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

Prioritising EU regions for building renovation:

seismic risk, energy efficiency, socioeconomic vulnerability

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REEBUILD

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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 (COM (2021)573) ([1]) 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 (Resolution 2015/A/Res/70/1) ([2]) 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 priority regions for intervention by considering seismic risk, energy performance of buildings and socioeconomic vulnerability.

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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', priority regions for building renovation across the EU-27 are identified considering seismic risk, energy performance of buildings, and socioeconomic aspects. An integrated analysis framework is first presented along with the primary metrics adopted for regional assessment and prioritisation. Metrics address (*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. The framework uses as a starting point a recently released seismic exposure model, extended to address both structural and energy attributes of the European building stock. A wealth of open-access state-of-the-art data and models related to seismic hazard, climatic, physical and social vulnerability, along with energy performance modelling in Europe are employed in support of probabilistic seismic risk assessment, data-driven machine learning approaches, and composite socioeconomic indicators. Initially, metrics are used to form indicators and prioritise regions based on seismic risk, energy performance and socioeconomic vulnerability, independently. Different modes/patterns of prioritisation are identified depending on the considered type and format (absolute/normalised) of indicators. Single and multi-sectoral indicators are subsequently introduced to capture the different patterns in an integrated way. The results presented in this report clearly indicate 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 across different sectors. Overall, the work presented herein provides a set of data, indicators and rankings, which promote risk-informed and inclusive decision making in support of local, regional or European policies and initiatives for building renovation. The output of this work is used in a following report to define and assess the impact of regional renovation scenarios across the EU through cost–benefit analysis.

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., 2020b), whereas the European building stock is reportedly responsible for 40% of energy consumption and 36% of CO2 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 economy, and can be most efficiently addressed through a holistic approach.

The priority of 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 or national building renovation plans. 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 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; 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 renovation rates (Pohoryles and Bournas, 2021). To understand which regions would most benefit from integrated renovation, however, an EU-wide regional assessment of seismic risk and building energy efficiency is needed. Such an assessment would allow to identify priority regions for integrated retrofitting, as well as identifying regions in which energy renovation alone is preferred.

In the above context, the present report summarises work performed within REEBUILD on regional assessments with the aim to investigate the effect of integrated indicators in regional prioritisation across Europe. It covers the methodology, and input models, and provides results of regional assessments. Specifically, seismic risk and energy performance of residential and commercial buildings were assessed with a focus on the regions of the 27 EU Member States (EU-27) rather than the national level. Different indicators were employed and investigated with the aim to identify those regions where interventions on the building stock are of higher priority, considering also socioeconomic vulnerability. Finally, this report serves as a point of reference towards proposing renovation scenarios and investigating their impact in Gkatzogias et al. (2022).

Following this introduction, Chapter 2, presents an integrated analysis framework along with the metrics adopted for the regional assessment and prioritisation of existing residential and commercial buildings across the EU-27. Metrics address loss of life, economic loss, and energy consumption. Different sections describe state-of-the-art exposure, seismic hazard, climatic, physical and social vulnerability, along with energy performance models that were used in the analysis framework. Finally, the chapter summarises indicators adopted to identify priority regions. The selected indicators address separately and in an integrated approach, aspects of seismic risk, energy performance of buildings, and socioeconomic vulnerability.

Chapter 3 provides the output of the regional assessments in terms of the adopted metrics, and prioritises regions using the selected indicators. Results are presented considering separately seismic risk to residential and commercial buildings, energy performance of residential buildings, and socioeconomic vulnerability. The last section addresses multi-sectoral integrated indicators and prioritises regions in an effort to highlight areas where building renovation is expected to have a multidimensional impact on various metrics.

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

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, including a brief introduction to the definition and impact assessment of intervention scenarios (Gkatzogias et al., 2022).

Additional details regarding the adopted source data, input models, and indicator values for the EU-27 regions are provided in Annexes A and B.

2 Integrated framework for regional prioritisation

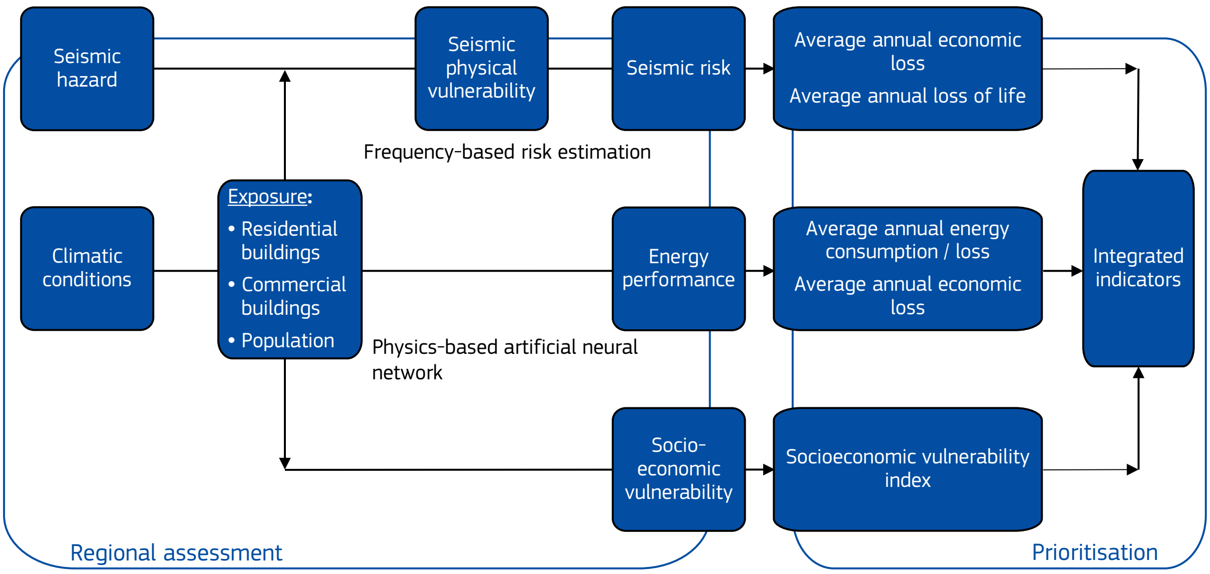
The adopted framework for regional assessment and prioritisation is illustrated in Figure 1. The framework combines three assessment 'routes' addressing seismic risk to residential and commercial buildings and occupants, energy performance of residential buildings, and socioeconomic indicators.

The three routes use as a reference point a common exposure model. Exposure models describe the spatial distribution of the building/dwelling count and area, population and replacement cost of a building stock, characterised in terms of building classes. Herein, a recently released seismic exposure model was adopted as a starting point, and subsequently extended to address both structural and energy attributes of the European building stock.

Seismic risk assessment involves the estimation of the probability and magnitude of undesirable consequences resulting from potential future earthquakes. Consequences were expressed herein in terms of loss, and therefore the total probability theorem was applied combining exposure, hazard, and vulnerability to estimate risk. Seismic hazard is represented by the probability of exceedance of different levels of ground motion intensity, with surface ground shaking being the main contributor to building damage and loss. Physical vulnerability represents the probability of loss to a given building class, conditional on the level of surface ground shaking intensity. 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 approach was employed, considering all potential earthquakes that affect a specific site over a given period and their associated frequencies of occurrence, to estimate the relevant risk metrics of average annual economic loss and average annual loss of life.

On the other hand, the energy performance of residential buildings was estimated within a deterministic context. Herein, energy performance refers to the capability of a building class to provide a desired living comfort to occupants in terms of dwellings' internal air temperature, as a function of the climatic conditions and the energy attributes of the building class. The energy performance was quantified by the energy consumption (i.e. energy loss) and energy cost (i.e. economic loss). Climatic conditions were estimated from outside air temperature measurements, represented by heating degree days (*HDD*s), and averaged over a 10-year period. Energy attributes comprised the thermal transmittance of the building envelope and the building geometry. A physics-based artificial neural network was employed to estimate the average annual energy consumption using as input climatic and building stock data. The average annual energy consumption was translated to average annual economic loss using energy prices for residential use.

Figure 1. Framework for regional assessment and prioritisation



Composite indicators were adopted in the present study to quantify socioeconomic development, smart, sustainable, and inclusive growth, and social progress. A composite indicator represents an aggregation of measurable sub-indicators with the aim to quantify a concept (e.g. social progress) that is not directly measurable. The selected composite indicators, measuring socioeconomic wellbeing, were properly combined to a single measure to express socioeconomic vulnerability.

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

The following sections describe in detail the different components of the adopted framework, addressing the development of the exposure model (Section 2.1), environmental excitation models in terms of seismic hazard (Section 2.2) and climatic conditions (Section 2.3), physical vulnerability models (Section 2.4), along with the methodologies used to estimate seismic risk (Section 2.5), energy performance of buildings (Section 2.6), and socioeconomic vulnerability (Section 2.7). Finally, Section 2.8 presents a summary of the adopted indicators for regional prioritisation.

2.1 Exposure model

The seismic exposure model of the European Seismic Risk Model 2020 (ESRM20, Crowley et al., 2021a, available from the European Facilities for Earthquake Hazard and Risk, EFEHR,[4] © Eucentre Foundation, 2022) was adopted in the present study as the point of reference. The model was developed within the Seismology and Earthquake engineering Research infrastructure Alliance for Europe (SERA) ([5]) project (Giardini et al., 2017) with the aim to integrate it within the Global Earthquake Model (GEM) Foundation's mosaic of risk models (Silva et al., 2020). The model defines the spatial distribution of the number of buildings, dwellings, occupants, floor area, and replacement cost by seismic building class. The focus was on residential and commercial buildings within the EU-27. In order to perform integrated regional assessments of seismic risk and energy performance (Figure 1), the existing seismic exposure model was subsequently extended in the present study to include building energy attributes. The following sections provide a brief description of the model development and its features. Further details regarding the seismic exposure model can be found in Crowley et al. (2020b, 2021a, b).

2.1.1 Source data on residential and commercial buildings

The source data used to develop the seismic exposure model are publicly available by Crowley et al. (2020a) on the EFEHR ESRM20 exposure repository ([6]). The latest public census data for all European countries was collected at the highest resolution available within the SERA project, as part of the development of the ESRM20. Additional sources were investigated for both the seismic exposure model and its extension to include energy building classes. A brief summary of the main data obtained from each source is provided in the following.

Population and housing census: For residential buildings, this was the main source of the number of dwellings/buildings and population, and for some countries the age of construction, material of construction, type of dwelling, number of floors, total floor area of dwellings, and distinction between urban/rural administrative units. For commercial buildings, the census was typically used to obtain the distribution of labour force across the country, but in some countries, it provided the number of commercial buildings.

EU Buildings Database ([7])**:** This is a European Commission database on building stock characteristics across several Member States, focusing on characteristics that are important for assessing the energy performance of existing buildings. The main data extracted from this database for residential buildings were the total floor area for the year of the census (when this data was not directly available in the census). For commercial buildings, this database was the main source for the number of private offices, hotels and restaurants, and wholesale and retail trade, as well as the floor area for each of these categories.

Europe's Buildings Under the Microscope ([8])**:** This resource is a country-by-country review of the energy performance of buildings published by the Buildings Performance Institute Europe (BPIE). This report provided a breakdown of the commercial floor area in selected countries.

([4]) http://risk.efehr.org.
([5]) http://www.sera-eu.org/en/home/.
([6]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure.
([7]) https://ec.europa.eu/energy/eu-buildings-database_en.
([8]) https://www.bpie.eu/publication/europes-buildings-under-the-microscope/.

EPISCOPE/TABULA ([9])**:** The European project Energy Performance Indicator Tracking Schemes for the Continuous Optimisation of Refurbishment Processes in European Housing Stocks (EPISCOPE) was launched in April 2013 as a follow-up to the Typology Approach for Building Stock Energy Assessment (TABULA). Both projects dealt with the definition of residential building typologies, and they provided information on building characteristics for 21 countries across Europe. The main data taken from EPISCOPE/TABULA was the total number of buildings at a national level. EPISCOPE/TABULA was further used to develop mapping schemes (Section 2.1.2.1).

GED4GEM: The Development of a Global Exposure Database for the Global Earthquake Model (GED4GEM) project resulted in a spatial inventory of residential buildings and population for the purposes of seismic risk modelling and earthquake loss estimation (Gamba, 2014; Gamba et al., 2012). For some European countries with low levels of hazard and thus low expected priority, the number of dwellings by administrative region and building class (Section 2.1.2.1) was obtained from GED4GEM (rather than the national census). The number of the distributed dwellings were then scaled to match the total number of dwellings provided by the latest census. The total number of buildings at national level was also extracted from GED4GEM.

Eurostat ([10])**:** This is the result of a major joint effort by the European Statistical System to better disseminate the results of population and housing censuses in Europe. The average floor area per dwelling was obtained from this source for several countries when the total floor area was not available in the census. Likewise, the number of commercial buildings (or businesses and enterprises) per sector was obtained from Eurostat when it was not available in the census. Proportions of dwellings' count corresponding to different construction periods, and ratios of the number of occupied to the total number of dwellings were obtained from Eurostat, per NUTS-3 region (according to the Nomenclature of Territorial Units for Statistics, NUTS, standard) ([11]), to further differentiate seismic building classes into energy ones. The 2012 ad-hoc module 'housing conditions' of the EU Statistics on Income and Living Conditions (EU-SILC) ([12]) instrument was used to estimate the total amount of occupied floor area that is heated during winter.

NERA ([13])**:** The Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation (NERA) project developed a European model of residential buildings for 45 European countries by collecting building stock information at a national level from housing censuses and national records on construction practices performed by statistical or financial services of the country (Crowley et al., 2012). The total floor area, and total number of residential buildings or dwellings was obtained for some EU countries to calibrate data at a national level.

INSPIRE ([14])**:** The Development of Systemic Packages for Deep Energy Renovation of Residential and Tertiary Buildings including Envelope and Systems (INSPIRE) project analysed the European building stock and developed different technologies and renovation approaches to reduce building energy consumption. Retrieved data was used to extend the exposure model to include energy aspects and comprised building envelope thermal transmittance (*U*) values defined per country and construction period.

ENTRANZE ([15])**:** The Policies to Enforce the Transition to Nearly Zero-Energy Buildings in the EU-27 (ENTRANZE) project provided relevant data, analysis and guidelines for existing buildings. Herein, it was used to obtain *U* values related to counties not addressed by INSPIRE.

CA EPBD ([16])**:** The Concerted Action (CA) EPBD works on sharing knowledge and experiences in the adoption and implementation of EPBD. Data obtained from this source refer to required maximum *U* values for the renovation of existing buildings, adopted for specific regions and climatic zones within some countries to improve regional energy assessment.

Academic literature and local expert knowledge: Several academic papers were consulted, specifically for the evolution of seismic design codes, the identification of building classes, and the development of mapping schemes (Section 2.1.2.1). Local experts also provided feedback on these issues through workshops, meetings and email exchanges. ([17])

([9]) https://episcope.eu/welcome/.
([10]) https://ec.europa.eu/eurostat/web/population-demography/population-housing-censuses.
([11]) https://ec.europa.eu/eurostat/web/nuts/background.
([12]) https://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions.
([13]) https://cordis.europa.eu/project/id/262330/reporting.
([14]) https://cordis.europa.eu/project/id/314461.
([15]) https://www.entranze.eu.
([16]) https://epbd-ca.eu.
([17]) Contributors to the development of the European seismic exposure model are provided on https://eu-risk.eucentre.it/contributors/.

The source data, collected for the EU-27 residential and commercial buildings and used to develop the exposure model, is summarised in Table A. 1and Table A. 2, respectively.

2.1.2 Model development

The development of the exposure model followed three main steps: *i*) modelling the distribution of the number of buildings across different building classes (by considering their structural attributes) within urban areas, rural areas, and big cities for residential buildings, and within offices, wholesale and retail trade, hotels and restaurants for commercial buildings; *ii*) modelling the spatial distribution of the number of buildings, dwellings, floor area, replacement cost and spatiotemporal distribution of number of occupants within each building class across a given country by combining data from different public sources (Crowley et al., 2020b); *iii*) modelling the distribution of the above data to additional building classes considering their energy attributes.

2.1.2.1 Building classes

This section provides a summary of the classification of residential and commercial building classes in the exposure model, and the methods used to distribute the buildings in Europe among these classes.

The buildings in the exposure model were classified according to their seismic performance using a building taxonomy that is based on an updated version (Silva et al., 2022) of an international standard (i.e. the GEM Building Taxonomy,[18] Brzev et al., 2013). The specific taxonomy allows buildings classification according to various attributes. The main structural and energy attributes, selected for the consistent definition of the building stock across Europe, are indicated as a string for each building class as follows:

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

where:

- MATERIAL: Main construction material, e.g. CR: reinforced concrete, MR: reinforced masonry, MCF: confined 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, S: steel, W: wood.
- LLRS: Lateral load resisting system, e.g. LDUAL: dual frame-wall system, LFINF: infilled frame, LWAL: load bearing wall, LFM: moment frame, LFBR: braced frame, LFLS: flat slab/plate or waffle slab, LPB: post and beam.
- CODE LEVEL: Seismic design code level (Section 2.1.2.2).
- LATERAL FORCE COEFFICIENT: Fraction of the building weight specified as the lateral design force in the seismic design code (see CODE LEVEL) (Section 2.1.2.2).
- DUCTILITY: Ductility capacity, i.e. DNO: non-ductile, DUL: low ductility, DUM: medium ductility, DUH: high ductility.
- HEIGHT: Number of storeys, i.e. H: exact number, HBET: range.
- IRREGULARITY: Vertical irregularity, i.e. SOS: soft storey.
- CONSTRUCTION DATE: Period of construction, e.g. 1996–2000, used to indicate energy characteristics in residential buildings (Section 2.1.2.3).

The building classes in each country were identified by local expert judgment and peer-reviewed publications, and then the population, building count and replacement cost was distributed across these building classes as follows.

Population and housing census statistics usually provide information related to living conditions such as the number of dwellings and physical housing attributes that exist in each area. Some countries have detailed information on the number and characteristics of the buildings through a separate Building Census (e.g. Portugal, Greece), but in the majority of cases only the type of the dwelling (single-family or multi-family) or the predominant material of the exterior walls or the year of construction is available (e.g. Croatia).

([18]) https://github.com/gem/gem_taxonomy.

For residential buildings, the information that is used to describe individual dwellings/buildings within national housing censuses varies across the different countries, and typically did not allow for a one-to-one mapping to the building classes described previously. By carefully exploring the information provided by the census of each country, it became apparent that in many cases the information within the census can be mapped to more than one building class. For example, dwellings whose predominant exterior wall material is defined in the census as clay bricks could potentially be reinforced concrete infilled moment-frame, confined masonry wall or unreinforced masonry wall systems.

The type of occupancy was also used to distinguish between building classes; for example, apartments are usually found in mid- to high-rise buildings constructed with reinforced concrete or load-bearing masonry, whereas detached or terraced single-family houses are usually low-rise and often built with unreinforced masonry. The percentage of the number of buildings in each class was directly inferred from the material, the type of occupancy, the number of storeys, or whether the area in which they are located is urban or rural, and this was further informed by the judgment provided by local experts. The development of the judgment-based mapping of the available (census) data to the distribution of building classes (i.e. the mapping schemes) closely followed the methodology thoroughly described in Yepes-Estrada et al. (2017). The advantage of this approach is that it can be continuously refined based on additional input from local experts.

Residential building mapping schemes were developed for all European countries using both local expertise and the following sources of information: NERA project (Crowley et al., 2012); TABULA; World Housing Encyclopedia;[19] peer-reviewed publications; GED4GEM; US Geological Survey's (USGS) Prompt Assessment of Global Earthquakes for Response (PAGER) building inventory database (Jaiswal and Wald, 2008). Mapping schemes were provided separately for urban and rural areas and big cities within each country, so that the differences in the distribution of building classes between these areas could be captured. In many cases the census provided separately the data on the number of dwellings/buildings between urban/rural areas. For the rest of the cases, the population-based definition of urban/rural within each country (obtained from the census) was used to assign each municipality to the appropriate category.

Commercial buildings were considered to comprise three categories: offices, wholesale and retail trade, and hotels and restaurants. The distribution of the predominant building classes associated with each one of the three aforementioned commercial categories was developed based on local expert judgment, the residential building distributions (assuming that the building types for the commercial buildings are similar to the residential buildings, though their distribution may differ) as well as satellite imagery. It is worth noting here that mixed buildings, with both commercial and residential use, were assumed to be contained within the residential building stock data.

2.1.2.2 Seismic design code level and lateral force coefficient

Crowley et al. (2021b) undertook a detailed study of the temporal and spatial evolution of seismic design across Europe to identify for each country the type of seismic codes that was applied in different eras. The seismic design code level is defined as:

- CDN: Code Design level – No (absence of seismic design)
- 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)
- CDH: Code Design level – High (building designed for lateral resistance coupled with target ductility requirements/capacity design)

The seismic design code level was assigned to all building classes mainly based on the year of construction and the evolution of codes in each Member State. Subsequently the code level was mapped to ductility level only in the case of building classes with capacity curves expressed in terms of ductility rather than code level (see Section 2.4.1). Figure 2 shows, among others, the temporal evolution of the seismic design codes (CD) in the EU-27 (based on Crowley et al., 2021b); detailed data are provided in Table A. 3.

In reinforced concrete building classes (and some classes combining masonry walls and reinforced concrete frames), an additional attribute was assigned, i.e. the lateral force coefficient *k*, defined as the seismic design shear normalised to the weight of the building. *k* coefficients were calculated according to Equation (1) by combining a seismic coefficient K_s, a structural coefficient K_p, an importance coefficient K_o, and a dynamic coefficient K_d. K_s depends on the seismic zonation (and the soil category in older codes). K_p depends on the

([19]) http://db.world-housing.net.

lateral load resisting system and represents the ductility and damping characteristics (along with the overstrength in newer codes). K_o is a function of the building occupancy and importance in the aftermath of an earthquake), while K_d depends on the period of vibration (and soil effect in recent codes).

$$k = K_s \cdot K_p \cdot K_o \cdot K_d \quad (1)$$

The codes that have been applied across Europe, corresponding to CDL, CDM, and CDH levels, were assessed, and the lateral force coefficients were calculated (i.e. assuming k = 0 for CDN). The coefficients were estimated for the different seismic zones in each country assuming a medium rise reinforced concrete frame on medium soil with an assumed period of vibration of 0.5 sec. As an example of the seismic coefficient K_s derivation, maps showing the spatial variation of seismic zonation in Bulgaria are provided in Figure 3. The colour bar in the figure distinguishes the seismic zones introduced by each code. In older codes, as in the example illustrated in Figure 3a, the lateral force coefficient was specified as a fixed value that was applied to areas where earthquakes had been observed in the past, thus it was just a function of the seismic intensity (k = K_s). The seismic intensity was often correlated with observed macroseismic intensity from past major earthquakes (hence, the use of Latin numeral notation to describe seismic zones). The range of the lateral force coefficient k in the considered example was found equal to 2.5–10% in seismic zones VII–X of the 1957 (CDL) code, 4.5–18% in seismic zones VII–X of the 1964 (CDL) code, and 4–19% in seismic zones VI–X of the 1987 (CDM) code. For instance, two buildings constructed in Bulgaria during 1960 and 1970 were both assigned with CDL. However, their lateral force coefficient may differ, depending on the zonation introduced by the 1957 and 1964 codes along with the location of the buildings (defining K_s). Furthermore, the 1964 code introduced further design criteria associating the seismic resistance of buildings with their lateral load resisting system (K_p), importance (K_o), and period of vibration (K_d), whereas in the 1954 code the lateral resistance of the building was only a function of seismic zonation (k = K_s). Further details on the estimation of k are provided in Crowley et al. (2021b).

2.1.2.3 Thermal transmittance values

The 'construction date' attribute was used to extend the residential exposure model to include energy aspects. This approach was selected to ensure compatibility of results obtained from seismic risk and energy performance assessments using consistently the same building classes. The temporal and spatial evolution of building envelopes from INSPIRE (Birchall et al., 2014) were adopted in the present study. Specifically, for each country, different thermal transmittance values of external walls (U_w) and roofs (U_r) were assigned to each building class as a function of the period of construction, and subsequently used as input parameters to estimate energy consumption (Section 2.6). Similar data was retrieved for the case of Croatia from the ENTRANZE project (ENTRANZE and Enerdata, 2008a, b), since it was not addressed by INSPIRE. INSPIRE adopted six periods of construction to highlight historically significant changes in building envelope performance in the EU, in terms of U_w and U_r (Table 1).

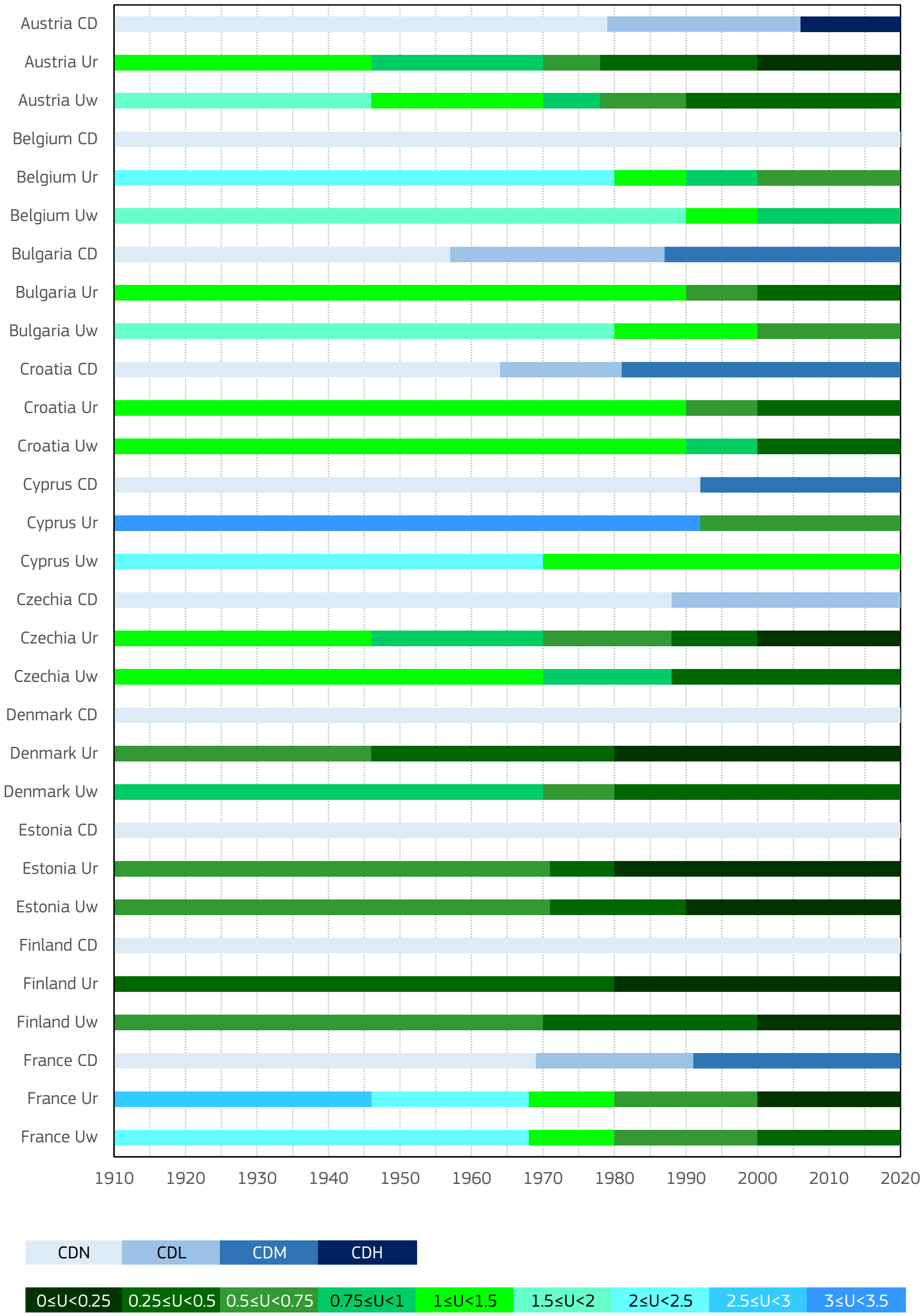
Table 1. Periods of construction associated with different U_w and U_r values, according to Birchall et al. (2014).

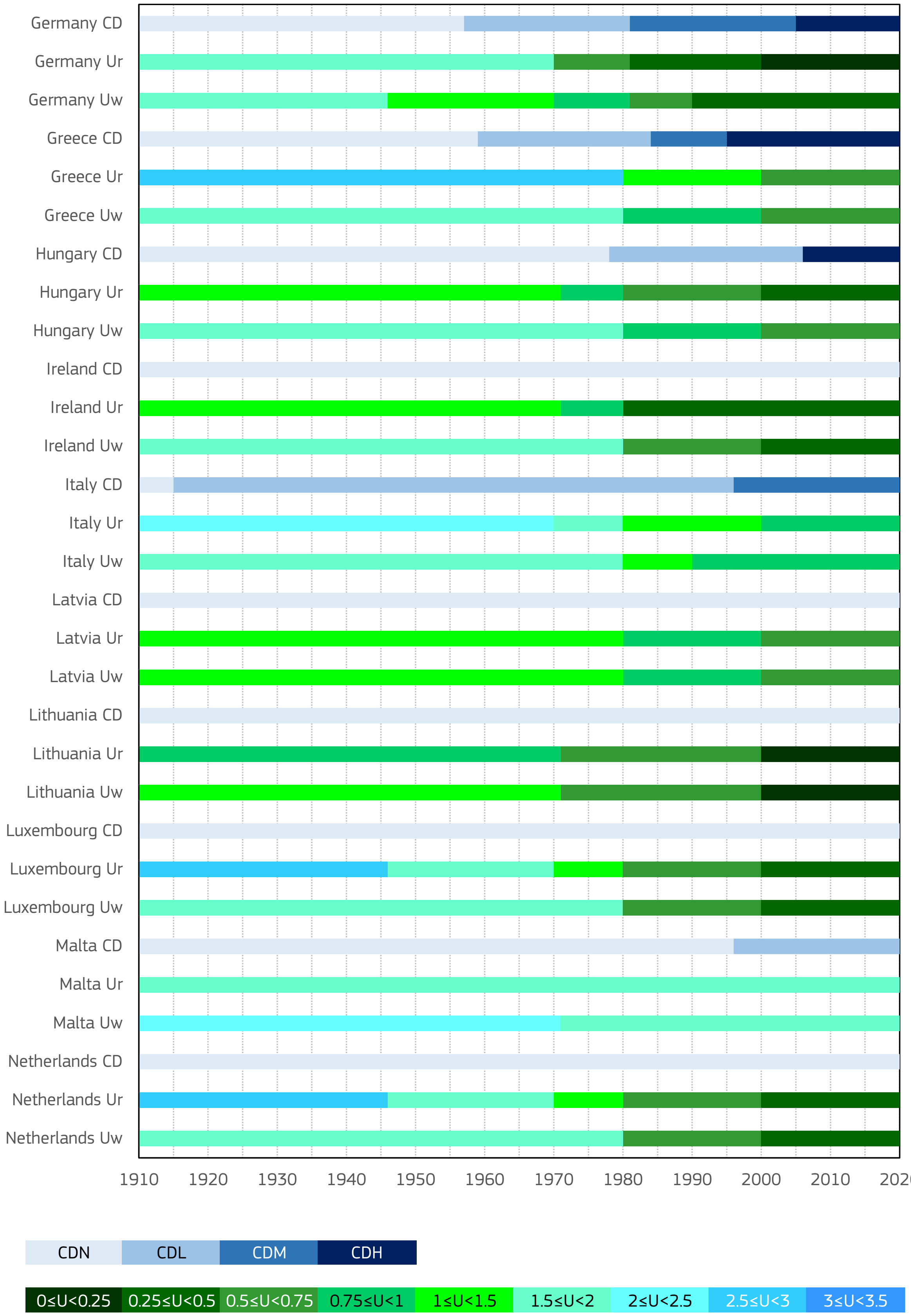
Period	I	II	III	IV	V	VI
Years	< 1945	1945–1970	1970–1980	1980–1990	1990 - 2000	>2000

In Figure 2, the evolution of U_w and U_r is mapped in parallel to the seismic design code level. In general, dates signalling a change in thermal transmittance values do not coincide with relevant changes in the seismic design code level. Therefore, in each Member State, the periods corresponding to specific seismic design code levels were further divided to smaller ones (Figure 4), so that unique values of seismic code level and U_w, U_r could be assigned to each of them (Table A. 3). Likewise, building classes associated with a specific seismic design code level within a country were subdivided to additional classes corresponding to the smaller periods characterised by unique U_w, U_r values.

