04	147075.01	66768	557644	1311393
64	Plovdiv	BG421	14992	29983	149917	1065.27	2000.28	10908.39	47505	76090	362343
65	Ravenna	ITH57	8963	17925	89627	3346.87	8660.99	28470.29	28020	72480	224312
66	Kastoria	EL532	1516	3032	15159	205.89	390.64	1556.91	4053	7659	28429
67	Firenze	ITI14	12963	25925	129626	5063.68	13622.15	62702.56	47593	128276	567896
68	Potenza	ITF51	10536	21071	105356	2432.45	4256.47	21349.84	25829	45935	221443
69	Lefkada	EL624	1349	2698	13489	77.09	221.45	1150.40	989	2788	13385
70	Parma	ITH52	8211	16423	82113	2121.14	4242.29	30728.72	17948	35897	249479
71	Lakonia, Messinia	EL653	11613	23226	116131	1227.66	2187.17	9638.03	19556	34568	140724
72	Fthiotida	EL644	5912	11824	59118	921.66	1540.94	5828.60	15396	24949	89392
73	Pazardzhik	BG423	8662	17323	86615	1006.97	1292.22	6329.22	23381	30807	146177
74	Ferrara	ITH56	8450	16900	84502	3110.31	8806.45	25966.73	25083	69402	206114
75	Stara Zagora	BG344	8895	17789	88947	850.23	1136.12	5357.78	26237	36481	176796
76	Razgrad	BG324	4279	8558	42789	586.69	723.83	2417.64	14811	19032	66413
77	Korinthia	EL652	6405	12809	64047	992.30	1532.64	5924.80	14450	22712	81964
78	Arta, Preveza	EL541	4933	9865	49326	772.58	1102.37	4101.08	14885	20652	70826
79	Pescara	ITF13	5793	11585	57926	1598.63	2945.68	20369.25	15838	29116	184344
80	Ikaria, Samos	EL412	2532	5064	25321	146.42	378.00	1979.58	2026	5034	24213
81	Lodi	ITC49	3546	7093	35464	1671.96	4846.91	13886.56	15910	45676	130733
82	Thessaloniki	EL522	16705	33410	167052	10497.40	14104.41	46510.74	127154	180323	627401
83	Agrigento	ITG14	13426	26853	134264	1880.10	4121.96	27535.58	19550	42776	261869
84	Rodopi	EL513	3435	6870	34348	559.97	818.88	3229.54	11361	16398	63296
85	Forlì-Cesena	ITH58	7562	15124	75620	2439.89	8043.59	25771.18	22684	71663	227384
86	Ithaki, Kefallinia	EL623	2332	4664	23321	204.88	409.91	1909.56	2557	5022	22051
87	Brescia	ITC47	22075	44151	220754	6553.52	20721.21	78607.30	63224	192851	721843
88	Mantova	ITC4B	9367	18734	93670	3062.70	8182.59	29015.68	25340	67287	237543
89	Ioannina	EL543	5548	11096	55480	964.49	1911.04	6392.86	14936	29119	94855
90	Treviso	ITH34	19500	39001	195004	5649.73	15988.96	61250.85	47843	134167	510564
91	Grevena, Kozani	EL531	5786	11572	57860	928.08	1570.17	5823.07	17780	29877	102794
92	Cremona	ITC4A	6989	13979	69895	2483.29	7200.82	23573.56	22228	63246	207460
93	Irakleio	EL431	9580	19159	95796	2185.10	4075.68	11552.45	33148	61011	172585
94	Evros	EL511	4587	9173	45867	1098.87	1563.47	5254.74	17604	25063	83582
95	Matera	ITF52	4166	8332	41661	841.14	2701.96	11487.02	9272	27829	117442
96	Haskovo	BG422	7203	14405	72026	849.88	1106.03	5316.45	20394	27377	130628
97	Kerkyra	EL622	4670	9340	46699	462.70	842.21	3730.85	8040	14760	58964
98	Chios	EL413	2460	4920	24602	144.58	443.60	2052.34	2391	7230	29758
99	Campobasso	ITF22	6188	12376	61879	887.38	1774.77	14447.91	8634	17268	133129
100	Vicenza	ITH32	18658	37317	186585	4889.67	10131.14	59839.83	42346	87326	499213

Table B. 15. Scenario 2 – energy efficiency upgrading: renovated buildings, replacement cost, and average number of occupants for renovation to replacement cost ratio C_{ren} / C_{rep} = 0.15 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^{*}_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
1	Buzău	RO222	15176	30352	151759	642.90	1354.40	5719.11	29490	61893	254589
2	Bucureşti	RO321	12895	25790	128948	13485.35	15871.05	25243.60	695472	803635	1188883
3	Vrancea	RO226	11574	23148	115742	384.07	805.91	4382.59	17400	36134	192099
4	Galaţi	RO224	12037	24074	120372	569.31	891.59	4734.33	40194	56860	302657
5	Prahova	RO316	21564	43128	215640	1114.95	2170.34	9688.52	54353	104902	430579
6	Braşov	RO122	9624	19247	96236	1045.87	1329.28	6180.10	53614	66951	310113
7	Brăila	RO221	7858	15715	78576	315.07	724.52	2961.65	19397	47133	181319
8	Bacău	RO211	17666	35331	176656	711.20	1341.44	7082.54	38787	71138	347817
9	Covasna	RO123	5713	11427	57134	337.94	506.89	2333.77	18139	25959	118641
10	Napoli	ITF33	29167	58335	291675	16361.17	45388.63	151859.24	208076	551930	1788647
11	Vaslui	RO216	12928	25856	129280	306.27	572.22	3172.46	22481	39201	223253
12	Ialomiţa	RO315	8566	17131	85655	336.98	769.45	2931.41	19344	44226	155361
13	Catania	ITG17	21773	43546	217728	6268.45	14364.01	65545.36	64428	142021	631088
14	Catanzaro	ITF63	9630	19260	96301	1418.59	3491.10	22099.02	14426	35047	210983
15	Neamţ	RO214	14906	29813	149063	661.17	1098.86	5663.57	33277	52788	265740
16	Reggio di Calabria	ITF65	15527	31054	155268	4845.22	7858.37	33547.97	48965	78690	322317
17	Dâmboviţa	RO313	16409	32819	164093	819.93	1261.80	6241.30	41015	62369	292823
18	Bologna	ITH55	11980	23961	119804	4305.41	10467.45	66974.41	38276	93510	569404
19	Argeş	RO311	17697	35394	176970	953.12	1722.99	7698.62	47178	83523	345310
20	Cosenza	ITF61	19220	38440	192199	3684.60	8789.22	45268.17	36702	87048	418382
21	Teleorman	RO317	13936	27872	139358	410.65	863.21	3370.84	28126	58436	214573
22	Călăraşi	RO312	9939	19879	99393	331.31	744.47	3204.49	18778	42266	173085
23	Achaia	EL632	9001	18002	90011	1992.40	3381.76	11513.86	30951	53240	174960
24	Tulcea	RO225	6754	13507	67537	287.37	471.96	2325.03	16756	25547	120282
25	Foggia	ITF46	10691	21381	106905	2287.51	6860.09	34523.29	26498	77655	367034
26	Iaşi	RO213	18135	36270	181352	1097.99	2126.17	7900.69	66889	127820	437833
27	Harghita	RO124	8919	17838	89188	485.57	748.22	3725.01	23947	35842	176498
28	Giurgiu	RO314	9995	19990	99952	364.98	753.47	3295.14	18668	38852	158858
29	Messina	ITG13	17108	34217	171085	2856.79	7694.63	39054.12	29432	76347	379529
30	Vibo Valentia	ITF64	5288	10577	52884	1055.52	1923.25	9308.33	11243	20296	95425
31	Benevento	ITF32	7891	15782	78912	1626.81	4156.98	17536.13	15774	39419	166577
32	Milano	ITC4C	22158	44316	221581	11704.47	31322.84	219498.82	106319	265885	1773224
33	Siracusa	ITG19	10375	20750	103752	2159.54	5066.04	25450.38	22206	48449	234197
34	Modena	ITH54	11362	22724	113622	3508.10	7016.20	46770.14	30784	61568	400350
35	Constanţa	RO223	13106	26213	131063	1113.38	2172.16	8634.01	51568	100445	386222
36	Barletta-Andria-Trani	ITF48	5028	10055	50276	1377.16	5049.41	21348.91	16452	56233	229273
37	Caserta	ITF31	17498	34996	174982	5841.97	11689.10	50394.90	65078	126715	529436
38	Avellino	ITF34	11627	23255	116275	2708.76	7679.71	26065.99	27251	73384	250983
39	Crotone	ITF62	4767	9534	47671	829.44	1665.01	10250.23	8741	17115	99888
40	Olt	RO414	14516	29032	145160	725.46	1248.18	5093.20	39813	65439	246341
41	Perugia	ITI21	14592	29184	145921	3632.43	7264.86	43587.10	32910	65820	382934
42	Kentrikos Tomeas Athinon	EL303	9041	18081	90406	17130.45	27686.70	59033.19	160604	261099	581623
43	Ileia	EL633	6317	12634	63168	666.17	1058.81	5111.21	12354	19873	89996
44	Roma	ITI43	38881	77763	388815	15141.95	57153.97	304906.43	144509	468672	2316179
45	L'Aquila	ITF11	9307	18614	93072	1327.31	2909.83	18247.62	12987	28749	173254
46	Isernia	ITF21	2904	5807	29037	411.88	823.77	5748.14	3884	7768	51492
47	Sibiu	RO126	9465	18929	94645	1144.93	1426.47	4903.97	53675	66075	224282
48	Salerno	ITF35	19835	39670	198348	4930.11	15051.43	62040.50	55247	159000	638933
49	Reggio nell'Emilia	ITH53	9500	19000	95000	2800.19	5600.37	34316.32	25403	50806	302054
50	Palermo	ITG12	23675	47351	236755	3871.24	10937.39	77225.73	41501	114731	728218
51	Notios Tomeas Athinon	EL304	6013	12026	60128	6553.70	8376.76	26342.05	70874	93414	299323
52	Silistra	BG325	3935	7870	39352	190.59	317.59	2154.87	5815	9925	63380
53	Zakynthos	EL621	1795	3590	17948	112.46	331.98	1493.50	1890	5528	23027
54	Ragusa	ITG18	9956	19912	99558	1816.07	4259.85	19983.63	17454	39030	180238
55	Fokida	EL645	2182	4364	21818	235.16	362.40	1602.42	3680	5600	22792

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%	Sub-scenario 2.1	Sub-scenario 2.2	100%
			10%	20%		10%	20%		10%	20%	
56	Aitoloakarnania	EL631	7643	15286	76428	1205.95	1670.46	7106.47	21945	30206	119092
57	Larisa	EL612	7562	15124	75618	1626.16	2117.37	10833.48	24742	34633	160628
58	Caltanissetta	ITG15	7510	15021	75105	1002.22	2004.45	16394.32	10693	21385	160455
59	Florina	EL533	1601	3203	16014	248.97	342.54	1486.57	5138	7136	29046
60	Ruse	BG323	6458	12916	64579	364.36	580.15	4564.34	10560	17077	124800
61	Lesvos, Limnos	EL411	5290	10579	52896	641.39	964.41	3992.82	10289	15286	58584
62	Enna	ITG16	5880	11761	58803	755.63	1511.26	10162.97	7948	15896	101486
63	Torino	ITC11	30036	60073	300363	7050.43	28757.29	147075.01	65913	267196	1311393
64	Plovdiv	BG421	14992	29983	149917	1151.15	1642.07	10908.39	39385	57709	362343
65	Ravenna	ITH57	8963	17925	89627	3595.52	9610.87	28470.29	30875	81075	224312
66	Kastoria	EL532	1516	3032	15159	169.43	376.41	1556.91	3284	7321	28429
67	Firenze	ITI14	12963	25925	129626	5063.68	12514.31	62702.56	47593	116825	567896
68	Potenza	ITF51	10536	21071	105356	1669.34	4465.15	21349.84	18279	47732	221443
69	Lefkada	EL624	1349	2698	13489	156.48	235.20	1150.40	1932	2921	13385
70	Parma	ITH52	8211	16423	82113	2121.14	4242.29	30728.72	17948	35897	249479
71	Lakonia, Messinia	EL653	11613	23226	116131	973.37	1656.94	9638.03	15214	25618	140724
72	Fthiotida	EL644	5912	11824	59118	1047.03	1409.97	5828.60	17321	23671	89392
73	Pazardzhik	BG423	8662	17323	86615	487.08	773.90	6329.22	11981	19406	146177
74	Ferrara	ITH56	8450	16900	84502	3110.31	9113.85	25966.73	25083	72547	206114
75	Stara Zagora	BG344	8895	17789	88947	539.61	825.53	5357.78	18600	29155	176796
76	Razgrad	BG324	4279	8558	42789	198.33	336.71	2417.64	5765	9963	66413
77	Korinthia	EL652	6405	12809	64047	1034.05	1442.44	5924.80	15082	20714	81964
78	Arta, Preveza	EL541	4933	9865	49326	610.87	903.60	4101.08	11386	16265	70826
79	Pescara	ITF13	5793	11585	57926	1473.82	3435.09	20369.25	14657	33073	184344
80	Ikaria, Samos	EL412	2532	5064	25321	173.93	326.76	1979.58	2429	4432	24213
81	Lodi	ITC49	3546	7093	35464	1937.40	5003.84	13886.56	18962	48179	130733
82	Thessaloniki	EL522	16705	33410	167052	12985.11	17117.05	46510.74	154683	207458	627401
83	Agrigento	ITG14	13426	26853	134264	1880.10	3813.40	27535.58	19550	39640	261869
84	Rodopi	EL513	3435	6870	34348	465.18	674.91	3229.54	9749	14543	63296
85	Forlì-Cesena	ITH58	7562	15124	75620	2439.89	6441.79	25771.18	22684	59824	227384
86	Ithaki, Kefallinia	EL623	2332	4664	23321	148.94	372.87	1909.56	1865	4583	22051
87	Brescia	ITC47	22075	44151	220754	6553.52	14806.20	78607.30	63224	141750	721843
88	Mantova	ITC4B	9367	18734	93670	3062.70	8547.05	29015.68	25340	70525	237543
89	Ioannina	EL543	5548	11096	55480	512.81	856.88	6392.86	7867	12964	94855
90	Treviso	ITH34	19500	39001	195004	5649.73	16197.72	61250.85	47843	138628	510564
91	Grevena, Kozani	EL531	5786	11572	57860	1000.97	1351.89	5823.07	19168	25344	102794
92	Cremona	ITC4A	6989	13979	69895	2483.29	7838.19	23573.56	22228	69072	207460
93	Irakleio	EL431	9580	19159	95796	824.71	1622.34	11552.45	13719	27772	172585
94	Evros	EL511	4587	9173	45867	868.82	1179.09	5254.74	14312	20106	83582
95	Matera	ITF52	4166	8332	41661	841.14	2132.27	11487.02	9272	23123	117442
96	Haskovo	BG422	7203	14405	72026	509.65	794.66	5316.45	13338	20977	130628
97	Kerkyra	EL622	4670	9340	46699	713.03	991.79	3730.85	12351	16907	58964
98	Chios	EL413	2460	4920	24602	350.71	497.26	2052.34	5635	8022	29758
99	Campobasso	ITF22	6188	12376	61879	887.38	1774.77	14447.91	8634	17268	133129
100	Vicenza	ITH32	18658	37317	186585	4856.83	10135.20	59839.83	42052	88037	499213