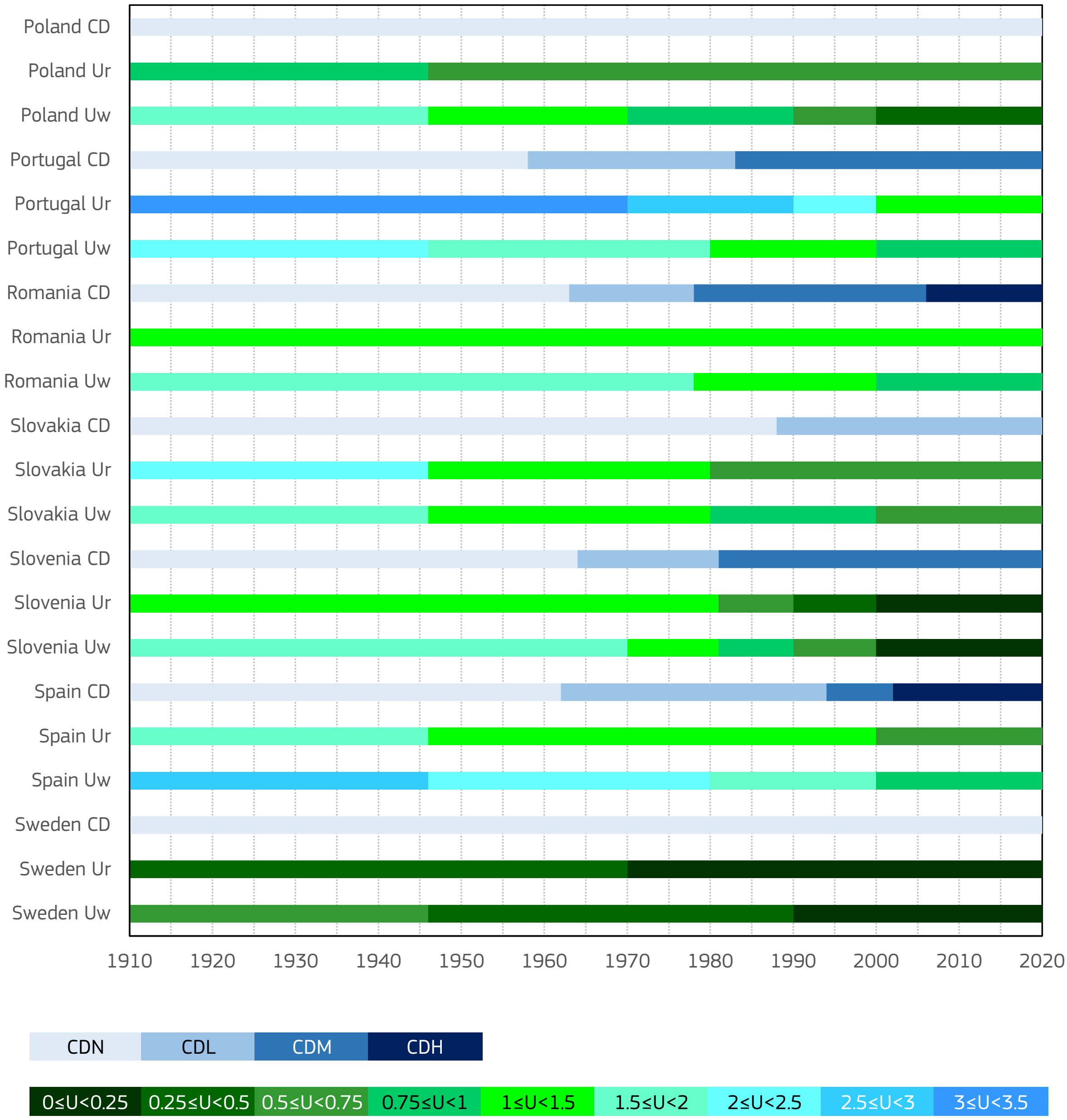
On limited occasions, the periods associated with unique U_w and U_r values (Table 1) were not strictly followed, as a means to limit the number of additional building classes created due to the introduction of energy attributes. Considering the case of Austria for example (Figure 4b), a strict adoption of the classification in Table 1 would require the subdivision of CDL to four periods, i.e. 1979–1980, 1981–1990, 1991–2000, 2001–2006. In this case, the first and second periods were merged to 1979–1990 and U_w and U_r of period III were adopted, since 1979 represents only 1/12=8.3% of the extended period. When the percentage was found more than 10%, both periods and corresponding transmittance values were considered.

Figure 2. Temporal evolution of seismic design (CD) and energy efficiency design in terms of thermal transmittance (in W/(m^{2}K)) of walls (U_w) and roofs (U_r) in the EU-27 (1) (Source: CD data according to Crowley et al., 2021b)



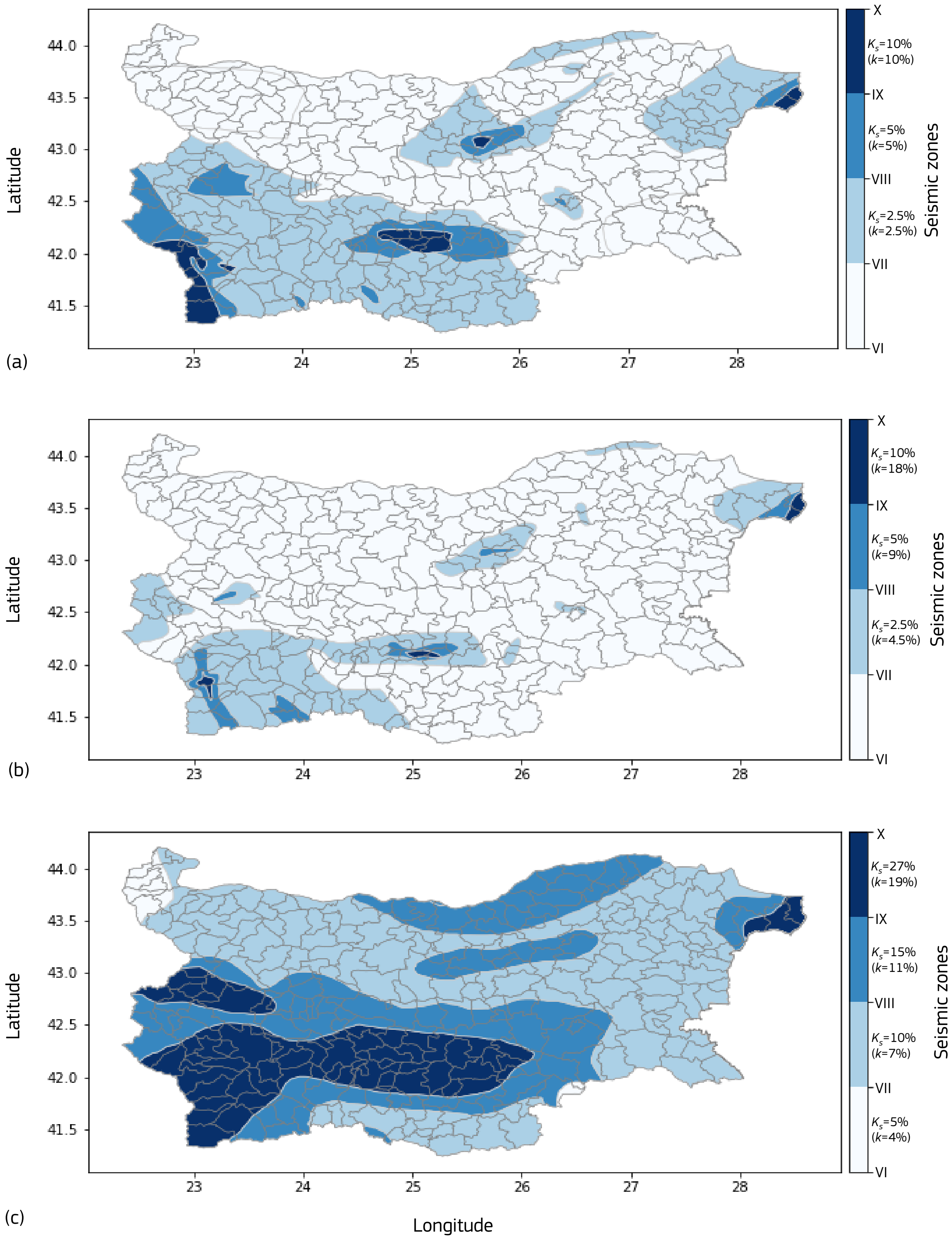


Germany CD
Germany Ur
Germany Uw
Greece CD
Greece Ur
Greece Uw
Hungary CD
Hungary Ur
Hungary Uw
Ireland CD
Ireland Ur
Ireland Uw
Italy CD
Italy Ur
Italy Uw
Latvia CD
Latvia Ur
Latvia Uw
Lithuania CD
Lithuania Ur
Lithuania Uw
Luxembourg CD
Luxembourg Ur
Luxembourg Uw
Malta CD
Malta Ur
Malta Uw
Netherlands CD
Netherlands Ur
Netherlands Uw
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
CDN
CDL
CDM
CDH
0≤U<0.25
0.25≤U<0.5
0.5≤U<0.75
0.75≤U<1
1≤U<1.5
1.5≤U<2
2≤U<2.5
2.5≤U<3
3≤U<3.5



(1) In Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Luxembourg, Poland, and Sweden, CDL was assigned to wood building classes to consider their inherent ductility. This differentiation is irrelevant to the age of construction and therefore not depicted in the figure. Energy classes of CDL building types in these countries were assumed the same to CDN ones.

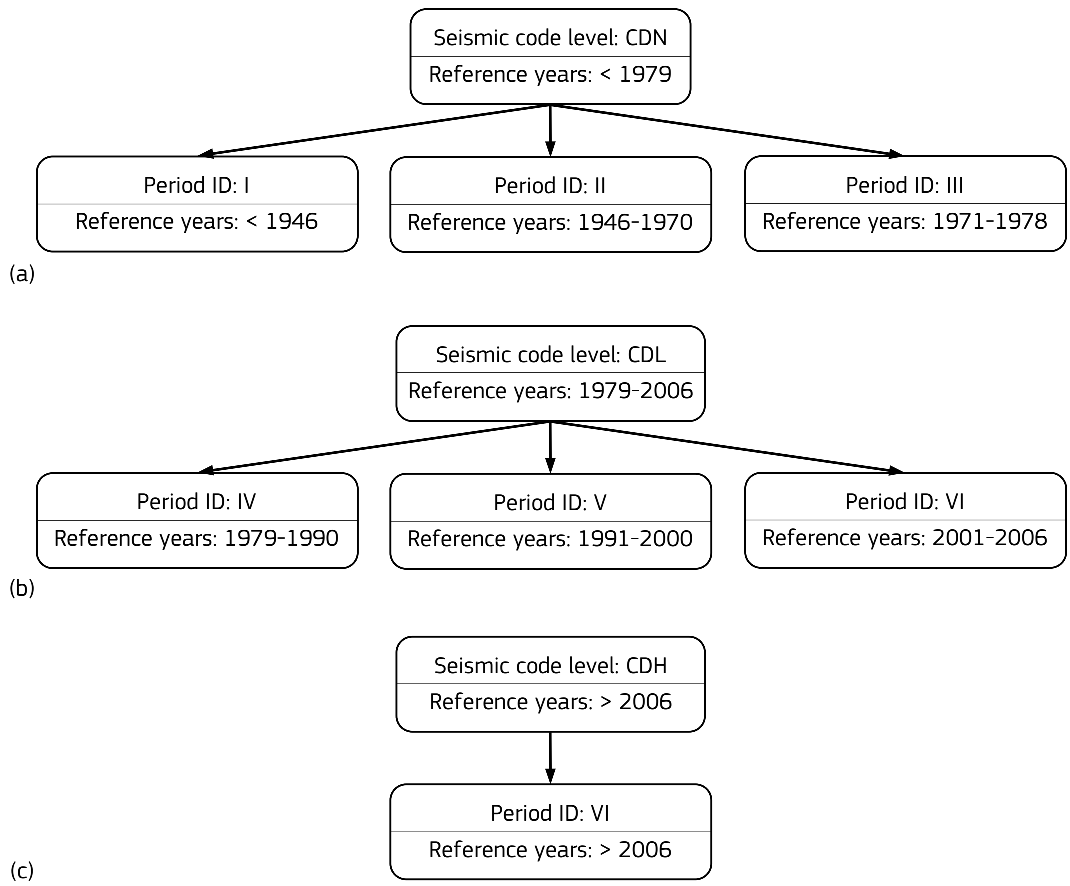
Figure 3. Spatial evolution of seismic zonation in Bulgaria in (a) 1957, (b) 1964, (c) 1987, and corresponding seismic (K_s) and lateral force coefficients (k). (Source: data according to Crowley et al., 2021b)



To assess more efficiently the energy performance of buildings, an attempt was made to capture the effect of regional climate on the thermal transmittance values adopted at the time of construction, according to Equation (2). This approach concerned regions where thermal transmittance values were expected to be significantly different from the national average ones, since U_w and U_r in the INSPIRE and ENTRANZE projects (i.e. $U_{INSPIRE/ENTRANZE}$) represent national statistical weighted average values. To this end, target (i.e. required maximum) thermal transmittance values by climatic zone ($U_{t/climatic\ zone}$) were obtained from relevant requirements prescribed for the renovation of existing buildings in 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 each of the above countries, the $U_{t/climatic\ zone}$ values were combined with the number of conventional occupied dwellings per climatic zone ($N_{dw\_occ/climatic\ zone}$) in residential building types ([20]) (Eurostat, 2011a) to estimate national weighted average required U values (i.e. the denominator in Equation (2)). The ratios of regional to national required U values (Table A. 4) were finally multiplied with the national values per period of construction provided by INSPIRE and ENTRANZE to estimate historical (i.e. at the time of construction) thermal transmittance values per climatic zone ($U_{climatic\ zone}$). Equation (2) assumes the present exposure model and climatic conditions throughout the periods presented in Table 1.

$$U_{climatic\ zone} = U_{INSPIRE/ENTRANZE} \cdot \frac{U_{t/climatic\ zone}}{\frac{\sum\left(U_{t/climatic\ zone} \cdot N_{dw\_occ/climatic\ zone}\right)}{N_{dw\_occ}}} \qquad (2)$$

Figure 4. Subdivision of periods corresponding to (a) CDN, (b) CDL, and (c) CDH to periods characterising building envelope performance in Austria



([20]) Definitions according to Eurostat (https://ec.europa.eu/eurostat/cache/metadata/en/cens_11r_esmscs.htm).

2.1.2.4 *Spatiotemporal distribution of residential building data*

In case the spatial distribution of the **number of residential buildings** ($N_{res\_bldg/bcl}$) was not available from the national census, it was estimated by dividing the number of dwellings (N_{dw}) within a region by the average number of dwellings per story and building class ($N_{dw/st}$), and by the average number of storeys per building class ($N_{st/bcl}$). Census data with local expert feedback were thus combined according to Equation (3) and the adopted values of $N_{dw/st}$, $N_{st/bcl}$ ([21]) per building class and country are provided in Crowley et al. (2020a).

$$N_{res\_bldg/bcl} = \frac{N_{dw}}{N_{dw/st} \cdot N_{st/bcl}} = \frac{N_{dw}}{N_{dw/bcl}} \tag{3}$$

When the total number of buildings in the country was available, the above data was calibrated until there was an agreement between the estimated and observed total number of buildings. In those cases where the census information was only provided in terms of buildings, the **number of dwellings** was estimated by multiplying the number of buildings ($N_{res\_bldg/bcl}$) with the number of dwellings per building class ($N_{dw/bcl}$).

Exposure source data per Member State (Table A. 1) correspond to different reference years. The number of dwellings in the final exposure model represents the total number of conventional dwellings (i.e. occupied, unoccupied, unknown) in all building types (i.e. residential, non-residential, unknown) ([22]). In the cases of Denmark, Finland, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, Poland, Slovakia, Slovenia and Sweden, the number of dwellings retrieved from the above process was scaled to match the total number of conventional dwellings in all buildings types provided by Eurostat (census round 2011) ([23]). Among the previous countries, the number of buildings was not scaled, when provided in the original census data (i.e. case of Denmark, Finland, Ireland, Italy, Lithuania, Luxembourg, Poland, Slovenia and Sweden), and instead represents the number obtained or inferred from the original census data (thus, reflects the date of the census). On the other hand, in Hungary, Malta, Poland and Slovakia, the number of buildings was inferred from the scaled number of dwellings.

The distribution of the number of buildings/dwellings to the additional building classes characterising the building envelope performance ($N_{res\_bldg(dw)/bcl\_date}$) (Section 2.1.2.3) was performed using Eurostat ratios of conventional dwellings built during relevant periods (N_{dw_date}) to the total number of conventional dwellings in all building types (Eurostat, 2011b). At the time of analysis, this data was not available for Finland and Slovakia, so the relevant proportions were obtained from the number of occupied conventional dwellings in residential buildings.

$$N_{res\_bldg(dw)/bcl\_date} = \frac{N_{dw\_date}}{N_{dw}} N_{res\_bldg(dw)/bcl} \tag{4}$$

The **built-up area** of a residential building class with/without considering the construction date ($A_{res/bcl(\_date)}$) was obtained by multiplying the estimated number of dwellings for each building class ($N_{dw/bcl(\_date)}$) by the average floor area per dwelling within the building class ($A_{dw/bcl}$).

$$A_{res/bcl(\_date)} = N_{dw/bcl(\_date)} \cdot A_{dw/bcl} \tag{5}$$

The average area per dwelling for each building class was defined using information often available in the housing census and taking into account that single-family detached buildings (i.e. one dwelling) tend to have larger area compared to dwellings within apartments. For example, according to data found in the Statistics Netherlands, the average area of a single-family dwelling is around 150 m^2, while a dwelling in a multi-family building (apartment) is approximately 80 m^2. Finally, a check was performed to ensure that the total calculated area is in accordance with the total residential area of each country, as reported in the associated national census or alternative sources of information. An iterative process was often necessary to achieve compliance

([21]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure/-/tree/master/res_dwelling_per_building.
([22]) Definitions according to Eurostat (https://ec.europa.eu/eurostat/cache/metadata/en/cens_11r_esmscs.htm).
([23]) https://ec.europa.eu/eurostat/web/population-demography/population-housing-censuses.

by adjusting $A_{dw/bcl}$. The adopted values of $A_{dw/bcl}$ ([24]) per building class and country are provided in Crowley et al. (2020a).

Although different definitions of floor area are provided in national censuses (Table A. 1), for the purpose of assigning construction costs (see next paragraph), $A_{res/bcl}$ reported in the final exposure model was assumed to be 'useful' area (i.e. excluding common and non-heated areas). On the other hand, during energy performance calculations, the built-up area of a residential building class (A_{res/bcl_date}) obtained from the final exposure model within each administrative region was reduced to represent heated occupied area (A_{res/bcl_date_heat}), according to Equation (6). In the equation, the first ratio represents occupied (N_{dw_occ}) to total conventional dwellings in all building types from all construction periods (Eurostat, 2011a), and the second heated ($N_{dw\_occ\_heat}$) to occupied conventional dwellings.

$$A_{res/bcl\_date\_heat} = \frac{N_{dw\_occ}}{N_{dw}} \frac{N_{dw\_occ\_heat}}{N_{dw\_occ}} A_{res/bcl\_date} \quad (6)$$

The ratio of the number of heated to occupied dwellings was retrieved from the 2012 ad-hoc module 'housing conditions' ([25]) of EU-SILC (Eurostat, 2012). Specifically, the ratios were estimated from the variable HC050, i.e. dwelling equipped with heating facilities, by considering households heated by 'central heating or similar' and 'other fixed heating' ([26]). Relevant data was available for all Member States apart from Poland, where a ratio of100% was assumed.

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 country, and it includes the cost of the structural, non-structural components and content (excluding the cost of land). Construction cost per square metre of useful area ([27]) (Crowley et al., 2020a) was selected from various sources for specific countries (Crowley et al., 2021a); this typically refers to the replacement of the structural and non-structural components and it was differentiated among urban and rural areas and big cities mainly by expert judgment. For the rest of the countries, construction cost was inferred by considering the expected relative ranking of residential construction cost among European countries. The ranking was undertaken using construction cost indices ([28]) along with a final validation and calibration (when necessary) (Crowley et al., 2021a). Construction cost was further differentiated by the following factors based on the main material used for construction, i.e. 0.95 for unreinforced masonry, adobe, and wood; 1.00 for steel, and mixed; 1.05 for reinforced concrete. It was assumed that construction cost corresponds to 80% of the total replacement cost value with the cost of structural and non-structural components equal to 30% and 50% of the total value, respectively. The remaining 20% was assumed to correspond to the content cost. Euro was selected as the reference currency to homogenise and compare values among countries. All replacement cost values were adjusted using construction cost indices to represent the value of replacing a building in the reference year of 2020. All currencies were converted to Euro based on an average exchange rate for 2020.

The **population** within a given residential building class and administrative division ($P_{res/bcl}$) was calculated by distributing the total number of people in the administrative division (P_{admin}) according to the proportion of dwellings per residential building class.

$$P_{res/bcl} = \frac{N_{dw/bcl}}{N_{dw}} P_{admin} \quad (7)$$

The further distribution of population to the building classes characterising the building envelope performance (P_{res/bcl_date}) was performed similarly to the distribution of buildings (Equation (4)) using the same Eurostat ratios (Eurostat, 2011b).

([24]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure/-/tree/master/res_dwelling_area.

([25]) https://ec.europa.eu/eurostat/web/income-and-living-conditions/data/ad-hoc-modules.

([26]) Definitions according to Eurostat (https://ec.europa.eu/eurostat/documents/1012329/1012401/2012+Module+assessment.pdf).

([27]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure/-/tree/master/sources.

([28]) The construction cost index provides the trend in the cost of new residential buildings over the years and is commonly found in the Statistical Office of each individual country.

$$P_{res/bcl\_date} = \frac{N_{dw\_date}}{N_{dw}} P_{res/bcl} \quad (8)$$

Population source data per Member State (Table A. 1) correspond to different reference years. However, the population obtained from source data was scaled to 2019 values ([29]) provided by the World Bank ([30]) (Crowley et al., 2020a). The distribution of the population between daytime (10:00 to 18:00), night-time (22:00 to 06:00) and transit-time (06:00 to 10:00, and 18:00 to 22:00) was made by applying national average percentages ([31]) from PAGER (Crowley et al., 2020a) to $P_{res/bcl}$. This spatiotemporal distribution ensures that the total population available within each administrative region is consistent with the census data, but it is also based on the simplifying assumptions that people live and work within the same administrative unit and that all dwellings and buildings are occupied, contrary to the assumptions made for heated area according to Equation (6). During seismic risk calculations, the average 24-hour (day/night/transit) population was used. Earthquakes can occur at any time, and therefore by using the average population, an equal probability is considered that they will occur during the day-, night- or transit-time (8-hour) periods.

2.1.2.5 Spatiotemporal distribution of commercial building data

Only a few national Statistical Offices provide exposure information for non-residential buildings at regional or national scale. Therefore, the commercial building stock relied on secondary sources when it was not captured in a separate national building census. Such sources included socioeconomic data, studies related to the energy efficiency of buildings, European statistics platforms, and local expert judgement.

Although some national Statistical Offices provide information regarding the total number of commercial buildings (e.g. Italy) or the number of commercial facilities at the smallest division (e.g. Greece), the majority of countries in Europe do not release relevant information. In general, the total number of commercial buildings and the total built-up area was collected from the EU Buildings Database (e.g. Belgium) or estimated based on the number of enterprises/establishments/businesses (e.g. Portugal). The number of commercial facilities is usually related with the type of commercial sector and business: wholesale and retail trade, repair of motor vehicles and motorcycles, accommodation and food services, information and communication, financial and insurance activities, real estate activities, administrative and support service activities, arts, entertainment and recreation and other services. This data was organised to three categories: offices, wholesale and retail trade, and hotels and restaurants.

When only the number of commercial facilities was available at the national level (e.g. by the EU building database), it was necessary to distribute these facilities within the national administrative divisions to improve the spatial resolution of the exposure model. The assignment of the number and built-up area of each of the three categories of commercial buildings within each administrative division relied essentially on economic census surveys that provided demographic data concerning the workforce per commercial activity, such as the number of employees for each administrative division ($N_{empl/admin}$). Following this approach, the **number of commercial buildings** ($N_{com\_bldg/admin}$) was calculated according to Equation (9).

$$N_{com\_bldg/admin} = N_{com\_bldg/country} \frac{N_{empl/admin}}{N_{empl/country}} \quad (9)$$

The **area** per building and building class ([32]) (Crowley et al., 2020a) was estimated based on initial reasonable assumptions for each building class and subsequent iterative corrections until the total floor area converged to national calibration data (Table A. 2).

Similarly to residential buildings, construction cost per square metre of useful area ([33]) (Crowley et al., 2020a) were obtained for office buildings and specific countries from various sources (Crowley et al., 2021a). Unless otherwise indicated by local experts, the construction cost of hotel and trade buildings was considered 105%

([29]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure/-/tree/master/social_indicators.
([30]) https://data.worldbank.org.
([31]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure/-/blob/master/social_indicators/population_distribution_PAGER.xlsx.
([32]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure/-/tree/master/com_building_area.
([33]) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure/-/tree/master/sources.

and 75% of office buildings, respectively. For the rest of the countries, construction cost was inferred by considering the expected relative ranking of non-residential construction cost among European countries. Construction cost was further differentiated based on the main material used for construction as in the case of residential buildings. It was assumed that construction cost corresponds to 50% of the total **replacement cost** value with structural and non-structural components equal to 20% and 30% of the total value, respectively. The remaining 50% was assumed to correspond to the content cost. Similarly to residential buildings, replacement cost represents the value of replacing a building in 2020.

Regarding the **population** distribution to commercial buildings, the non-residential temporal percentages from PAGER (Crowley et al., 2020a) already account for the percentage of the population that is employed. Therefore, the percentage working in commercial buildings is required. About 20% of employees in Europe work in the public sector ([34]) which is not addressed in the exposure model. It was assumed that, on average in Europe, 50% of the remaining employed population work in the commercial sector ([35]). Hence, for commercial exposure, the 2019 scaled P_{admin} was distributed as a function of the area of commercial buildings per building class, multiplied by 0.4, and then the non-residential percentages of day-, night- and transit-time were applied. In risk calculations, the average 24-hour (day/night/transit) population was used.

2.1.3 Model features

The complete exposure model for the residential and commercial buildings of each Member State includes the following attributes:

- LONGITUDE, LATITUDE: Geographical co-ordinates used to describe the asset location for risk calculations. These coordinates represent the built-up area density weighted centroids of the highest administrative level available.
- TAXONOMY: Building taxonomy string that describes the key structural attributes of the building (Section 2.1.2.1).
- MACRO_TAXONOMY: A human-readable simplified description of the taxonomy described in Crowley et al. (2021a).
- BUILDINGS: The total number of buildings comprising the asset.
- DWELLINGS: The total number of dwellings (in residential exposure model).
- OCCUPANCY: The primary occupancy class (res: residential, com: commercial)
- OCCUPANCY_TYPE: The secondary occupancy class in (*i*) commercial buildings, i.e. OFFICE: offices, TRADE: wholesale and retail trade, HOTEL: hotels and restaurants (*ii*) the residential model of Cyprus, i.e. SINGLE or APARTMENT buildings. This field was used to differentiate construction cost (Section 2.1.2).
- SETTLEMENT_TYPE: In residential model a differentiation among URBAN, RURAL, and BIG CITY. The field was used to differentiate construction cost. (Section 2.1.2). Table 2 provides a list of the big cities considered in the model (based on judgement rather than specific criteria).
- AREA_PER_DWELLING_SQM: The average floor area of a house or dwelling (in m^2) in the residential exposure model.
- AREA_HEAT_PER_ASSET_SQM: The total heated occupied area of the asset (in m^2) in the residential exposure model.
- AREA_PER_BUILDING_SQM: The average floor area of an establishment (in m^2) in the commercial exposure model.
- COST_PER_AREA_EUR: The average replacement cost per unit area (in 2020 Euro/m^2, including the structural, non-structural components and building content).
- TOTAL_REPL_COST_EUR: The total replacement cost of the asset (in 2020 Euro, including the structural and non-structural components and building content).
- COST_STRUCTURAL_EUR: The replacement cost of the structural asset components (in 2020 Euro).
- COST_NONSTRUCTURAL_EUR: The replacement cost of the non-structural asset components (in 2020 Euro).

([34]) https://en.wikipedia.org/wiki/List_of_countries_by_public_sector_size.
([35]) https://ec.europa.eu/eurostat/web/products-datasets/product?code=nama_10_a64_e.

— COST_CONTENTS_EUR: The replacement cost of the building content (in 2020 Euros).

— OCCUPANTS_PER_ASSET: The total number of occupants associated with the asset (obtained from residential population data).

— OCCUPANTS_PER_ASSET_DAY: The average number of daytime (10:00 to 18:00) occupants of all buildings comprising the asset.

— OCCUPANTS_PER_ASSET_NIGHT: The average number of night-time (22:00 to 06:00) occupants of all buildings comprising the asset.

— OCCUPANTS_PER_ASSET_TRANSIT: The average number of transit-time (06:00 to 10:00, and 18:00 to 22:00) occupants of all buildings comprising the asset.

— OCCUPANTS_PER_ASSET_AVERAGE: The average number of occupants over a 24-hour period of all buildings comprising the asset.

Table 2. List of big cities considered in the residential exposure model (Source: ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org).

Country	Big city
Austria	Vienna
Belgium	Antwerpen, Bruxelles, Vlaams Brabant, West-Vlaanderen, Oost-Vlaanderen, Hainaut, Liege, Limburg, Namur
Bulgaria	Burgas, Varna, Grad Sofiya
Croatia	Primorsko-Goranska, Osjecko-Baranjska, Split, Grad Zagreb
France	Nice, Marseille, Toulouse, Bordeaux, Montpellier, Nantes, Lille, Strasbourg, Lyon, Paris
Germany	Berlin, Munchen, Hamburg, Stuttgart, Koln, Dresden
Greece	Alexandroupoli, Ioannina, Larissa, Volos, Rhodes, Heraklion, Thessaloniki, Athens
Hungary	All those assigned "Kecskemét mjv" in census data
Italy	Milan, Rome
Netherlands	Amsterdam, Delft, Eindhoven, Groningen, Rotterdam, Utrecht
Portugal	Lisbon, Porto, Setubal
Romania	municipalities of Constanta and Bucuresti
Slovakia	Zilina, Bytca, Cadca, Dolny Kubin, Kysucke Nove Mesto
Slovenia	Ljubljana
Spain	Barcelona, Madrid

The level of resolution of the exposure model was kept at the administrative level where data was collected to maintain a close link to original source data, and reduce the computational effort (compared to higher resolution models). Each administrative region was represented by a single coordinate corresponding to a density-weighted centroid. The centroid was calculated from a 30 arc-second grid of built-up area density, interpolated from the 250×250 m resolution built-up area density map by Pesaresi et al. (2015). The decision to use the built-up area density weighted centroids together with a density-weighted site response model was based on Dabbeek et al. (2021), as this approach was found capable of reducing bias in average annual loss estimation at a regional scale with high variability of hazard and soil properties within regions (approximately 18% on average per country), whilst ensuring a reasonable level of computational effort.

Each country has a different highest level of sub-division as a function of the seismic source data availability (Table A. 1 and Table A. 2). Sub-divisions in seismic source data are based on the Global Database of Administrative Areas (GADM) ([36]) and represent administrative units with six levels (0: country, 1: region, 2: province, 3: municipality, etc). Seismic risk calculations were performed at the highest GADM sub-division level available for each Member State. Nevertheless, for the sake of compatibility with energy and socioeconomic source data both seismic exposure and risk results were mapped to the NUTS standard. The NUTS 2021 classification was employed herein presenting seismic, energy and socioeconomic data/indicators at the NUTS-3 level (i.e. small regions) or at a lower level.

When the resolution of NUTS-3 was lower than the highest considered level of GADM sub-division (i.e. NUTS-3 region incorporating GADM sub-divisions) with overlapping external boundaries resulting in more than 90% of common area (i.e. majority of cases), GADM data were simply aggregated to estimate NUTS-3 data. When the overlapping area was less than 90%, GADM data were assigned to the proper NUTS-3 based on relevant area overlaps. In cases when the resolution of NUTS-3 was higher than the highest considered level of GADM sub-

([36]) https://gadm.org.

division (i.e. GADM sub-division incorporating NUTS-3 regions), GADM data were disaggregated to NUTS-3 using proportions of total conventional dwellings in all building types provided by Eurostat (2011a). The spatial analysis was performed with QGIS software (QGIS, 2021).

Spatial distributions of the number of buildings, average population, and replacement cost at NUTS-3 level are provided in Figure 5–Figure 10. Specifically, Figure 5 and Figure 6 present exposure data for residential buildings, Figure 7 and Figure 8 for commercial buildings, and Figure 9 and Figure 10 for their aggregate (i.e. residential plus commercial). Relevant data at the national level are provided in Table A. 5–Table A. 7.

Figure 5. (a) Residential building count, and (b) average 24-hour population in the EU-27 at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

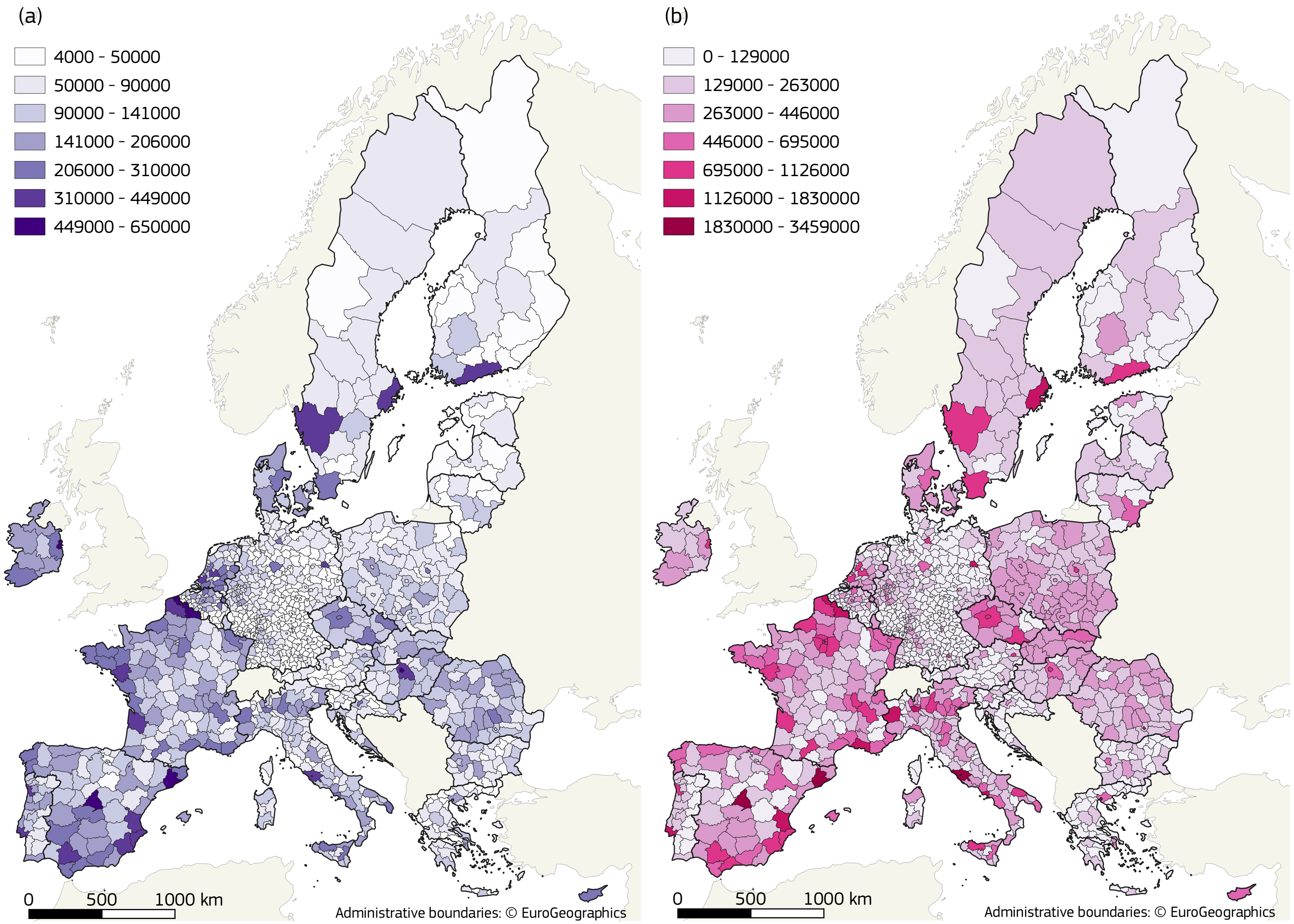


Figure 6. Replacement cost (·10⁶ €) of residential buildings in the EU-27 at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

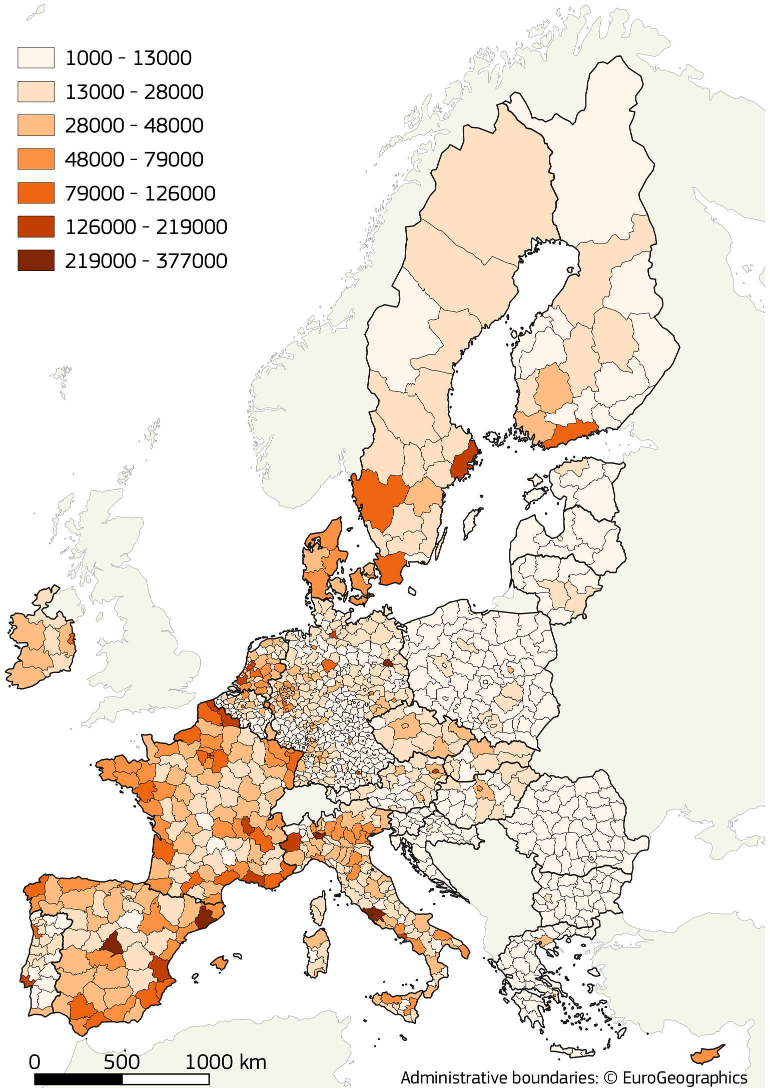


Figure 7. (a) Commercial building count, and (b) average 24-hour population in the EU-27 at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

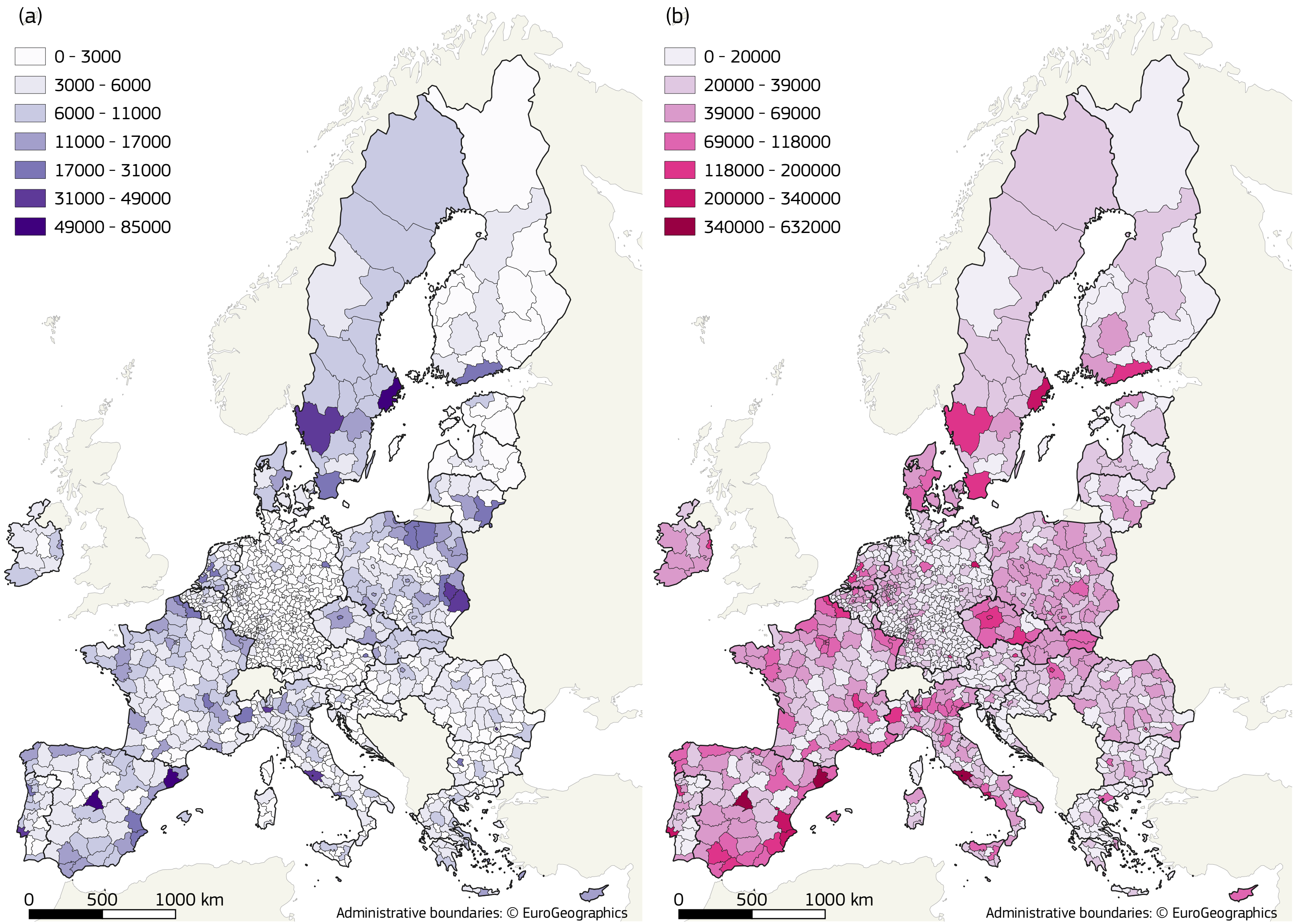


Figure 8. Replacement cost (·10^6 €) of commercial buildings in the EU-27 at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

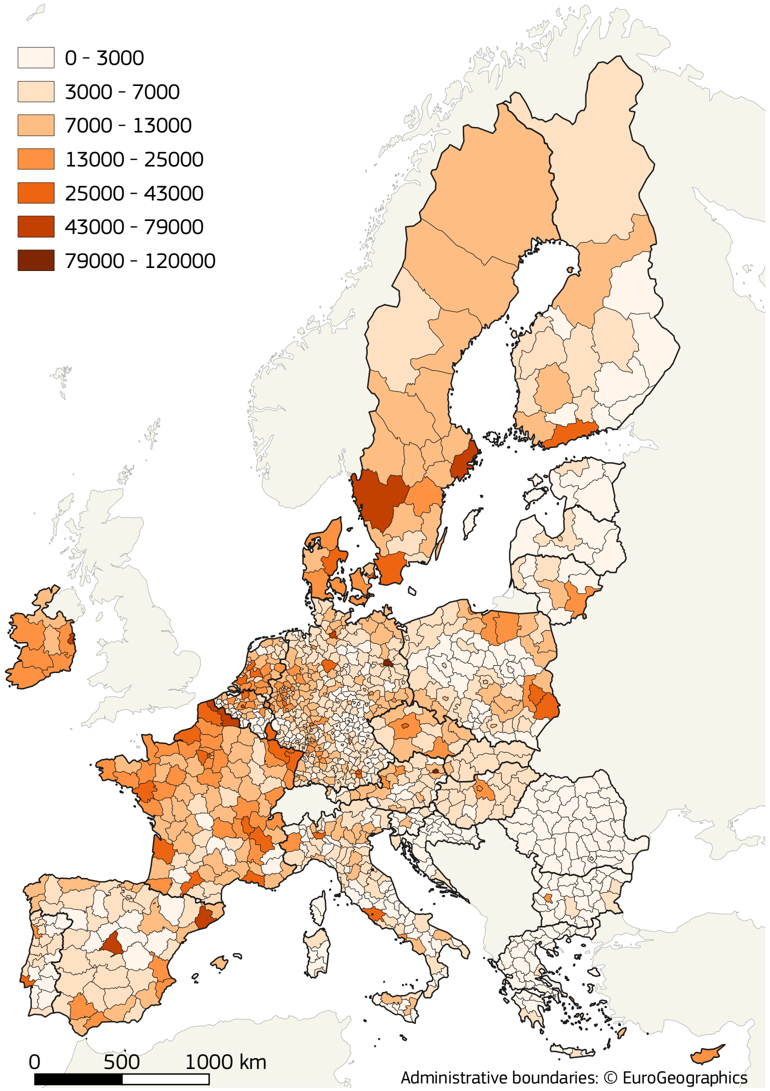


Figure 9. (a) Residential and commercial building count, and (b) average 24-hour population in the EU-27 at NUTS-3 level (Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

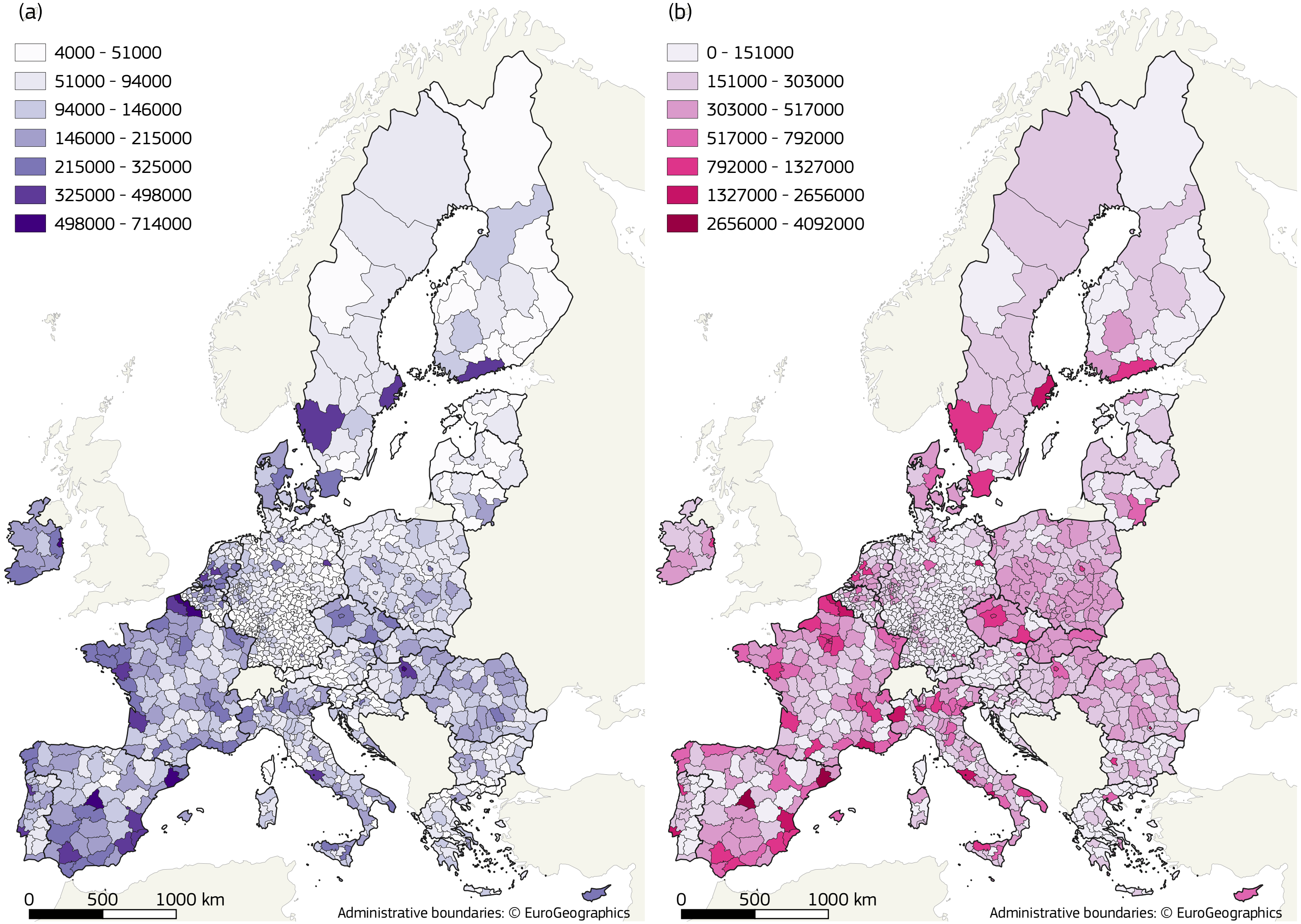
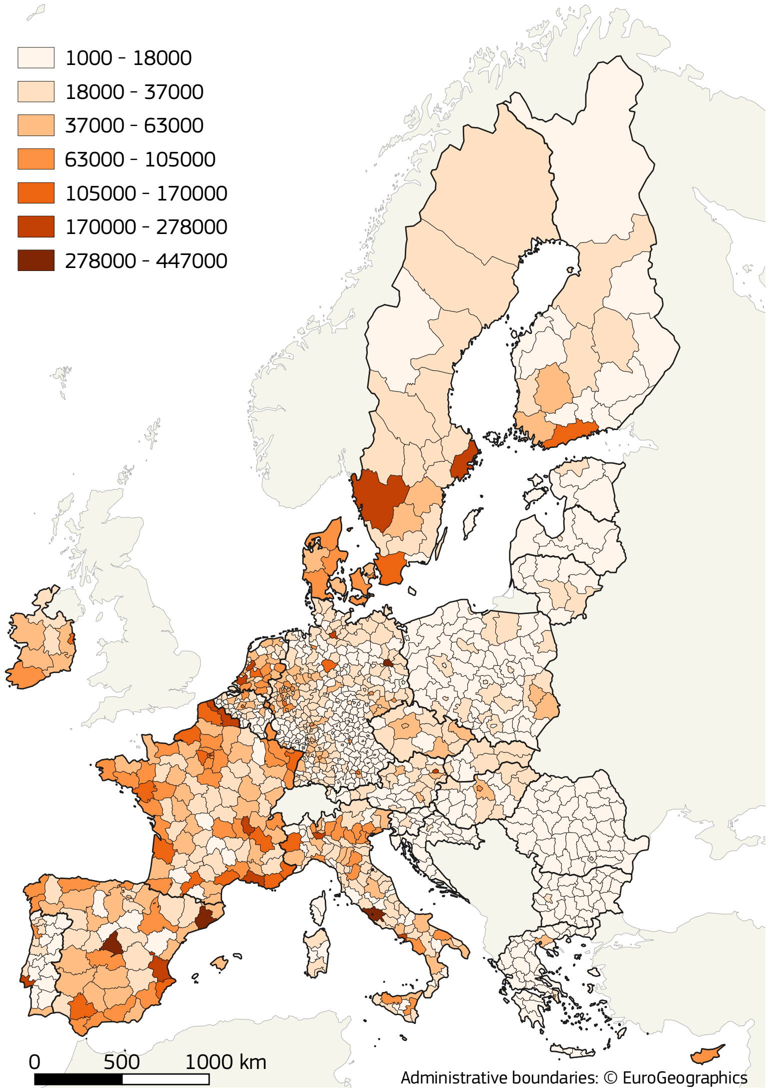


Figure 10. Replacement cost (·10^6 €) of residential and commercial buildings in the EU-27 at NUTS-3 level (Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

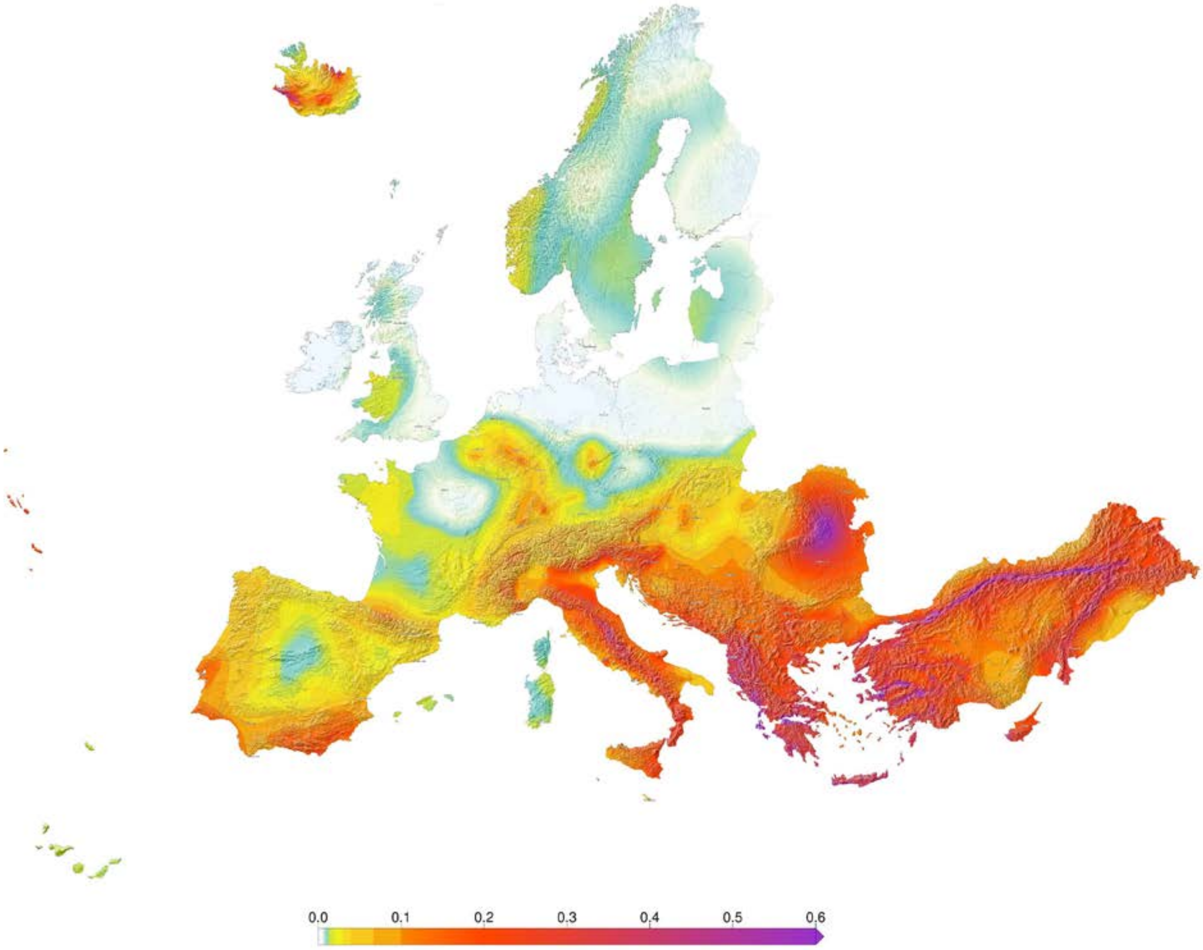


2.2 Seismic hazard

Seismic hazard models consist of two main components, i.e. seismogenic source and ground motion models. Seismogenic source models describe the spatial and temporal distribution of seismicity, typically through point, area, simple/complex/characteristic fault sources. Ground motion models describe the mean and standard deviation of a range of ground shaking intensity measures (e.g. *PGA*) conditional on predictor variables, that are typically the rupture (e.g. moment magnitude, M_w), distance, and site parameters (e.g. the average seismic shear-wave velocity from the surface to a depth of 30 meters, $V_{S,30}$).

The final version of the European Seismic Hazard Model 2020 (ESHM20, Danciu et al., 2021, available from EFEHR,[37] © ETH Zurich, 2022) was used in this study, as developed within the Joint Research Activities of the SERA project (Giardini et al., 2017). All input files of the model are available online on the EFEHR ESHM20 repository ([38]), and the main outputs (hazard maps, curves and spectra) are free to access online on the EFEHR hazard web platform ([37]). As an example, Figure 11 presents expected *PGA* with exceedance probability of 0.21% in one year (or return period T_R = 476 years) on reference rock. The hazard input files used in the OpenQuake engine (Pagani et al., 2014; Silva et al., 2014; GEM, 2019) to perform risk calculations ([39]) are publicly available by Crowley et al. (2021a) on the EFEHR ESRM20 repository ([40]). The following sections summarise the main features of ESHM20.

Figure 11. Mean values of *PGA* on reference rock ($V_{s,30}$ = 800 m/sec) with exceedance probability of 0.21% in one year (T_R = 476 years), based on ESHM20 (Danciu et al., 2021, available from EFEHR, http://hazard.efehr.org) (© ETH Zurich, 2022)



([37]) http://hazard.efehr.org/en/home/.
([38]) https://gitlab.seismo.ethz.ch/efehr/eshm20.
([39]) The OpenQuake hazard input files for the risk calculations are different from those used to calculate seismic hazard maps at specific return periods following a classical probabilistic seismic hazard assessment approach (Section 2.5). The latter are available from the EFEHR ESHM20 repository (https://gitlab.seismo.ethz.ch/efehr/eshm20).
([40]) https://gitlab.seismo.ethz.ch/efehr/esrm20.

2.2.1 ESHM20 seismogenic logic tree

The ESHM20 (Danciu et al., 2021) seismogenic source model logic tree was developed on the basis of the European Seismic Hazard Model 2013 (ESHM13, Woessner et al., 2015). It consists of two main branches, reflecting the cross border harmonised area sources model (ASM) and a hybrid smoothed seismicity and active fault sources model (FS+SSM). Both seismogenic sources were developed with the most recent input datasets: a unified earthquake catalogue, improved seismotectonic information and updated active faults datasets. Previously unidentified historical events (between 1000-1900) were added to the European PreInstrumental earthquake CAtalogue (EPICA) (Rovida and Antonucci, 2021) as an update of the SHARE European Earthquake Catalogue (SHEEC) (Stucchi et al., 2013), whereas attributes of some previously identified events were updated based on further study and investigation. The instrumental part of the earthquake catalogue was extended from 2006 to the end of 2014, the earthquake magnitude threshold was dropped to a moment magnitude (M_w) of 3.5 (previously M_w = 3.5 in northern Europe and 4.0 in southern Europe).

The European Database of Seismogenic Faults (EDSF) was updated by integrating sources of active faults information in Europe from regional datasets (Basili et al., 2020). The seismogenic source models extend to the subduction interface and in-slab of the Hellenic, Cyprian, Calabrian, and Gibraltar Arcs, and to the non-subducting deep seismicity in Vrancea (Romania) as well as the cluster of deep seismicity in southern Iberian Peninsula.

The earthquake rate forecast of the individual seismogenic sources were estimated based on the assumptions that the regional seismicity follows a memoryless Poisson process characterised by a stationary mean rate of occurrence estimated from the declustered ([41]) earthquake catalogue and using data-driven completeness ([42]) intervals (Danciu et al., 2021). The inherent uncertainties associated with the earthquake rate forecast were captured by two different types of magnitude frequency distributions (i.e. double truncated Gutenberg Richter and Pareto) and their main parameters (productivity, slope and maximum magnitude). The tectonic seismicity provided the proxy for containing the seismic productivity of the active faults, and the uncertainties of the slip-rate and the maximum magnitude were considered in the fault source characterisation as well as for the subduction interface sources (Basili et al., 2020).

A collapsed version of the ESHM20 source model logic tree was used for the risk calculations with the two main source branches (i.e. ASM, FS+SSM) having equal weights.

2.2.2 ESHM20 ground motion model logic tree

Epistemic uncertainty in the ground motion logic tree should vary geographically, with higher values found in areas with limited data and lower ones in areas with considerable data (Douglas, 2018). A transparent approach to model the epistemic uncertainty in the European ground-motion model that ensures all branches are mutually exclusive and collectively exhaustive is the so-called backbone approach (Atkinson et al., 2014) ([43]). In this approach, a single ground motion model is calibrated or selected from the literature. Adjustment factors are applied to this model that quantify the uncertainty in the expected ground motion as a result of the limited knowledge on the seismological properties in a region.

The above approach was adopted for the ESHM20 ground motion logic tree for the three main seismotectonic region types in Europe, i.e. shallow crustal seismicity (non-craton), seismicity in the stable craton region of northeastern Europe, and subduction and deep seismicity including the Hellenic, Calabrian, Cypriot and Gibraltar arcs, as well as the Vrancea deep seismic zone. In addition, special cases were considered in which the main approach was modified and decisions were made on the basis of insights and information from other data sets or studies. More details on the logic tree can be found in Danciu et al. (2021) and relevant recent journal publications (Kotha et al., 2020, 2022; Weatherill et al, 2020a; Weatherill and Cotton, 2020).

2.2.3 Site amplification

Topographic slope, inferred (from topographic slope) $V_{S,30}$, and geological unit/era were used as the three main proxies for site response in the European seismic risk model. The site amplification function of the backbone ground motion model for shallow seismicity in active and low seismicity non-cratonic regions in the ESHM20 logic tree (Kotha et al., 2020) was developed using the regression between the site-to-site variability and topographic slope, with geological unit as a random effect (Weatherill et al., 2020b, 2022). In both the craton

([41]) Declustering consists of removing all seismicity clusters and identifying independent mainshock events.

([42]) Assessing magnitude completeness consists of identifying the range of years over which the catalogue can be considered complete for different magnitude thresholds.

([43]) Also adopted in many site-specific studies for critical facilities.

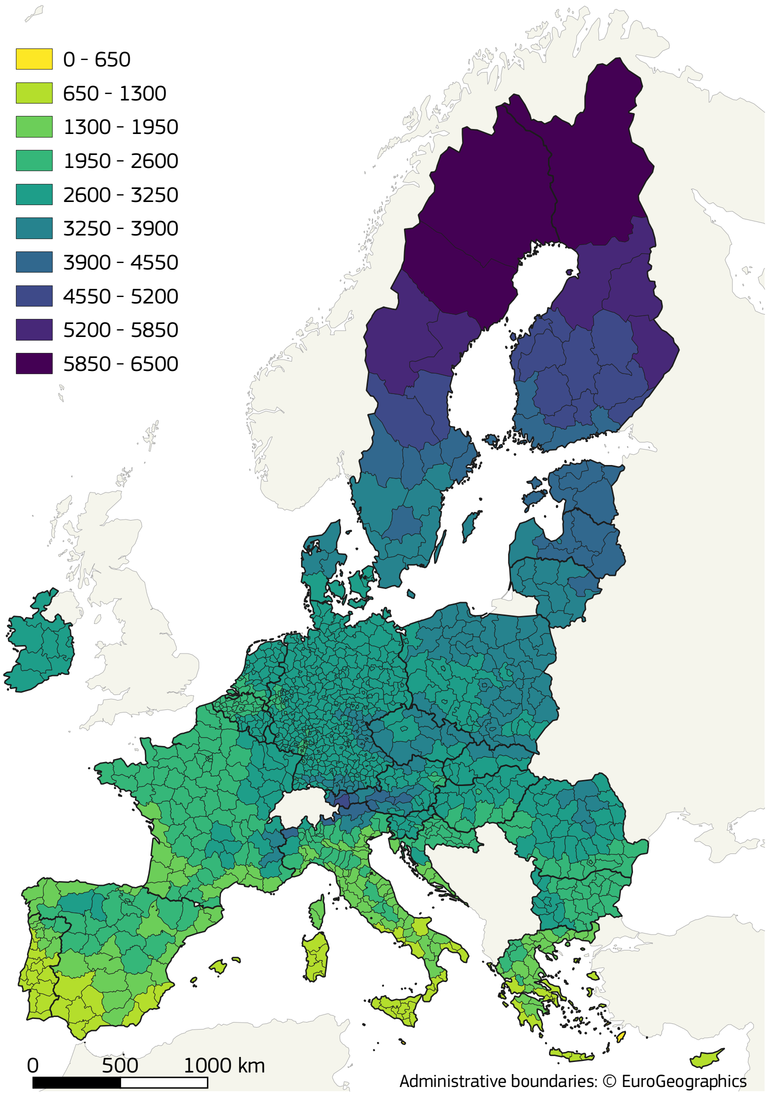
and the subduction/deep seismicity regions, the site amplification terms from the appropriate models described above were directly adopted together with inferred $V_{S,30}$ values.