Table B. 16. Scenario 2 – integrated renovation: renovated buildings, replacement cost, and average number of occupants for renovation to replacement cost ratio C_{ren} / C_{rep} = 0.21 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	**NUTS-3**		**Buildings**			**Replacement cost (10^6 €)**			**Average occupants (over 24 hours)**		
	Name	**ID**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**	**Sub-scenario 2.1**	**Sub-scenario 2.2**	**100%**
			10%	**20%**		**10%**	**20%**		**10%**	**20%**	
1	Buzău	RO222	15176	30352	151759	890.03	1430.60	5719.11	40486	64548	254589
2	Bucureşti	RO321	12895	25790	128948	9624.42	10593.38	25243.60	495609	533490	1188883
3	Vrancea	RO226	11574	23148	115742	735.41	1046.91	4382.59	34420	47840	192099
4	Galați	RO224	12037	24074	120372	807.97	1195.98	4734.33	59646	82550	302657
5	Prahova	RO316	21564	43128	215640	1438.60	2023.08	9688.52	69651	98088	430579
6	Braşov	RO122	9624	19247	96236	1268.73	2406.33	6180.10	65776	123826	310113
7	Brăila	RO221	7858	15715	78576	450.38	741.75	2961.65	29196	46417	181319
8	Bacău	RO211	17666	35331	176656	1065.41	1552.39	7082.54	60684	82869	347817
9	Covasna	RO123	5713	11427	57134	585.45	849.17	2333.77	32709	46851	118641
10	Napoli	ITF33	29167	58335	291675	14218.73	44206.04	151859.24	182550	535868	1788647
11	Vaslui	RO216	12928	25856	129280	371.04	638.08	3172.46	27445	45433	223253
12	Ialomița	RO315	8566	17131	85655	514.39	817.89	2931.41	29528	45693	155361
13	Catania	ITG17	21773	43546	217728	7549.17	21661.55	65545.36	76156	209628	631088
14	Catanzaro	ITF63	9630	19260	96301	2031.15	6897.43	22099.02	19788	64427	210983
15	Neamț	RO214	14906	29813	149063	833.12	1235.60	5663.57	45674	63443	265740
16	Reggio di Calabria	ITF65	15527	31054	155268	3212.26	9428.60	33547.97	32487	88795	322317
17	Dâmbovița	RO313	16409	32819	164093	1174.40	1712.95	6241.30	59718	86013	292823
18	Bologna	ITH55	11980	23961	119804	4305.41	9469.79	66974.41	38276	83107	569404
19	Argeş	RO311	17697	35394	176970	1531.62	2045.58	7698.62	80315	100705	345310
20	Cosenza	ITF61	19220	38440	192199	4629.12	12845.57	45268.17	44258	117410	418382
21	Teleorman	RO317	13936	27872	139358	489.74	826.34	3370.84	33436	55213	214573
22	Călăraşi	RO312	9939	19879	99393	531.63	802.73	3204.49	31693	45377	173085
23	Achaia	EL632	9001	18002	90011	2465.77	3642.36	11513.86	39285	57178	174960
24	Tulcea	RO225	6754	13507	67537	365.96	627.61	2325.03	21153	34726	120282
25	Foggia	ITF46	10691	21381	106905	2287.51	11074.16	34523.29	26498	117041	367034
26	Iaşi	RO213	18135	36270	181352	1339.04	1863.37	7900.69	82777	110754	437833
27	Harghita	RO124	8919	17838	89188	617.66	1100.90	3725.01	31229	53249	176498
28	Giurgiu	RO314	9995	19990	99952	517.12	788.05	3295.14	27253	39209	158858
29	Messina	ITG13	17108	34217	171085	4977.50	12547.36	39054.12	47760	119960	379529
30	Vibo Valentia	ITF64	5288	10577	52884	945.16	1524.81	9308.33	10000	16495	95425
31	Benevento	ITF32	7891	15782	78912	1632.61	5428.46	17536.13	15832	51613	166577
32	Milano	ITC4C	22158	44316	221581	11416.19	31322.84	219498.82	102963	265885	1773224
33	Siracusa	ITG19	10375	20750	103752	2920.96	9276.62	25450.38	28815	85301	234197
34	Modena	ITH54	11362	22724	113622	3508.10	7016.20	46770.14	30784	61568	400350
35	Constanța	RO223	13106	26213	131063	1872.16	2293.30	8634.01	85380	106779	386222
36	Barletta-Andria-Trani	ITF48	5028	10055	50276	1535.00	5065.98	21348.91	18215	56524	229273
37	Caserta	ITF31	17498	34996	174982	5797.53	15005.19	50394.90	64229	157400	529436
38	Avellino	ITF34	11627	23255	116275	2482.64	7718.84	26065.99	24730	73110	250983
39	Crotone	ITF62	4767	9534	47671	1196.39	3207.87	10250.23	11935	31143	99888
40	Olt	RO414	14516	29032	145160	835.37	1371.99	5093.20	44469	72248	246341
41	Perugia	ITI21	14592	29184	145921	3632.43	7264.86	43587.10	32910	65820	382934
42	Kentrikos Tomeas Athinon	EL303	9041	18081	90406	15832.33	27698.10	59033.19	149603	261285	581623
43	Ileia	EL633	6317	12634	63168	691.73	1149.81	5111.21	13007	21121	89996
44	Roma	ITI43	38881	77763	388815	15406.25	26223.66	304906.43	147596	247341	2316179
45	L'Aquila	ITF11	9307	18614	93072	2569.75	4030.39	18247.62	24325	38344	173254
46	Isernia	ITF21	2904	5807	29037	411.88	823.77	5748.14	3884	7768	51492
47	Sibiu	RO126	9465	18929	94645	1628.08	1976.61	4903.97	77309	92747	224282
48	Salerno	ITF35	19835	39670	198348	4920.35	14493.97	62040.50	55122	153950	638933
49	Reggio nell'Emilia	ITH53	9500	19000	95000	2800.19	5600.37	34316.32	25403	50806	302054
50	Palermo	ITG12	23675	47351	236755	3871.24	10937.39	77225.73	41501	114731	728218
51	Notios Tomeas Athinon	EL304	6013	12026	60128	5583.06	7406.12	26342.05	60995	83535	299323
52	Silistra	BG325	3935	7870	39352	384.56	630.46	2154.87	10710	17880	63380
53	Zakynthos	EL621	1795	3590	17948	202.74	314.59	1493.50	3411	5187	23027
54	Ragusa	ITG18	9956	19912	99558	2303.56	3526.88	19983.63	21742	33390	180238
55	Fokida	EL645	2182	4364	21818	128.76	327.56	1602.42	1967	5081	22792

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 2.1 10%	Sub-scenario 2.2 20%	100%	Sub-scenario 2.1 10%	Sub-scenario 2.2 20%	100%	Sub-scenario 2.1 10%	Sub-scenario 2.2 20%	100%
56	Aitoloakarnania	EL631	7643	15286	76428	1122.81	1745.63	7106.47	20741	31596	119092
57	Larisa	EL612	7562	15124	75618	2633.45	3143.50	10833.48	37186	47208	160628
58	Caltanissetta	ITG15	7510	15021	75105	1136.70	2138.92	16394.32	11929	22622	160455
59	Florina	EL533	1601	3203	16014	217.04	332.20	1486.57	4521	6936	29046
60	Ruse	BG323	6458	12916	64579	981.06	1194.24	4564.34	25932	32388	124800
61	Lesvos, Limnos	EL411	5290	10579	52896	413.81	832.89	3992.82	6693	13801	58584
62	Enna	ITG16	5880	11761	58803	755.63	1511.26	10162.97	7948	15896	101486
63	Torino	ITC11	30036	60073	300363	7050.43	29267.90	147075.01	65913	271892	1311393
64	Plovdiv	BG421	14992	29983	149917	1581.76	2072.67	10908.39	64429	82753	362343
65	Ravenna	ITH57	8963	17925	89627	3316.44	8525.02	28470.29	27706	71715	224312
66	Kastoria	EL532	1516	3032	15159	205.22	374.54	1556.91	4068	7375	28429
67	Firenze	ITI14	12963	25925	129626	5063.68	12514.31	62702.56	47593	116825	567896
68	Potenza	ITF51	10536	21071	105356	1669.34	5141.54	21349.84	18279	55102	221443
69	Lefkada	EL624	1349	2698	13489	77.09	221.45	1150.40	989	2788	13385
70	Parma	ITH52	8211	16423	82113	2121.14	4242.29	30728.72	17948	35897	249479
71	Lakonia, Messinia	EL653	11613	23226	116131	1219.91	2044.63	9638.03	19460	31931	140724
72	Fthiotida	EL644	5912	11824	59118	939.20	1492.98	5828.60	15751	24997	89392
73	Pazardzhik	BG423	8662	17323	86615	427.87	941.09	6329.22	10782	23411	146177
74	Ferrara	ITH56	8450	16900	84502	3110.31	9005.28	25966.73	25083	71977	206114
75	Stara Zagora	BG344	8895	17789	88947	577.05	862.98	5357.78	16913	27468	176796
76	Razgrad	BG324	4279	8558	42789	463.02	665.76	2417.64	12104	17943	66413
77	Korinthia	EL652	6405	12809	64047	980.70	1541.42	5924.80	14325	22628	81964
78	Arta, Preveza	EL541	4933	9865	49326	651.61	1099.43	4101.08	12428	20342	70826
79	Pescara	ITF13	5793	11585	57926	1473.82	3291.48	20369.25	14657	32379	184344
80	Ikaria, Samos	EL412	2532	5064	25321	149.12	379.39	1979.58	2064	5163	24213
81	Lodi	ITC49	3546	7093	35464	1892.25	5014.88	13886.56	18203	48290	130733
82	Thessaloniki	EL522	16705	33410	167052	13022.29	16098.08	46510.74	151738	196844	627401
83	Agrigento	ITG14	13426	26853	134264	1880.10	3844.77	27535.58	19550	39958	261869
84	Rodopi	EL513	3435	6870	34348	473.49	683.69	3229.54	9913	14683	63296
85	Forlì-Cesena	ITH58	7562	15124	75620	2439.89	7302.44	25771.18	22684	66598	227384
86	Ithaki, Kefallinia	EL623	2332	4664	23321	201.48	373.25	1909.56	2542	4515	22051
87	Brescia	ITC47	22075	44151	220754	6553.52	15788.57	78607.30	63224	150255	721843
88	Mantova	ITC4B	9367	18734	93670	3062.70	8069.54	29015.68	25340	66606	237543
89	Ioannina	EL543	5548	11096	55480	949.89	1306.95	6392.86	14771	20201	94855
90	Treviso	ITH34	19500	39001	195004	5649.73	15147.46	61250.85	47843	128042	510564
91	Grevena, Kozani	EL531	5786	11572	57860	922.60	1318.69	5823.07	17632	24722	102794
92	Cremona	ITC4A	6989	13979	69895	2483.29	7214.69	23573.56	22228	63909	207460
93	Irakleio	EL431	9580	19159	95796	2205.20	2905.29	11552.45	33497	44876	172585
94	Evros	EL511	4587	9173	45867	896.62	1209.17	5254.74	14666	20480	83582
95	Matera	ITF52	4166	8332	41661	841.14	2412.05	11487.02	9272	25838	117442
96	Haskovo	BG422	7203	14405	72026	902.89	1145.79	5316.45	22322	28893	130628
97	Kerkyra	EL622	4670	9340	46699	523.05	914.10	3730.85	9397	16090	58964
98	Chios	EL413	2460	4920	24602	168.48	436.50	2052.34	2769	7116	29758
99	Campobasso	ITF22	6188	12376	61879	887.38	1774.77	14447.91	8634	17268	133129
100	Vicenza	ITH32	18658	37317	186585	4856.99	10137.95	59839.83	42054	87775	499213

Table B. 17. Scenario 3 – seismic retrofit: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, *t* = 35 years			C_{ren} / C_{rep} = 0.12, *t* = 50 years			C_{ren} / C_{rep} = 0.06, *t* = 100 years		
	Name	**ID**	**Sub-scenario 3.1 BCR ≥ 1**	**Sub-scenario 3.2 ΣBCR ≈ 1**	**100%**	**Sub-scenario 3.1 BCR ≥ 1**	**Sub-scenario 3.2 ΣBCR ≈ 1**	**100%**	**Sub-scenario 3.1 BCR ≥ 1**	**Sub-scenario 3.2 ΣBCR ≈ 1**	**100%**
1	Buzău	RO222	1.96	1.16	0.40	2.24	1.14	1.14	4.97	4.58	4.58
2	Bucureşti	RO321	1.27	1.13	0.36	1.79	1.04	1.04	4.97	4.14	4.14
3	Vrancea	RO226	1.58	1.07	0.36	2.13	1.01	1.01	4.64	4.06	4.06
4	Galați	RO224	1.23	1.03	0.25	1.42	1.00	0.72	3.85	2.89	2.89
5	Prahova	RO316	1.59	1.03	0.28	1.93	1.17	0.81	3.63	3.24	3.24
6	Braşov	RO122	1.29	1.01	0.28	2.11	1.01	0.80	5.15	3.21	3.21
7	Brăila	RO221	1.41	1.01	0.25	1.41	1.19	0.72	3.65	2.87	2.87
8	Bacău	RO211	1.38	1.01	0.23	2.02	1.00	0.65	3.66	2.58	2.58
9	Covasna	RO123	1.75	1.26	0.25	2.04	1.13	0.72	4.54	2.88	2.88
10	Napoli	ITF33	–	–	0.10	–	–	0.27	1.44	1.10	1.10
11	Vaslui	RO216	–	–	0.12	1.54	1.24	0.33	2.29	1.33	1.33
12	Ialomița	RO315	1.43	1.04	0.23	2.10	1.07	0.67	3.41	2.67	2.67
13	Catania	ITG17	–	–	0.18	–	–	0.52	2.32	2.06	2.06
14	Catanzaro	ITF63	–	–	0.23	–	–	0.66	2.82	2.66	2.66
15	Neamț	RO214	1.23	1.02	0.11	1.79	1.11	0.30	2.79	1.21	1.21
16	Reggio di Calabria	ITF65	–	–	0.23	–	–	0.65	2.75	2.61	2.61
17	Dâmbovița	RO313	1.37	1.02	0.15	1.84	1.17	0.44	3.34	1.75	1.75
18	Bologna	ITH55	–	–	0.19	–	–	0.54	2.35	2.14	2.14
19	Argeş	RO311	1.05	1.05	0.13	1.68	1.00	0.36	3.20	1.45	1.45
20	Cosenza	ITF61	–	–	0.19	–	–	0.54	2.31	2.16	2.16
21	Teleorman	RO317	–	–	0.08	1.65	1.05	0.24	1.55	1.01	0.96
22	Călăraşi	RO312	1.29	1.00	0.15	1.76	1.14	0.44	3.30	1.76	1.76
23	Achaia	EL632	–	–	0.27	1.67	1.00	0.78	4.33	3.14	3.14
24	Tulcea	RO225	–	–	0.08	1.33	1.15	0.23	1.54	1.06	0.92
25	Foggia	ITF46	–	–	0.14	–	–	0.41	1.82	1.62	1.62
26	Iaşi	RO213	–	–	0.05	1.05	1.04	0.15	1.36	1.11	0.61
27	Harghita	RO124	–	–	0.08	1.69	1.04	0.23	3.05	1.02	0.93
28	Giurgiu	RO314	1.14	1.06	0.12	1.76	1.13	0.35	2.67	1.40	1.40
29	Messina	ITG13	–	–	0.16	–	–	0.44	2.07	1.78	1.78
30	Vibo Valentia	ITF64	–	–	0.19	–	–	0.55	2.33	2.21	2.21
31	Benevento	ITF32	–	–	0.12	–	–	0.35	1.56	1.41	1.41
32	Milano	ITC4C	–	–	0.04	–	–	0.12	–	–	0.49
33	Siracusa	ITG19	–	–	0.13	–	–	0.38	1.96	1.52	1.52
34	Modena	ITH54	–	–	0.21	–	–	0.60	2.64	2.42	2.42
35	Constanța	RO223	–	–	0.06	1.06	1.06	0.18	2.38	1.05	0.70
36	Barletta-Andria-Trani	ITF48	–	–	0.06	–	–	0.18	1.28	1.01	0.72
37	Caserta	ITF31	–	–	0.08	–	–	0.23	1.46	1.01	0.94
38	Avellino	ITF34	–	–	0.11	–	–	0.32	1.52	1.27	1.27
39	Crotone	ITF62	–	–	0.16	–	–	0.45	2.07	1.81	1.81
40	Olt	RO414	–	–	0.07	1.28	1.05	0.20	2.00	1.03	0.82
41	Perugia	ITI21	–	–	0.20	–	–	0.57	2.37	2.26	2.26
42	Kentrikos Tomeas Athinon	EL303	–	–	0.09	1.08	1.08	0.27	2.05	1.07	1.07
43	Ileia	EL633	–	–	0.24	1.34	1.00	0.68	3.48	2.72	2.72
44	Roma	ITI43	–	–	0.07	–	–	0.21	1.03	1.02	0.83
45	L'Aquila	ITF11	–	–	0.20	–	–	0.58	2.47	2.33	2.33
46	Isernia	ITF21	–	–	0.15	–	–	0.43	1.76	1.70	1.70
47	Sibiu	RO126	–	–	0.04	1.09	1.00	0.12	2.50	1.02	0.49
48	Salerno	ITF35	–	–	0.06	–	–	0.16	1.29	1.00	0.65
49	Reggio nell'Emilia	ITH53	–	–	0.20	–	–	0.57	2.61	2.28	2.28
50	Palermo	ITG12	–	–	0.05	–	–	0.15	–	–	0.59