In each country, input site parameters were defined for each coordinate in the exposure model (provided on the ESRM20 repository) ([44]). Input site parameters include the slope, geological unit, inferred $V_{S,30}$, and the distance to the volcanic front (an additional parameter used in the ground motion model).

2.3 Climatic conditions

The impact of the exterior (outdoor) environment on building energy performance was represented by local climatic conditions. In the present study, energy consumption associated with space heating in residential buildings was assessed, and climatic conditions were represented by *HDD*s. This parameter is derived from outside air temperature measurements, and it is used to estimate heating energy requirements. The *HDD* calculation relies on a base temperature, i.e. a threshold denoting the daily mean outside air temperature above which a building requires no heating. Herein, both the base temperature (i.e. 15°C) and *HDD* calculations are defined according to Equation (10) (Eurostat[45]), where $T_m{}^i$ is the mean air temperature of day *i*.

Figure 12. Average *HDD* values (2010–2019) in the EU-27 at NUTS-3 level (Source: Eurostat, 2020b; JRC analysis)



([44]) https://gitlab.seismo.ethz.ch/efehr/esrm20.
([45]) https://ec.europa.eu/eurostat/cache/metadata/en/nrg_chdd_esms.htm.

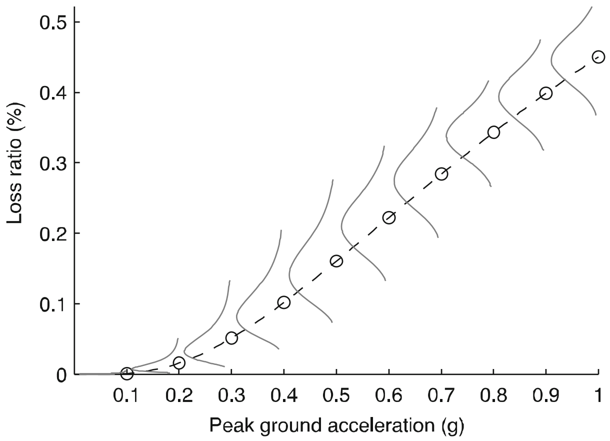
$$HDD = \begin{cases} \sum_i (18 - T_m^i), & for\ T_m^i \leq 15^oC \\ 0, & for\ T_m^i > 15^oC \end{cases} \quad (10)$$

HDD values are derived from meteorological observations of air temperature, interpolated to regular grids at 25 km resolution for Europe. Calculated gridded *HDD* values are aggregated and subsequently presented at NUTS-3 level. Eurostat integrates monthly data as published by the Joint Research Centre's AGRI4CAST Resources Portal ([46]). Annual data are calculated as the sum of monthly data by Eurostat. Herein, annual *HDD* data were retrieved from Eurostat for the years 2010-2019 for all NUTS-3 regions (Eurostat, 2020b), and their average over this 10-year period (Figure 12) was calculated and used in the regional energy performance assessment.

2.4 Seismic physical vulnerability

Physical vulnerability is defined herein as the probability of loss conditional on the level of ground shaking intensity (Figure 13). Although efforts have been made to directly develop empirical vulnerability models in terms of economic loss (e.g. Jaiswal and Wald, 2013), such models do not consider the building stock and thus the relative differences between building types. Furthermore, they do not allow considering the impact of retrofitting schemes which forms one of the main objectives for regional prioritisation (Gkatzogias et al., 2022). Hence, vulnerability models used in the present study combine fragility functions ([47]) and consequence (damage-to-loss) models.

Figure 13. Illustration of a vulnerability model example (© Crowley, 2014)



2.4.1 Fragility functions

Fragility functions within the objectives of the pilot project need to address the various building classes across Europe (for which damage observations are not always available, especially under high levels of seismic excitation), estimate consistently the relative risk between different building classes for the prioritisation of retrofitting actions, and facilitate the consideration of the retrofit effect (Gkatzogias et al., 2022).

GEM released recently a global database of capacity curves (Martins and Silva, 2021), developed by compiling data from research studies and experimental campaigns. Among these capacity curves, 247 were identified to represent masonry (MCF, MR, MUR), steel (S), timber (W) and some reinforced concrete building classes (CR_LDUAL, CR_LWAL) in Europe, with various height and ductility levels according to the GEM Building Taxonomy ([48]). These models include ductility rather than code level, hence the code level and lateral force coefficients in the exposure model were mapped to ductility according to Table 3.

([46]) https://agri4cast.jrc.ec.europa.eu.
([47]) A fragility function defines, for specific building classes, the probability of damage exceedance, conditional on ground shaking.
([48]) https://github.com/gem/gem_taxonomy.

Table 3. Mapping of exposure code level and lateral force coefficient to ductility level for GEM models (Source: ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org).

Code level	**Reinforced concrete (CR), MIX (MUR+CR)**						**Steel**
	Lateral force coefficient (%)						**S, SRC**
	0	**5**	**10**	**15**	**20**	**25, 30**	
CDH	DUL	DUM	DUM	DUM	DUH	DUH	DUM
CDM	DUL	DUL	DUM	DUM	DUM	DUH	DUM
CDL	DUL	DUL	DUL	DUM	DUM	DUM	DUM
CDN	DUL	-	-	-	-	-	DUM

Code level	**Masonry**		**Wood**	**MIX**		**Earth**	**Unknown**
	MUR	**MCF, MR**	**W**	**MUR+W**	**LH**	**EU**	**UNK**
CDH	-	-	DUH	-	-	-	-
CDM	-	-	DUM	-	DUL	-	DUM
CDL	-	DUL	DUL	DNO	DUL	-	DNO
CDN	DNO	DUL	DUL	DNO	DNO	DNO	DNO

The GEM methodology (Martins and Silva, 2021) was adapted in the SERA project (as part of the ESRM20) to develop fragility models for the selected building classes (Romão et al., 2019) as follows:

— Representative equivalent single-degree-of-freedom (SDOF) oscillators were developed for each building class using the selected capacity curves and the pinching4 model in OpenSees (McKenna et al., 2000).

— Earthquake records with a *PGA* above 0.05g were selected from the Engineering Strong Motion (Luzi et al., 2016a, b) and the NGA West (Chiou et al., 2008) databases. Different intensity measures (*IM*s) were considered to account for the dynamic properties of the different building classes, including *PGA* and spectral acceleration at different periods. For each *IM*, acceleration bins (ranges) were considered, and 20 records were randomly selected per bin, leading to a total of 200 records, leading to a total of 200 records. A maximum scaling factor between 1.5 and 3.5 was applied (higher scaling applied to bins of higher intensity) when the number of available records was below the minimum considered.

— Nonlinear dynamic analysis was performed with OpenSees to evaluate the maximum displacement, *D*, of the SDOF oscillators (i.e. the engineering demand parameter – *EDP*) under the selected ground motion records.

— The cloud methodology (e.g. Jalayer and Cornell, 2002) was applied to define a best-fit curve between *IM* and *EDP* in the logarithmic space. A censored regression (Schnedler, 2005) approach was followed with the threshold for the censored observations set at 1.5 times the displacement for complete damage. Different *IM*s were considered in the regression and the most efficient one (Martins and Silva, 2021) was selected for each building class.

— To calculate the probability of exceeding a set of damage states (*DS*) (i.e. DS1: slight, DS2: moderate, DS3: extensive, and DS4: complete damage), a damage criterion based on the yielding and ultimate displacement points was selected (Villar-Vega et al., 2017). These damage states describe an estimate of the combined structural, non-structural and content damage of the building.

— The expected value of the natural logarithm of *D* given an intensity measure (i.e. $E[\ln D|\ln IM]$) was modelled by the slope and intercept of the linear regression. The probability that a given damage state (ds_i) will be reached or exceeded given an intensity measure (i.e. $P[DS \geq ds_i|IM]$) was subsequently calculated according to Equation (11). Φ is the cumulative function of the standard normal distribution, and D_{dsi} is the damage threshold displacement for each damage state. σ represents the standard deviation of the regression which directly accounts for the record-to-record variability.

$$P[DS \geq ds_i|IM] = \Phi\left(\frac{ln\, D_{dsi} - E[lnD|lnIM]}{\sigma}\right) \quad (11)$$

— Equation (11) leads to a fragility function with a lognormal distribution of a given median and dispersion (i.e. lognormal standard deviation). This dispersion was empirically increased to model the building-to-building and damage threshold variability.

As part of the SERA project, a more detailed approach was adopted to develop capacity curves for European reinforced concrete infilled and moment frames (Romão et al., 2019). Rather than defining capacity curves of SDOF oscillators using existing literature, a simulated design (Borzi et al., 2008; Verderame et al., 2010) of prototype frames was employed by combining different numbers of storeys (1–6), seismic design code levels (CDN, CDL, CDM, CDH) and lateral force coefficients (0, 5, 10, 15, 20, 25, 30%). In total, 264 reinforced concrete classes were identified, whereas the building-to-building variability, considered for each building class, resulted in the simulated design of up to 300 buildings per building class. Multi-degree-of-freedom models of these designed buildings were produced, and nonlinear static analysis was performed in each direction to develop capacity curves (by considering the average of all buildings and directions).

All the adopted capacity curves that were used to develop fragility and vulnerability models for ESRM20 (adopted herein) are publicly available on a GitLab repository (Romão et al., 2021). Overall, a distinct capacity curve was not available for every building class in the exposure model, and thus building classes were mapped to available models (Table A. 8) ([49]). Fragility functions for all European building classes were computed using the Vulnerability Modellers' Toolkit ([50]), a resource developed by GEM in collaboration with members of the European seismic risk community (Martins et al., 2021). The toolkit is a set of Python scripts that read the capacity curves, produce SDOF hysteresis models, launch OpenSeesPy ([51]) to run nonlinear dynamic analysis, apply linear censored regression to the cloud of nonlinear responses, and compute fragility functions for different damage states based on user-defined damage state thresholds. The final scripts used to develop the European models, which are a modified version of GEM's Vulnerability Modeller's Toolkit, are available on the aforementioned GitLab repository (Romão et al., 2021). Table A. 9 presents the median (θ_{DSi}) and dispersion (β_{DS}) of lognormal distributions that were fit to the discrete fragility models for DS1 to DS4 according to Equation (12). The intensity measure selected for each fragility class is also presented in the same table.

$$P[DS \geq ds_i|IM] = \Phi\left(\frac{ln(IM/\theta_{DSi})}{\beta_{DS}}\right) \tag{12}$$

2.4.2 Vulnerability functions

Economic vulnerability models that describe the expected economic loss ratio per damage state (i.e. repair cost to replacement cost, *ELR*) conditional on the intensity measure (i.e. $E[ELR|IM]$) were produced using the fragility functions and a damage-to-loss model based on recent European studies (Cosenza et al., 2018; Di Ludovico et al., 2021; De Martino et al., 2017; Erdik, 2021; Akkar, 2021; Tyagunov et al., 2006). The adopted damage-to-loss model defines expected loss ratios $E[ELR_i]$ of 5%, 15%, 60%, and 100% for DS1 to DS4, respectively. In Equations (13) and (14), n_{DS} is the number of damage states, $P[DS = ds_i|IM]$ is the probability of reaching damage state ds_i conditional on *IM*, and P_{DSi} is the probability of exceedance of ds_i conditional on *IM* (obtained from the fragility functions). Since the damage states of the fragility functions provide an estimate of the combined structural, non-structural and content damage, the loss ratio accounts for the total loss, i.e. total repair cost over the total replacement cost of the building (Sections 2.1.2.4, 2.1.2.5).

$$E[ELR|IM] = \sum_{i=1}^{n_{DS}} (P[DS = ds_i|IM] \cdot E[ELR_i]) \tag{13}$$

$$E[ELR|IM] = (P_{DS1} - P_{DS2}) \cdot 0.05 + (P_{DS2} - P_{DS3}) \cdot 0.15 + (P_{DS3} - P_{DS4}) \cdot 0.60 + P_{DS4} \cdot 1.00 \tag{14}$$

The damage-to-loss model for loss of life uses a number of factors obtained from both past observations and expert judgment to estimate the expected loss of life ratio (i.e. number of fatalities to number of occupants) for a given level of intensity (i.e. $E[LLR|IM]$) according to Equation (15). These factors 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 ($P_{lethal|DS4}$) times a collapse factor (*cf*), the probability of entrapment given fatal collapse ($P_{entrapment}$) varying

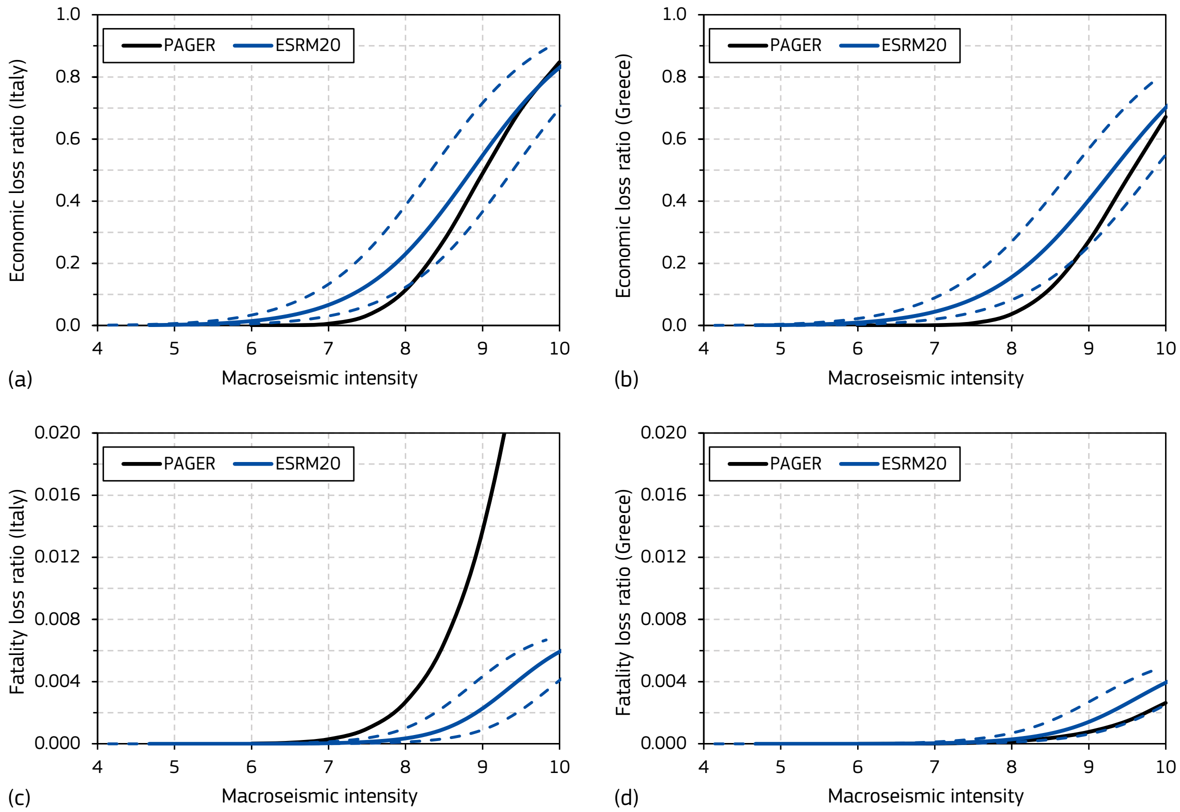
([49]) Out of 512 available fragility and vulnerability models, 243 were used in risk assessment as several combinations of material, number of storeys, lateral load resisting system, lateral force coefficient, ductility etc. are not present in the building stock.
([50]) https://github.com/GEMScienceTools/VMTK-Vulnerability-Modellers-ToolKit.
([51]) https://openseespydoc.readthedocs.io/en/latest/index.html.

between daytime and night-time, and the probability of loss of life given entrapment ($P_{LL|\text{entrapment}}$) (Reinoso et al., 2018). $P_{\text{lethal}|DS4}$ was assumed equal to 1% considering data from recent earthquakes (Antonios Pomonis, personal communication), whereas *cf* was based on expert judgment, varying from 0.5 to 5 as a function of the building class and representing a judgement-based correction of $P_{DS4} \cdot P_{\text{lethal}|DS4}$. Different entrapment ratios for daytime and night-time were assumed, and higher values were assigned to the latter since during night-time people react slowly resulting in a higher probability of life loss. Furthermore, an increase in the entrapment ratio with number of storeys was implemented for the daytime entrapment rates. The loss of life given entrapment was obtained by Reinoso et al. (2018) where a clear distinction between buildings with less than and more than 5 storeys was observed and thus applied herein. The adopted values of the parameters in the damage-loss model for each vulnerability class are provided in Table A. 10.

$$E[LLR|IM] = P[DS = ds_4|IM] \cdot P_{lethal|DS4} \cdot cf \cdot P_{entrapment} \cdot P_{LL|entrapment} \tag{15}$$

Vulnerability functions were computed using the Vulnerability Modellers' Toolkit (Section 2.4.1). Extensive testing of the resulting models was undertaken as described in Crowley et al. (2020c, 2021a). The plots in Figure 14 show comparisons of the European analytical vulnerability models with PAGER's empirical models for Greece and Italy. It is seen that economic analytical models perform well in both countries, whereas fatalities appear to be underestimated in Italy and overestimated in Greece. Such differences are expected since fatalities are quite rare and empirical data is based only on a few events per country highly influenced by aspects such as the time of the day and the number of people inside buildings during the earthquake. An additional aspect is that only a few building classes in a few locations within these countries caused fatalities, whereas the national analytical models are weighted by all building classes in the country. Hence, these comparisons alone are not sufficient to test the validity of the models and further tests are required.

Figure 14. National mean analytical vulnerability functions from ESRM20 (plus/minus one standard deviation) compared with PAGER's empirical models for (a) economic loss in Italy (b) and Greece, (c) fatalities in Italy and (d) Greece (Crowley et al., 2021a) (© Eucentre, 2022)



Vulnerability models were further tested against observed losses from past European earthquakes since the 1980's, considering in total 48 scenarios with magnitude above 5 (Crowley et al., 2021a). The European exposure and vulnerability models were found to produce limited bias in the loss on average, but they can lead to losses that are quite different from the observations in individual cases. Whilst such comparisons are useful for testing the models and evaluating risk analysis results, it is worth considering the high uncertainty associated also with the observed loss. For example, the total economic loss after an event is difficult to be defined and might not represent the same assets considered in ESRM20. In addition, fatalities are often misreported, and past losses were adjusted to today's value without explicitly considering the changes in the built environment.

2.5 Seismic risk

The selected risk metrics, i.e. average annual economic loss ($AAEL_{eq}$) and average annual loss of life (*AALL*), require the hazard to be defined with a frequency-based (or time-based) approach. Frequency-based risk assessment considers all the potential earthquake scenarios (in terms of magnitude, location, depth, rupture characteristics) that can affect a site over a given period, together with their probability of occurrence. Following a classical probabilistic seismic hazard assessment (PSHA) approach, for each event, the probability of exceeding different levels of ground motion is obtained from the aleatory variability of the ground motion model, and this is multiplied by the probability of occurrence of the event. This is repeated and summed for all possible events resulting in a hazard curve which describes the annual probability or frequency of exceedance of given levels of ground motion at a given site. The convolution of the hazard curve with a vulnerability function provides the loss curve for a single building, and the mean of the latter is the average annual loss.

As opposed to classical PSHA, an event-based approach was employed in this study to take into account the frequency of occurrence of each event and estimate seismic hazard. The event-based approach was selected as the OpenQuake engine (Pagani et al., 2014; Silva et al., 2014), used in the risk calculation, is optimised for event-based analyses of large regions, thus it is computationally less demanding for application at the European scale. The approach is commonly applied when a single aggregate loss curve for a collection of assets of buildings is sought (Silva et al., 2014), and considers the joint probability of ground motions at the sites where the buildings are located by generating a synthetic or stochastic catalogue of events. The catalogue is obtained with Monte Carlo sampling (Crowley et al., 2021a) of an earthquake rupture forecast (i.e. a list of all of the possible ruptures that can occur in the region of interest) created by the seismogenic source model. Branches of the full logic tree, i.e the collapsed seismogenic logic tree (Section 2.2.1) and the ground motion model logic tree (Section 2.2.2) are randomly sampled. A stochastic catalogue, and ground motion fields for each event in the stochastic catalogue, are generated for each of the sampled logic tree branches (i.e. 'realisations'), The inter-event and intra-event correlation of the aleatory (random) variability in the ground motion model is taken into account in each realisation. The aggregate loss (i.e. the sum of all building losses at all sites within a region) per event can then be calculated by combining the site-amplified ground motions with the exposure (Section 2.1) and vulnerability (Section 2.4) models. The resulting aggregate loss for each event (i.e. the event loss table) can be used for the calculation of several risk metrics, including exceedance probability loss curves and average annual losses.

Each loss in the event loss table is associated with the same annual rate of occurrence, and the annual rate/frequency of exceedance (λ) of each aggregate loss can be calculated by ranking the aggregate losses in decreasing order and computing the number of exceedances of each loss (l) divided by the length of the stochastic catalogue of events (n_e).

$$\lambda(L > l) = \frac{1}{n_e} \sum_{i=1}^{j} I(L_i > l) \tag{16}$$

In Equation (16), $I(L_i > l)$ represents the number of loss values above l, j is the total number of losses, and L_i stands for the loss caused by event i. The return period is the inverse of the annual frequency of exceedance, and the annual probability of exceedance for a given period can be calculated using the Poisson model. The average annual loss (*AAL*), the mean of the regional loss exceedance curve, can be computed using Equation (17).

$$AAL = \frac{1}{n}\sum_{i=1}^{j} L_i \tag{17}$$

2.6 Energy performance

The energy performance of the residential building stock in the EU-27 was assessed in terms of space heating energy consumption and associated costs. The analysis methodology relied on simulated design of prototype buildings to map the exposure building classes into energy performance classes characterised by key energy parameters. A database of energy demand simulations, containing different combinations of the key parameters, was developed by employing the building energy modelling (BEM) approach in the EnergyPlus software (EnergyPlus, 2020). The database was used to calibrate an artificial neural network (ANN) (Section 2.6.1). ANN was used in turn to estimate energy consumption for the different energy performance classes per NUTS-3 region (Section 2.6.2). The energy consumption was finally translated to average annual economic loss associated with annual energy space heating cost ($AAEL_{en}$). The analysis presented in the following relies on the methodology and tools developed and described in more detail by Veljkovic et al. (2023).

2.6.1 Artificial neural network

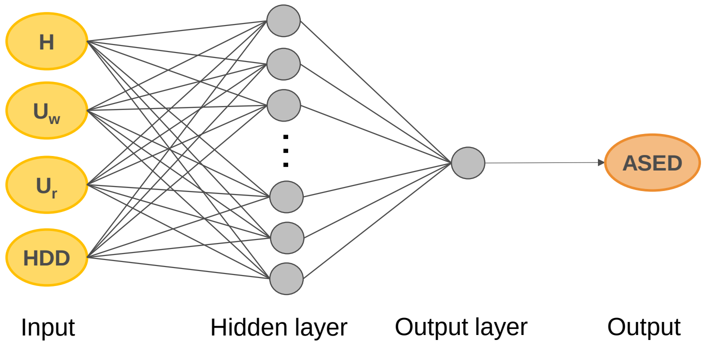
The ANN was used to estimate annual specific (i.e. per m^2) heating energy demand for the residential building exposure model. ANN is a machine learning method suitable for modelling nonlinear problems inspired on a biological information processing scheme. It is a data-driven approach that uses known pairs of input and output variables (neurons) to define the relationships between them and calibrate the simulation model. Being highly accurate and easy to implement, this method is frequently used in many studies referring to building energy performance (Aydinalp et al., 2004; Ekici and Aksoy, 2009; Kialashaki and Reisel, 2013; Jovanović et al., 2015; Martellotta et al., 2017; Ascione et al., 2017).

A database of energy demand simulations' input and output was compiled and used to calibrate the ANN. The energy performance assessments employed to populate the database, were based on the 'synthetical average building' approach developed within the TABULA project (Ballarini et al., 2014). In fact, aggregation of energy demand from prototype buildings was found to be an efficient method to estimate the energy performance of building portfolios, and the methodology has been applied (Pohoryles et al., 2020) to design prototype buildings representative of the EU building stock. Herein, the methodology was implemented in support of developing an ANN, with a view to minimising the computational effort a full-scale BEM analysis of prototype buildings in the EU-27 would require, given the adopted resolution of the exposure model and the climatic conditions at NUTS-3 level.

The simulated design of prototype buildings was performed by combining key building energy performance parameters representative of the building exposure model. Three key building properties were identified in defining building energy performance classes (Pohoryles et al., 2020; Veljkovic et al., 2023), i.e. the building height, and the building envelope thermal transmittance values U_w and U_r. The height of buildings was considered among these key attributes, since the building geometry in terms of compactness ratio (the ratio of the external surface area to the volume of the building) affects the space heating energy demand. All prototype buildings had the same base area (8 x 18 m) and different height defined by the number of storeys, i.e. H = 2, 4, and 8, associated with low-, mid- and high-rise buildings, respectively. U_w and U_r values, used in the ANN calibration, were selected by using the Latin hypercube sampling method, which provides good representativeness of calibration sample points (McKay, 1979) to obtain a reliable neural network model. Latin hypercube sampling was performed across a 2D space of U_w vs U_r variables, with ranges of 0–2.65 W/(m^2K) and 0–4.4 W/(m^2K), respectively, representative of the EU building stock (Birchall et al., 2014; Pohoryles et al., 2020). Nine combinations (i.e. pairs) of U_w and U_r values were selected from this sample space, out of which three were assigned to each building geometry (i.e. 2-, 4-, and 8-storey building). The thermal transmittance of windows was not considered as an input variable, but it was implicitly considered through its linear correlation with the U_w values, assuming these two parameters are typically linked. Other parameters, such as the thermal transmittance of the floor slab on the ground, indoor set-point (i.e. target) temperature (SPT = 20 °C), internal heat gains resulting from occupants' presence, artificial lighting, electric equipment and hot water, were kept constant in all building models. Models based on these nine combinations were simulated in EnergyPlus (2020), using 12 different weather files encompassing an *HDD* range of 350–7000, to calculate relevant annual specific energy demand (*ASED*) in kWh/m^2. This created a database of 9 x 12 = 108 pairs of input (H, U_w, U_r and *HDD*) and output (*ASED*) variables that were subsequently used for calibrating the neural network.

The ANN simulation was performed in MATLAB (Mathworks, 2020). The model included input, output, one hidden, and one output layers of neurons (Figure 15). The input layer consisted of four neurons representing each of the key parameters and the output had only one neuron, i.e. annual specific energy demand. After preliminary analysis, the number of neurons in hidden layer was set equal to 20.

Figure 15. Artificial Neural Network (ANN) configuration scheme



The connections between neurons (i.e. the weights) were calibrated through a network training process. Training optimises the complex relationships between variables by minimising the mean squared prediction error until the desired performance is reached. The training process relied on the Bayesian regularisation backpropagation algorithm and involved 85% of the calibration dataset. The remaining 15% was used to test the performance of the trained network on previously unseen data. In the beginning of the simulation, calibration data was assigned randomly to training and testing subsets, together with the initial values of weights that were random as well. Although this process ensured unbiased design, the repeated simulations with different random distribution of data and initial values, produced different calibrated networks and, subsequently, different output results. To reduce this effect and create a robust model, the ensemble averaging technique (Hansen and Salamon, 1990) was used. It consists of grouping and averaging the individual calibrated networks' output, which results in improved accuracy of the model (Opitz and Maclin, 1999). Analysis showed that an ensemble of 200 networks was able to reach the desired convergence, hence this structure was adopted for the calculation of energy demand in this study. More details on the ANN methodology, as well as more elaborated analysis tools, can be found in Veljkovic et al. (2023).

2.6.2 Average annual energy consumption and economic loss

To calculate energy demand using the ANN, the building classes of the exposure model (Section 2.1) were mapped to energy performance classes according to Table 4. Specifically, the building classes of the exposure model were mapped to low/mid/high-rise prototype buildings according to their number of storeys. Each building class was assigned with thermal transmittance values (U_w, U_r) according to the construction date and occasionally the regional climatic conditions as described in Section 2.1.2.3.

Table 4. Mapping of building classes (exposure model) to energy performance classes used in the ANN.

Building class attribute (exposure model)		**Building energy performance class (ANN's input)**
[HEIGHT]	1 ≤ H < 3	H = 2 (low-rise building)
	3 ≤ H < 6	H = 4 (mid-rise building)
	H ≥ 6	H = 8 (high-rise building
[CONSTRUCTION DATE]		U_w , U_r
Longitude, latitude		

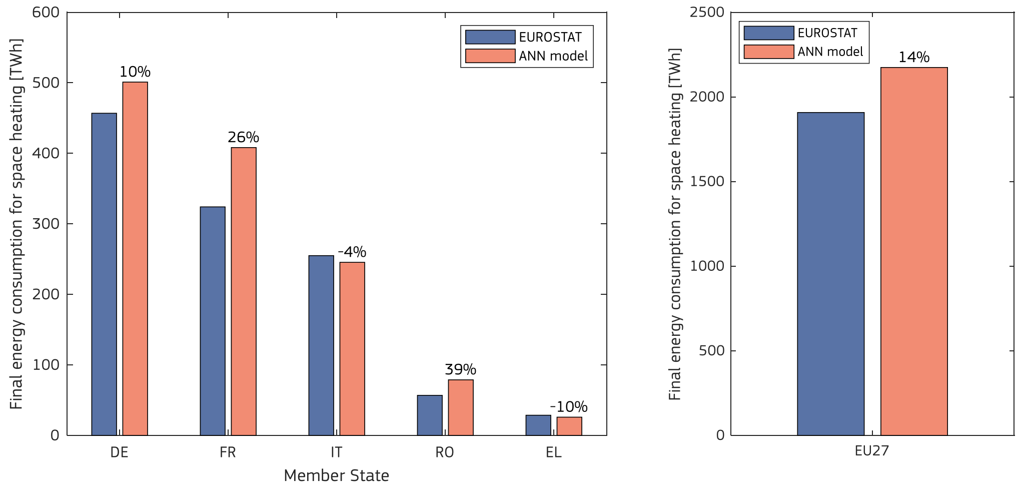
The average annual specific energy demand (*AASED*) in kWh/m^2 was obtained from the ANN per building class and NUTS-3 region, for average climatic conditions (*HDD* values) over the period 2010–2019 according to Section 2.3. As the ANN performance was inadequate for low *HDD* values (i.e. *HDD* < 1750), *AASED* results for *HDD* < 1750 were calculated from linear interpolation between *AASED* at *HDD* =1750 (obtained from ANN) and an assumed *AASED* = 0 at *HDD* = 0 (for all combinations of variables H, U_w and U_r). By following this approach, the trend of the ANN results obtained for *HDD* > 1750 was maintained for lower values as well. In any case, this approximation does not have a considerable effect on the estimated energy demand or the definition of renovation scenarios. Heating energy demand in hot climates is low and retrofit is not expected to contribute to significant savings (Gkatzogias et al., 2022).

Results for low-rise buildings were modified by a row-house factor that reduced *AASED* considering the effect of adjacent external walls, typical of certain building types, i.e. terraced (row) houses and semi-detached houses. As indoor *SPT* highly influences *AASED*, the results were modified for certain countries with a relevant *SPT* factor, defined as the ratio of heating energy demand of buildings having different *SPT* values (18–24 °C) to the heating energy demand of buildings with the common *SPT* value of 20 °C. Both the row-house and *SPT* factors were calculated (Veljkovic et al., 2023) using the INSPIRE database (Bales et al., 2014b) and were applied in this study. Finally, *AASED* assumes an ideal conditioning system of the building without considering system losses, thus referring to useful energy demand (i.e. net energy used to provide heat in this case). An energy conversion efficiency factor was used to transform *AASED* to final energy demand, denoted here as average annual specific energy consumption (*AASEC*), that considers heating equipment and energy distribution and storage loss. The conversion efficiency factor was calculated (Veljkovic et al., 2023) using the methodological approach and database of the project 'Mapping and analyses of the current and future (2020-2030) heating/cooling fuel deployment (fossil/renewables)' (European Commission, 2016). Finally, *AASEC* (in kWh/m^2) was multiplied with the respective heated occupied floor area (Section 2.1.2.4), to estimate the **average annual energy consumption** (*AAEC*) (in kWh) per building class and NUTS-3 region.

To control the accuracy of the analysis results, the measured total (Eurostat, 2020a) and disaggregated (Eurostat, 2019a) final energy consumption for households was retrieved from Eurostat for the period of 2010–2019. The disaggregated energy consumption was used to obtain for each Member State the share of the total energy consumption associated with space heating. The database was not complete, as data for many countries were reported only for the most recent years. On such occasions, an average value of the space heating share was estimated from the available years, and subsequently adopted in the case of years with absent data. The retrieved space heating shares were then applied to the measured total consumption (Eurostat, 2020a) to obtain space heating energy consumption for each year within the period 2010–2019. The average consumption over the same period was calculated for the sake of compatibility with analysis results. In the same context, *AAEC* from analysis was aggregated at the national level.

The comparison of measured and calculated energy consumption at the EU-27 level showed that the analysis overestimated the measured consumption by 14%. Although such an overall accuracy is deemed satisfactory, the differences at the national level were found higher for certain countries (e.g. Figure 16). This may be a consequence of the employed exposure model compared to the actual building stock, the adopted input parameters and factors, the level of detail in simulation models, but also the user behaviour, such as fuel poverty, country-specific consumer habits, heating systems, or other features of energy consumption. To ensure consistency with the measured energy consumption, the estimated (from analysis) *AASEC* per building class and NUTS-3 region were scaled to match the Eurostat final energy consumption at a national level. This approach further maintained the different contributions of individual building classes (per square meter) to the total consumption, which was crucial to the investigation of renovation scenarios (Gkatzogias et al., 2022).

Figure 16. Measured (Eurostat) and calculated (ANN model) final energy consumption for space heating in Germany (DE), France (FR), Italy (IT), Romania (RO), Greece (EL) and at the EU-27 level



The price of energy for residential use in different EU countries was obtained from the Ecofys report (Grave et al., 2016). The report provided national data on household energy consumption by energy carrier, i.e. electricity, gas, oil, coal, wood, and district heating, along with relevant expenditure in the year 2013. Dividing the total residential energy expenditure by the corresponding consumption, provided the energy price in Euro/kWh per country, as a weighted average over all fuels in use. Assuming an unchanged energy carrier balance, this specific price was adjusted to year 2020 using the annual average index for electricity, gas and other fuels (CP045), i.e. a measure of inflation published within the Harmonised Index of Consumer Prices (HICP) (Eurostat, 2020c). The energy price was then multiplied by the average annual energy consumption to obtain **average annual economic loss** ($AAEL_{en}$) (i.e. energy cost) per building class and NUTS-3 region.

Accordingly, the energy prices used to translate energy consumption to cost correspond to the year 2020. 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, Gkatzogias et al., 2022).

2.7 Socioeconomic vulnerability

Three composite indicators were adopted in the present study to quantify socioeconomic development, smart, sustainable, and inclusive growth, and social progress, and consequently socioeconomic vulnerability. These indicators are the Human Development Index (HDI), the EU2020 index, and the Social Progress Index (SPI), modified at EU regional level. Composite indicators can be easily conveyed to non-technical audience, such as policymakers and the public, in the form of rankings and maps which facilitate easy comparisons of countries, and regions. They regularly appear in the media, due to their simplicity, and can have a strong impact on public perception and policy (Kelley and Simmons, 2015). Although their construction involves various subjective decisions, the three composite indicators were adopted here as a first attempt to provide a socioeconomic dimension in regional prioritisation obtained on the basis of seismic risk and energy performance of buildings (e.g. GEM's national risk profiles[52]). Their selection was based on their previous association with seismic risk, the sustainable development goals (SDGs) (Resolution 2015/A/Res/70/1), and their capacity to express residential satisfaction through specific dimensions. The three composite indicators are briefly presented in Sections 2.7.1–2.7.3, and adapted to express socioeconomic vulnerability in Section 2.7.4.

2.7.1 Human development index

HDI was first introduced in the annual Human Development Report by the United Nations Development Programme (UNDP, 1990) and represents one of the most well-known indices of socioeconomic development. It measures a country's overall achievement in key dimensions of long and healthy life, knowledge, and decent standard of living. HDI is the geometric mean of normalised indices representing each of the three dimensions with a value range of 0–1 (score increasing with degree of development). HDI was found to be highly negatively correlated with the rate of urban growth at a national level, i.e. a measure of vulnerability used by UNDP (2004) to empirically estimate risk in terms of fatalities due to earthquakes, among other hazards.

Table 5. EU-HDI dimensions and indicators.

No	Dimension	Indicator	Eurostat Code	Year
1	Long and healthy life	Life expectancy by age, sex, and NUTS-2 region	demo_r_mlifexp (1)	2019
2	Knowledge	Population aged 25-64 by educational attainment level, sex, and NUTS-2 region: 2.1 Low education attainment (less than lower secondary education, ISCED levels 0-2) 2.2 High education attainment (tertiary education, ISCED levels 5-8)	edat_lfse_04 (2)	2020
3	Decent standard of living	Gross domestic product (GDP) at current market prices by NUTS-2 region	nama_10r_2gdp (3)	2019

(1) Eurostat (2019c).
(2) Eurostat (2020d).
(3) Eurostat (2019b).

Despite the high national HDI scores in the EU (UNDP, 2020), EU countries and regions present significant variations. In this context, Smits and Permanyer (2019) created a database with subnational data for 1625

(52) https://www.globalquakemodel.org/country-risk-profiles.

regions in 161 countries, covering the period from 1990 to 2017. Due to missing data for some of the EU Member States, the methodology by Bubbico and Dijkstra (2011) was adopted here to calculate the regional HDI in the EU (EU-HDI). The method uses the set of indicators presented in Table 5. The indicators were retrieved from Eurostat at NUTS-2 level for all EU countries.

2.7.2 EU2020 index

EU2020 was developed by Athanasoglou and Dijkstra (2014) to provide a summary metric capable of evaluating the performance of Member States and regions towards meeting the Europe 2020 strategy goals. The Europe 2020 strategy was introduced by the European Commission to promote smart, sustainable, and inclusive growth throughout the EU (COM (2010)2020) using the Cohesion Policy as the investment framework to meet the defined goals. The strategy identified eight headline targets to be attained by the end of 2020 (Eurostat, 2018) addressing five policy areas and employed to assess specific sustainable development goals (Eurostat, 2019d, e) of the 2030 Agenda for Sustainable Development (Resolution 2015/A/Res/70/1) (Table 6).

The progress of a Member State/region towards meeting each target in Table 6 is measured relative to the distance between the value of the respective descriptor (e.g. percentage of employed population at the age of 20–64) and the EU target (i.e. 75% in the previous example), normalised and subtracted from unity so that higher indicator values imply better performance. National targets have been also used to reflect the EU-27 heterogeneity among Member States, however in the present study the EU targets were adopted. Subsequently, the EU2020 score is calculated by considering a weighted arithmetic average of the eight indicators. It is noted that due to missing regional data on climate change and energy sustainability, headline targets 3–5 were not considered. EU2020 scores were retrieved by Becker et al. (2020).

Table 6. Europe 2020 strategy headline targets.

No	Policy area	Objective	Sustainable development goal
1	Employment	75% of 20-64 year olds to be employed	SDG 8: Decent work and economic growth
2	R&D	3% of EU GDP to be invested in R&D	SDG 9: Industry, innovation, and infrastructure
3	Climate change and energy sustainability	Greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990	SDG 13: Climate action
4		20% of energy from renewables	SDG 7: Affordable and clean energy SDG 12: Responsible consumption and production
5		20% increase in energy efficiency compared to 2005	SDG 13: Climate action
6	Education	Reducing the rates of early school leaving below 10%	SDG 4: Quality education
7		At least 40% of 30-34–year-olds completing third level education	
8	Fighting poverty and social exclusion	At least 20 million fewer people in or at risk of poverty and social exclusion	SDG 1: No poverty

2.7.3 Social progress index

SPI aims to quantify social and environmental performance (Social Progress Imperative, 2019) and excludes economic aspects/indicators (e.g. GDP), thus providing a good basis to investigate the interaction of economic and social progress. Furthermore, the underlying concepts of SPI relate to the concepts of all 17 SDGs, and it can be used as a proxy measure to track countries' progress on the SDGs (Social Progress Imperative, 2018). A regional-based version of the index (EU-SPI) was first presented by Annoni et al. (2016) and recently updated by Annoni and Bolsi (2020). Figure 17 presents the latest edition of EU-SPI adopted herein, highlighting the new indicators compared to the 2016 version.

EU-SPI aims at providing comparable measures of social and environmental progress at regional level (NUTS-2) in the EU Member States. While its core framework is similar to the global SPI, EU-SPI includes indicators that are related to regional strategies within the EU. The EU-SPI framework contains 54 indicators aggregated into 12 components, three dimensions, and ultimately into a single summary measure based on a scale of 0–100, with 100 indicating an ideal performance. The first dimension partially measures residential satisfaction through sub-indicators such as burden cost of housing, adequate heating, and overcrowding. Data sources of the regional version comprise Eurostat ([53]) (including EU-SILC[54]), the Gallup World Poll ad-hoc survey ([55]), the European Environment Agency ([56]), the Quality of Government Institute ([57]) (University of Gothenburg), and the Gender Statistics Database ([58]) (European Institute for Gender Equality).

Figure 17. Dimensions, components, and indicators of the EU-SPI (Annoni and Bolsi, 2020)

Basic Human Needs

1. Nutrition and Basic Medical Care
- Mortality rate before 65
- Infant mortality
- Unmet medical needs
- Insufficient food

2. Water and Sanitation
- Satisfaction with water quality
- Lack of toilet in dwelling
- Uncollected sewage
- Sewage treatment

3. Shelter
- Burden cost of housing
- Housing quality due to dampness **NEW**
- Overcrowding
- Adequate heating

4. Personal Security
- Crime **NEW**
- Safety at night
- Money stolen **NEW**
- Assaulted/Mugged **NEW**

Foundations of Wellbeing

5. Access to Basic Knowledge
- Upper secondary enrolment rate age 14-18
- Lower secondary completion rate
- Early school leavers

6. Access to Information and Communications
- Internet at home
- Broadband at home
- Online interaction with public authorities
- Internet access **NEW**

7. Health and Wellness
- Life expectancy
- Self-perceived health status
- Cancer death rate
- Heart disease death rate
- Leisure activities **NEW**
- Traffic deaths

8. Environmental quality
- Air pollution NO2 **NEW**
- Air pollution ozone
- Air pollution pm10
- Air pollution pm2.5

Opportunity

9. Personal Rights
- Trust in the national government
- Trust in the legal system
- Trust in the police
- Active citizenship **NEW**
- Female participation in regional assemblies **NEW**
- Quality of public services

10. Personal Freedom and Choice
- Freedom over life choices
- Job opportunities **NEW**
- Involuntary part-time/temporary employment **NEW**
- Young people not in education, employment or training NEET
- Corruption in public services

11. Tolerance and Inclusion
- Impartiality of public services
- Tolerance towards immigrants
- Tolerance towards minorities
- Tolerance towards homosexuals
- Making friends **NEW**
- Volunteering **NEW**
- Gender employment gap

12. Access to Advanced Education and LLL
- Tertiary education attainment
- Tertiary enrolment
- Lifelong learning
- Female lifelong education and learning **NEW**

2.7.4 Socioeconomic vulnerability index

In this section, the three composite indicators, EU-HDI, EU2020, and EU-SPI, measuring socioeconomic wellbeing, are properly combined to a single measure to express socioeconomic vulnerability.

Regions were first classified according to the EU Cohesion Policy 2021–2027 ([59]) into three categories, i.e. more-developed (MD), transition (TR), and less-developed (LD) regions. The main classification criterion considers the gross domestic product (GDP). Specifically, LD, TR, and MD regions are defined as those with GDP per capita less than 75%, between 75 and 100%, and more than 100% of the EU-27 national average, respectively. Figure 18 presents the range of GDP per capita (average over three years) in purchasing power standards (PPS) for 240 regions at NUTS-2 level (corresponding to the EU-27) in increasing order. 78 regions were classified as LD (i.e. 33%), 67 as TR (i.e. 28%) and the remaining 95 as MD (40%). GDP is expressed in PPS as a means to eliminate differences in price levels among regions and countries, whereas normalisation to the population allows the comparison of regions that are significantly diverse in absolute size. GDP per capita varies considerably among the EU-27 regions, from 8033 (Mayotte, FRY5, outermost region of France) and 8567 (Severozapaden, BG31, Bulgaria) to 62767 (Southern, IE05, Ireland) and 76067 PPS (Luxembourg, LU00), i.e. approximately 9.5 times the lowest value.

Figure 19 presents the three composite indicator scores, calculated according to Sections 2.7.1–2.7.3 for the 240 NUTS-2 regions, plotted in increasing order and against GDP per capita. Unsurprisingly, MD regions perform better than TR and LD regions. Many capital regions (e.g. Paris, FR10; Dublin, IE06; Stockholm, SE11) have high EU-HDI scores, while the lowest performance is recorded in regions of Bulgaria (e.g. Severozapaden, BG31), Romania (e.g. North East, RO21), Hungary (e.g. Northern, HU31), and some outermost regions and islands (Mayo-

([53]) https://ec.europa.eu/eurostat.
([54]) https://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions.
([55]) https://www.gallup.com/analytics/318875/global-research.aspx.
([56]) https://www.eea.europa.eu.
([57]) https://www.gu.se/en/quality-government.
([58]) https://eige.europa.eu/gender-statistics/dgs.
([59]) https://ec.europa.eu/regional_policy/en/2021_2027/.

Figure 18. Average GDP per capita (2015–2017) for the EU-27 NUTS-2 regions (Source: Eurostat, 2019b; JRC analysis)

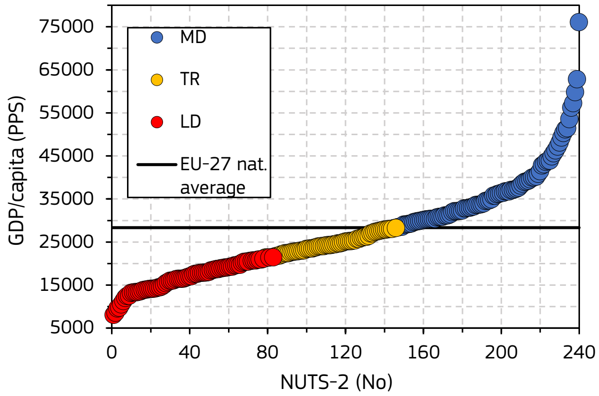
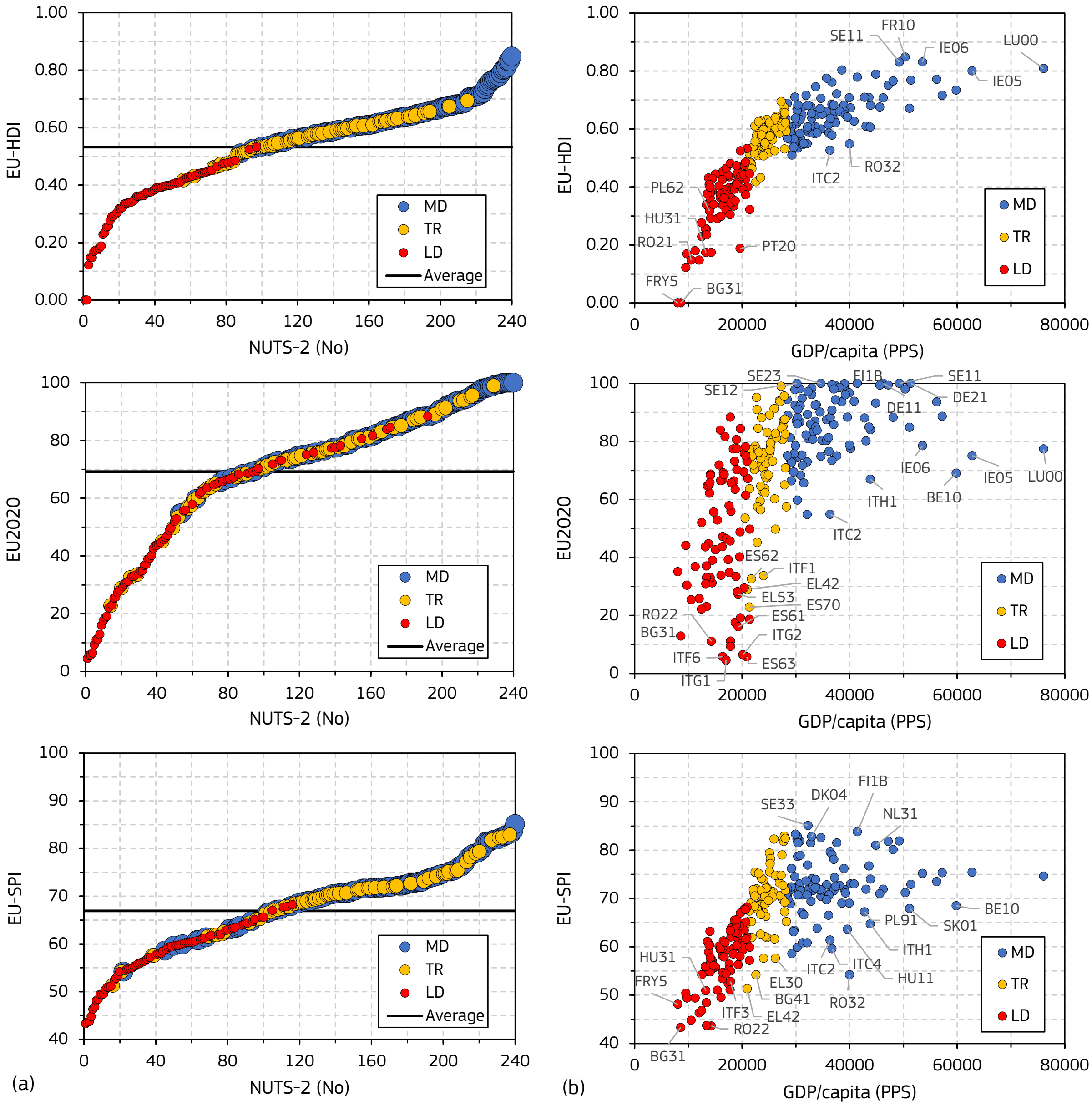


Figure 19. EU-HDI, EU2020, and EU-SPI plotted (a) in increasing order, and (b) against GDP per capita (Source: EU-HDI: Table 5; EU2020: Becker et al., 2020; EU–SPI: Annoni and Bolsi, 2020)



tte, FRY5; Azores, PT20). As expected, the correlation between EU-HDI and GDP per capita is strong and positive (correlation coefficient *r* = 0.83) since GDP per capita is directly associated with the third dimension of the composite indicator (see Table 5).

Capital regions typically have higher EU2020 scores than the average of NUTS-2 regions at a national level with few exceptions, e.g. Brussels (BE10) presents a lower score. Regions with the highest score (i.e. 100%) are the capital regions of Sweden (SE11) and Finland (FI1B), two regions in Germany (Stuttgart, DE11; Upper Bavaria, DE21) and two additional regions in Sweden (East-Central Sweden, SE12; West Sweden, SE23). Regions with the lowest performance are found in Italy (e.g. Sicily, ITG1; Calabria, ITF6; Sardinia, ITG2; Apulia, ITF4; Campania, ITF3), Spain (e.g. Ceuta, ES63; Andalusia, ES61; Extremadura, ES43), Bulgaria (e.g. Severozapaden, BG31), Romania (e.g. South–East, RO22), and Greece (e.g. West Macedonia, EL53). The correlation between EU2020 and GDP per capita is moderate and positive (*r* = 0.61). The capital regions of Brussels (BE10), Luxembourg (LU00), Eastern and Midland (Dublin, IE06) together with regions such as Bolzano (ITH1) and Southern (IE05, Ireland) present low EU2020 index scores relative to their GDP per capita.

The highest EU-SPI scores are found in regions of Sweden (e.g. Upper Norrland, SE33), Finland (e.g. Helsinki, FI1B), Denmark (e.g. Central, DK04), and the Netherlands (Utrecht, NL31). On the contrary, the lowest scores are found in regions of Bulgaria (e.g. Severozapaden, BG31; South–East, BG34), Romania (e.g. South–East, RO22; South Muntenia, RO31), outermost regions (e.g. Mayotte, FRY5; French Guiana, FRY3), Hungary (e.g. Northerm, HU31; Northern Great Plain, HU32), and Greece (e.g. Southern Aegean, EL42; Central Greece, EL64). Since EU-SPI excludes economic aspects, it is interesting to investigate the relationship between economic and social development, measured by GDP per capita and EU-SPI, respectively. EU-SPI was found moderately correlated to GDP per inhabitant with a Pearson correlation coefficient of *r* = 0.63. Overall, high levels of social progress are associated with high economic development. Yet, this relationship is not linear. At lower income levels, small increases in GDP per capita are associated with significant improvement in social progress. However, at higher income levels, the relevant rate decreases. Regions such as Brussels (BE10), Bratislava (SK01), Lombardy (ITC4), and Bucharest (RO32) have a relatively low EU–SPI score relative to their GDP per capita.

Figure 20. EU-HDI, EU2020, and EU-SPI correlation (Source: EU-HDI: Table 5; EU2020: Becker et al., 2020; EU–SPI: Annoni and Bolsi, 2020)

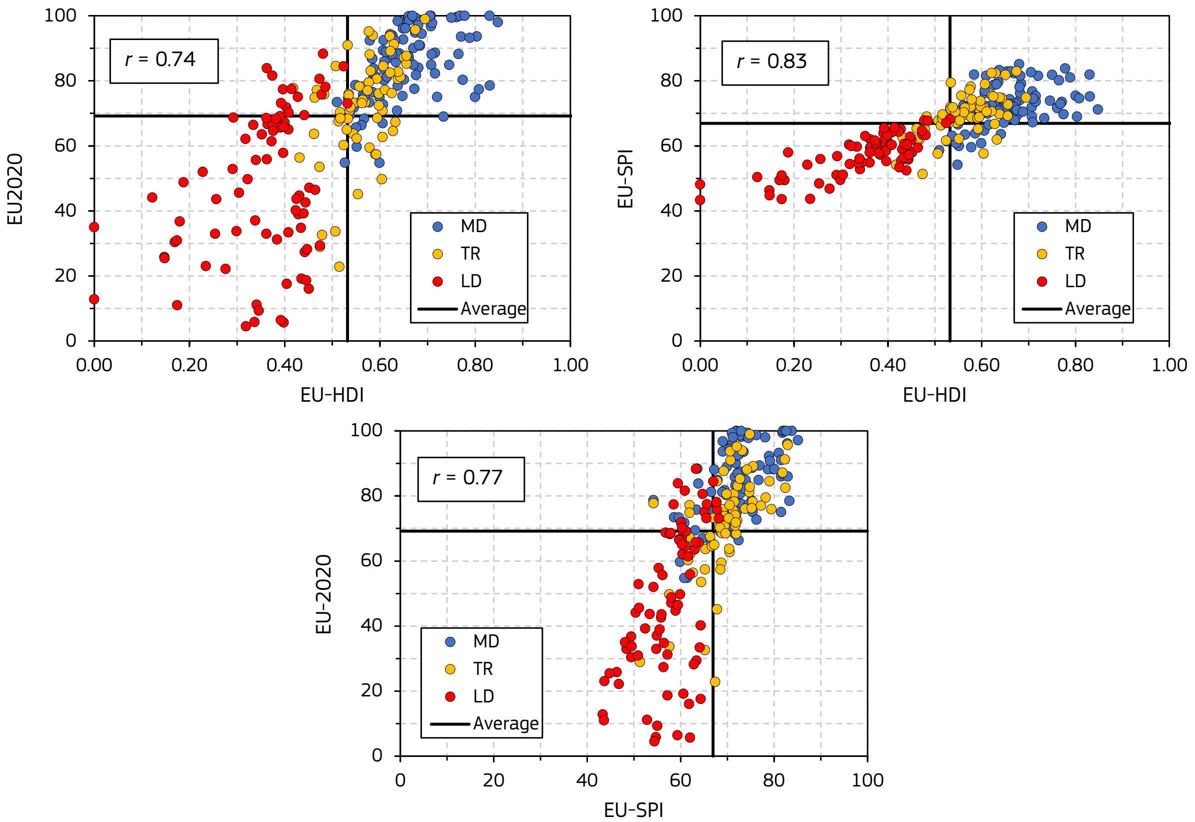


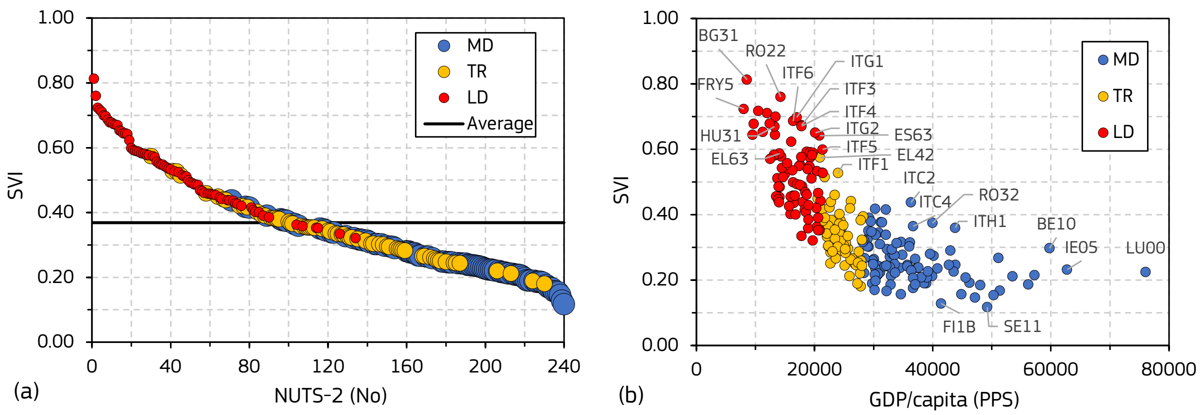
Figure 20 presents scatter plots of composite indicator pairs; their correlation was found to be positive and moderate ($r_{EU2020\ vs\ EU\text{-}HDI}$, $r_{EU2020\ vs\ EU\text{-}SPI}$) to strong ($r_{EU\text{-}SPI\ vs\ EU\text{-}HDI}$) but not perfect, indicating, similarly to Figure 19, the added value of each indicator to regional prioritisation. To facilitate ranking of regions by considering performance in human development, adherence to the Europe 2020 strategy, and social progress, the three indicators were combined according to Equation (18) to a single measure, i.e. the Socioeconomic Vulnerability Index (*SVI*). EU2020 and EU-SPI were first scaled to a range of 0–1, and the mean value of the three indicators (i.e. assigning equal weights) was subtracted from unity to measure socioeconomic vulnerability (rather than wellbeing), thus ensuring consistency with seismic risk and energy performance metrics.

$$SVI = 1 - \frac{1}{3}\left(EU\text{-}HDI + \frac{EU2020}{100} + \frac{EU\text{-}SPI}{100}\right) \tag{18}$$

Similarly to the three composite indicators, the highest *SVI* scores, associated with increased socioeconomic vulnerability, are recorded in regions of Bulgaria, Romania, Hungary, Spain, Greece and outermost regions (see Figure 21). *SVI* presents a negative and moderate correlation with GDP per capita (r = -0.74), with regions of Italy (e.g. Sardinia, ITG2; Lombardy, ITC4), Belgium (Brussels, BE10) and Luxembourg (LU00), among others, underperforming relative to their GDP per capita.

Detailed regional scores for the three composite indicators and *SVI* are provided in Table A. 11, reporting all NUTS-2 regional codes and names. It is noted that the NUTS 2016 classification was initially adopted for the calculation of socioeconomic indicators. These were mapped to the 2021 classification by considering the relevant changes between the 2016 and 2021 versions (Table A. 11). Subsequently, they were mapped to NUTS-3 level, assuming that NUTS-2 regions and the relevant (i.e. enclosed) NUTS-3 regions share the same indicator value. Prioritisation of NUTS-3 regions based on *SVI* is discussed in Section 3.3.

Figure 21. *SVI* plotted (a) in decreasing order, and (b) against GDP per capita



2.8 Indicators for regional prioritisation

This section summarises the indicators adopted to identify priority regions. The selected indicators address separately specific aspects of seismic risk (i.e. economic loss, loss of life), energy performance of buildings (i.e. energy consumption, energy cost) and socioeconomic vulnerability (i.e. *SVI*). Alternatively, they combine multiple aspects to form single or multi-sectoral (seismic and/or energy and/or socioeconomic) integrated indicators.

In the latter case of integrated indicators, all involved component indicators were normalised to a 0–1 range, and an equal weight was assigned to each one of them. This decision was made, first, to avoid complexity and subjectivity, e.g. arising from assigning a monetary value to aspects such as loss of life or socioeconomic vulnerability. Second, the specific approach was driven by an attempt to filter out severe disparities among different aspects even in the case when they were expressed in the same units. For instance, in the majority of the NUTS-3 regions, the average annual economic loss related to heating energy cost was found considerably higher than average annual economic loss related to seismic repair cost. Prioritising regions based on the sum of economic losses alone would mainly highlight regions in need for energy retrofit. Such an approach is reasonable in terms of monetary loss but fails to address life-safety and socioeconomic aspects of seismic risk mitigation or their relevant significance compared to energy savings and environmental impact in regional prioritisation for building renovation. Furthermore, it disregards the need for risk-proofed investments on energy renovation (Directive 2018/844; SWD 2016/205) and the uncertainty associated with the probabilistic assessment of risk compared to the deterministic estimation of energy performance. Nevertheless, approaches other than the one adopted here may be explored based on expert judgement and/or the specific objectives of the regional assessment. Examples include assigning different weights to specific aspects or using loss of life/socioeconomic vulnerability as proxies for regional prioritisation in cases of similar seismic risk among regions.

It is noted that in the case of multi-sectoral integrated indicators, socioeconomic vulnerability is combined with seismic performance at the risk rather than the physical vulnerability level, as one would expect from the adopted terminology (Figure 1). Despite the apparent lack of harmonised nomenclature among different disciplines, both approaches have been explored in the past (e.g. Crowley et al., 2018; UNDP, 2004). The first one is adopted here mainly for the sake of simplicity, while the second one, although more systematic, would require modelling the interaction of socioeconomic vulnerability and physical risk.

2.8.1 Seismic risk indicators

The following indicators for regional prioritisation were investigated to address seismic risk in terms of economic loss and loss of life in absolute (non-normalised) and normalised form.

Average Annual Economic Loss ($AAEL_{eq}$; unit: 10^6 €): The indicator represents the average quantity of money that would be spent yearly to repair all buildings within a region assuming that building loss occurs like clockwork, once a year, with the same amplitude (Porter, 2021) (Section 2.5).

Average Annual Loss of Life (*AALL*; unit: number of fatalities]: The indicator represents average annual fatalities in all buildings within a region, assuming that loss occurs like clockwork, once a year, with the same amplitude.

Average Annual Economic Loss per building ($AAEL_{eq/bldg}$; unit: €): The indicator is defined as the ratio of $AAEL_{eq}$ to the size of the building stock, expressed by the total number of buildings within a region irrespective of their damage or loss state.

$$AAEL_{eq/bldg} = \frac{AAEL_{eq}}{N_{bldg}} \tag{19}$$

Average Annual Economic Loss Ratio ($AAELR_{eq}$; unit: 10^{-3}): The indicator is defined as the ratio of $AAEL_{eq}$ to the value of the building stock, considering the total replacement cost (C_{rep}) of buildings within a region irrespective of their damage or loss state. Implicitly, it is a normalisation of $AAEL_{eq}$ to both the number and value of buildings within a region according to Equation (20):

$$AAELR_{eq} = \frac{AAEL_{eq}}{C_{rep}} = \frac{AAEL_{eq}}{N_{bldg}\frac{C_{rep}}{N_{bldg}}} = \frac{AAEL_{eq/bldg}}{C_{rep/bldg}} \tag{20}$$

Herein, $AAELR_{eq}$ is expressed per mille, as for several regions, it corresponds to very low values.

Average Annual Loss of Life Ratio (*AALLR*; unit: 10^{-5}): The indicator is defined as the ratio of *AALL* to the average number of occupants over a 24-hour period (Section 2.1.3) in all buildings within a region, irrespective of building damage or loss state.

$$AALLR = \frac{AALL}{P_{admin}} 10^5 \tag{21}$$

Herein, it is expressed per hundred thousand occupants, due to its low value and in line with the Sendai framework for disaster risk reduction (UNDRR, 2015).