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	–	–	0.15	1.14	1.00	0.44	2.97	1.75	1.75
52	Silistra	BG325	–	–	0.18	1.40	1.06	0.50	2.58	2.01	2.01
53	Zakynthos	EL621	–	–	0.24	1.38	1.07	0.68	3.81	2.73	2.73
54	Ragusa	ITG18	–	–	0.10	–	–	0.28	1.49	1.13	1.13
55	Fokida	EL645	–	–	0.22	1.35	1.01	0.62	3.08	2.48	2.48
56	Aitoloakarnania	EL631	–	–	0.18	1.31	1.01	0.50	2.91	2.01	2.01
57	Larisa	EL612	–	–	0.15	1.44	1.05	0.44	3.21	1.76	1.76
58	Caltanissetta	ITG15	–	–	0.07	–	–	0.21	1.30	1.03	0.83
59	Florina	EL533	–	–	0.06	–	–	0.17	1.28	1.02	0.67
60	Ruse	BG323	–	–	0.15	1.08	1.07	0.42	2.34	1.67	1.67
61	Lesvos, Limnos	EL411	–	–	0.19	1.17	1.04	0.55	2.84	2.20	2.20
62	Enna	ITG16	–	–	0.07	–	–	0.20	1.29	1.01	0.79
63	Torino	ITC11	–	–	0.04	–	–	0.11	–	–	0.43
64	Plovdiv	BG421	–	–	0.08	–	–	0.23	1.81	1.01	0.92
65	Ravenna	ITH57	–	–	0.21	1.05	1.02	0.61	2.60	2.43	2.43
66	Kastoria	EL532	–	–	0.05	–	–	0.15	1.16	1.07	0.61
67	Firenze	ITI14	–	–	0.10	–	–	0.29	1.26	1.15	1.15
68	Potenza	ITF51	–	–	0.11	–	–	0.31	1.44	1.22	1.22
69	Lefkada	EL624	–	–	0.23	1.43	1.02	0.67	3.95	2.69	2.69
70	Parma	ITH52	–	–	0.17	–	–	0.49	2.25	1.98	1.98
71	Lakonia, Messinia	EL653	–	–	0.22	1.34	1.05	0.62	3.32	2.47	2.47
72	Fthiotida	EL644	–	–	0.15	1.15	1.04	0.42	2.53	1.69	1.69
73	Pazardzhik	BG423	–	–	0.06	–	–	0.17	1.35	1.00	0.67
74	Ferrara	ITH56	–	–	0.20	–	–	0.57	2.44	2.28	2.28
75	Stara Zagora	BG344	–	–	0.05	–	–	0.15	1.77	1.04	0.58
76	Razgrad	BG324	–	–	0.13	1.04	1.04	0.37	2.27	1.47	1.47
77	Korinthia	EL652	–	–	0.21	1.49	1.00	0.60	3.28	2.41	2.41
78	Arta, Preveza	EL541	–	–	0.21	1.56	1.02	0.60	3.41	2.41	2.41
79	Pescara	ITF13	–	–	0.08	–	–	0.24	1.19	1.02	0.97
80	Ikaria, Samos	EL412	–	–	0.17	1.17	1.07	0.49	2.59	1.95	1.95
81	Lodi	ITC49	–	–	0.10	–	–	0.28	1.44	1.14	1.14
82	Thessaloniki	EL522	–	–	0.09	–	–	0.26	1.90	1.02	1.02
83	Agrigento	ITG14	–	–	0.05	–	–	0.14	–	–	0.54
84	Rodopi	EL513	–	–	0.05	–	–	0.13	1.70	1.37	0.54
85	Forlì-Cesena	ITH58	–	–	0.18	–	–	0.51	2.20	2.06	2.06
86	Ithaki, Kefallinia	EL623	–	–	0.17	1.30	1.00	0.49	3.93	1.98	1.98
87	Brescia	ITC47	–	–	0.09	–	–	0.27	1.35	1.07	1.07
88	Mantova	ITC4B	–	–	0.13	–	–	0.37	1.79	1.47	1.47
89	Ioannina	EL543	–	–	0.15	1.29	1.00	0.43	2.70	1.71	1.71
90	Treviso	ITH34	–	–	0.12	–	–	0.35	1.75	1.42	1.42
91	Grevena, Kozani	EL531	–	–	0.05	–	–	0.15	1.56	1.00	0.61
92	Cremona	ITC4A	–	–	0.11	–	–	0.33	1.64	1.30	1.30
93	Irakleio	EL431	–	–	0.21	1.54	1.02	0.60	3.47	2.40	2.40
94	Evros	EL511	–	–	0.07	1.11	1.10	0.20	2.21	1.02	0.81
95	Matera	ITF52	–	–	0.05	–	–	0.16	1.15	1.02	0.63
96	Haskovo	BG422	–	–	0.06	–	–	0.17	1.26	1.06	0.67
97	Kerkyra	EL622	–	–	0.16	1.12	1.01	0.47	2.44	1.88	1.88
98	Chios	EL413	–	–	0.14	–	–	0.39	2.17	1.57	1.57
99	Campobasso	ITF22	–	–	0.09	–	–	0.24	1.17	1.01	0.97
100	Vicenza	ITH32	–	–	0.10	–	–	0.29	1.42	1.16	1.16

Table B. 18. Scenario 3 – energy efficiency upgrading: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^{*}_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
1	Buzău	RO222	–	–	0.59	1.73	1.69	1.69	6.76	6.76	6.76
2	Bucureşti	RO321	–	–	0.57	1.68	1.63	1.63	6.53	6.53	6.53
3	Vrancea	RO226	–	–	0.59	1.77	1.69	1.69	6.77	6.77	6.77
4	Galați	RO224	–	–	0.60	1.76	1.70	1.70	6.81	6.81	6.81
5	Prahova	RO316	–	–	0.60	1.77	1.72	1.72	6.88	6.88	6.88
6	Braşov	RO122	1.05	1.02	0.74	2.18	2.13	2.13	8.50	8.50	8.50
7	Brăila	RO221	–	–	0.56	1.64	1.61	1.61	6.42	6.42	6.42
8	Bacău	RO211	1.09	1.09	0.63	1.87	1.79	1.79	7.17	7.17	7.17
9	Covasna	RO123	1.09	1.05	0.82	2.39	2.36	2.36	9.43	9.43	9.43
10	Napoli	ITF33	–	–	0.19	–	–	0.56	2.22	2.22	2.22
11	Vaslui	RO216	1.20	1.02	0.84	2.41	2.41	2.41	9.65	9.65	9.65
12	Ialomița	RO315	–	–	0.52	1.51	1.48	1.48	5.90	5.90	5.90
13	Catania	ITG17	–	–	0.18	–	–	0.50	2.05	2.02	2.02
14	Catanzaro	ITF63	–	–	0.17	–	–	0.47	1.92	1.89	1.89
15	Neamț	RO214	1.02	1.02	0.71	2.12	2.02	2.02	8.09	8.09	8.09
16	Reggio di Calabria	ITF65	–	–	0.15	–	–	0.43	1.77	1.71	1.71
17	Dâmbovița	RO313	–	–	0.55	1.60	1.58	1.58	6.32	6.32	6.32
18	Bologna	ITH55	–	–	0.34	1.10	1.00	0.98	3.91	3.91	3.91
19	Argeş	RO311	1.03	1.03	0.58	1.75	1.67	1.67	6.67	6.67	6.67
20	Cosenza	ITF61	–	–	0.18	–	–	0.52	2.09	2.07	2.07
21	Teleorman	RO317	1.05	1.05	0.68	1.98	1.96	1.96	7.82	7.82	7.82
22	Călăraşi	RO312	–	–	0.49	1.44	1.40	1.40	5.62	5.62	5.62
23	Achaia	EL632	–	–	0.22	1.37	1.02	0.62	2.81	2.48	2.48
24	Tulcea	RO225	–	–	0.51	1.47	1.44	1.44	5.77	5.77	5.77
25	Foggia	ITF46	–	–	0.20	–	–	0.57	2.27	2.27	2.27
26	Iaşi	RO213	1.07	1.07	0.69	1.99	1.98	1.98	7.91	7.91	7.91
27	Harghita	RO124	1.05	1.00	0.89	2.55	2.55	2.55	10.22	10.22	10.22
28	Giurgiu	RO314	–	–	0.47	1.40	1.35	1.35	5.40	5.40	5.40
29	Messina	ITG13	–	–	0.16	–	–	0.46	1.89	1.85	1.85
30	Vibo Valentia	ITF64	–	–	0.13	–	–	0.38	1.60	1.52	1.52
31	Benevento	ITF32	–	–	0.20	–	–	0.56	2.25	2.25	2.25
32	Milano	ITC4C	–	–	0.32	1.07	1.00	0.91	3.63	3.63	3.63
33	Siracusa	ITG19	–	–	0.14	–	–	0.40	1.67	1.62	1.62
34	Modena	ITH54	–	–	0.35	1.14	1.00	1.00	4.00	4.00	4.00
35	Constanța	RO223	–	–	0.37	1.19	1.06	1.06	4.26	4.26	4.26
36	Barletta-Andria-Trani	ITF48	–	–	0.20	–	–	0.57	2.28	2.28	2.28
37	Caserta	ITF31	–	–	0.21	–	–	0.59	2.35	2.35	2.35
38	Avellino	ITF34	–	–	0.19	–	–	0.53	2.13	2.13	2.13
39	Crotone	ITF62	–	–	0.10	–	–	0.30	1.30	1.19	1.19
40	Olt	RO414	–	–	0.49	1.43	1.41	1.41	5.64	5.64	5.64
41	Perugia	ITI21	–	–	0.31	1.10	1.04	0.89	3.57	3.57	3.57
42	Kentrikos Tomeas Athinon	EL303	–	–	0.24	1.02	1.01	0.67	3.06	2.70	2.70
43	Ileia	EL633	–	–	0.15	1.18	1.03	0.42	2.04	1.69	1.69
44	Roma	ITI43	–	–	0.21	–	–	0.60	2.39	2.39	2.39
45	L'Aquila	ITF11	–	–	0.23	–	–	0.65	2.59	2.59	2.59
46	Isernia	ITF21	–	–	0.23	–	–	0.65	2.61	2.61	2.61
47	Sibiu	RO126	1.07	1.07	0.68	2.00	1.95	1.95	7.82	7.82	7.82
48	Salerno	ITF35	–	–	0.18	–	–	0.52	2.10	2.08	2.08
49	Reggio nell'Emilia	ITH53	–	–	0.36	1.18	1.02	1.02	4.10	4.10	4.10
50	Palermo	ITG12	–	–	0.17	–	–	0.48	1.95	1.93	1.93

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	–	–	0.19	1.10	1.09	0.55	2.66	2.21	2.21
52	Silistra	BG325	–	–	0.30	1.20	1.00	0.87	3.54	3.48	3.48
53	Zakynthos	EL621	–	–	0.15	1.06	1.04	0.42	2.18	1.69	1.69
54	Ragusa	ITG18	–	–	0.11	–	–	0.33	1.40	1.30	1.30
55	Fokida	EL645	–	–	0.21	1.12	1.12	0.59	2.57	2.37	2.37
56	Aitoloakarnania	EL631	–	–	0.18	1.25	1.07	0.51	2.24	2.02	2.02
57	Larisa	EL612	–	–	0.26	1.33	1.01	0.74	3.42	2.95	2.95
58	Caltanissetta	ITG15	–	–	0.14	–	–	0.41	1.66	1.63	1.63
59	Florina	EL533	–	–	0.42	1.74	1.21	1.21	5.43	4.84	4.84
60	Ruse	BG323	–	–	0.27	1.14	1.01	0.77	3.17	3.08	3.08
61	Lesvos, Limnos	EL411	–	–	0.16	1.10	1.06	0.44	2.03	1.78	1.78
62	Enna	ITG16	–	–	0.18	–	–	0.51	2.06	2.02	2.02
63	Torino	ITC11	–	–	0.50	1.55	1.43	1.43	5.72	5.72	5.72
64	Plovdiv	BG421	–	–	0.26	1.13	1.03	0.73	3.08	2.92	2.92
65	Ravenna	ITH57	–	–	0.26	–	–	0.74	2.95	2.95	2.95
66	Kastoria	EL532	–	–	0.43	1.66	1.22	1.22	5.45	4.87	4.87
67	Firenze	ITI14	–	–	0.29	1.01	1.00	0.83	3.32	3.32	3.32
68	Potenza	ITF51	–	–	0.21	–	–	0.60	2.41	2.41	2.41
69	Lefkada	EL624	–	–	0.11	–	–	0.31	1.61	1.25	1.25
70	Parma	ITH52	–	–	0.34	1.14	1.00	0.97	3.87	3.87	3.87
71	Lakonia, Messinia	EL653	–	–	0.16	1.04	1.04	0.46	2.21	1.83	1.83
72	Fthiotida	EL644	–	–	0.23	1.57	1.01	0.65	2.84	2.61	2.61
73	Pazardzhik	BG423	–	–	0.32	1.11	1.00	0.92	3.81	3.69	3.69
74	Ferrara	ITH56	–	–	0.26	–	–	0.76	3.02	3.02	3.02
75	Stara Zagora	BG344	–	–	0.22	1.02	1.02	0.64	2.65	2.57	2.57
76	Razgrad	BG324	–	–	0.28	1.12	1.12	0.79	3.22	3.17	3.17
77	Korinthia	EL652	–	–	0.14	1.07	1.00	0.41	2.12	1.63	1.63
78	Arta, Preveza	EL541	–	–	0.20	1.30	1.24	0.56	2.43	2.23	2.23
79	Pescara	ITF13	–	–	0.23	–	–	0.66	2.65	2.65	2.65
80	Ikaria, Samos	EL412	–	–	0.12	–	–	0.35	1.82	1.42	1.42
81	Lodi	ITC49	–	–	0.32	1.13	1.00	0.91	3.65	3.65	3.65
82	Thessaloniki	EL522	–	–	0.27	1.42	1.00	0.77	3.38	3.09	3.09
83	Agrigento	ITG14	–	–	0.13	–	–	0.36	1.50	1.43	1.43
84	Rodopi	EL513	–	–	0.32	1.31	1.00	0.92	4.06	3.70	3.70
85	Forlì-Cesena	ITH58	–	–	0.30	1.09	1.02	0.86	3.43	3.43	3.43
86	Ithaki, Kefallinia	EL623	–	–	0.11	–	–	0.31	1.79	1.24	1.24
87	Brescia	ITC47	–	–	0.42	1.30	1.19	1.19	4.77	4.77	4.77
88	Mantova	ITC4B	–	–	0.33	1.17	1.01	0.94	3.76	3.76	3.76
89	Ioannina	EL543	–	–	0.26	1.22	1.00	0.73	3.42	2.93	2.93
90	Treviso	ITH34	–	–	0.29	1.09	1.02	0.83	3.33	3.33	3.33
91	Grevena, Kozani	EL531	–	–	0.32	1.37	1.03	0.92	4.12	3.68	3.68
92	Cremona	ITC4A	–	–	0.34	1.14	1.00	0.96	3.85	3.85	3.85
93	Irakleio	EL431	–	–	0.13	1.01	1.01	0.36	1.97	1.45	1.45
94	Evros	EL511	–	–	0.24	1.14	1.03	0.68	3.14	2.72	2.72
95	Matera	ITF52	–	–	0.22	–	–	0.62	2.49	2.49	2.49
96	Haskovo	BG422	–	–	0.20	–	–	0.56	2.34	2.26	2.26
97	Kerkyra	EL622	–	–	0.11	–	–	0.33	1.62	1.31	1.31
98	Chios	EL413	–	–	0.14	1.06	1.01	0.40	1.90	1.60	1.60
99	Campobasso	ITF22	–	–	0.18	–	–	0.51	2.06	2.04	2.04
100	Vicenza	ITH32	–	–	0.37	1.21	1.06	1.06	4.25	4.25	4.25