Seismic risk index ($I_{eq,i}$): Two different indices were investigated by combining $AAEL_{eq/bldg}$, $AAELR_{eq}$, and $AALLR$, according to Equations (22) and (23). Within these equations, the relevant regional indicator values were normalised according to Equation (24), so that minimum and maximum ones from all EU regions were set equal to 0 and 1, respectively, prior to obtaining their average.

$$I_{eq,1} = \frac{1}{2}\left[\overline{AAELR}_{eq} + \overline{AALLR}\right] \tag{22}$$

$$I_{eq,2} = \frac{1}{3}\left[\overline{AAEL}_{eq/bldg} + \overline{AAELR}_{eq} + \overline{AALLR}\right] \tag{23}$$

$$\bar{x} = \frac{x - min(x)_{EU}}{max(x)_{EU} - min(x)_{EU}} \tag{24}$$

2.8.2 Energy performance indicators

The following indicators for regional prioritisation were investigated to address energy performance of buildings in terms of energy consumption and cost (i.e. economic loss) for space heating in absolute and normalised form.

Average Annual Energy Consumption (*AAEC*; unit: kWh): The indicator represents average (over the period 2010–2019) annual household space heating energy consumption aggregated from all buildings within a region (Section 2.6.2).

Average Annual Economic Loss ($AAEL_{en}$; unit: 10^6 €]: The indicator represents aggregated annual expenses related to household space heating energy consumption from all buildings within a region.

Average Annual Energy Consumption per building ($AAEC_{bldg}$; unit: kWh): The indicator represents aggregated annual space heating energy consumption normalised to the number of buildings within a region, similarly to Equation (19).

Average Annual Energy Consumption per building and HDD ($AAEC_{bldg/HDD}$; unit: kWh/HDD): The indicator is additionally normalised by the regional *HDD* value.

Average Annual Economic Loss per building ($AAEL_{en/bldg}$; unit: €): Similarly to its energy consumption counterpart, $AAEL_{en/bldg}$ represents aggregated annual space heating expenses normalised to the number of buildings within a region.

Average Annual Economic Loss Ratio ($AAELR_{en}$; unit: 10^{-3}): The indicator is defined as the ratio of $AAEL_{en}$ to the value of the building stock, considering the total replacement cost of buildings within a region.

Energy performance index (I_{en}): Similarly to $I_{eq,2}$, the energy performance index combines one non-monetary indicator, herein addressing normalised energy consumption, with two monetary normalised indicators, related to energy cost.

$$I_{en} = \frac{1}{3}\left[\overline{AAEC}_{bldg,HDD} + \overline{AAEL}_{en/bldg} + \overline{AAELR}_{en}\right] \tag{25}$$

2.8.3 Socioeconomic indicators

To assess performance of regions in terms of human development, adherence to the Europe 2020 strategy, and social progress, the **Socioeconomic Vulnerability Index** (*SVI*) (Section 2.7.4) was employed.

2.8.4 Multi-sectoral integrated indicators

Four multi-sectoral integrated indicators were defined following two alternative approaches. According to the *first one*, seismic, energy and socioeconomic indices were normalised using the min–max approach to ensure an equal weight among different aspects and combined as follows:

$$I_{eq-en} = \frac{1}{2}\left[\overline{AAELR}_{eq} + \overline{AAELR}_{en}\right] \tag{26}$$

$$I_{eq-en-SVI,1} = \frac{1}{3}\left[\overline{AAELR}_{eq} + \overline{AAELR}_{en} + \overline{SVI}\right] \tag{27}$$

$$I_{eq-en-SVI,2} = \frac{1}{3}\left[\bar{I}_{eq,1} + \overline{AAELR}_{en} + \overline{SVI}\right] \tag{28}$$

$$I_{eq-en-SVI,3} = \frac{1}{3}\left[\bar{I}_{eq,2} + \bar{I}_{en} + \overline{SVI}\right] \tag{29}$$

According to the *second* approach, the multi-sectoral indices defined by Equations (26)–(29) were extracted following a slightly different approach. Specifically, the 200 regions with the highest seismic risk were initially selected considering the relevant seismic indicators included in each of the four combinations, i.e. $AAELR_{eq}$, for the first and second indices, and $I_{eq,1}$ and $I_{eq,2}$ for the third and fourth, respectively. The preselected regions were subsequently ranked based on the multi-sectoral indices (considering all indicators in each combination), and the top 100 were finally selected. Once again, normalisations were performed considering minimum and maximum values obtained from all EU regions. The second approach promotes regions of high seismic risk, but it is sensitive on the number of initially selected regions (here 200). Multi-sectoral integrated indicators are denoted with I^*_{eq-en}, $I^*_{eq-en-SVI,1}$, $I^*_{eq-en-SVI,2}$, and $I^*_{eq-en-SVI,3}$ to differentiate them from those of the first approach.

3 Priority regions

Chapter 3 presents georeferenced regional results derived from implementing the framework for regional prioritisation in the EU-27 as described in Chapter 2, and using the indicators defined in Section 2.8. First, priority regions are presented based on indicators that address separately aspects of seismic risk (i.e. economic loss, loss of life), energy performance of buildings (i.e. energy consumption, energy cost) and socioeconomic vulnerability (i.e. *SVI*). Subsequently, the output of multi-sectoral integrated indicators is presented. Considering the above metrics and context, regional prioritisation does not aim to identify a unique ranking of regions. On the contrary, an effort was made to showcase the differentiation of results when multiple aspects are considered, and ideally identify regions where building renovation may have the highest and most spread impact. Overall, the efficiency of each indicator is rather a function of the scope of the regional prioritisation. Detailed results of primary seismic risk and energy performance indicators for 1151 NUTS-3 regions (2021 classification) are provided in Table B. 1 (i.e. excluding outermost regions and Åland, FI200, Finland). Prioritisation results based on integrated indicators are provided for the top 100 regions in Annex B.

3.1 Seismic risk

3.1.1 Residential buildings

Seismic risk indicators for residential buildings in the EU-27 NUTS-3 regions are mapped in Figure 22–Figure 24. Unless noted otherwise, each shade in map colour scales corresponds to 1151/11≈105 regions so that the last shade highlights approximately the top 100 priority regions (i.e. those having the highest risk). Average annual losses $AAEL_{eq}$ and *AALL* are mapped in Figure 22a and b, respectively. Both indicators measure absolute loss (economic and loss of life) aggregated from all building classes within a region. In broad terms, the distribution of absolute average annual loss clearly follows the pattern of seismicity (Figure 11). However, apart from the seismic hazard, prioritisation based on $AAEL_{eq}$ and *AALL* is affected by the vulnerability of the building stock and modelling uncertainty. As $AAEL_{eq}$ is an aggregated metric, prioritisation further depends on the number and the value (aggregated replacement cost) of buildings within regions. Likewise, *AALL* depends on the number of occupants (i.e. distribution of population). The top 100 priority regions from each indicator include regions from Austria, Bulgaria, Cyprus, Germany, Greece, Spain, France, Croatia, Italy, Portugal, Romania, and Slovenia, and both indicators present a similar distribution of regions among these countries (Table 7). Absolute average annual loss rankings highlight European regions of moderate-to-high seismicity, emphasising densely built and populated (urban, big city) areas (Figure 25a, d). Both indicator rankings are characterised by the strong presence of Italian regions, followed by Greek or Romanian regions depending on the considered measure (Table 7).

Normalised average annual loss for residential buildings, i.e. $AAEL_{eq/bldg}$ and *AALLR* according to Equations (19) and (21), respectively, is presented in Figure 23. Both indicators are measures of absolute average annual loss per building or per 100,000 inhabitants, i.e. distributed over the total number of buildings and occupants, and disregarding the expected damage/loss by building class within a region. The top 100 ranking based on $AAEL_{eq/bldg}$ include 80 common regions to the top 100 ranking based on $AAEL_{eq}$. Most of these common regions are located in the top 50 places of these rankings (Figure 25a, b). $AAEL_{eq/bldg}$ assigns higher risk to regions with high average annual economic losses relative to the number of buildings. This may be the case of dense urban areas with high absolute annual loss and a large share of mid- and high-rise buildings (e.g. central and southern divisions of Athens, EL303, EL304, Greece) (Figure 25b). On the other hand, large urban areas with lower ratios of absolute loss to number of buildings (e.g. Rome, ITI43, Naples, ITF33, Italy; Thessaloniki, EL522, Greece) move to lower ranking positions but remain within the top 100 ranking. $AAEL_{eq/bldg}$ further highlights regions of high seismicity with lower number of buildings (e.g. Ionian islands in Greece), which were not included in the $AAEL_{eq}$ top 100 ranking, and excludes altogether regions from France, Portugal, and Croatia (Table 7). The top 100 priority regions based on *AALLR* include fewer common regions to *AALL* (i.e. 73). New (non-common) regions introduced by *AALLR* are located also in the upper half of the top 100 (Figure 25d, e), indicating more pronounced differentiations in ranking. *AALLR* shifts further down in the top 100 ranking densely populated areas (e.g. Naples, ITF33, Italy), or even excludes them (e.g. Rome, ITI43, Milan, ITC4C, Turin, ITC11, Italy), and assigns higher risk to regions with high average annual fatalities relative to the population (e.g. Vrancea, RO226, Romania; Achaea, EL632, including the city of Patras, and Ionian islands, Greece; Ferrara, ITH56, L'Aquila, ITF11, Italy; Dubrovnik-Neretva, HR037, Croatia). In addition, *AALLR* excludes from the top 100 ranking, the capital regions of Austria and Portugal, and Bas-Rhin (FRF11, France) region which includes the city of Strasbourg.

Overall, prioritisation based on $AAEL_{eq/bldg}$ and *AALLR* facilitates comparison of regions with notable differences in the size of the building stock and population. However, $AAEL_{eq/bldg}$ is still affected by the value of the building stock (i.e. the replacement cost). $AAELR_{eq}$ is mapped in Figure 24 for residential buildings, and it represents a more robust normalised indicator, useful for comparing diverse regions in terms of both number and value of buildings. In this context, it may be seen as the aggregated average annual economic loss normalised to the total value of the building stock within a region, or as the ratio of the average annual economic loss of a single (average) building within the region (i.e. $AAEL_{eq/bldg}$) to its (average) replacement cost, according to Equation (20). The top 100 $AAELR_{eq}$ ranking presents 66 regions in common with $AAEL_{eq/bldg}$, and most of the new ones are located in the upper half (Figure 25b, c) including many regions of Romania (e.g. Vrancea, RO226), regions of Greece (e.g. in the Ionian and Aegean Sea) and Bulgaria. As a pure normalised indicator (both to number of buildings and replacement cost), $AAELR_{eq}$ results in a top 100 ranking that follows more closely the pattern described in the case of *AALLR* in terms of prioritisation (Figure 24, Figure 25) and distribution of priority regions in Member States (Table 7). It highlights regions with high $AAEL_{eq/bldg}$ and low construction cost, placing Romanian and Greek regions on top of Italian ones (e.g. Modena, ITH54) and excluding regions of Austria, Germany, and Spain, previously captured by $AAEL_{eq/bldg}$ (Table 7).

The single-sector integrated indicators $I_{eq,1}$ and $I_{eq,2}$, combining $AAEL_{eq/bldg}$, $AAELR_{eq}$, and *AALLR* according to Equations (22) and (23), respectively, were found adequate to capture the different modes of prioritisation described earlier. For example, selecting the top 100 priority regions from $AAEL_{eq}$, $AAEL_{eq/bldg}$, $AAELR_{eq}$, *AALL*, and *AALLR* with regard to residential buildings, results in 152 unique NUTS-3 regions. $I_{eq,2}$ identified 142 (92%) of these regions within its top 152. Likewise, $I_{eq,1}$ captured 99% of the regions included in the top 100 $AAELR_{eq}$ and *AALLR* listings. Figure 26 presents the top 50 priority regions based on $I_{eq,1}$ and $I_{eq,2}$. $I_{eq,1}$ prioritises regions by assigning an equal weight (importance) to normalised average annual loss per building and number of fatalities per 100,000 occupants, and addresses regions irrespective of building count, value, and population concentration. $I_{eq,2}$ considers additionally absolute measures of loss. Table B. 2 presents the top 100 priority regions based on $I_{eq,2}$, and provides the normalised scores of the component indicators and the corresponding value of $I_{eq,1}$. According to the relevant definitions provided in Section 2.8, both $I_{eq,i}$ and component indicators range within 0–1, i.e. $I_{eq,i}$ = 0 and 1 correspond to the extreme cases of having all component indicators equal to 0 and 1, respectively.

Table 7. Residential buildings: distribution of top 100 NUTS-3 priority regions to Member States based on seismic risk.

Member State	$AAEL_{eq}$	$AAEL_{eq/bldg}$	$AAELR_{eq}$	*AALL*	*AALLR*	$I_{eq,1}$	$I_{eq,2}$
Austria	1	1	-	1	-	-	1
Bulgaria	1	1	5	2	4	5	3
Cyprus	1	1	1	1	1	1	1
Germany	1	3	-	-	-	-	-
Greece	13	21	31	13	30	32	28
Spain	5	1	-	5	1	-	-
France	2	-	-	1	-	-	-
Croatia	1	-	2	3	5	3	2
Italy	66	70	44	53	41	42	51
Portugal	2	-	-	1	-	-	-
Romania	7	2	17	19	17	17	14
Slovenia	-	-	-	1	1	-	-
SUM	100	100	100	100	100	100	100

Figure 22. (a) $AAEL_{eq}$ ($\cdot 10^6$ €), and (b) *AALL* (number of fatalities) in residential EU-27 buildings at NUTS-3 level (Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

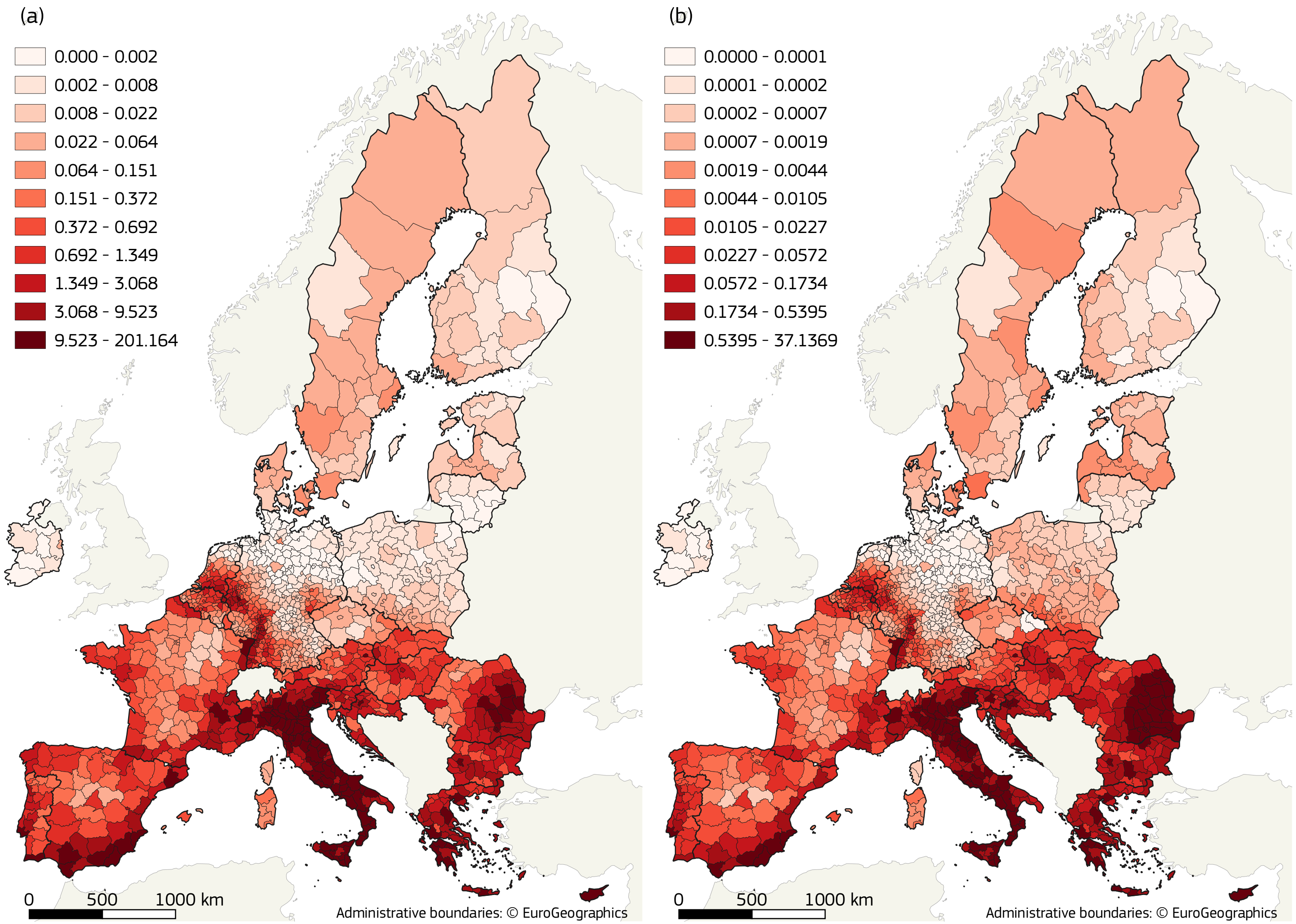


Figure 23. (a) $AAEL_{eq/bldg}$ (€), and (b) $AALLR$ ($\cdot 10^{-5}$) in residential EU-27 buildings at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

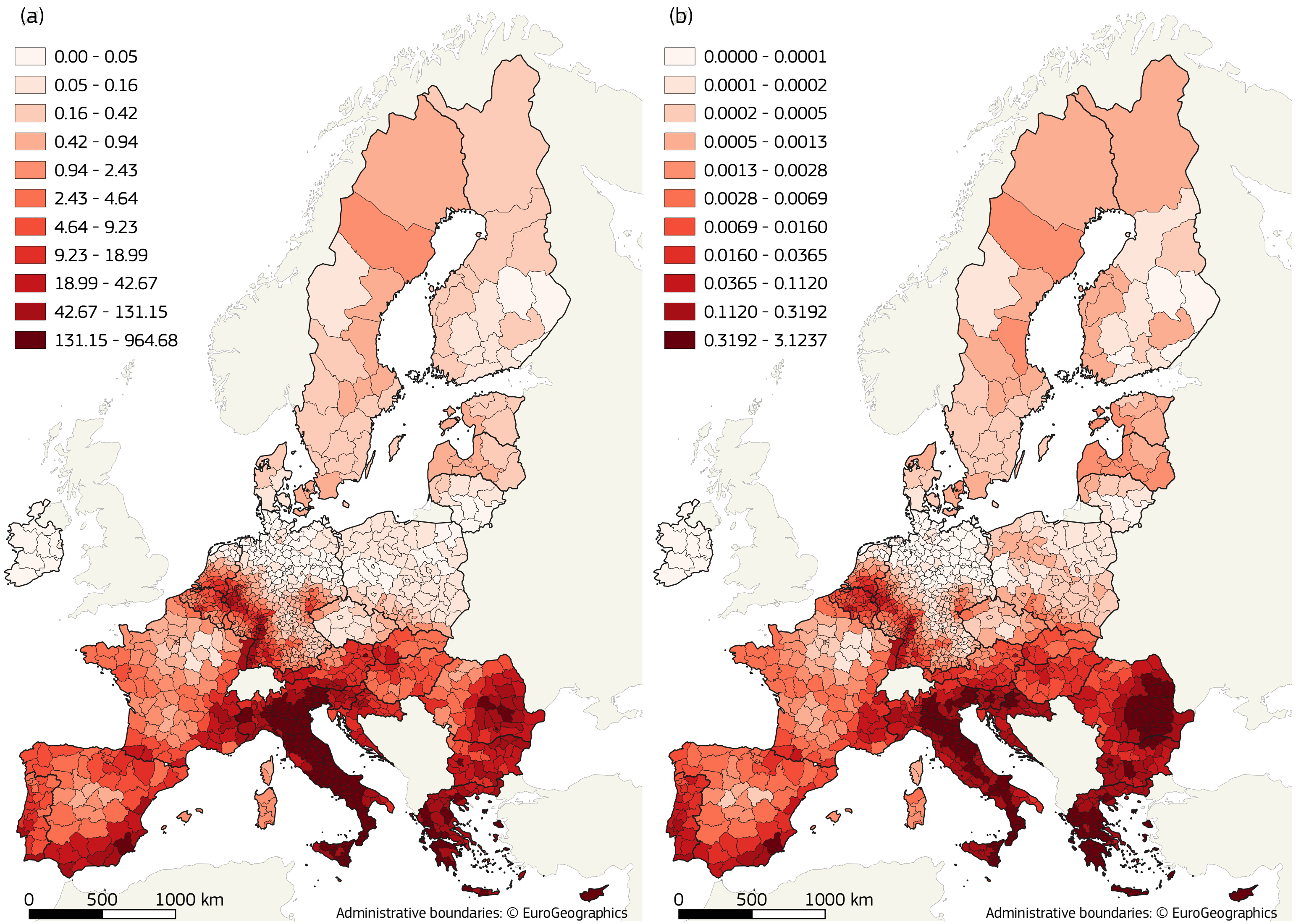


Figure 24. *AAELR*$_{eq}$ (·10^{-3}) in residential EU-27 buildings at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

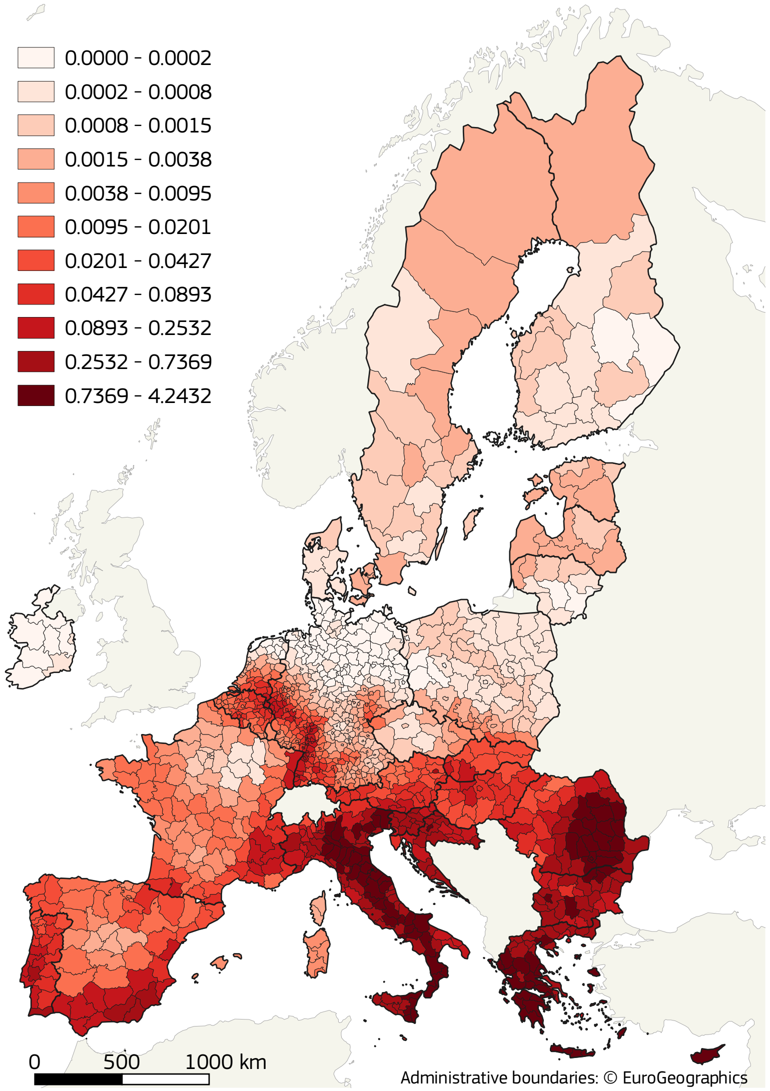


Figure 25. Residential buildings: Top 50 priority regions based on (a) $AAEL_{eq}$, (b) $AAEL_{eq/bldg}$, (c) $AAELR_{eq}$, (d) $AALL$, (e) $AALLR$

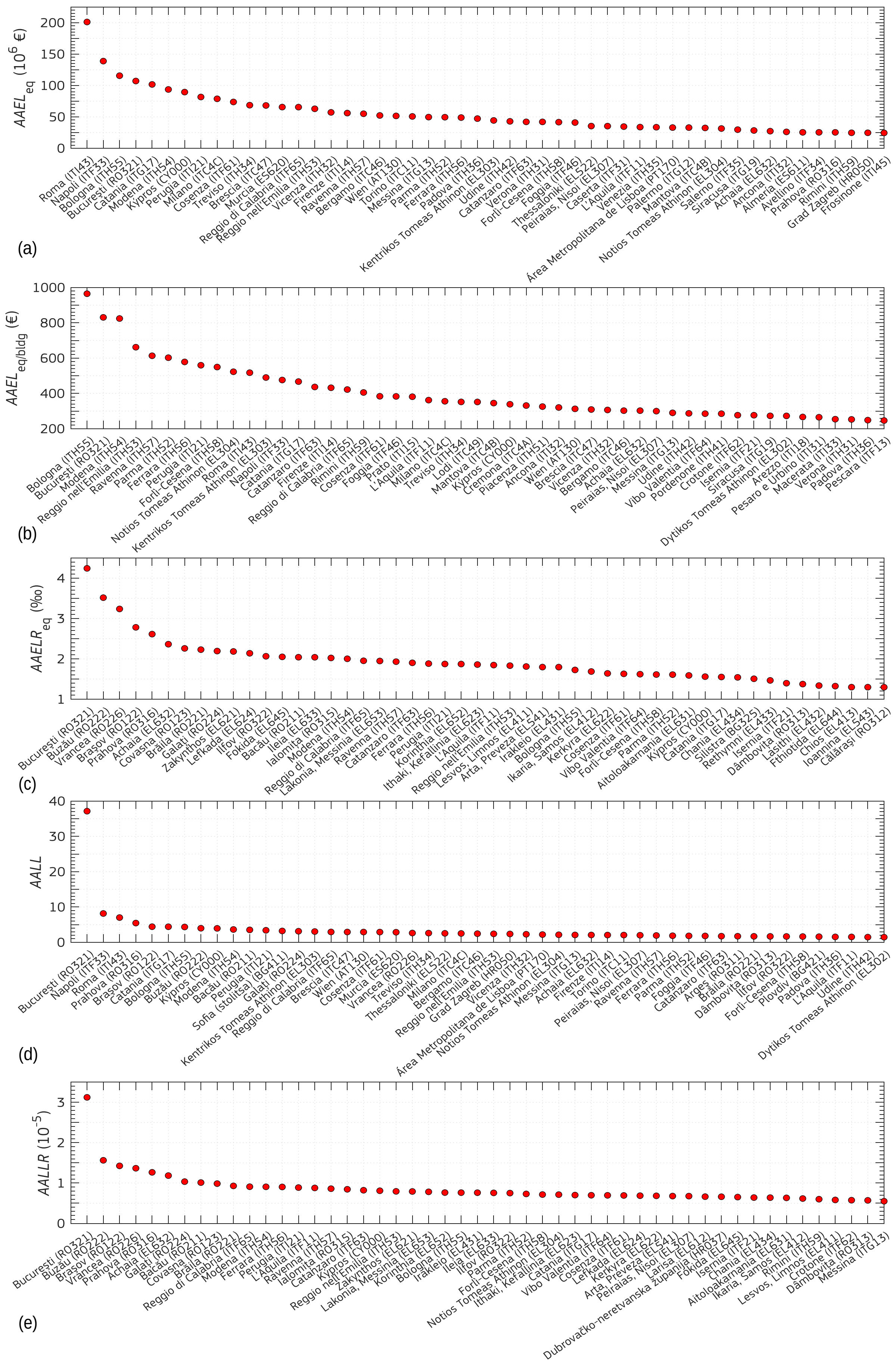
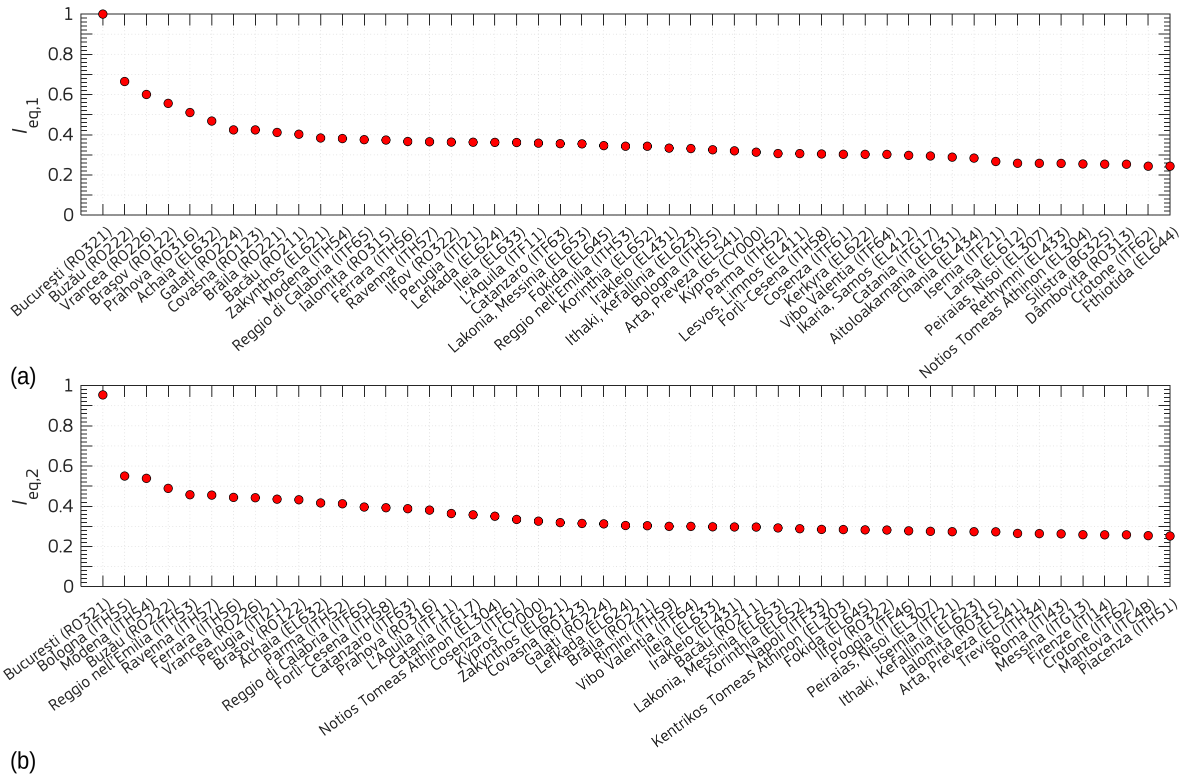


Figure 26. Residential buildings: Top 50 priority regions based on (a) $I_{eq,1}$, and (b) $I_{eq,2}$



3.1.2 Commercial buildings

Seismic risk indicators for commercial buildings (i.e. offices, wholesale and retail trade, hotels and restaurants) in the EU-27 NUTS-3 regions are mapped in Figure 27–Figure 29. The average annual economic loss and loss of life are mapped in Figure 27a and b, respectively. Overall, the distribution of absolute loss in commercial buildings, i.e. $AAEL_{eq}$ and *AALL*, follows the pattern of residential ones (Figure 22). The top 100 priority regions from each absolute loss indicator include regions from the same countries as the case of residential buildings, with few differences in their distribution (Table 7 vs. Table 8). The top 100 $AAEL_{eq}$ ranking for commercial buildings presents 76 regions in common with the case of residential buildings. Among others, it excludes the capital regions of Greece (Athens, EL301–EL304) and Croatia (Grad Zagreb, HR050), and 12 Italian regions including Bari (ITF47). On the other hand, it introduces a region in Bulgaria (Plovdiv, BG421), four German regions including Frankfurt (DE712), 12 Greek mainland and island regions, three regions of Spain (e.g. Valencia, ES523), two regions of France including the city of Marseille (i.e. Bouches-du-Rhône, FRL04), one region in Romania, and the capital region of Slovenia (Central Slovenia, SI041). The top 100 *AALL* ranking introduces only eight different regions compared to residential buildings, which are located towards the bottom of the list. The top 50 regions considering absolute average loss to commercial buildings are provided in Figure 30a, and Figure 31a.

Average annual loss normalised to the number of commercial buildings is presented in Figure 28. The top 100 priority regions based on $AAEL_{eq/bldg}$ include 69 common regions to those based on $AAEL_{eq}$, most of which are located in the top 50 (Figure 30a, b), albeit with different ranking, as $AAEL_{eq/bldg}$ assigns higher risk to regions with high average annual economic losses relative to the number of buildings. Large urban areas move to lower ranking positions (e.g. Naples, ITF33, Italy) or are excluded from the top 100 $AAEL_{eq/bldg}$ list (e.g. Rome, ITI43, Milan, ITC4C, Italy; Thessaloniki, EL522, Greece). As in the case of residential buildings, $AAEL_{eq/bldg}$ further introduces regions of high seismicity with lower number of buildings (e.g. regions in southern Italy), which were not included in the $AAEL_{eq}$ top 100 ranking, and excludes altogether regions from France, Portugal, and Slovenia (Table 8). Interestingly, $AAEL_{eq/bldg}$ introduces 12 additional German regions in the top 100 compared to $AAEL_{eq}$. The top 100 priority regions based on *AALLR* include 74 common regions to *AALL*, assigning higher risk to regions with high average annual fatalities relative to the population (e.g. Romanian, Greek, and Italian regions in Figure 31). The $AAEL_{eq/bldg}$ and *AALLR* top 100 rankings of commercial buildings present 73 and 88 regions, respectively, in common with those of residential buildings.

$AAELR_{eq}$ is mapped in Figure 29 for commercial buildings, and its top 100 ranking presents 70 regions in common with $AAEL_{eq/bldg}$. Compared to the latter, $AAELR_{eq}$ excludes the capital region of Austria (Wien, AT130), all German regions, and 15 Italian regions from the central and northern part of the country (apart from one in Sicily). On the other hand, it introduces two additional Bulgarian regions (including Plovdiv, BG421), 13 central and southern Greek regions including West Attica (EL306), three Croatian region including Zagreb (HR050), and twelve Romanian regions, which in general occupy the top of the list (Figure 30c). $AAELR_{eq}$ follows more closely *AALLR* in terms of prioritisation (Figure 30c, Figure 31b) and distribution of priority regions in Member States (Table 8), rather than $AAEL_{eq/bldg}$. Interestingly, its top 100 ranking has 94 regions in common with the relevant ranking of residential buildings.

The single-sector integrated indicators $I_{eq,1}$ and $I_{eq,2}$, were found adequate to capture the different modes of prioritisation, identifying 98% and 86%, respectively, of the top 100 priority regions derived from component indicators. Figure 32 presents the top 50 priority regions based on $I_{eq,1}$ and $I_{eq,2}$. Furthermore, Table B. 3 presents the top 100 priority regions based on $I_{eq,2}$, and provides the normalised scores of the component indicators and the corresponding value of $I_{eq,1}$. The top 100 rankings resulting from both integrated indicators were found to be similar to those of residential buildings (Table 7 vs Table 8), with their main difference referring to the exclusion of urban Greek regions (e.g. Central Athens, EL303, Thessaloniki, EL522).

Table 8. Commercial buildings: distribution of top 100 NUTS-3 priority regions to Member States based on seismic risk.

Member State	$AAEL_{eq}$	$AAEL_{eq/bldg}$	$AAELR_{eq}$	***AALL***	***AALLR***	$I_{eq,1}$	$I_{eq,2}$
Austria	1	1	-	1	-	-	-
Bulgaria	2	3	5	2	3	4	5
Cyprus	1	1	1	1	1	1	1
Germany	5	14	-	-	-	-	-
Greece	19	13	26	11	23	25	19
Spain	5	1	1	3	1	1	1
France	4	-	-	-	-	-	-
Croatia	-	1	4	4	7	6	4
Italy	54	58	43	59	48	44	54
Portugal	1	-	-	-	-	-	-
Romania	7	8	20	18	17	19	16
Slovenia	1	-	-	1	-	-	-
SUM	100	100	100	100	100	100	100

Figure 27. (a) $AAEL_{eq}$ ($\cdot 10^6$ €), and (b) *AALL* (number of fatalities) in commercial EU-27 buildings at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

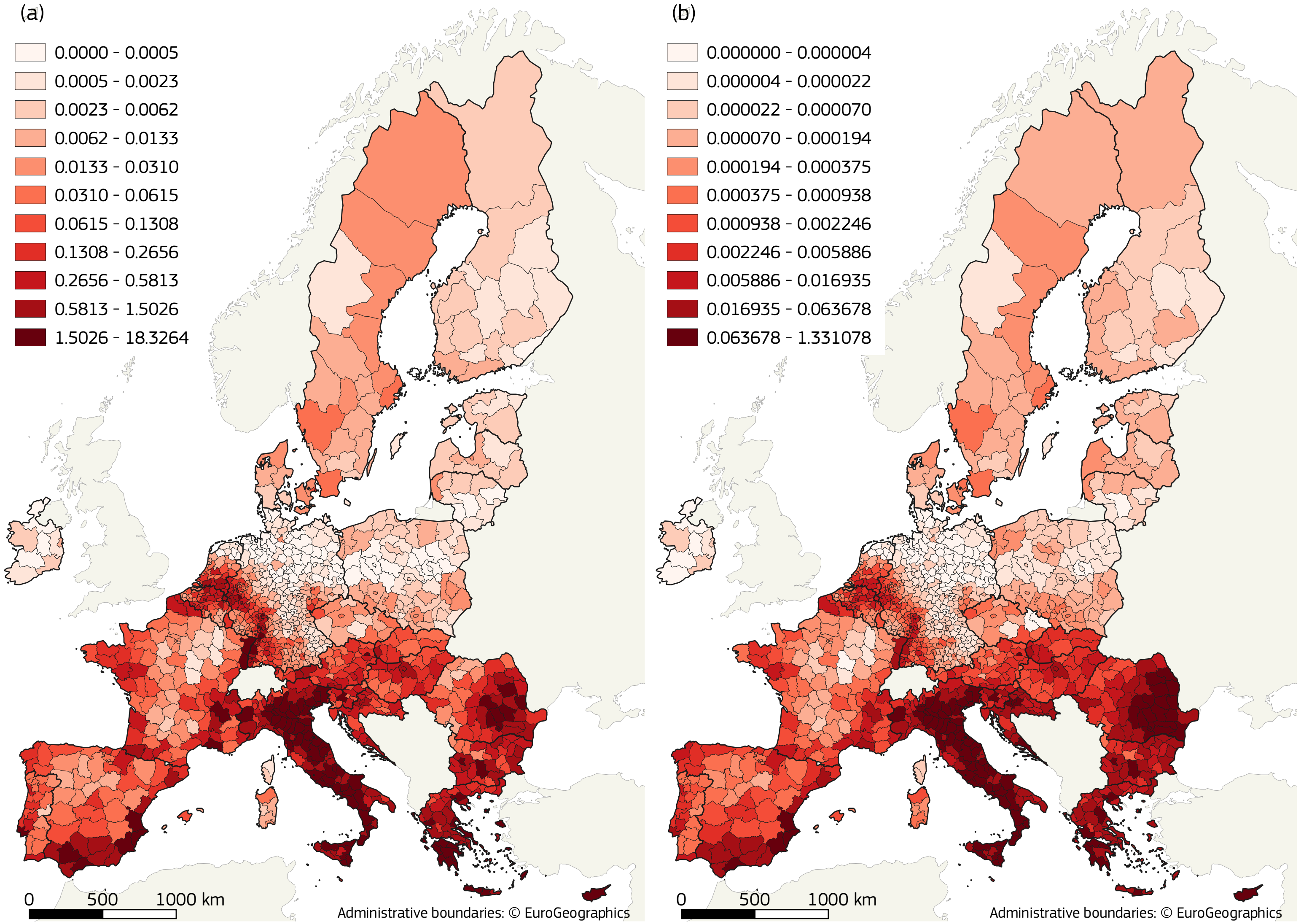


Figure 28. (a) $AAEL_{eq/bldg}$ (€), and (b) $AALLR_{eq}$ ($\cdot 10^{-5}$) in commercial EU-27 buildings at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

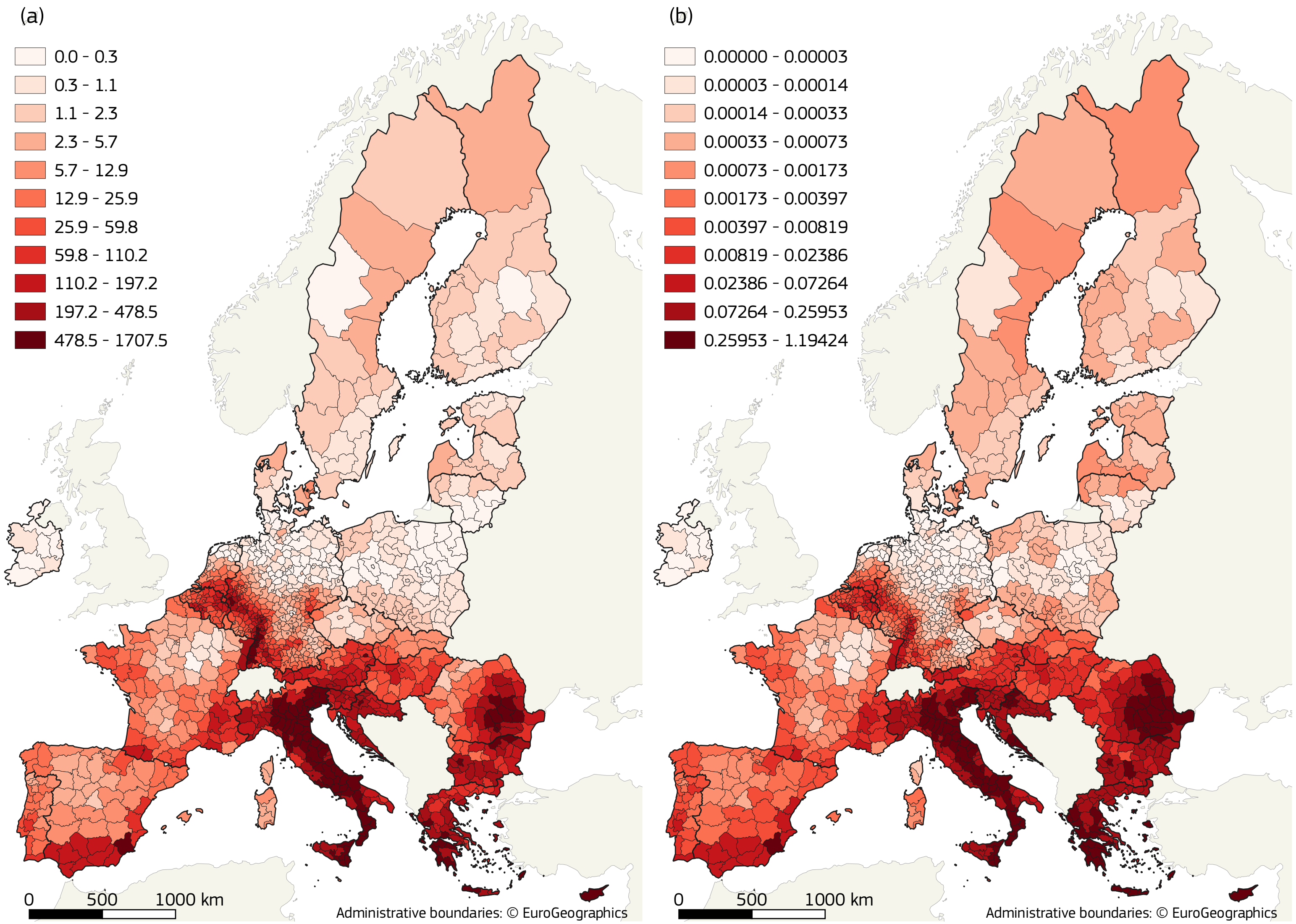


Figure 29. *AAELR*$_{eq}$ ($\cdot 10^{-3}$) in commercial EU-27 buildings at NUTS-3 level
(Source: GADM data obtained from ESRM20, Crowley et al., 2021a, available from EFEHR, http://risk.efehr.org; JRC mapping to NUTS)

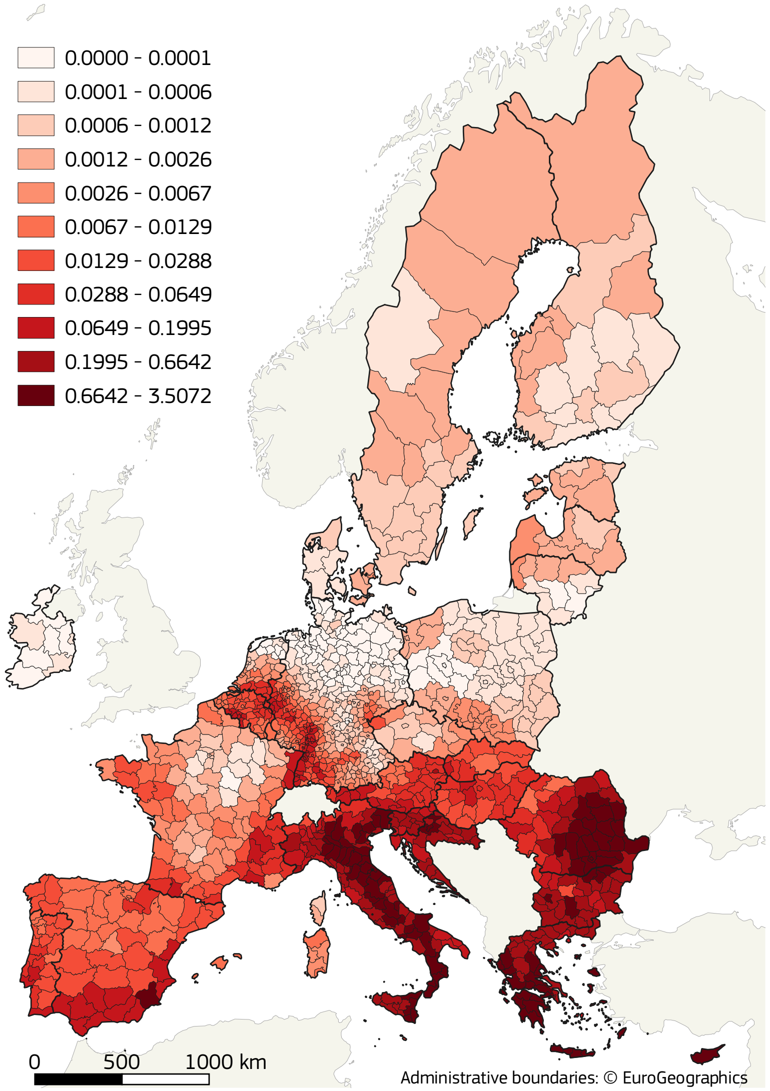


Figure 30. Commercial buildings: Top 50 priority regions based on (a) $AAEL_{eq}$, (b) $AAEL_{eq/bldg}$, and (c) $AAELR_{eq}$

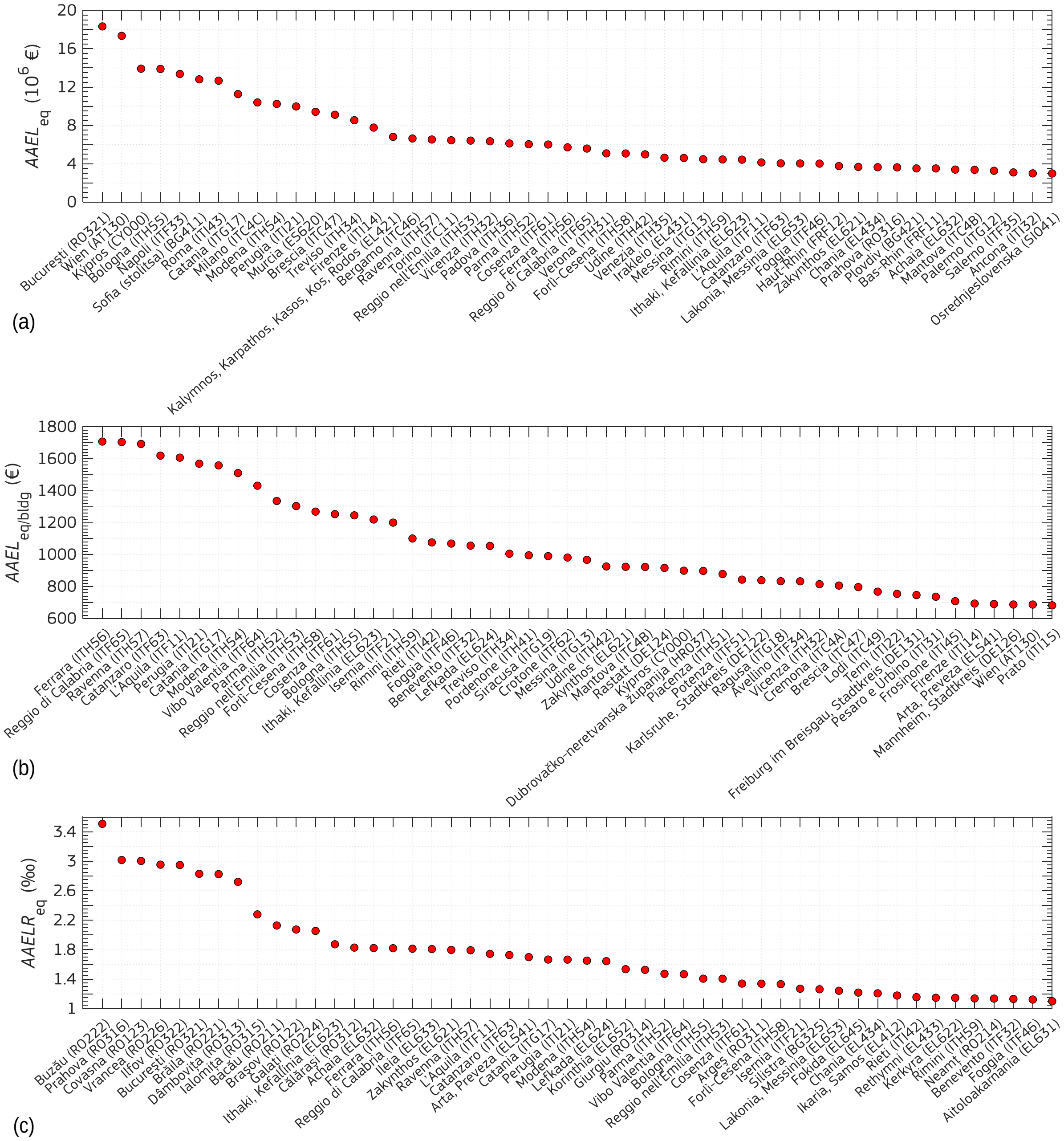


Figure 31. Commercial buildings: Top 50 priority regions based on (a) *AALL*, and (b) *AALLR*

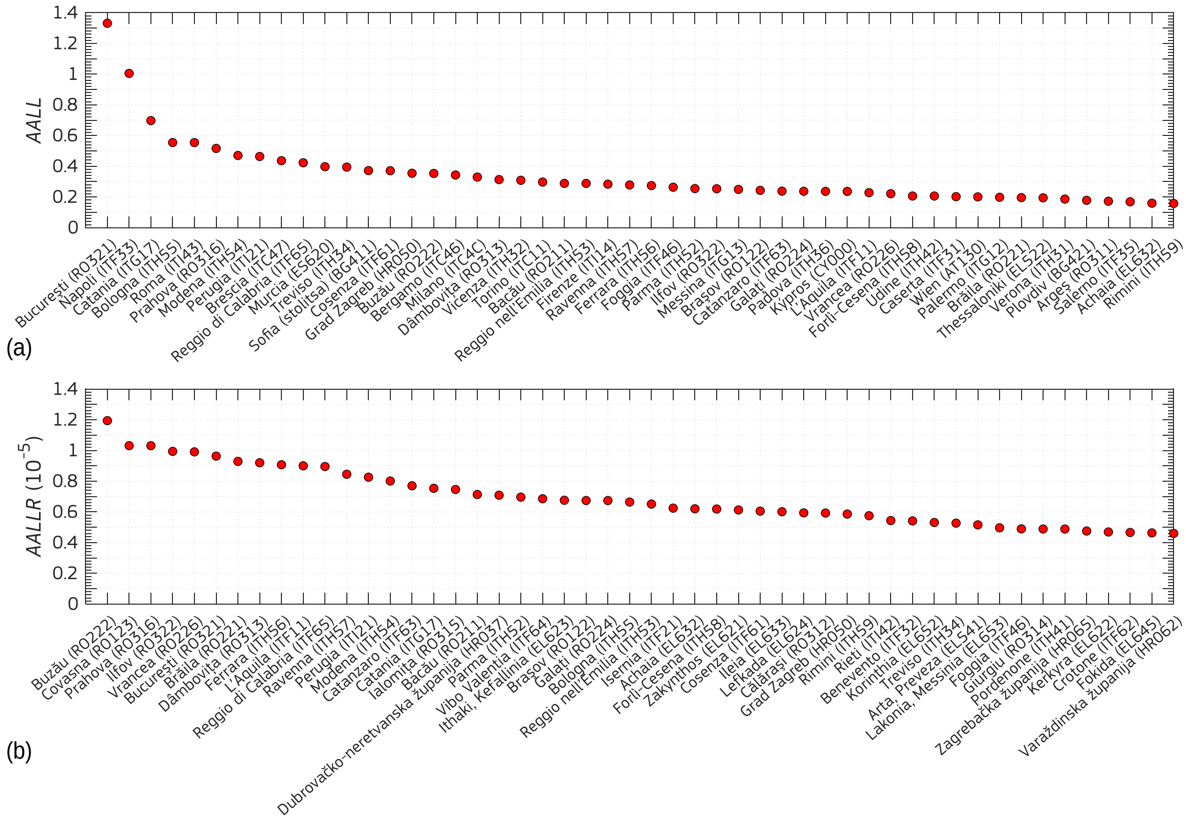
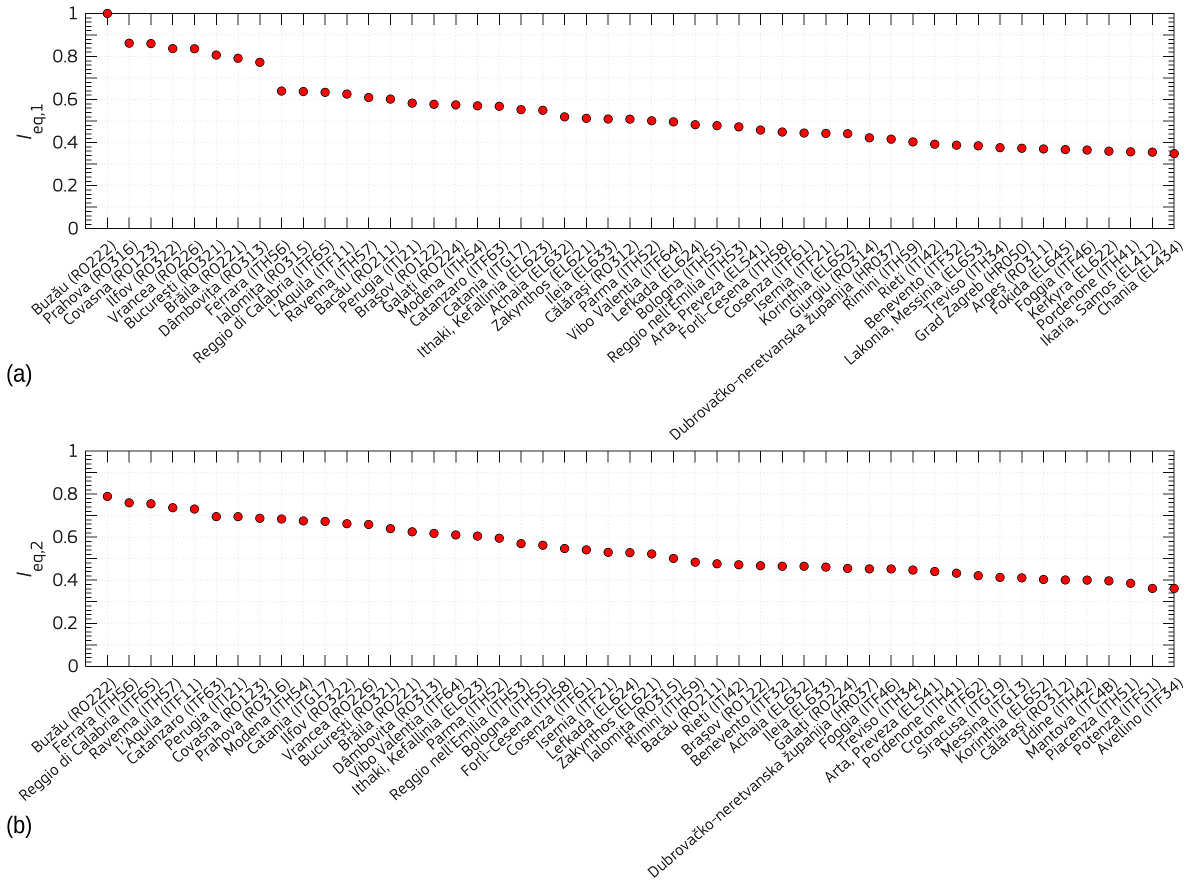


Figure 32. Commercial buildings: Top 50 priority regions based on (a) $I_{eq,1}$, and (b) $I_{eq,2}$



3.2 Energy performance

Energy performance indicators for residential buildings in the EU-27 NUTS-3 regions are mapped in Figure 33–Figure 35. Prioritisation of regions based on average annual economic loss $AAEL_{en}$ and consumption $AAEC$ is presented in Figure 33a and b, respectively. $AAEC$ is affected by climatic conditions, the energy performance attributes of building classes (U values and number of storeys), the size of the building stock (i.e. area of heated occupied dwellings), along with modelling uncertainty, whereas $AAEL_{en}$ is affected in addition by energy prices. Energy consumption and cost are highly correlated, indicating similar patterns in Figure 33a and b. Apart from the expected tendency for higher values in colder climates (following the pattern of HDD index – Figure 12), absolute indicators are mainly controlled by the number of buildings and related heated floor area. In fact, among the highest ranked regions (Figure 36a, Figure 37a) are densely built and populated areas, common to both indicator rankings, encompassing Turin (ITC11), Milan (ITC4C), Rome (ITI43), Berlin (DE300), Hamburg (DE600), Stockholm (SE110), Barcelona (ES511), and Nord (FRE11) in France including Lille. These regions consume and pay the most in energy bills. Common regions in the top 100 rankings include NUTS-3 from 13 Member States, largely represented by French regions, and followed by Italian ones (Table 9). Assuming that a regional prioritisation is led by total figures of energy use and cost, these are the areas where renovation may have the highest impact in absolute terms. As energy consumption can be directly associated with greenhouse gas (GHG) emissions, and hence environmental impact and climate change, $AAEC$ is highly relevant to energy related policies, e.g. the EPBD (Directive 2018/844).

Figure 34a and b present the spatial distribution of $AAEL_{en/bldg}$ and $AAEC_{bldg}$, respectively, i.e. the former two energy indicators normalised to the total number of buildings per NUTS-3 region. In this case, prioritisation highlights regions with high heating expenses and energy consumption per building, and/or urban regions with high share of mid- and high-rise buildings (multi-family buildings). Common highly ranked regions among the two indicators include cold-climate areas of Europe, (e.g. in northern Italy and Germany), and big cities and urban regions (Paris, FR101, France; Milan, ITC4C, Turin, ITC11, Italy; Berlin, DE300, Dresden, DED21, Germany) (Figure 36b, Figure 37b). The top 100 rankings derived from $AAEL_{en/bldg}$ and $AAEC_{bldg}$ include regions from Austria, Belgium, Finland, France, Germany, Italy and Sweden, with a strong presence of German regions (i.e. 50%), followed by French and Italian regions (i.e. 10% each) (Table 9). Comparison of the top 100 priority regions, defined by $AAEL_{en/bldg}$ and $AAEL_{en}$, showed that there are less than 30% of common regions. The same is valid for $AAEC_{bldg}$ and $AAEC$ rankings. In both cases, normalised indicators emphasise German regions over French ones. In addition, Finish regions rank higher, whereas Italian ones move in lower positions. In conclusion, although there is still a significant share of highly ranked urban areas, the overall difference of normalised indicators lies in an evident shift towards northern Europe, ruling out southern areas with low normalised energy consumption (and cost) due to warmer weather conditions. Prioritisation based on $AAEC_{bldg}$ (Figure 34b) follows the climate conditions pattern (Figure 12) more closely than all other indicators. Prioritisation based on $AAEL_{en/bldg}$ (Figure 34a), which builds on $AAEC_{bldg}$, moves to higher ranking positions German and Swedish regions, and lowers the priority of Finnish, Estonian and Austrian ones (Table 9) due to the consideration of the energy prices. The comparison of the relevant maps in Figure 34a and b shows that $AAEL_{en/bldg}$ gives less priority to regions in other Baltic and central-east European countries due to the same reason.

Figure 35a identifies priority regions based on the normalised economic loss indicator $AAELR_{en}$. In line with Equation (20), $AAELR_{en}$ highlights regions with high average space heating energy expenses relative to the replacement cost, both referring to an average building within the region. As in the case of seismic risk, $AAELR_{en}$ is useful for comparing diverse regions in terms of both size and value of the exposure, thus it represents a more robust normalised indicator compared to $AAEL_{en/bldg}$. Highly ranked regions according to $AAELR_{en}$ are located in Romania (Figure 36c), whose regions comprise 40% of all regions within the top 100 ranking (Table 9) and include almost all regions of the country (i.e. 40 out of the 42). The rest of the regions are distributed mainly among Belgium, Czechia, and Slovenia. Compared to $AAEL_{en/bldg}$, $AAELR_{en}$ shifts priority towards the central-east European zone, with moderately cold climate and small values of average building replacement cost. The role of the exposure value in prioritisation is evident when $AAELR_{en}$ and $AAEL_{en/bldg}$ top 100 rankings are compared, resulting in only five common regions. Thus, $AAEL_{en/bldg}$ shifts priority westwards due to the low energy price in central and eastern Europe, whereas $AAELR_{en}$ more to the east due to the low values of replacement cost.

In Figure 35b, regions are prioritised based on $AAEC_{bldg/HDD}$; this is an indicator that provides an overview of regional energy consumption per building and HDD value, thus eliminating the effect of the buildings stock size and climate severity. $AAEC_{bldg/HDD}$ highlights regions with high energy consumption per building irrespective of climatic conditions. It emphasises potentially inefficient building envelopes (U values), energy systems (losses in the energy network), and user behaviour. Compared to $AAEC_{bldg}$, $AAEC_{bldg/HDD}$ maintains in high-ranking positions Paris (FR101), Hauts-de-Seine (FR105), Milan (ITC4C), and Turin (ITC11). Additionally, it introduces Italian cities and urban regions (e.g. Bologna, ITH55, Genoa, ITC33, Rome, ITI43, Naples, ITF33), and central

Athens (EL303) (Figure 37c). Overall, Italian regions represent a 43% share within the top 100 (Table 9), followed by regions of Germany and France. As opposed to five Austrian, five Estonian and 15 Finish regions in the top 100 $AAEC_{bldg}$ ranking, only Wien (AT130, Austria) was maintained by $AAEC_{bldg/HDD}$. $AAEC_{bldg/HDD}$ and $AAEC_{bldg}$ top 100 rankings include 59 common regions. Furthermore, $AAEC_{bldg/HDD}$ shifts the priority from northern European regions (with building insulation properties and heating systems adjusted to relevant climatic conditions and energy cost) to central and southern European regions with higher potential for energy efficiency improvement (Figure 34b vs Figure 35b).

The single-sector integrated indicator I_{en} combines $AAEL_{en/bldg}$, $AAELR_{en}$, and $AAEC_{bldg/HDD}$ by assigning an equal weight (importance) to each component according to Equation (25). Individual prioritisations based on $AAEL_{en}$, $AAEC$, $AAEL_{en/bldg}$, $AAEC_{bldg}$, $AAELR_{en}$, and $AAEC_{bldg/HDD}$ are more diverse compared to the case of seismic risk (Section 3.1), hence the efficiency of I_{en} in capturing the different modes of prioritisation of all six component indicators was found somewhat reduced (compared to $I_{eq,2}$). I_{en} captured 73% of the unique regions obtained separately from the six component indicator top 100 rankings (i.e. 230 out of 314). The top 100 ranking based on I_{en} include regions mainly from Germany and Italy, followed by Romania and France (Table 9). Figure 38 presents the top 50 priority regions based on I_{en}, whereas the top 100 ranking with the normalised scores of the component indicators is provided in Table B. 4.

Table 9. Residential buildings: distribution of top 100 NUTS-3 priority regions to Member States based on energy performance.