Table B. 19. Scenario 3 – integrated renovation: benefit-to-cost ratios (*BCR*) for variable renovation to replacement cost ratios (C_{ren} / C_{rep}) and planning periods (*t*), within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
	Buzău	RO222	1.39	1.09	0.68	1.99	1.93	1.93	7.72	7.72	7.72
	Bucureşti	RO321	1.23	1.10	0.64	1.95	1.82	1.82	7.29	7.29	7.29
	Vrancea	RO226	1.33	1.03	0.65	1.96	1.85	1.85	7.42	7.42	7.42
	Galați	RO224	1.16	1.00	0.59	1.76	1.69	1.69	6.76	6.76	6.76
	Prahova	RO316	1.44	1.04	0.61	1.83	1.75	1.75	7.01	7.01	7.01
	Braşov	RO122	1.31	1.00	0.72	2.12	2.05	2.05	8.20	8.20	8.20
	Brăila	RO221	1.22	1.05	0.56	1.67	1.61	1.61	6.45	6.45	6.45
	Bacău	RO211	1.39	1.00	0.60	1.80	1.71	1.71	6.85	6.85	6.85
	Covasna	RO123	1.26	1.01	0.76	2.23	2.17	2.17	8.69	8.69	8.69
0	Napoli	ITF33	–	–	0.20	–	–	0.57	2.30	2.29	2.29
1	Vaslui	RO216	1.02	1.01	0.69	2.02	1.98	1.98	7.94	7.94	7.94
2	Ialomița	RO315	1.23	1.02	0.52	1.54	1.49	1.49	5.96	5.96	5.96
3	Catania	ITG17	–	–	0.24	–	–	0.68	2.72	2.72	2.72
4	Catanzaro	ITF63	–	–	0.26	1.00	1.00	0.74	2.97	2.97	2.97
5	Neamț	RO214	1.21	1.05	0.59	1.76	1.68	1.68	6.71	6.71	6.71
6	Reggio di Calabria	ITF65	–	–	0.25	1.01	1.01	0.70	2.81	2.81	2.81
7	Dâmbovița	RO313	1.28	1.00	0.50	1.45	1.43	1.43	5.72	5.72	5.72
8	Bologna	ITH55	–	–	0.36	1.14	1.04	1.04	4.17	4.17	4.17
9	Argeş	RO311	1.05	1.01	0.51	1.53	1.45	1.45	5.80	5.80	5.80
0	Cosenza	ITF61	–	–	0.25	–	–	0.70	2.81	2.81	2.81
1	Teleorman	RO317	–	–	0.56	1.61	1.59	1.59	6.37	6.37	6.37
2	Călăraşi	RO312	1.15	1.02	0.46	1.34	1.30	1.30	5.20	5.20	5.20
3	Achaia	EL632	–	–	0.32	1.48	1.01	0.92	4.21	3.70	3.70
4	Tulcea	RO225	–	–	0.42	1.28	1.20	1.20	4.82	4.82	4.82
5	Foggia	ITF46	–	–	0.23	–	–	0.66	2.64	2.64	2.64
6	Iaşi	RO213	–	–	0.54	1.57	1.56	1.56	6.22	6.22	6.22
7	Harghita	RO124	1.06	1.01	0.71	2.09	2.03	2.03	8.12	8.12	8.12
8	Giurgiu	RO314	1.05	1.01	0.42	1.26	1.21	1.21	4.83	4.83	4.83
9	Messina	ITG13	–	–	0.21	–	–	0.61	2.44	2.42	2.42
0	Vibo Valentia	ITF64	–	–	0.21	–	–	0.61	2.46	2.44	2.44
1	Benevento	ITF32	–	–	0.22	–	–	0.62	2.50	2.50	2.50
2	Milano	ITC4C	–	–	0.26	1.02	1.01	0.74	2.98	2.98	2.98
3	Siracusa	ITG19	–	–	0.18	–	–	0.52	2.10	2.10	2.10
4	Modena	ITH54	–	–	0.38	1.22	1.10	1.10	4.40	4.40	4.40
5	Constanța	RO223	–	–	0.31	1.16	1.01	0.89	3.57	3.57	3.57
6	Barletta-Andria-Trani	ITF48	–	–	0.19	–	–	0.53	2.12	2.12	2.12
7	Caserta	ITF31	–	–	0.20	–	–	0.57	2.30	2.30	2.30
8	Avellino	ITF34	–	–	0.20	–	–	0.58	2.33	2.33	2.33
9	Crotone	ITF62	–	–	0.17	–	–	0.49	2.05	1.95	1.95
0	Olt	RO414	–	–	0.41	1.21	1.17	1.17	4.66	4.66	4.66
1	Perugia	ITI21	–	–	0.35	1.13	1.01	1.00	3.98	3.98	3.98
2	Kentrikos Tomeas Athinon	EL303	–	–	0.23	1.07	1.07	0.66	3.02	2.63	2.63
3	Ileia	EL633	–	–	0.25	1.35	1.00	0.71	3.27	2.86	2.86
4	Roma	ITI43	–	–	0.20	–	–	0.57	2.26	2.26	2.26
5	L'Aquila	ITF11	–	–	0.29	1.06	1.02	0.83	3.30	3.30	3.30
6	Isernia	ITF21	–	–	0.26	–	–	0.74	2.94	2.94	2.94
7	Sibiu	RO126	–	–	0.53	1.56	1.52	1.52	6.08	6.08	6.08
8	Salerno	ITF35	–	–	0.17	–	–	0.48	1.94	1.92	1.92
9	Reggio nell'Emilia	ITH53	–	–	0.38	1.23	1.10	1.10	4.38	4.38	4.38
0	Palermo	ITG12	–	–	0.16	–	–	0.44	1.82	1.77	1.77

No.	NUTS-3		C_{ren} / C_{rep} = 0.24, t = 35 years			C_{ren} / C_{rep} = 0.12, t = 50 years			C_{ren} / C_{rep} = 0.06, t = 100 years		
	Name	ID	Sub-scenario 3.1	Sub-scenario 3.2	100%	Sub-scenario 3.1	Sub-scenario 3.2	100%	Sub-scenario 3.1	Sub-scenario 3.2	100%
			BCR ≥ 1	ΣBCR ≈ 1		BCR ≥ 1	ΣBCR ≈ 1		BCR ≥ 1	ΣBCR ≈ 1	
1	Notios Tomeas Athinon	EL304	–	–	0.23	1.43	1.00	0.67	3.32	2.67	2.67
2	Silistra	BG325	–	–	0.33	1.27	1.00	0.94	3.77	3.77	3.77
3	Zakynthos	EL621	–	–	0.25	1.33	1.01	0.72	3.50	2.87	2.87
4	Ragusa	ITG18	–	–	0.14	–	–	0.41	1.67	1.63	1.63
5	Fokida	EL645	–	–	0.28	1.19	1.03	0.81	3.54	3.23	3.23
6	Aitoloakarnania	EL631	–	–	0.24	1.28	1.01	0.67	3.03	2.69	2.69
7	Larisa	EL612	–	–	0.28	1.53	1.01	0.81	3.79	3.23	3.23
8	Caltanissetta	ITG15	–	–	0.15	–	–	0.43	1.73	1.70	1.70
9	Florina	EL533	–	–	0.35	1.43	1.02	1.00	4.49	3.98	3.98
0	Ruse	BG323	–	–	0.29	1.16	1.01	0.82	3.29	3.27	3.27
1	Lesvos, Limnos	EL411	–	–	0.23	1.10	1.01	0.66	2.87	2.62	2.62
2	Enna	ITG16	–	–	0.17	–	–	0.49	2.00	1.97	1.97
3	Torino	ITC11	–	–	0.39	1.24	1.12	1.12	4.49	4.49	4.49
4	Plovdiv	BG421	–	–	0.24	1.06	1.01	0.68	2.84	2.71	2.71
5	Ravenna	ITH57	–	–	0.32	1.19	1.00	0.91	3.63	3.63	3.63
6	Kastoria	EL532	–	–	0.35	1.35	1.01	0.99	4.46	3.97	3.97
7	Firenze	ITI14	–	–	0.27	–	–	0.78	3.14	3.14	3.14
8	Potenza	ITF51	–	–	0.22	–	–	0.63	2.51	2.51	2.51
9	Lefkada	EL624	–	–	0.22	1.33	1.00	0.63	3.28	2.52	2.52
0	Parma	ITH52	–	–	0.35	1.18	1.01	1.01	4.03	4.03	4.03
1	Lakonia, Messinia	EL653	–	–	0.25	1.27	1.00	0.71	3.18	2.82	2.82
2	Fthiotida	EL644	–	–	0.26	1.29	1.01	0.73	3.25	2.94	2.94
3	Pazardzhik	BG423	–	–	0.27	1.02	1.01	0.78	3.22	3.13	3.13
4	Ferrara	ITH56	–	–	0.31	1.16	1.11	0.90	3.59	3.59	3.59
5	Stara Zagora	BG344	–	–	0.20	–	–	0.56	2.31	2.25	2.25
6	Razgrad	BG324	–	–	0.28	1.15	1.02	0.81	3.23	3.22	3.22
7	Korinthia	EL652	–	–	0.23	1.40	1.01	0.66	3.17	2.63	2.63
8	Arta, Preveza	EL541	–	–	0.27	1.40	1.02	0.77	3.43	3.08	3.08
9	Pescara	ITF13	–	–	0.22	–	–	0.63	2.53	2.53	2.53
0	Ikaria, Samos	EL412	–	–	0.19	1.06	1.00	0.55	2.56	2.21	2.21
1	Lodi	ITC49	–	–	0.30	1.13	1.03	0.85	3.38	3.38	3.38
2	Thessaloniki	EL522	–	–	0.25	1.33	1.00	0.72	3.49	2.90	2.90
3	Agrigento	ITG14	–	–	0.12	–	–	0.35	1.44	1.38	1.38
4	Rodopi	EL513	–	–	0.27	1.24	1.06	0.76	3.42	3.06	3.06
5	Forlì-Cesena	ITH58	–	–	0.33	1.15	1.00	0.94	3.76	3.76	3.76
6	Ithaki, Kefallinia	EL623	–	–	0.18	1.22	1.00	0.52	2.82	2.09	2.09
7	Brescia	ITC47	–	–	0.36	1.20	1.04	1.04	4.17	4.17	4.17
8	Mantova	ITC4B	–	–	0.32	1.23	1.01	0.91	3.66	3.66	3.66
9	Ioannina	EL543	–	–	0.28	1.25	1.01	0.79	3.74	3.18	3.18
0	Treviso	ITH34	–	–	0.29	1.17	1.10	0.83	3.30	3.30	3.30
1	Grevena, Kozani	EL531	–	–	0.27	1.26	1.02	0.77	3.57	3.08	3.08
2	Cremona	ITC4A	–	–	0.32	1.18	1.00	0.91	3.62	3.62	3.62
3	Irakleio	EL431	–	–	0.22	1.25	1.00	0.62	3.06	2.50	2.50
4	Evros	EL511	–	–	0.22	1.25	1.01	0.62	2.90	2.50	2.50
5	Matera	ITF52	–	–	0.19	–	–	0.55	2.23	2.22	2.22
6	Haskovo	BG422	–	–	0.18	–	–	0.52	2.14	2.07	2.07
7	Kerkyra	EL622	–	–	0.18	1.07	1.07	0.52	2.38	2.08	2.08
8	Chios	EL413	–	–	0.19	1.29	1.00	0.53	2.40	2.12	2.12
9	Campobasso	ITF22	–	–	0.18	–	–	0.52	2.10	2.09	2.09
00	Vicenza	ITH32	–	–	0.34	1.15	1.00	0.96	3.83	3.83	3.83

Table B. 20. Scenario 3 – seismic retrofit: benefit in terms of average annual economic loss (*ΔAAEL*), average annual loss of life (Δ*AALL*), average annual energy consumption (Δ*AAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.12 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Δ*AAEL* (10^6 €)			Δ*AALL* (fatalities)			Δ*AAEC* (GWh)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
1	Buzău	RO222	11.91	15.96	15.96	2.8	3.7	3.7	–	–	–
2	Bucureşti	RO321	54.81	63.72	63.72	27.4	33.3	33.3	–	–	–
3	Vrancea	RO226	7.52	10.84	10.84	1.7	2.4	2.4	–	–	–
4	Galați	RO224	5.77	7.67	8.35	1.9	2.7	2.9	–	–	–
5	Prahova	RO316	13.41	17.28	19.12	3.7	4.5	5.0	–	–	–
6	Braşov	RO122	7.59	11.87	12.09	2.2	3.8	3.9	–	–	–
7	Brăila	RO221	3.80	4.20	5.17	1.1	1.2	1.6	–	–	–
8	Bacău	RO211	5.33	9.75	11.15	1.9	2.8	3.2	–	–	–
9	Covasna	RO123	2.92	3.71	4.09	0.9	1.0	1.1	–	–	–
10	Napoli	ITF33	0.00	0.00	101.51	0.0	0.0	7.3	–	–	–
11	Vaslui	RO216	0.37	0.45	2.57	0.2	0.2	0.9	–	–	–
12	Ialomița	RO315	1.77	4.03	4.78	0.5	1.0	1.2	–	–	–
13	Catania	ITG17	0.00	0.00	82.43	0.0	0.0	4.1	–	–	–
14	Catanzaro	ITF63	0.00	0.00	35.81	0.0	0.0	1.7	–	–	–
15	Neamț	RO214	1.01	1.80	4.19	0.3	0.5	1.0	–	–	–
16	Reggio di Calabria	ITF65	0.00	0.00	53.28	0.0	0.0	2.8	–	–	–
17	Dâmbovița	RO313	3.22	4.46	6.66	1.0	1.2	1.5	–	–	–
18	Bologna	ITH55	0.00	0.00	87.46	0.0	0.0	4.0	–	–	–
19	Argeş	RO311	2.57	4.82	6.81	0.7	1.2	1.6	–	–	–
20	Cosenza	ITF61	0.00	0.00	59.49	0.0	0.0	2.7	–	–	–
21	Teleorman	RO317	0.31	0.59	1.98	0.1	0.2	0.5	–	–	–
22	Călăraşi	RO312	1.16	1.78	3.43	0.3	0.4	0.8	–	–	–
23	Achaia	EL632	12.82	21.59	22.02	1.4	1.9	2.0	–	–	–
24	Tulcea	RO225	0.17	0.24	1.30	0.1	0.1	0.3	–	–	–
25	Foggia	ITF46	0.00	0.00	34.17	0.0	0.0	1.7	–	–	–
26	Iaşi	RO213	0.12	0.14	2.95	0.1	0.1	0.7	–	–	–
27	Harghita	RO124	0.67	1.19	2.12	0.2	0.3	0.5	–	–	–
28	Giurgiu	RO314	0.74	1.33	2.82	0.2	0.3	0.6	–	–	–
29	Messina	ITG13	0.00	0.00	42.36	0.0	0.0	2.0	–	–	–
30	Vibo Valentia	ITF64	0.00	0.00	12.53	0.0	0.0	0.6	–	–	–
31	Benevento	ITF32	0.00	0.00	15.08	0.0	0.0	0.8	–	–	–
32	Milano	ITC4C	0.00	0.00	66.02	0.0	0.0	2.4	–	–	–
33	Siracusa	ITG19	0.00	0.00	23.59	0.0	0.0	1.0	–	–	–
34	Modena	ITH54	0.00	0.00	68.88	0.0	0.0	3.3	–	–	–
35	Constanța	RO223	0.10	0.10	3.69	0.0	0.0	0.7	–	–	–
36	Barletta-Andria-Trani	ITF48	0.00	0.00	9.37	0.0	0.0	0.5	–	–	–
37	Caserta	ITF31	0.00	0.00	28.81	0.0	0.0	1.4	–	–	–
38	Avellino	ITF34	0.00	0.00	20.18	0.0	0.0	1.0	–	–	–
39	Crotone	ITF62	0.00	0.00	11.30	0.0	0.0	0.6	–	–	–
40	Olt	RO414	0.35	0.58	2.54	0.1	0.1	0.5	–	–	–
41	Perugia	ITI21	0.00	0.00	60.06	0.0	0.0	3.1	–	–	–
42	Kentrikos Tomeas Athin	EL303	0.89	0.89	38.43	0.1	0.1	2.9	–	–	–
43	Ileia	EL633	4.98	7.61	8.46	0.4	0.6	0.6	–	–	–
44	Roma	ITI43	0.00	0.00	154.92	0.0	0.0	6.4	–	–	–
45	L'Aquila	ITF11	0.00	0.00	25.97	0.0	0.0	1.4	–	–	–
46	Isernia	ITF21	0.00	0.00	5.96	0.0	0.0	0.3	–	–	–
47	Sibiu	RO126	0.29	0.42	1.45	0.1	0.1	0.4	–	–	–
48	Salerno	ITF35	0.00	0.00	24.66	0.0	0.0	1.2	–	–	–
49	Reggio nell'Emilia	ITH53	0.00	0.00	47.69	0.0	0.0	2.2	–	–	–
50	Palermo	ITG12	0.00	0.00	27.65	0.0	0.0	1.2	–	–	–

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	12.10	19.54	28.13	1.2	1.7	2.1	–	–	–
52	Silistra	BG325	1.05	1.59	2.63	0.1	0.2	0.3	–	–	–
53	Zakynthos	EL621	1.62	2.29	2.49	0.1	0.1	0.2	–	–	–
54	Ragusa	ITG18	0.00	0.00	13.71	0.0	0.0	0.6	–	–	–
55	Fokida	EL645	0.67	1.46	2.42	0.0	0.1	0.1	–	–	–
56	Aitoloakarnania	EL631	3.17	4.93	8.72	0.3	0.4	0.7	–	–	–
57	Larisa	EL612	6.14	8.51	11.63	0.7	0.8	1.0	–	–	–
58	Caltanissetta	ITG15	0.00	0.00	8.32	0.0	0.0	0.4	–	–	–
59	Florina	EL533	0.00	0.00	0.61	0.0	0.0	0.1	–	–	–
60	Ruse	BG323	1.84	1.86	4.65	0.3	0.3	0.5	–	–	–
61	Lesvos, Limnos	EL411	2.29	2.98	5.36	0.1	0.2	0.3	–	–	–
62	Enna	ITG16	0.00	0.00	4.89	0.0	0.0	0.2	–	–	–
63	Torino	ITC11	0.00	0.00	38.72	0.0	0.0	1.9	–	–	–
64	Plovdiv	BG421	0.00	0.00	6.12	0.0	0.0	1.4	–	–	–
65	Ravenna	ITH57	7.24	8.12	42.23	0.3	0.4	1.8	–	–	–
66	Kastoria	EL532	0.00	0.00	0.58	0.0	0.0	0.0	–	–	–
67	Firenze	ITI14	0.00	0.00	43.77	0.0	0.0	1.9	–	–	–
68	Potenza	ITF51	0.00	0.00	15.93	0.0	0.0	0.8	–	–	–
69	Lefkada	EL624	0.99	1.79	1.88	0.0	0.1	0.1	–	–	–
70	Parma	ITH52	0.00	0.00	37.01	0.0	0.0	1.7	–	–	–
71	Lakonia, Messinia	EL653	6.52	11.03	14.51	0.5	0.8	1.0	–	–	–
72	Fthiotida	EL644	2.00	2.47	6.01	0.2	0.2	0.4	–	–	–
73	Pazardzhik	BG423	0.00	0.00	2.58	0.0	0.0	0.3	–	–	–
74	Ferrara	ITH56	0.00	0.00	36.06	0.0	0.0	1.7	–	–	–
75	Stara Zagora	BG344	0.00	0.00	1.90	0.0	0.0	0.4	–	–	–
76	Razgrad	BG324	0.78	0.78	2.17	0.1	0.1	0.2	–	–	–
77	Korinthia	EL652	3.02	7.25	8.69	0.3	0.5	0.6	–	–	–
78	Arta, Preveza	EL541	2.31	4.88	6.03	0.2	0.4	0.5	–	–	–
79	Pescara	ITF13	0.00	0.00	12.01	0.0	0.0	0.5	–	–	–
80	Ikaria, Samos	EL412	0.47	0.79	2.36	0.0	0.0	0.1	–	–	–
81	Lodi	ITC49	0.00	0.00	9.62	0.0	0.0	0.5	–	–	–
82	Thessaloniki	EL522	0.00	0.00	29.03	0.0	0.0	2.4	–	–	–
83	Agrigento	ITG14	0.00	0.00	9.12	0.0	0.0	0.5	–	–	–
84	Rodopi	EL513	0.00	0.00	1.06	0.0	0.0	0.1	–	–	–
85	Forlì-Cesena	ITH58	0.00	0.00	32.33	0.0	0.0	1.5	–	–	–
86	Ithaki, Kefallinia	EL623	1.17	1.99	2.30	0.1	0.1	0.1	–	–	–
87	Brescia	ITC47	0.00	0.00	51.45	0.0	0.0	2.7	–	–	–
88	Mantova	ITC4B	0.00	0.00	26.08	0.0	0.0	1.0	–	–	–
89	Ioannina	EL543	2.39	3.52	6.64	0.2	0.3	0.4	–	–	–
90	Treviso	ITH34	0.00	0.00	52.85	0.0	0.0	2.4	–	–	–
91	Grevena, Kozani	EL531	0.00	0.00	2.17	0.0	0.0	0.2	–	–	–
92	Cremona	ITC4A	0.00	0.00	18.71	0.0	0.0	0.8	–	–	–
93	Irakleio	EL431	8.09	14.50	16.89	0.7	1.0	1.2	–	–	–
94	Evros	EL511	0.01	0.01	2.60	0.0	0.0	0.2	–	–	–
95	Matera	ITF52	0.00	0.00	4.38	0.0	0.0	0.2	–	–	–
96	Haskovo	BG422	0.00	0.00	2.19	0.0	0.0	0.3	–	–	–
97	Kerkyra	EL622	0.67	1.20	4.28	0.1	0.1	0.4	–	–	–
98	Chios	EL413	0.00	0.00	1.97	0.0	0.0	0.1	–	–	–
99	Campobasso	ITF22	0.00	0.00	8.58	0.0	0.0	0.4	–	–	–
100	Vicenza	ITH32	0.00	0.00	42.14	0.0	0.0	2.1	–	–	–

Table B. 21. Scenario 3 – energy efficiency upgrading: benefit in terms of average annual economic loss (*ΔAAEL*), average annual loss of life (Δ*AALL*), average annual energy consumption (Δ*AAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.15 and planning period *t* = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
1	Buzău	RO222	28.83	29.44	29.44	–	–	–	372.03	379.85	379.85
2	Bucureşti	RO321	122.74	125.51	125.51	–	–	–	1583.77	1619.56	1619.56
3	Vrancea	RO226	21.67	22.60	22.60	–	–	–	279.59	291.58	291.58
4	Galați	RO224	23.94	24.56	24.56	–	–	–	308.96	316.90	316.90
5	Prahova	RO316	49.42	50.77	50.77	–	–	–	637.72	655.09	655.09
6	Braşov	RO122	39.19	40.04	40.04	–	–	–	505.69	516.66	516.66
7	Brăila	RO221	14.23	14.49	14.49	–	–	–	183.56	186.97	186.97
8	Bacău	RO211	37.31	38.72	38.72	–	–	–	481.44	499.59	499.59
9	Covasna	RO123	16.62	16.77	16.77	–	–	–	214.46	216.33	216.33
10	Napoli	ITF33	0.00	0.00	256.87	–	–	–	0.00	0.00	2689.64
11	Vaslui	RO216	23.34	23.34	23.34	–	–	–	301.11	301.11	301.11
12	Ialomița	RO315	12.89	13.19	13.19	–	–	–	166.37	170.16	170.16
13	Catania	ITG17	0.00	0.00	100.63	–	–	–	0.00	0.00	1053.69
14	Catanzaro	ITF63	0.00	0.00	31.76	–	–	–	0.00	0.00	332.56
15	Neamț	RO214	33.62	34.89	34.89	–	–	–	433.77	450.19	450.19
16	Reggio di Calabria	ITF65	0.00	0.00	43.75	–	–	–	0.00	0.00	458.06
17	Dâmbovița	RO313	29.74	30.04	30.04	–	–	–	383.78	387.67	387.67
18	Bologna	ITH55	128.60	194.23	199.67	–	–	–	1346.58	2033.76	2090.79
19	Argeş	RO311	37.45	39.14	39.14	–	–	–	483.25	505.10	505.10
20	Cosenza	ITF61	0.00	0.00	71.24	–	–	–	0.00	0.00	745.94
21	Teleorman	RO317	19.90	20.09	20.09	–	–	–	256.84	259.25	259.25
22	Călăraşi	RO312	13.43	13.72	13.72	–	–	–	173.28	176.99	176.99
23	Achaia	EL632	5.98	11.73	21.74	–	–	–	62.79	123.30	228.46
24	Tulcea	RO225	10.03	10.23	10.23	–	–	–	129.44	131.96	131.96
25	Foggia	ITF46	0.00	0.00	59.58	–	–	–	0.00	0.00	623.87
26	Iaşi	RO213	47.37	47.62	47.62	–	–	–	611.30	614.40	614.40
27	Harghita	RO124	29.01	29.01	29.01	–	–	–	374.27	374.27	374.27
28	Giurgiu	RO314	12.99	13.55	13.55	–	–	–	167.59	174.86	174.86
29	Messina	ITG13	0.00	0.00	54.93	–	–	–	0.00	0.00	575.18
30	Vibo Valentia	ITF64	0.00	0.00	10.79	–	–	–	0.00	0.00	112.94
31	Benevento	ITF32	0.00	0.00	30.01	–	–	–	0.00	0.00	314.19
32	Milano	ITC4C	189.64	428.77	606.75	–	–	–	1985.69	4489.64	6353.26
33	Siracusa	ITG19	0.00	0.00	31.34	–	–	–	0.00	0.00	328.20
34	Modena	ITH54	83.13	142.55	142.55	–	–	–	870.48	1492.64	1492.64
35	Constanța	RO223	21.97	28.01	28.01	–	–	–	283.46	361.44	361.44
36	Barletta-Andria-Trani	ITF48	0.00	0.00	37.09	–	–	–	0.00	0.00	388.34
37	Caserta	ITF31	0.00	0.00	90.26	–	–	–	0.00	0.00	945.10
38	Avellino	ITF34	0.00	0.00	42.30	–	–	–	0.00	0.00	442.91
39	Crotone	ITF62	0.00	0.00	9.27	–	–	–	0.00	0.00	97.07
40	Olt	RO414	21.54	21.90	21.90	–	–	–	277.91	282.55	282.55
41	Perugia	ITI21	49.24	71.27	118.48	–	–	–	515.57	746.25	1240.65
42	Kentrikos Tomeas Athin	EL303	70.41	82.77	121.23	–	–	–	739.78	869.69	1273.78
43	Ileia	EL633	0.12	0.20	6.57	–	–	–	1.24	2.05	69.02
44	Roma	ITI43	0.00	0.00	554.46	–	–	–	0.00	0.00	5805.80
45	L'Aquila	ITF11	0.00	0.00	36.01	–	–	–	0.00	0.00	377.11
46	Isernia	ITF21	0.00	0.00	11.44	–	–	–	0.00	0.00	119.76
47	Sibiu	RO126	28.66	29.22	29.22	–	–	–	369.78	377.01	377.01
48	Salerno	ITF35	0.00	0.00	98.15	–	–	–	0.00	0.00	1027.69
49	Reggio nell'Emilia	ITH53	65.10	107.09	107.09	–	–	–	681.62	1121.31	1121.31
50	Palermo	ITG12	0.00	0.00	113.30	–	–	–	0.00	0.00	1186.39

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	19.29	19.55	44.28	–	–	–	202.73	205.37	465.25
52	Silistra	BG325	0.25	2.77	5.71	–	–	–	3.96	44.12	90.88
53	Zakynthos	EL621	0.00	0.00	1.93	–	–	–	0.04	0.04	20.24
54	Ragusa	ITG18	0.00	0.00	19.80	–	–	–	0.00	0.00	207.31
55	Fokida	EL645	0.10	0.10	2.90	–	–	–	1.02	1.02	30.45
56	Aitoloakarnania	EL631	0.61	0.91	10.95	–	–	–	6.43	9.53	115.10
57	Larisa	EL612	9.47	19.56	24.32	–	–	–	99.51	205.50	255.57
58	Caltanissetta	ITG15	0.00	0.00	20.37	–	–	–	0.00	0.00	213.33
59	Florina	EL533	4.51	5.49	5.49	–	–	–	47.37	57.65	57.65
60	Ruse	BG323	0.49	1.10	10.73	–	–	–	7.72	17.45	170.60
61	Lesvos, Limnos	EL411	0.08	0.10	5.41	–	–	–	0.88	1.04	56.87
62	Enna	ITG16	0.00	0.00	15.66	–	–	–	0.00	0.00	164.00
63	Torino	ITC11	594.75	640.57	640.57	–	–	–	6227.63	6707.40	6707.40
64	Plovdiv	BG421	1.76	2.77	24.24	–	–	–	28.00	43.98	385.55
65	Ravenna	ITH57	0.00	0.00	64.03	–	–	–	0.00	0.00	670.48
66	Kastoria	EL532	4.94	5.78	5.78	–	–	–	51.90	60.69	60.69
67	Firenze	ITI14	51.41	53.42	158.61	–	–	–	538.27	559.40	1660.76
68	Potenza	ITF51	0.00	0.00	39.28	–	–	–	0.00	0.00	411.27
69	Lefkada	EL624	0.00	0.00	1.10	–	–	–	0.00	0.00	11.51
70	Parma	ITH52	50.34	87.69	90.49	–	–	–	527.06	918.24	947.53
71	Lakonia, Messinia	EL653	0.00	0.00	13.45	–	–	–	0.02	0.02	141.36
72	Fthiotida	EL644	0.61	4.25	11.60	–	–	–	6.45	44.61	121.86
73	Pazardzhik	BG423	8.24	16.00	17.78	–	–	–	131.11	254.53	282.77
74	Ferrara	ITH56	0.00	0.00	59.83	–	–	–	0.00	0.00	626.46
75	Stara Zagora	BG344	0.27	0.27	10.49	–	–	–	4.35	4.35	166.80
76	Razgrad	BG324	0.23	0.23	5.85	–	–	–	3.64	3.64	92.97
77	Korinthia	EL652	0.66	0.95	7.35	–	–	–	6.89	9.98	77.25
78	Arta, Preveza	EL541	0.09	0.11	6.97	–	–	–	0.95	1.14	73.25
79	Pescara	ITF13	0.00	0.00	41.10	–	–	–	0.00	0.00	430.33
80	Ikaria, Samos	EL412	0.00	0.00	2.14	–	–	–	0.00	0.00	22.44
81	Lodi	ITC49	15.43	32.99	38.66	–	–	–	161.59	345.48	404.85
82	Thessaloniki	EL522	55.73	96.82	109.48	–	–	–	585.63	1017.29	1150.31
83	Agrigento	ITG14	0.00	0.00	30.07	–	–	–	0.00	0.00	314.91
84	Rodopi	EL513	5.49	8.89	9.10	–	–	–	57.72	93.43	95.58
85	Forlì-Cesena	ITH58	21.07	35.67	67.39	–	–	–	220.63	373.46	705.67
86	Ithaki, Kefallinia	EL623	0.00	0.00	1.81	–	–	–	0.00	0.00	19.02
87	Brescia	ITC47	256.57	285.74	285.74	–	–	–	2686.53	2992.02	2992.02
88	Mantova	ITC4B	24.71	68.65	83.08	–	–	–	258.72	718.81	869.95
89	Ioannina	EL543	6.18	12.15	14.25	–	–	–	64.95	127.67	149.74
90	Treviso	ITH34	41.02	61.97	155.23	–	–	–	429.55	648.93	1625.39
91	Grevena, Kozani	EL531	12.34	15.84	16.31	–	–	–	129.70	166.39	171.32
92	Cremona	ITC4A	27.48	64.89	69.10	–	–	–	287.72	679.50	723.55
93	Irakleio	EL431	0.01	0.01	12.79	–	–	–	0.08	0.08	134.35
94	Evros	EL511	2.16	4.84	10.89	–	–	–	22.72	50.82	114.45
95	Matera	ITF52	0.00	0.00	21.79	–	–	–	0.00	0.00	228.21
96	Haskovo	BG422	0.00	0.00	9.15	–	–	–	0.00	0.00	145.49
97	Kerkyra	EL622	0.00	0.00	3.72	–	–	–	0.00	0.00	39.09
98	Chios	EL413	0.07	0.09	2.51	–	–	–	0.77	0.98	26.36
99	Campobasso	ITF22	0.00	0.00	22.45	–	–	–	0.00	0.00	235.08
100	Vicenza	ITH32	144.09	193.87	193.87	–	–	–	1508.73	2030.02	2030.02

Table B. 22. Scenario 3 – integrated renovation: benefit in terms of average annual economic loss (*ΔAAEL*), average annual loss of life (Δ*AALL*), average annual energy consumption (Δ*AAEC*) for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.21 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Δ*AAEL* (10^6 €)			Δ*AALL* (fatalities)			Δ*AAEC* (GWh)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
1	Buzău	RO222	44.56	45.40	45.40	3.7	3.7	3.7	369.92	379.85	379.85
2	București	RO321	180.50	189.24	189.24	33.2	33.3	33.3	1517.88	1619.56	1619.56
3	Vrancea	RO226	32.40	33.44	33.44	2.4	2.4	2.4	279.22	291.58	291.58
4	Galați	RO224	32.05	32.91	32.91	2.9	2.9	2.9	306.37	316.90	316.90
5	Prahova	RO316	67.97	69.89	69.89	5.0	5.0	5.0	632.12	655.09	655.09
6	Brașov	RO122	51.11	52.13	52.13	3.9	3.9	3.9	504.12	516.66	516.66
7	Brăila	RO221	19.10	19.66	19.66	1.6	1.6	1.6	180.21	186.97	186.97
8	Bacău	RO211	48.14	49.87	49.87	3.2	3.2	3.2	478.84	499.59	499.59
9	Covasna	RO123	20.53	20.86	20.86	1.1	1.1	1.1	212.28	216.33	216.33
10	Napoli	ITF33	0.00	0.00	358.37	0.0	0.0	7.3	0.00	0.00	2689.64
11	Vaslui	RO216	25.60	25.91	25.91	0.8	0.9	0.9	297.21	301.11	301.11
12	Ialomița	RO315	17.53	17.96	17.96	1.2	1.2	1.2	164.97	170.16	170.16
13	Catania	ITG17	0.00	0.00	183.06	0.0	0.0	4.1	0.00	0.00	1053.69
14	Catanzaro	ITF63	2.92	3.01	67.57	0.1	0.1	1.7	12.60	13.01	332.56
15	Neamț	RO214	37.82	39.07	39.07	1.0	1.0	1.0	434.63	450.19	450.19
16	Reggio di Calabria	ITF65	7.93	7.93	97.03	0.3	0.3	2.8	35.14	35.14	458.06
17	Dâmbovița	RO313	36.08	36.70	36.70	1.5	1.5	1.5	380.10	387.67	387.67
18	Bologna	ITH55	217.75	287.13	287.13	3.2	4.0	4.0	1558.66	2090.79	2090.79
19	Argeș	RO311	43.71	45.95	45.95	1.6	1.6	1.6	477.45	505.10	505.10
20	Cosenza	ITF61	0.00	0.00	130.73	0.0	0.0	2.7	0.00	0.00	745.94
21	Teleorman	RO317	21.83	22.07	22.07	0.5	0.5	0.5	256.15	259.25	259.25
22	Călărași	RO312	16.57	17.15	17.15	0.8	0.8	0.8	170.20	176.99	176.99
23	Achaia	EL632	29.01	43.16	43.76	1.6	2.0	2.0	139.28	223.33	228.46
24	Tulcea	RO225	9.97	11.53	11.53	0.3	0.3	0.3	112.71	131.96	131.96
25	Foggia	ITF46	0.00	0.00	93.75	0.0	0.0	1.7	0.00	0.00	623.87
26	Iași	RO213	50.05	50.56	50.56	0.7	0.7	0.7	608.12	614.40	614.40
27	Harghita	RO124	30.53	31.12	31.12	0.5	0.5	0.5	366.82	374.27	374.27
28	Giurgiu	RO314	15.40	16.37	16.37	0.6	0.6	0.6	163.21	174.86	174.86
29	Messina	ITG13	0.00	0.00	97.29	0.0	0.0	2.0	0.00	0.00	575.18
30	Vibo Valentia	ITF64	0.00	0.00	23.32	0.0	0.0	0.6	0.00	0.00	112.94
31	Benevento	ITF32	0.00	0.00	45.09	0.0	0.0	0.8	0.00	0.00	314.19
32	Milano	ITC4C	28.70	34.83	672.77	0.1	0.2	2.4	263.97	321.73	6353.26
33	Siracusa	ITG19	0.00	0.00	54.93	0.0	0.0	1.0	0.00	0.00	328.20
34	Modena	ITH54	158.15	211.43	211.43	2.7	3.3	3.3	1074.58	1492.64	1492.64
35	Constanța	RO223	12.37	24.67	31.70	0.4	0.7	0.7	133.49	275.31	361.44
36	Barletta-Andria-Trani	ITF48	0.00	0.00	46.46	0.0	0.0	0.5	0.00	0.00	388.34
37	Caserta	ITF31	0.00	0.00	119.06	0.0	0.0	1.4	0.00	0.00	945.10
38	Avellino	ITF34	0.00	0.00	62.48	0.0	0.0	1.0	0.00	0.00	442.91
39	Crotone	ITF62	0.00	0.00	20.57	0.0	0.0	0.6	0.00	0.00	97.07
40	Olt	RO414	22.99	24.44	24.44	0.5	0.5	0.5	265.06	282.55	282.55
41	Perugia	ITI21	128.78	176.35	178.55	2.4	3.1	3.1	876.52	1226.95	1240.65
42	Kentrikos Tomeas Athin	EL303	73.27	73.89	159.66	1.9	1.9	2.9	537.79	543.01	1273.78
43	Ileia	EL633	4.73	11.64	15.03	0.3	0.6	0.6	16.12	46.19	69.02
44	Roma	ITI43	0.00	0.00	709.38	0.0	0.0	6.4	0.00	0.00	5805.80
45	L'Aquila	ITF11	17.62	25.23	61.98	0.5	0.6	1.4	102.64	148.75	377.11
46	Isernia	ITF21	0.00	0.00	17.40	0.0	0.0	0.3	0.00	0.00	119.76
47	Sibiu	RO126	30.00	30.67	30.67	0.4	0.4	0.4	368.64	377.01	377.01
48	Salerno	ITF35	0.00	0.00	122.81	0.0	0.0	1.2	0.00	0.00	1027.69
49	Reggio nell'Emilia	ITH53	112.99	154.77	154.77	1.8	2.2	2.2	793.57	1121.31	1121.31
50	Palermo	ITG12	0.00	0.00	140.95	0.0	0.0	1.2	0.00	0.00	1186.39

No.	NUTS-3		ΔAAEL (10^6 €)			ΔAALL (fatalities)			ΔAAEC (GWh)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	26.95	58.39	72.41	1.3	2.0	2.1	151.35	352.12	465.25
52	Silistra	BG325	2.67	6.94	8.35	0.2	0.3	0.3	21.76	74.12	90.88
53	Zakynthos	EL621	1.99	3.62	4.41	0.1	0.1	0.2	7.12	14.54	20.24
54	Ragusa	ITG18	0.00	0.00	33.50	0.0	0.0	0.6	0.00	0.00	207.31
55	Fokida	EL645	2.81	4.35	5.32	0.1	0.1	0.1	14.52	23.47	30.45
56	Aitoloakarnania	EL631	6.12	11.75	19.68	0.3	0.5	0.7	27.41	61.00	115.10
57	Larisa	EL612	17.17	33.47	35.95	0.7	1.0	1.0	104.03	232.74	255.57
58	Caltanissetta	ITG15	0.00	0.00	28.69	0.0	0.0	0.4	0.00	0.00	213.33
59	Florina	EL533	5.00	6.07	6.09	0.0	0.1	0.1	47.36	57.39	57.65
60	Ruse	BG323	3.76	6.98	15.37	0.3	0.3	0.5	29.28	65.66	170.60
61	Lesvos, Limnos	EL411	4.25	5.40	10.78	0.1	0.2	0.3	17.57	23.79	56.87
62	Enna	ITG16	0.00	0.00	20.56	0.0	0.0	0.2	0.00	0.00	164.00
63	Torino	ITC11	585.00	679.29	679.29	1.6	1.9	1.9	5799.75	6707.40	6707.40
64	Plovdiv	BG421	1.99	3.97	30.36	0.3	0.4	1.4	16.86	40.31	385.55
65	Ravenna	ITH57	36.97	85.91	106.26	0.8	1.5	1.8	218.05	527.88	670.48
66	Kastoria	EL532	5.30	6.33	6.35	0.0	0.0	0.0	50.90	60.51	60.69
67	Firenze	ITI14	0.00	0.00	202.37	0.0	0.0	1.9	0.00	0.00	1660.76
68	Potenza	ITF51	0.00	0.00	55.21	0.0	0.0	0.8	0.00	0.00	411.27
69	Lefkada	EL624	1.00	2.14	2.98	0.0	0.1	0.1	2.78	6.92	11.51
70	Parma	ITH52	72.90	127.50	127.50	1.0	1.7	1.7	527.68	947.53	947.53
71	Lakonia, Messinia	EL653	9.52	20.08	27.96	0.5	0.8	1.0	36.89	90.55	141.36
72	Fthiotida	EL644	6.08	12.61	17.60	0.2	0.4	0.4	35.82	81.74	121.86
73	Pazardzhik	BG423	2.07	2.72	20.36	0.0	0.0	0.3	29.35	38.26	282.77
74	Ferrara	ITH56	31.70	39.46	95.89	0.7	0.8	1.7	187.70	234.62	626.46
75	Stara Zagora	BG344	0.00	0.00	12.38	0.0	0.0	0.4	0.00	0.00	166.80
76	Razgrad	BG324	1.46	2.76	8.02	0.1	0.1	0.2	10.78	25.19	92.97
77	Korinthia	EL652	4.80	11.43	16.04	0.3	0.5	0.6	18.67	49.27	77.25
78	Arta, Preveza	EL541	4.45	10.63	13.00	0.2	0.4	0.5	18.94	54.59	73.25
79	Pescara	ITF13	0.00	0.00	53.10	0.0	0.0	0.5	0.00	0.00	430.33
80	Ikaria, Samos	EL412	0.72	1.18	4.49	0.0	0.0	0.1	2.63	4.54	22.44
81	Lodi	ITC49	10.69	21.00	48.29	0.1	0.2	0.5	86.59	176.89	404.85
82	Thessaloniki	EL522	66.71	116.49	138.51	1.4	2.3	2.4	563.07	950.05	1150.31
83	Agrigento	ITG14	0.00	0.00	39.20	0.0	0.0	0.5	0.00	0.00	314.91
84	Rodopi	EL513	3.08	6.92	10.15	0.1	0.1	0.1	27.77	64.42	95.58
85	Forlì-Cesena	ITH58	45.94	88.36	99.72	0.8	1.4	1.5	316.37	620.41	705.67
86	Ithaki, Kefallinia	EL623	1.10	2.28	4.11	0.0	0.1	0.1	3.38	7.54	19.02
87	Brescia	ITC47	238.24	337.20	337.20	2.0	2.7	2.7	2119.53	2992.02	2992.02
88	Mantova	ITC4B	30.20	87.46	109.16	0.3	0.8	1.0	224.96	681.29	869.95
89	Ioannina	EL543	12.94	19.39	20.90	0.3	0.4	0.4	89.29	136.60	149.74
90	Treviso	ITH34	43.75	62.89	208.07	0.7	0.9	2.4	316.59	466.09	1625.39
91	Grevena, Kozani	EL531	10.10	16.19	18.47	0.1	0.2	0.2	92.32	149.05	171.32
92	Cremona	ITC4A	25.50	65.61	87.81	0.3	0.6	0.8	197.55	527.93	723.55
93	Irakleio	EL431	11.06	18.85	29.67	0.7	0.9	1.2	31.22	72.95	134.35
94	Evros	EL511	3.16	5.94	13.49	0.1	0.1	0.2	22.50	47.69	114.45
95	Matera	ITF52	0.00	0.00	26.18	0.0	0.0	0.2	0.00	0.00	228.21
96	Haskovo	BG422	0.00	0.00	11.33	0.0	0.0	0.3	0.00	0.00	145.49
97	Kerkyra	EL622	0.86	0.86	8.00	0.1	0.1	0.4	3.34	3.36	39.09
98	Chios	EL413	0.13	0.90	4.48	0.0	0.0	0.1	0.83	3.96	26.36
99	Campobasso	ITF22	0.00	0.00	31.03	0.0	0.0	0.4	0.00	0.00	235.08
100	Vicenza	ITH32	108.96	223.96	236.01	1.0	1.9	2.1	942.27	1942.31	2030.02

Table B. 23. Scenario 3 – seismic retrofit: renovated buildings, replacement cost, and average number of occupants for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.12 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 3.1	Sub-scenario 3.2	100%	Sub-scenario 3.1	Sub-scenario 3.2	100%	Sub-scenario 3.1	Sub-scenario 3.2	100%
			BCR ≥ 1	ΣBCR ≈ 1		BCR ≥ 1	ΣBCR ≈ 1		BCR ≥ 1	ΣBCR ≈ 1	
1	Buzău	RO222	52756	151759	151759	2184.42	5719.11	5719.11	98469	254589	254589
2	Bucureşti	RO321	29958	128948	128948	12538.03	25243.60	25243.60	610622	1188883	1188883
3	Vrancea	RO226	36023	115742	115742	1448.92	4382.59	4382.59	65384	192099	192099
4	Galați	RO224	47910	87051	120372	1671.54	3146.75	4734.33	101758	198964	302657
5	Prahova	RO316	46046	112867	215640	2847.22	6044.81	9688.52	131075	271407	430579
6	Braşov	RO122	18315	53855	96236	1475.38	4821.34	6180.10	76204	245101	310113
7	Brăila	RO221	28187	36003	78576	1103.44	1450.35	2961.65	66557	89197	181319
8	Bacău	RO211	4521	93465	176656	1085.68	3990.84	7082.54	64818	202042	347817
9	Covasna	RO123	4368	25101	57134	587.81	1343.97	2333.77	33122	71960	118641
10	Napoli	ITF33	0	0	291675	0.00	0.00	151859.24	0	0	1788647
11	Vaslui	RO216	269	838	129280	97.97	147.24	3172.46	9796	14464	223253
12	Ialomița	RO315	3186	39475	85655	345.09	1545.75	2931.41	20138	84068	155361
13	Catania	ITG17	0	0	217728	0.00	0.00	65545.36	0	0	631088
14	Catanzaro	ITF63	0	0	96301	0.00	0.00	22099.02	0	0	210983
15	Neamț	RO214	1046	7435	149063	231.91	667.39	5663.57	14709	38258	265740
16	Reggio di Calabria	ITF65	0	0	155268	0.00	0.00	33547.97	0	0	322317
17	Dâmbovița	RO313	3526	25088	164093	718.65	1556.89	6241.30	37016	79416	292823
18	Bologna	ITH55	0	0	119804	0.00	0.00	66974.41	0	0	569404
19	Argeş	RO311	1843	24356	176970	628.37	1977.55	7698.62	36327	102178	345310
20	Cosenza	ITF61	0	0	192199	0.00	0.00	45268.17	0	0	418382
21	Teleorman	RO317	210	3236	139358	77.63	231.39	3370.84	6046	16897	214573
22	Călăraşi	RO312	4586	12892	99393	269.22	639.57	3204.49	16169	37604	173085
23	Achaia	EL632	18414	70922	90011	3146.94	8818.13	11513.86	49393	134139	174960
24	Tulcea	RO225	126	194	67537	52.60	87.36	2325.03	3443	5887	120282
25	Foggia	ITF46	0	0	106905	0.00	0.00	34523.29	0	0	367034
26	Iaşi	RO213	46	66	181352	46.70	55.71	7900.69	3076	3636	437833
27	Harghita	RO124	360	2798	89188	163.55	468.58	3725.01	8499	24354	176498
28	Giurgiu	RO314	2708	7805	99952	172.19	484.50	3295.14	9257	26391	158858
29	Messina	ITG13	0	0	171085	0.00	0.00	39054.12	0	0	379529
30	Vibo Valentia	ITF64	0	0	52884	0.00	0.00	9308.33	0	0	95425
31	Benevento	ITF32	0	0	78912	0.00	0.00	17536.13	0	0	166577
32	Milano	ITC4C	0	0	221581	0.00	0.00	219498.82	0	0	1773224
33	Siracusa	ITG19	0	0	103752	0.00	0.00	25450.38	0	0	234197
34	Modena	ITH54	0	0	113622	0.00	0.00	46770.14	0	0	400350
35	Constanța	RO223	15	15	131063	38.48	38.48	8634.01	1662	1662	386222
36	Barletta-Andria-Trani	ITF48	0	0	50276	0.00	0.00	21348.91	0	0	229273
37	Caserta	ITF31	0	0	174982	0.00	0.00	50394.90	0	0	529436
38	Avellino	ITF34	0	0	116275	0.00	0.00	26065.99	0	0	250983
39	Crotone	ITF62	0	0	47671	0.00	0.00	10250.23	0	0	99888
40	Olt	RO414	249	942	145160	112.27	227.08	5093.20	7206	13005	246341
41	Perugia	ITI21	0	0	145921	0.00	0.00	43587.10	0	0	382934
42	Kentrikos Tomeas Athinon	EL303	959	959	90406	341.19	341.19	59033.19	5084	5084	581623
43	Ileia	EL633	16378	39251	63168	1523.70	3106.24	5111.21	27948	55988	89996
44	Roma	ITI43	0	0	388815	0.00	0.00	304906.43	0	0	2316179
45	L'Aquila	ITF11	0	0	93072	0.00	0.00	18247.62	0	0	173254
46	Isernia	ITF21	0	0	29037	0.00	0.00	5748.14	0	0	51492
47	Sibiu	RO126	210	329	94645	110.27	172.29	4903.97	5479	8371	224282
48	Salerno	ITF35	0	0	198348	0.00	0.00	62040.50	0	0	638933
49	Reggio nell'Emilia	ITH53	0	0	95000	0.00	0.00	34316.32	0	0	302054
50	Palermo	ITG12	0	0	236755	0.00	0.00	77225.73	0	0	728218

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	2545	13892	60128	4347.20	7995.35	26342.05	45781	90812	299323
52	Silistra	BG325	1397	7259	39352	307.17	611.70	2154.87	8021	17174	63380
53	Zakynthos	EL621	4652	10479	17948	480.08	880.42	1493.50	7909	13773	23027
54	Ragusa	ITG18	0	0	99558	0.00	0.00	19983.63	0	0	180238
55	Fokida	EL645	3336	8549	21818	201.74	589.53	1602.42	3119	8977	22792
56	Aitoloakarnania	EL631	6447	17996	76428	995.15	2013.32	7106.47	18269	35564	119092
57	Larisa	EL612	2952	14409	75618	1755.27	3316.30	10833.48	23572	45604	160628
58	Caltanissetta	ITG15	0	0	75105	0.00	0.00	16394.32	0	0	160455
59	Florina	EL533	0	0	16014	0.00	0.00	1486.57	0	0	29046
60	Ruse	BG323	3206	3695	64579	701.20	716.64	4564.34	17867	18560	124800
61	Lesvos, Limnos	EL411	11679	15186	52896	802.12	1179.20	3992.82	13022	19002	58584
62	Enna	ITG16	0	0	58803	0.00	0.00	10162.97	0	0	101486
63	Torino	ITC11	0	0	300363	0.00	0.00	147075.01	0	0	1311393
64	Plovdiv	BG421	0	0	149917	0.00	0.00	10908.39	0	0	362343
65	Ravenna	ITH57	8011	8769	89627	2839.16	3259.07	28470.29	23801	27321	224312
66	Kastoria	EL532	0	0	15159	0.00	0.00	1556.91	0	0	28429
67	Firenze	ITI14	0	0	129626	0.00	0.00	62702.56	0	0	567896
68	Potenza	ITF51	0	0	105356	0.00	0.00	21349.84	0	0	221443
69	Lefkada	EL624	3742	9151	13489	284.50	719.65	1150.40	3552	8474	13385
70	Parma	ITH52	0	0	82113	0.00	0.00	30728.72	0	0	249479
71	Lakonia, Messinia	EL653	20663	49923	116131	2000.61	4316.68	9638.03	31805	66033	140724
72	Fthiotida	EL644	2412	6178	59118	715.44	970.01	5828.60	11587	16137	89392
73	Pazardzhik	BG423	0	0	86615	0.00	0.00	6329.22	0	0	146177
74	Ferrara	ITH56	0	0	84502	0.00	0.00	25966.73	0	0	206114
75	Stara Zagora	BG344	0	0	88947	0.00	0.00	5357.78	0	0	176796
76	Razgrad	BG324	1396	1396	42789	307.88	307.88	2417.64	7639	7639	66413
77	Korinthia	EL652	4226	31397	64047	831.80	2963.30	5924.80	12055	42821	81964
78	Arta, Preveza	EL541	3628	22452	49326	606.71	1969.13	4101.08	11774	35215	70826
79	Pescara	ITF13	0	0	57926	0.00	0.00	20369.25	0	0	184344
80	Ikaria, Samos	EL412	2792	3960	25321	164.80	304.52	1979.58	2282	4139	24213
81	Lodi	ITC49	0	0	35464	0.00	0.00	13886.56	0	0	130733
82	Thessaloniki	EL522	0	0	167052	0.00	0.00	46510.74	0	0	627401
83	Agrigento	ITG14	0	0	134264	0.00	0.00	27535.58	0	0	261869
84	Rodopi	EL513	0	0	34348	0.00	0.00	3229.54	0	0	63296
85	Forlì-Cesena	ITH58	0	0	75620	0.00	0.00	25771.18	0	0	227384
86	Ithaki, Kefallinia	EL623	4088	10158	23321	369.35	813.20	1909.56	4581	9538	22051
87	Brescia	ITC47	0	0	220754	0.00	0.00	78607.30	0	0	721843
88	Mantova	ITC4B	0	0	93670	0.00	0.00	29015.68	0	0	237543
89	Ioannina	EL543	2028	8795	55480	757.60	1439.81	6392.86	11858	22049	94855
90	Treviso	ITH34	0	0	195004	0.00	0.00	61250.85	0	0	510564
91	Grevena, Kozani	EL531	0	0	57860	0.00	0.00	5823.07	0	0	102794
92	Cremona	ITC4A	0	0	69895	0.00	0.00	23573.56	0	0	207460
93	Irakleio	EL431	9003	40967	95796	2148.52	5822.90	11552.45	32485	87575	172585
94	Evros	EL511	38	39	45867	2.71	2.85	5254.74	38	40	83582
95	Matera	ITF52	0	0	41661	0.00	0.00	11487.02	0	0	117442
96	Haskovo	BG422	0	0	72026	0.00	0.00	5316.45	0	0	130628
97	Kerkyra	EL622	874	5057	46699	244.49	484.94	3730.85	4214	8430	58964
98	Chios	EL413	0	0	24602	0.00	0.00	2052.34	0	0	29758
99	Campobasso	ITF22	0	0	61879	0.00	0.00	14447.91	0	0	133129
100	Vicenza	ITH32	0	0	186585	0.00	0.00	59839.83	0	0	499213

Table B. 24. Scenario 3 – energy efficiency upgrading: renovated buildings, replacement cost, and average number of occupants for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.15 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
1	Buzău	RO222	146612	151759	151759	5465.99	5719.11	5719.11	243543	254589	254589
2	București	RO321	117307	128948	128948	23986.80	25243.60	25243.60	1136319	1188883	1188883
3	Vrancea	RO226	107992	115742	115742	4009.69	4382.59	4382.59	176442	192099	192099
4	Galați	RO224	114570	120372	120372	4476.47	4734.33	4734.33	286488	302657	302657
5	Prahova	RO316	206453	215640	215640	9147.18	9688.52	9688.52	408363	430579	430579
6	Brașov	RO122	92348	96236	96236	5888.70	6180.10	6180.10	296169	310113	310113
7	Brăila	RO221	76779	78576	78576	2849.83	2961.65	2961.65	174404	181319	181319
8	Bacău	RO211	165510	176656	176656	6533.73	7082.54	7082.54	321974	347817	347817
9	Covasna	RO123	55850	57134	57134	2286.05	2333.77	2333.77	116360	118641	118641
10	Napoli	ITF33	0	0	291675	0.00	0.00	151859.24	0	0	1788647
11	Vaslui	RO216	129278	129280	129280	3172.34	3172.46	3172.46	223244	223253	223253
12	Ialomița	RO315	82844	85655	85655	2798.52	2931.41	2931.41	148035	155361	155361
13	Catania	ITG17	0	0	217728	0.00	0.00	65545.36	0	0	631088
14	Catanzaro	ITF63	0	0	96301	0.00	0.00	22099.02	0	0	210983
15	Neamț	RO214	140143	149063	149063	5208.22	5663.57	5663.57	245082	265740	265740
16	Reggio di Calabria	ITF65	0	0	155268	0.00	0.00	33547.97	0	0	322317
17	Dâmbovița	RO313	161676	164093	164093	6113.68	6241.30	6241.30	286547	292823	292823
18	Bologna	ITH55	46952	114759	119804	38189.96	63530.18	66974.41	329188	538350	569404
19	Argeș	RO311	165887	176970	176970	7028.84	7698.62	7698.62	313467	345310	345310
20	Cosenza	ITF61	0	0	192199	0.00	0.00	45268.17	0	0	418382
21	Teleorman	RO317	136693	139358	139358	3301.83	3370.84	3370.84	210327	214573	214573
22	Călărași	RO312	96045	99393	99393	3068.14	3204.49	3204.49	165796	173085	173085
23	Achaia	EL632	1040	23082	90011	1432.76	3764.74	11513.86	22692	59294	174960
24	Tulcea	RO225	65770	67537	67537	2233.62	2325.03	2325.03	115360	120282	120282
25	Foggia	ITF46	0	0	106905	0.00	0.00	34523.29	0	0	367034
26	Iași	RO213	180408	181352	181352	7815.17	7900.69	7900.69	432745	437833	437833
27	Harghita	RO124	89188	89188	89188	3725.01	3725.01	3725.01	176498	176498	176498
28	Giurgiu	RO314	94232	99952	99952	3053.40	3295.14	3295.14	147745	158858	158858
29	Messina	ITG13	0	0	171085	0.00	0.00	39054.12	0	0	379529
30	Vibo Valentia	ITF64	0	0	52884	0.00	0.00	9308.33	0	0	95425
31	Benevento	ITF32	0	0	78912	0.00	0.00	17536.13	0	0	166577
32	Milano	ITC4C	56288	118821	221581	58177.52	140418.58	219498.82	469186	1127441	1773224
33	Siracusa	ITG19	0	0	103752	0.00	0.00	25450.38	0	0	234197
34	Modena	ITH54	49948	113622	113622	23910.16	46770.14	46770.14	211799	400350	400350
35	Constanța	RO223	105060	131063	131063	6037.52	8634.01	8634.01	279308	386222	386222
36	Barletta-Andria-Trani	ITF48	0	0	50276	0.00	0.00	21348.91	0	0	229273
37	Caserta	ITF31	0	0	174982	0.00	0.00	50394.90	0	0	529436
38	Avellino	ITF34	0	0	116275	0.00	0.00	26065.99	0	0	250983
39	Crotone	ITF62	0	0	47671	0.00	0.00	10250.23	0	0	99888
40	Olt	RO414	141293	145160	145160	4926.70	5093.20	5093.20	237817	246341	246341
41	Perugia	ITI21	45718	59937	145921	14748.42	22535.95	43587.10	132131	199705	382934
42	Kentrikos Tomeas Athinon	EL303	11979	16000	90406	22709.51	27012.49	59033.19	212529	254015	581623
43	Ileia	EL633	24	122	63168	32.65	62.12	5111.21	605	1140	89996
44	Roma	ITI43	0	0	388815	0.00	0.00	304906.43	0	0	2316179
45	L'Aquila	ITF11	0	0	93072	0.00	0.00	18247.62	0	0	173254
46	Isernia	ITF21	0	0	29037	0.00	0.00	5748.14	0	0	51492
47	Sibiu	RO126	92215	94645	94645	4695.74	4903.97	4903.97	215281	224282	224282
48	Salerno	ITF35	0	0	198348	0.00	0.00	62040.50	0	0	638933
49	Reggio nell'Emilia	ITH53	41260	95000	95000	18126.01	34316.32	34316.32	164714	302054	302054
50	Palermo	ITG12	0	0	236755	0.00	0.00	77225.73	0	0	728218

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	3368	3803	60128	5752.48	5883.77	26342.05	61060	62591	299323
52	Silistra	BG325	148	25325	39352	68.38	906.46	2154.87	1861	28725	63380
53	Zakynthos	EL621	1	1	17948	1.22	1.32	1493.50	21	22	23027
54	Ragusa	ITG18	0	0	99558	0.00	0.00	19983.63	0	0	180238
55	Fokida	EL645	111	111	21818	28.26	28.26	1602.42	476	476	22792
56	Aitoloakarnania	EL631	108	622	76428	160.55	277.77	7106.47	2990	5218	119092
57	Larisa	EL612	18666	51730	75618	2341.04	6362.74	10833.48	38958	97566	160628
58	Caltanissetta	ITG15	0	0	75105	0.00	0.00	16394.32	0	0	160455
59	Florina	EL533	10959	16014	16014	849.85	1486.57	1486.57	16749	29046	29046
60	Ruse	BG323	304	6240	64579	140.19	357.07	4564.34	3686	10340	124800
61	Lesvos, Limnos	EL411	18	22	52896	24.93	30.75	3992.82	401	476	58584
62	Enna	ITG16	0	0	58803	0.00	0.00	10162.97	0	0	101486
63	Torino	ITC11	268088	300363	300363	125513.81	147075.01	147075.01	1116221	1311393	1311393
64	Plovdiv	BG421	1115	6682	149917	513.38	879.05	10908.39	16350	29229	362343
65	Ravenna	ITH57	0	0	89627	0.00	0.00	28470.29	0	0	224312
66	Kastoria	EL532	10496	15159	15159	977.45	1556.91	1556.91	17818	28429	28429
67	Firenze	ITI14	30559	31310	129626	16735.71	17449.94	62702.56	155698	162585	567896
68	Potenza	ITF51	0	0	105356	0.00	0.00	21349.84	0	0	221443
69	Lefkada	EL624	0	0	13489	0.00	0.00	1150.40	0	0	13385
70	Parma	ITH52	34406	78606	82113	14546.32	28758.57	30728.72	120161	232989	249479
71	Lakonia, Messinia	EL653	1	1	116131	0.69	0.69	9638.03	7	7	140724
72	Fthiotida	EL644	182	11398	59118	127.93	1384.94	5828.60	2193	23207	89392
73	Pazardzhik	BG423	60984	80985	86615	2431.96	5239.31	6329.22	60378	122083	146177
74	Ferrara	ITH56	0	0	84502	0.00	0.00	25966.73	0	0	206114
75	Stara Zagora	BG344	192	192	88947	88.35	88.35	5357.78	2732	2732	176796
76	Razgrad	BG324	145	145	42789	66.88	66.88	2417.64	1710	1710	66413
77	Korinthia	EL652	134	360	64047	200.52	311.11	5924.80	2437	3710	81964
78	Arta, Preveza	EL541	49	76	49326	22.82	28.71	4101.08	461	588	70826
79	Pescara	ITF13	0	0	57926	0.00	0.00	20369.25	0	0	184344
80	Ikaria, Samos	EL412	0	0	25321	0.00	0.00	1979.58	0	0	24213
81	Lodi	ITC49	6578	29136	35464	4467.53	10802.57	13886.56	43142	102501	130733
82	Thessaloniki	EL522	14540	99547	167052	12847.97	31664.77	46510.74	152079	409210	627401
83	Agrigento	ITG14	0	0	134264	0.00	0.00	27535.58	0	0	261869
84	Rodopi	EL513	17882	31390	34348	1372.34	2904.70	3229.54	29534	57174	63296
85	Forlì-Cesena	ITH58	15063	21907	75620	6360.18	11455.74	25771.18	59129	103192	227384
86	Ithaki, Kefallinia	EL623	0	0	23321	0.00	0.00	1909.56	0	0	22051
87	Brescia	ITC47	188314	220754	220754	64515.91	78607.30	78607.30	594411	721843	721843
88	Mantova	ITC4B	17218	74919	93670	6925.23	22328.13	29015.68	57461	184154	237543
89	Ioannina	EL543	24059	42611	55480	1665.36	3967.51	6392.86	24810	58126	94855
90	Treviso	ITH34	34587	51027	195004	12360.54	19863.05	61250.85	106180	169517	510564
91	Grevena, Kozani	EL531	34328	50188	57860	2946.73	5049.65	5823.07	51185	89023	102794
92	Cremona	ITC4A	14010	64922	69895	7898.80	21241.65	23573.56	69580	187180	207460
93	Irakleio	EL431	2	2	95796	2.42	2.42	11552.45	43	43	172585
94	Evros	EL511	2397	13924	45867	620.08	1534.90	5254.74	9980	26376	83582
95	Matera	ITF52	0	0	41661	0.00	0.00	11487.02	0	0	117442
96	Haskovo	BG422	0	0	72026	0.00	0.00	5316.45	0	0	130628
97	Kerkyra	EL622	0	0	46699	0.00	0.00	3730.85	0	0	58964
98	Chios	EL413	17	21	24602	22.67	30.45	2052.34	366	467	29758
99	Campobasso	ITF22	0	0	61879	0.00	0.00	14447.91	0	0	133129
100	Vicenza	ITH32	125143	186585	186585	39109.08	59839.83	59839.83	334650	499213	499213

Table B. 25. Scenario 3 – integrated renovation: renovated buildings, replacement cost, and average number of occupants for renovation to replacement cost ratios C_{ren} / C_{rep} = 0.21 and planning period t = 50 years, within the top 100 priority regions based on the multi-sectoral integrated regional indicator $I^*_{eq-en-SVI,3}$ (considering seismic risk, energy efficiency, socioeconomic vulnerability).

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
1	Buzău	RO222	145291	151759	151759	5431.22	5719.11	5719.11	242214	254589	254589
2	Bucureşti	RO321	97532	128948	128948	22462.54	25243.60	25243.60	1071064	1188883	1188883
3	Vrancea	RO226	107289	115742	115742	4016.67	4382.59	4382.59	176965	192099	192099
4	Galați	RO224	113746	120372	120372	4425.38	4734.33	4734.33	282694	302657	302657
5	Prahova	RO316	203954	215640	215640	9048.88	9688.52	9688.52	404332	430579	430579
6	Braşov	RO122	91128	96236	96236	5860.71	6180.10	6180.10	294680	310113	310113
7	Brăila	RO221	76181	78576	78576	2783.30	2961.65	2961.65	169970	181319	181319
8	Bacău	RO211	163686	176656	176656	6496.32	7082.54	7082.54	320578	347817	347817
9	Covasna	RO123	54597	57134	57134	2235.25	2333.77	2333.77	113769	118641	118641
10	Napoli	ITF33	0	0	291675	0.00	0.00	151859.24	0	0	1788647
11	Vaslui	RO216	126611	129280	129280	3079.48	3172.46	3172.46	216075	223253	223253
12	Ialomița	RO315	81823	85655	85655	2771.56	2931.41	2931.41	146735	155361	155361
13	Catania	ITG17	0	0	217728	0.00	0.00	65545.36	0	0	631088
14	Catanzaro	ITF63	723	780	96301	706.57	727.45	22099.02	6342	6531	210983
15	Neamț	RO214	140290	149063	149063	5234.54	5663.57	5663.57	246566	265740	265740
16	Reggio di Calabria	ITF65	10384	10384	155268	1913.77	1913.77	33547.97	20166	20166	322317
17	Dâmbovița	RO313	159579	164093	164093	6038.32	6241.30	6241.30	283044	292823	292823
18	Bologna	ITH55	84660	119804	119804	46246.73	66974.41	66974.41	396494	569404	569404
19	Argeş	RO311	162020	176970	176970	6929.02	7698.62	7698.62	309761	345310	345310
20	Cosenza	ITF61	0	0	192199	0.00	0.00	45268.17	0	0	418382
21	Teleorman	RO317	136651	139358	139358	3284.89	3370.84	3370.84	209089	214573	214573
22	Călăraşi	RO312	93450	99393	99393	2996.90	3204.49	3204.49	162252	173085	173085
23	Achaia	EL632	32580	80901	90011	4754.00	10391.14	11513.86	74341	157963	174960
24	Tulcea	RO225	55960	67537	67537	1897.12	2325.03	2325.03	99107	120282	120282
25	Foggia	ITF46	0	0	106905	0.00	0.00	34523.29	0	0	367034
26	Iaşi	RO213	180373	181352	181352	7751.44	7900.69	7900.69	428439	437833	437833
27	Harghita	RO124	85385	89188	89188	3553.60	3725.01	3725.01	168634	176498	176498
28	Giurgiu	RO314	91197	99952	99952	2963.55	3295.14	3295.14	143682	158858	158858
29	Messina	ITG13	0	0	171085	0.00	0.00	39054.12	0	0	379529
30	Vibo Valentia	ITF64	0	0	52884	0.00	0.00	9308.33	0	0	95425
31	Benevento	ITF32	0	0	78912	0.00	0.00	17536.13	0	0	166577
32	Milano	ITC4C	13835	16676	221581	6819.79	8388.63	219498.82	62599	76376	1773224
33	Siracusa	ITG19	0	0	103752	0.00	0.00	25450.38	0	0	234197
34	Modena	ITH54	81271	113622	113622	31438.51	46770.14	46770.14	275424	400350	400350
35	Constanța	RO223	35513	89466	131063	2592.13	5931.23	8634.01	121964	273773	386222
36	Barletta-Andria-Trani	ITF48	0	0	50276	0.00	0.00	21348.91	0	0	229273
37	Caserta	ITF31	0	0	174982	0.00	0.00	50394.90	0	0	529436
38	Avellino	ITF34	0	0	116275	0.00	0.00	26065.99	0	0	250983
39	Crotone	ITF62	0	0	47671	0.00	0.00	10250.23	0	0	99888
40	Olt	RO414	134609	145160	145160	4631.01	5093.20	5093.20	222653	246341	246341
41	Perugia	ITI21	96872	141618	145921	27794.09	42509.55	43587.10	248358	373891	382934
42	Kentrikos Tomeas Athinon	EL303	9447	9630	90406	16604.35	16777.12	59033.19	156799	158910	581623
43	Ileia	EL633	8623	35378	63168	849.80	2825.39	5111.21	15874	51228	89996
44	Roma	ITI43	0	0	388815	0.00	0.00	304906.43	0	0	2316179
45	L'Aquila	ITF11	18589	25087	93072	4023.21	6006.93	18247.62	38281	56819	173254
46	Isernia	ITF21	0	0	29037	0.00	0.00	5748.14	0	0	51492
47	Sibiu	RO126	91949	94645	94645	4674.39	4903.97	4903.97	214297	224282	224282
48	Salerno	ITF35	0	0	198348	0.00	0.00	62040.50	0	0	638933
49	Reggio nell'Emilia	ITH53	65988	95000	95000	22339.02	34316.32	34316.32	200367	302054	302054
50	Palermo	ITG12	0	0	236755	0.00	0.00	77225.73	0	0	728218

No.	NUTS-3		Buildings			Replacement cost (10^6 €)			Average occupants (over 24 hours)		
	Name	ID	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%	Sub-scenario 3.1 BCR ≥ 1	Sub-scenario 3.2 ΣBCR ≈ 1	100%
51	Notios Tomeas Athinon	EL304	2677	26642	60128	4571.50	14152.04	26342.05	48488	159875	299323
52	Silistra	BG325	6104	31344	39352	511.44	1687.46	2154.87	14460	49246	63380
53	Zakynthos	EL621	4020	10352	17948	365.78	868.44	1493.50	6021	13647	23027
54	Ragusa	ITG18	0	0	99558	0.00	0.00	19983.63	0	0	180238
55	Fokida	EL645	8486	14858	21818	574.77	1029.80	1602.42	8739	15034	22792
56	Aitoloakarnania	EL631	8271	30662	76428	1160.28	2821.82	7106.47	21462	49994	119092
57	Larisa	EL612	8548	61866	75618	2722.43	8089.78	10833.48	38775	122558	160628
58	Caltanissetta	ITG15	0	0	75105	0.00	0.00	16394.32	0	0	160455
59	Florina	EL533	10956	15504	16014	849.61	1450.60	1486.57	16745	28402	29046
60	Ruse	BG323	3648	20724	64579	786.16	1686.39	4564.34	20339	46172	124800
61	Lesvos, Limnos	EL411	12317	17550	52896	934.63	1298.80	3992.82	15459	21047	58584
62	Enna	ITG16	0	0	58803	0.00	0.00	10162.97	0	0	101486
63	Torino	ITC11	226694	300363	300363	114596.27	147075.01	147075.01	1028525	1311393	1311393
64	Plovdiv	BG421	2029	5759	149917	454.21	958.50	10908.39	23257	43381	362343
65	Ravenna	ITH57	14479	62056	89627	7566.48	20863.00	28470.29	64304	167617	224312
66	Kastoria	EL532	10209	14835	15159	953.59	1529.16	1556.91	17464	27978	28429
67	Firenze	ITI14	0	0	129626	0.00	0.00	62702.56	0	0	567896
68	Potenza	ITF51	0	0	105356	0.00	0.00	21349.84	0	0	221443
69	Lefkada	EL624	2075	6213	13489	183.68	518.42	1150.40	2330	6250	13385
70	Parma	ITH52	31333	82113	82113	15070.56	30728.72	30728.72	124166	249479	249479
71	Lakonia, Messinia	EL653	20130	59163	116131	1826.67	4866.04	9638.03	28795	74043	140724
72	Fthiotida	EL644	6678	29470	59118	1142.29	3038.33	5828.60	19019	48567	89392
73	Pazardzhik	BG423	9353	13831	86615	489.87	654.48	6329.22	12277	16476	146177
74	Ferrara	ITH56	12739	15333	84502	6619.26	8648.58	25966.73	52341	69121	206114
75	Stara Zagora	BG344	0	0	88947	0.00	0.00	5357.78	0	0	176796
76	Razgrad	BG324	1396	8210	42789	307.88	654.71	2417.64	7639	17602	66413
77	Korinthia	EL652	4226	27425	64047	831.80	2752.36	5924.80	12055	39431	81964
78	Arta, Preveza	EL541	6717	31329	49326	770.52	2543.69	4101.08	14509	44593	70826
79	Pescara	ITF13	0	0	57926	0.00	0.00	20369.25	0	0	184344
80	Ikaria, Samos	EL412	2792	3683	25321	164.15	287.00	1979.58	2272	3963	24213
81	Lodi	ITC49	4076	6856	35464	2301.93	4956.98	13886.56	21971	47727	130733
82	Thessaloniki	EL522	14055	96263	167052	12166.51	28302.21	46510.74	141343	364412	627401
83	Agrigento	ITG14	0	0	134264	0.00	0.00	27535.58	0	0	261869
84	Rodopi	EL513	5596	20361	34348	604.94	1586.13	3229.54	12959	33376	63296
85	Forlì-Cesena	ITH58	18982	61517	75620	9696.60	21434.55	25771.18	87198	190821	227384
86	Ithaki, Kefallinia	EL623	2636	6481	23321	219.72	554.35	1909.56	2766	6706	22051
87	Brescia	ITC47	136804	220754	220754	48411.71	78607.30	78607.30	453729	721843	721843
88	Mantova	ITC4B	15325	68480	93670	5958.35	21111.10	29015.68	49500	174190	237543
89	Ioannina	EL543	25838	46387	55480	2518.04	4684.65	6392.86	38247	68937	94855
90	Treviso	ITH34	28745	33744	195004	9085.79	13877.00	61250.85	76575	117277	510564
91	Grevena, Kozani	EL531	20640	38214	57860	1945.48	3874.03	5823.07	35733	68819	102794
92	Cremona	ITC4A	11279	47238	69895	5237.88	15917.31	23573.56	47065	141810	207460
93	Irakleio	EL431	9003	36192	95796	2148.52	4569.95	11552.45	32485	70847	172585
94	Evros	EL511	2230	12454	45867	614.92	1429.80	5254.74	9838	24636	83582
95	Matera	ITF52	0	0	41661	0.00	0.00	11487.02	0	0	117442
96	Haskovo	BG422	0	0	72026	0.00	0.00	5316.45	0	0	130628
97	Kerkyra	EL622	669	672	46699	194.88	196.20	3730.85	3371	3389	58964
98	Chios	EL413	18	3277	24602	24.95	216.80	2052.34	396	3569	29758
99	Campobasso	ITF22	0	0	61879	0.00	0.00	14447.91	0	0	133129
100	Vicenza	ITH32	63775	172469	186585	22967.47	54338.80	59839.83	196482	454021	499213

List of abbreviations and definitions

A	Floor area
AAEC	Average Annual Energy Consumption
AAEL(*R*)	Average Annual Economic Loss (Ratio)
AALL(*R*)	Average Annual Loss of Life (Ratio)
AEC	Average Energy Consumption (over period of *t* years)
AELR	Average Economic Loss Ratio (over period of *t* years)
ALLR	Average Loss of Life Ratio (over period of *t* years)
ANN	Artificial Neural Network
bcl	Building class without considering 'construction date' attribute
bcl_date	Building class considering 'construction date' attribute
BCR	Benefit-to-cost ratio
bldg	Building
C	Cost
CA	Concerted Action
CD	Code Design level
CDH	Code Design level: High (building designed for lateral resistance with limit state method coupled with target ductility requirements)
CDL	Code Design level: Low (building designed for lateral resistance using allowable stress method)
CDM	Code Design level: Moderate (building designed for lateral resistance with limit state method)
CDN	Code Design level: No (absence of seismic design)
cf	Collapse factor
COM	Commission Communication
CR	Reinforced concrete
CV	Coefficient of Variation
DNO	Non-ductile system
DS	Damage state
DUH	High ductility system
DUL	Low ductility system
DUM	Medium ductility system
EFEHR	European Facilities for Earthquake Hazard and Risk
en	Energy
ENTRANZE	Policies to ENforce the TRAnsition to Nearly Zero-Energy Buildings in the EU-27
eq	Earthquake
EPBD	Energy Performance of Buildings Directive
ESHM20	European Seismic Hazard Model 2020
ESRM20	European Seismic Risk Model 2020
EU	European Union
EU	Earth, unreinforced (material class)

ex	Existing (referring to loss, buildings, etc.)
g	Acceleration of gravity
GEM	Global Earthquake Model foundation
H	Exact number of storeys
HBET	Range of storeys
HDD	Heating Degree Day
HDI	Human Development Index
I	Single/multi-sectoral index
I_{eq-en}	Multi-sectoral integrated indicator considering normalised average annual economic loss ratios due to seismic repair and space heating energy consumption
$I^{(*)}_{eq-en-SVI,3}$	Multi-sectoral integrated indicator considering normalised average annual economic loss ratios due to seismic repair and space heating energy consumption, average annual loss of life ratio, average annual economic loss (seismic repair and energy consumption) per building, average annual energy consumption per building and *HDD*, and socioeconomic vulnerability
IM	Intensity Measure
INSPIRE	Development of Systemic Packages for Deep Energy Renovation of Residential and Tertiary Buildings including Envelope and Systems
int	Integrated
LDUAL	Dual frame-wall system
LFBR	Braced frame system
LFINF	Infilled frame system
LFLS	Flat slab/plate or waffle slab
LFM	Moment frame system
LH	Hybrid lateral load-resisting system
LWAL	Load bearing wall
LPB	Post and beam
m	Metre
MCF	Confined masonry
MR	Reinforced masonry
MUR	Unreinforced masonry
MUR-ADO	Adobe
MUR-CB99	Concrete block masonry
MUR-CL99	Clay brick masonry
MUR-STDRE	Dressed stone masonry
MUR-STRUB	Rubble stone masonry
N	Number of buildings, dwellings, etc
NUTS	Nomenclature of Territorial Units for Statistics
P	Population
P	Probability
PGA	Peak Ground Acceleration
pc	Percentage or ratio

ref	Reference case
ren	Renovation (referring to cost, loss, buildings, etc.)
rep	Replacement (referring to cost)
S	Steel
S_a	Spectral acceleration
sec	Seconds
SERA	Seismology and Earthquake engineering Research infrastructure Alliance for Europe
SOS	Soft storey irregularity
SPI	Social Progress Index
SRC	Concrete, composite with steel section
SVI	Socioeconomic Vulnerability Index
SWD	Commission Staff Working Document
T	Structural period of vibration
t	Planning period
U	Thermal transmittance value
UN	United Nations
UNK	Unknown (material)
U_r	Roof thermal transmittance value
U_w	Wall thermal transmittance value
W	Wood
β	Logarithmic standard deviation
Δ	difference between two values
θ	Median

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