Member State	$AAEL_{en}$	$AAEL_{en/bldg}$	$AAELR_{en}$	$AAEC$	$AAEC_{bldg}$	$AAEC_{bldg/HDD}$	I_{en}
Austria	1	1	1	2	5	1	3
Belgium	3	1	14	4	1	1	2
Czechia	4	-	14	6	-	-	4
Germany	8	62	-	5	47	38	27
Denmark	6	-	-	3	-	-	-
Estonia	-	-	4	-	5	-	-
Greece	-	-	5	-	-	2	1
Spain	3	-	-	3	-	1	-
Finland	1	6	3	2	15	-	6
France	44	11	-	37	10	12	12
Croatia	-	-	7	1	-	-	-
Hungary	1	-	-	3	-	-	-
Ireland	1	-	-	1	-	-	-
Italy	20	12	1	21	14	43	23
Luxembourg	-	-	-	1	1	1	-
Netherlands	5	-	-	3	-	-	-
Poland	-	-	-	4	-	-	-
Romania	-	-	40	1	-	1	13
Sweden	3	7	1	3	2	-	3
Slovenia	-	-	10	-	-	-	6
SUM	100	100	100	100	100	100	100

Figure 33. (a) $AAEL_{en}$ ($\cdot 10^6$ €), and (b) *AAEC* (GWh) in residential EU-27 buildings at NUTS-3 level

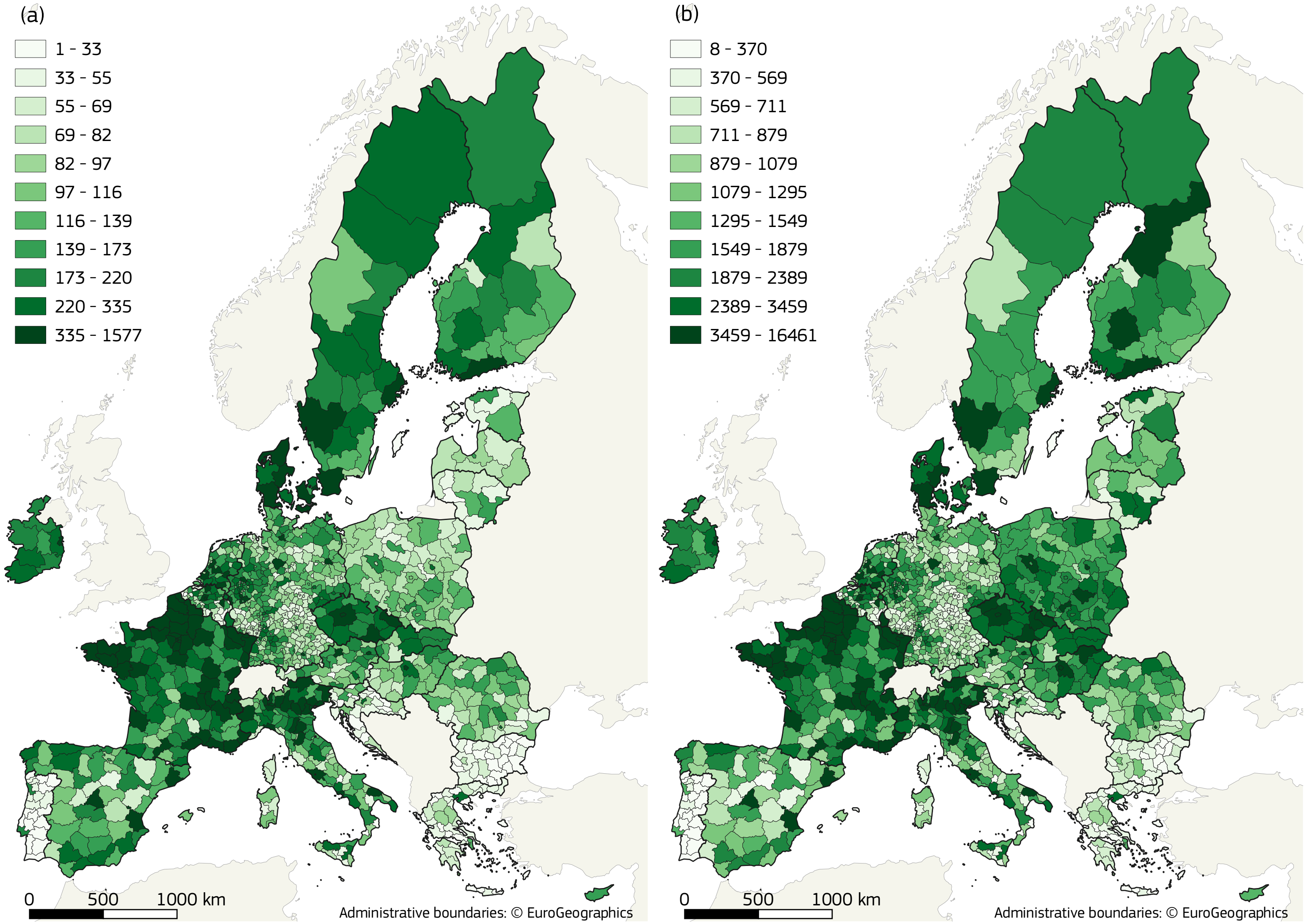


Figure 34. (a) $AAEL_{en/bldg}$ (€), and (b) $AAEC_{bldg}$ (kWh) in the EU-27 at NUTS-3 level

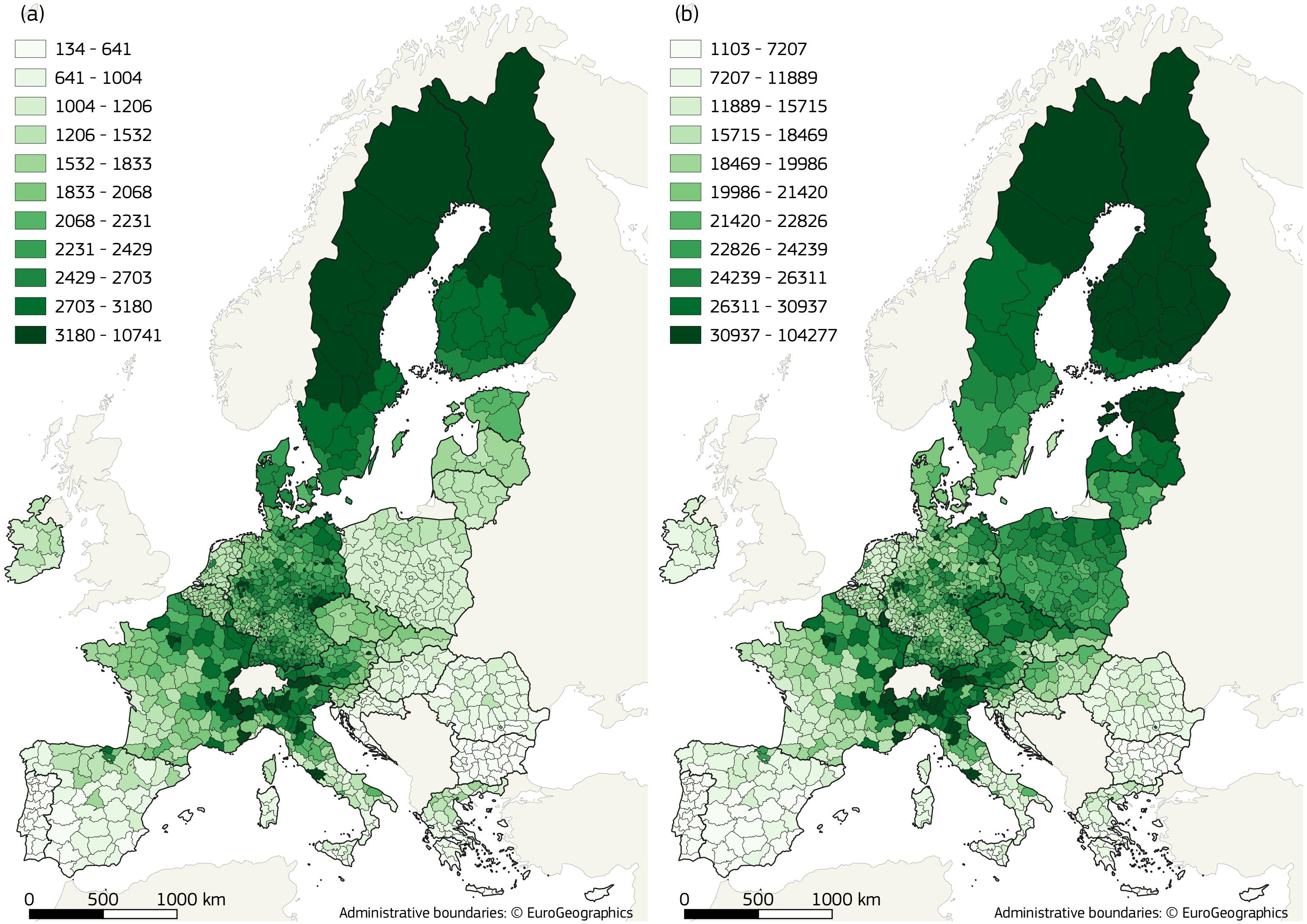


Figure 35. (a) $AAELR_{en}$ ($\cdot 10^{-3}$), and (b) $AAEC_{bldg,HDD}$ (kWh/HDD) in the EU-27 at NUTS-3 level

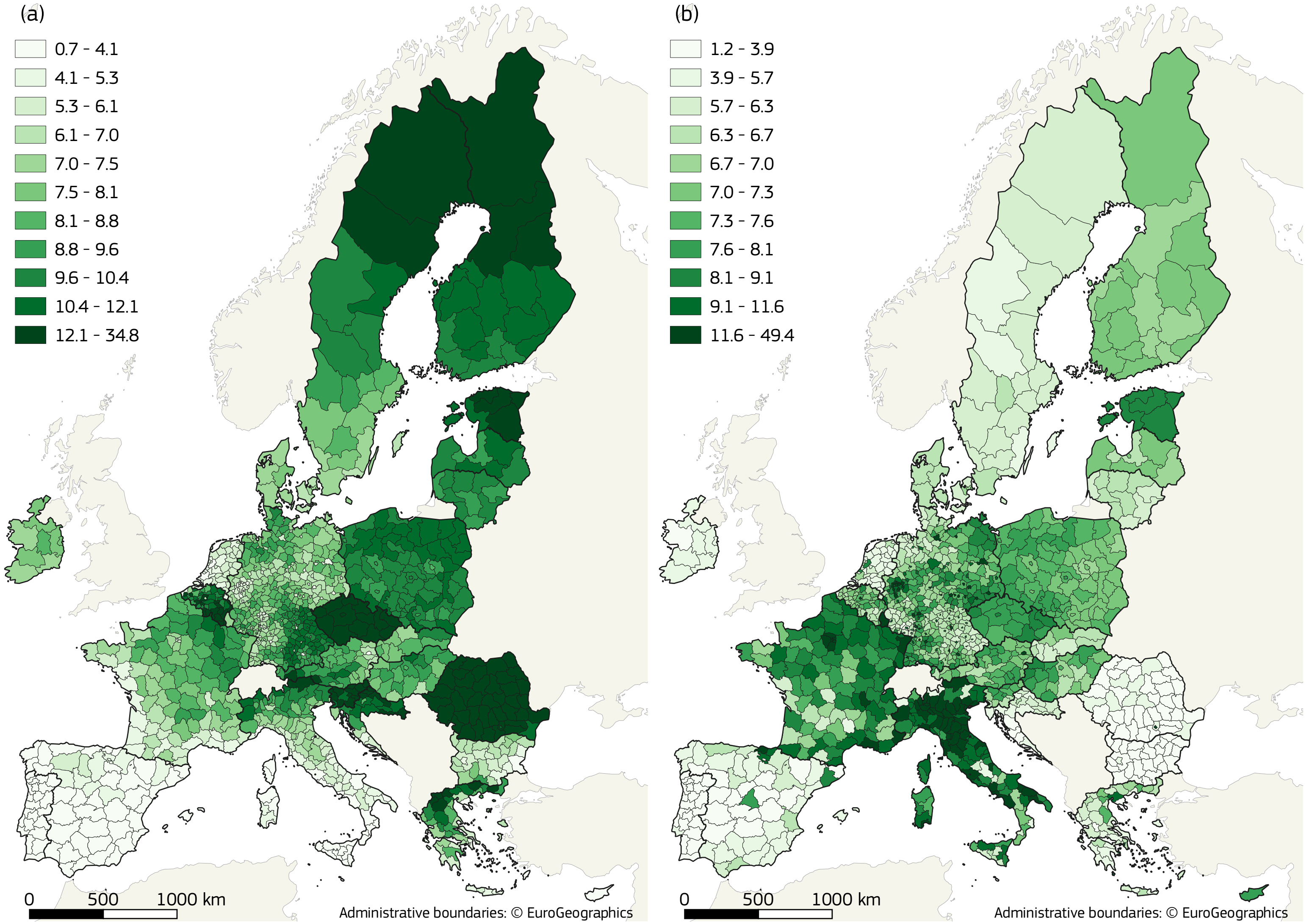


Figure 36. Residential buildings: Top 50 priority regions based on (a) $AAEL_{en}$, (b) $AAEL_{en/bldg}$, and (c) $AAELR_{en}$

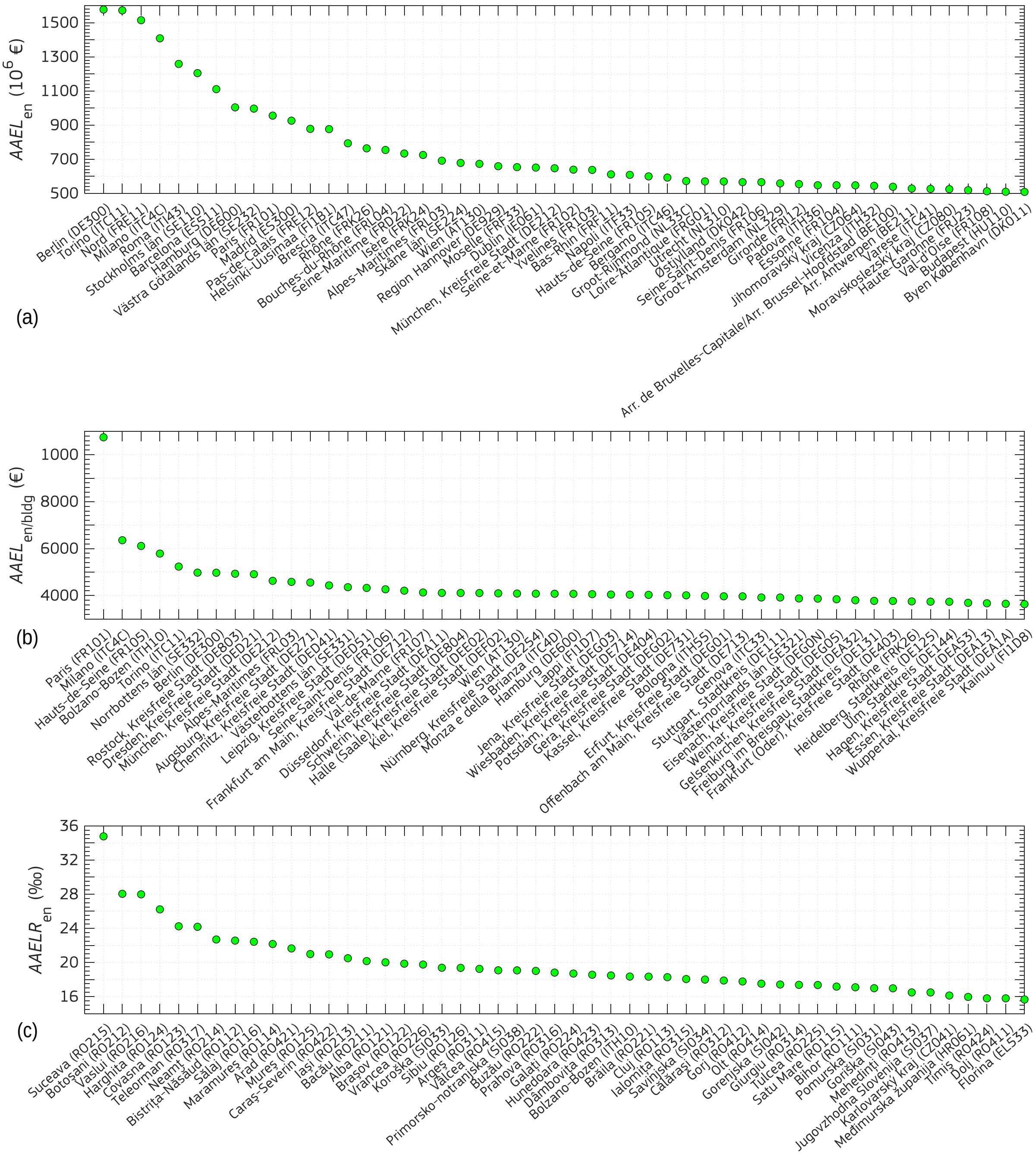


Figure 37. Residential buildings: Top 50 priority regions based on (a) *AAEC*, (b) $AAEC_{bldg}$, and (c) $AAEC_{bldg/HDD}$

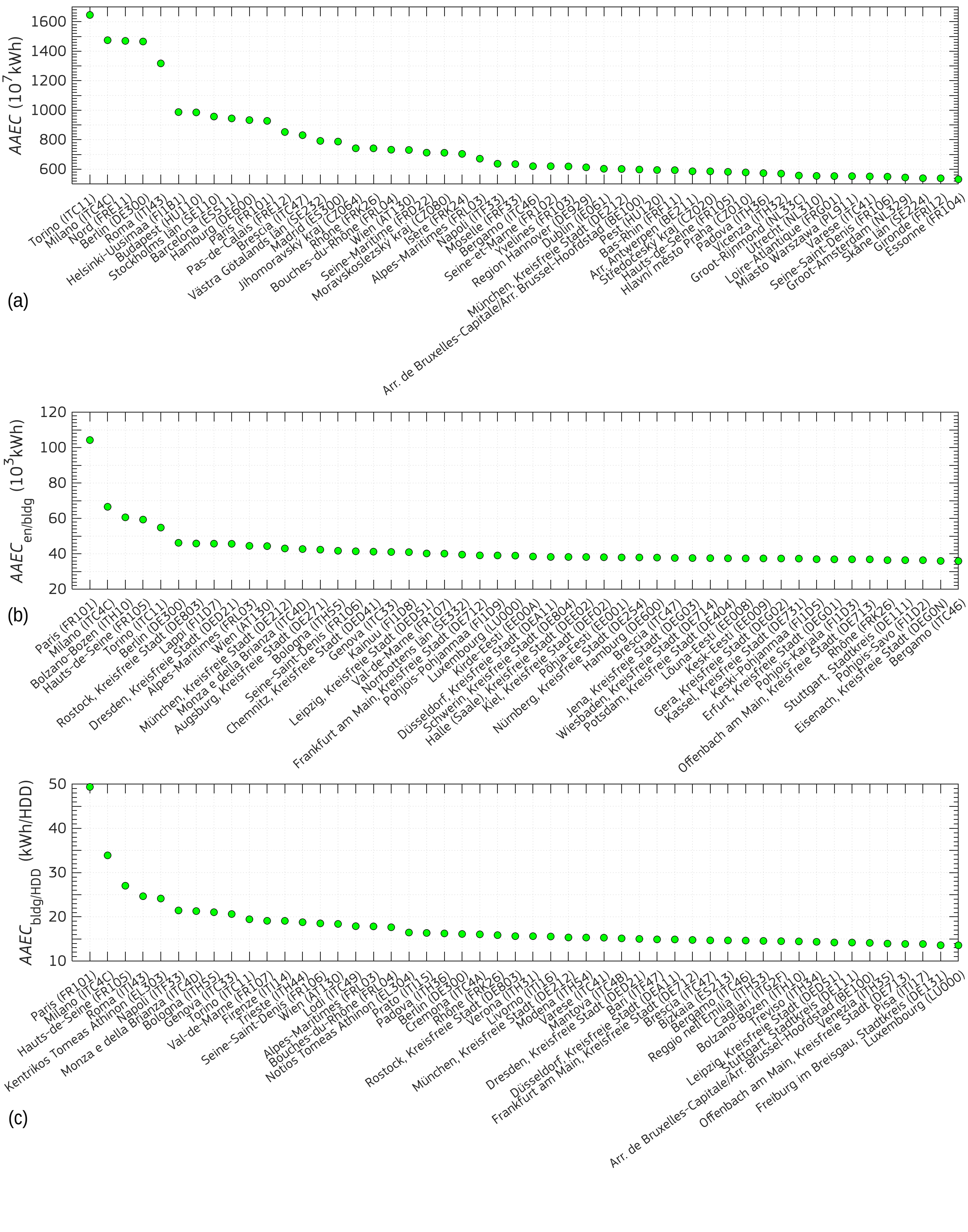
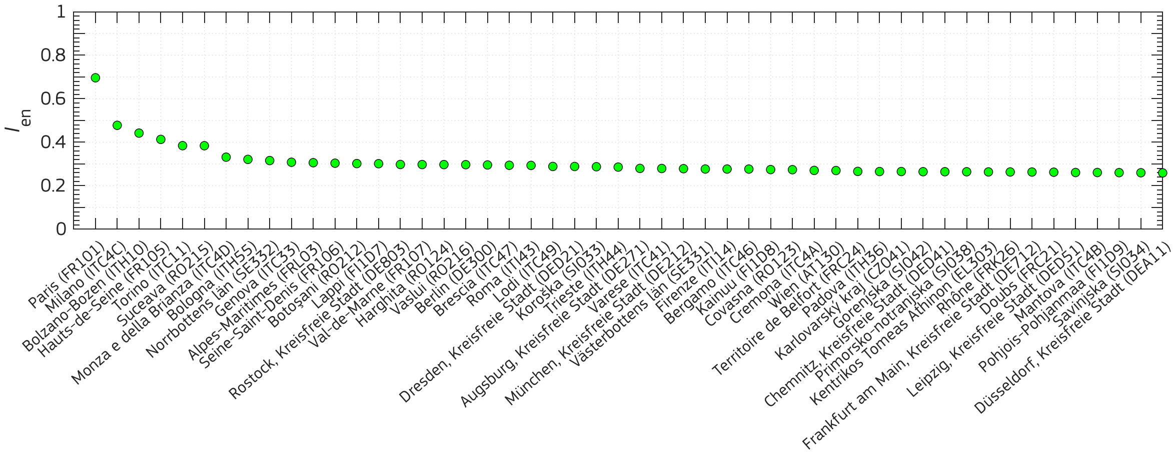


Figure 38. Residential buildings: Top 50 priority regions based on I_{en}



3.3 Socioeconomic vulnerability

The top 50 priority regions considering *SVI* at NUTS-3 level are presented in Figure 39, whereas *SVI* is mapped across the EU-27 in Figure 40. *SVI* represents an effort to prioritise regions by assigning an equal weight to socioeconomic development, smart, sustainable, and inclusive growth, and social progress. It captures 90% of the unique regions (i.e. 144 out of 160) obtained from the top 100 EU-HDI, EU2020, and EU-SPI indicator rankings adapted to reflect socioeconomic vulnerability. Table 10 presents the distribution of the top 100 regions, considering the different socioeconomic indicators. The top 100 *SVI* list consists of most Bulgarian regions (i.e. 23 out of 28) while excluding Sofia (BG411, BG412) and western regions of the country. Likewise, it includes most Romanian regions (i.e. 30 out of 42) while excluding Bucharest (RO321) and the north-western part of the country. Finally, the top 100 *SVI* list includes regions in southern Italy (e.g. Calabria, ITF65, Naples, ITF33), three regions in northern Hungary, and regions in south-western Spain (e.g. Seville, ES618).

Overall, the top 100 *SVI* ranking shares 29 common NUTS-3 regions to $I_{eq,2}$ of residential buildings. These include two regions of northern Bulgaria, 15 regions of southern Italy, and 12 regions of central and south-eastern Romania. The same regions are also present in the top 100 $I_{eq,2}$ ranking of commercial buildings. On this occasion, common *SVI* and $I_{eq,2}$ regions are complemented by two additional ones in Bulgaria, one in Italy, and two in Romania. On the other hand, the top 100 *SVI* list has only nine regions in common with I_{en}, all located in Romania, with two of them being also present in the top 100 $I_{eq,2}$ of residential buildings (i.e. RO122, RO123).

Table 10. Distribution of top 100 priority NUTS-3 regions to Member States considering socioeconomic vulnerability.

Member State	**1−(*EU-HDI*)**	**1−(*EU2020*) / 100**	**1−(*EU-SPI*) / 100**	***SVI***
Bulgaria	23	14	28	23
Greece	5	8	10	-
Spain	-	17	-	11
Hungary	15	3	6	3
Italy	14	34	14	33
Romania	40	24	42	30
Poland	3	-	-	-
SUM	100	100	100	100

Figure 39. Top 50 priority NUTS-3 regions based on *SVI*

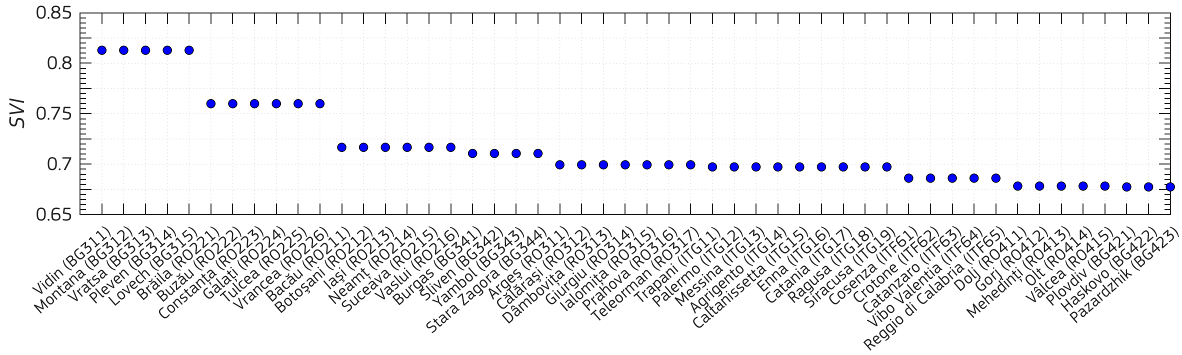
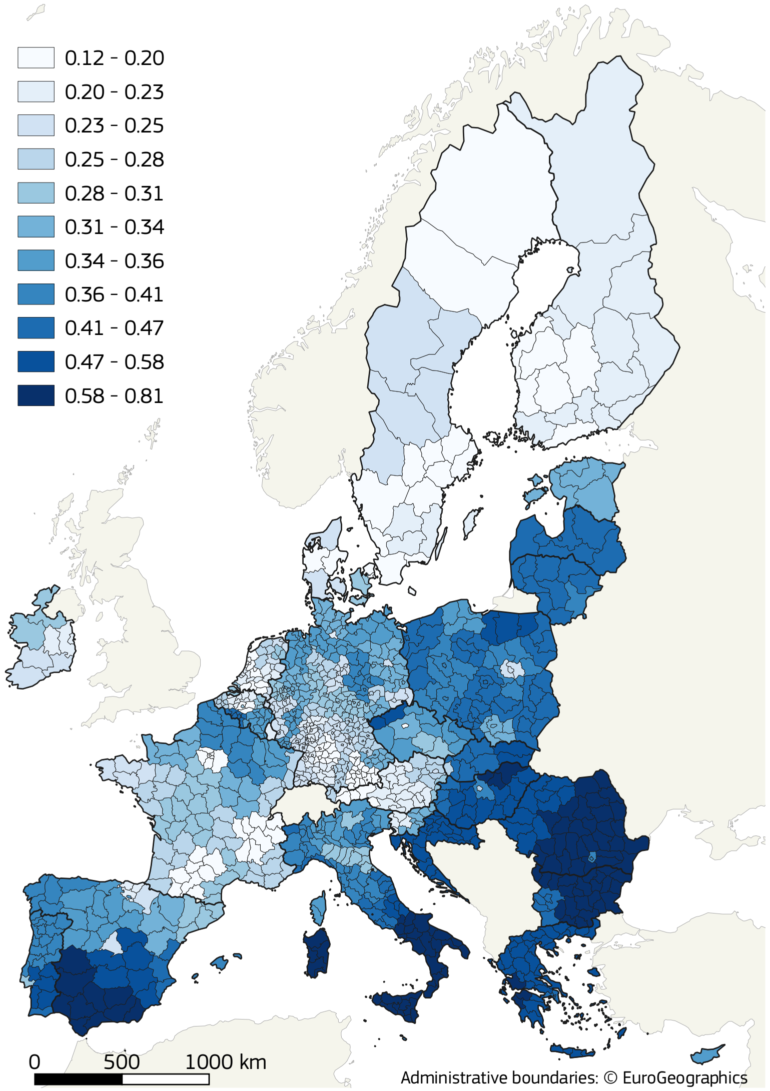


Figure 40. *SVI* in the EU-27 at NUTS-3 level



3.4 Integrated prioritisation

Multi-sectoral integrated indicators for residential buildings in the EU-27 NUTS-3 regions are mapped in Figure 41–Figure 44, considering at the same time seismic risk, energy performance and socioeconomic aspects according to Equations (26)–(29). Results are presented for both prioritisation approaches, described earlier in Section 2.8, i.e. *i*) selecting the top 100 out of the 1151 NUTS-3 regions ordered by decreasing values of integrated indicators, and *ii*) selecting first the top 200 out of the 1151 regions ordered by decreasing values of seismic risk indicators, and then the top 100 out of the 200 regions ordered by decreasing values of multi-sectoral integrated indicators. Cases *i* and *ii* are depicted as sub-figures 'a' and 'b', respectively, in Figure 41–Figure 44. Sub-figures 'a' highlight in red the top 1151/11≈105 regions and in shades of green the rest 1046 regions. Sub-figures 'b' highlight in red the top 100 regions, and in green the initially selected 200 regions. The distribution of the top 100 regions to Member States is provided in Table 11, whereas corresponding values of integrated and component indicators are given in Table B. 5–Table B. 12.

$I_{eq–en}$ consists of pure normalised seismic risk and energy performance economic indicators, and prioritises regions by assigning an equal weight to the ratios of average annual economic seismic and energy loss of a single (average) building within a region to its (average) replacement cost (Equation (26), Figure 41a). $I_{eq–en}$ can be used to identify priority regions where ratios of renovation benefit to renovation cost are expected to be maximised (e.g. evaluation of building renovation scenarios through cost–benefit analysis, Gkatzogias et al., 2022). Such an approach requires both cost and benefit to be defined in monetary terms. In this context, the indicator can be further populated with loss of life, and CO_2 emissions (due to space heating energy consumption and/or repair of buildings), if such relevant metrics are assigned with monetary values. $I_{eq–en}$ captures 89% of the unique regions obtained separately from the top 100 $AAELR_{eq}$ and $AAELR_{en}$ rankings (i.e. 163 out of 184). The top 100 $I_{eq–en}$ ranking includes all NUTS-3 regions of Romania and Slovenia apart from two (i,e. RO223, SI044), 24 out of the 52 NUTS-3 regions of Greece, 18 regions across Italy, four regions in northern Croatia (i.e. HR061, HR062, HR064, HR065), and two regions in north-eastern Bulgaria (i.e. BG323, BG325) (Table 11), all characterised by high relevant economic loss due to both seismic repair and energy consumption. $I^*_{eq–en}$ (Figure 41b) presents similar patterns to $I_{eq–en}$ with 79 common regions in the top 100. Unsurprisingly, based on its definition, $I^*_{eq–en}$ promotes regions of high seismic risk over regions of high average annual energy loss ratios. Among others, it excludes 17 regions of Romania, located in the northern and western part of the country (nine of which located in the upper half of the top 100 $I_{eq–en}$ ranking, Figure 45a vs Figure 46a). On the contrary, it introduces in the bottom of the top 100 ranking, 21 regions of higher $AAELR_{eq}$ from Italy, Greece, Bulgaria, Romania, the capital region of Croatia (Grad Zagreb, HR050), and Cyprus (CY000) (Table B. 5 vs Table B. 9).

$I_{eq–en–SVI,1}$ additionally considers socioeconomic vulnerability in regional prioritisation (Equation (27), Figure 42a), providing a wider perspective to the topic of building renovation that includes socioeconomic aspects. Therefore, the index is favoured from a policy point of view and can be used in support of relevant EU policies and initiatives (e.g. Recovery and Resilience Facility,[60] Cohesion Policy 2021–2027[61]). $I_{eq–en–SVI,1}$ was found capable of capturing 80% of the unique regions obtained separately from the top 100 $AAELR_{eq}$, $AAELR_{en}$, and *SVI* rankings (i.e. 189 out of 236). The top 100 regions based on $I_{eq–en–SVI,1}$ (Table B. 6) are distributed to the same countries as $I_{eq–en}$ except for Slovenia which is substituted to Hungary (Table 11). Although $I_{eq–en–SVI,1}$ top 100 ranking includes 70 common regions to $I_{eq–en}$, it presents a shift of priority to south-eastern Europe in line with *SVI*; it includes all regions of Romania, twelve additional regions of Bulgaria, while excluding regions of northern Italy, Croatia (apart from HR061), and all Slovenian regions. $I^*_{eq–en–SVI,1}$ (Figure 42b), similarly to $I^*_{eq–en}$, excludes from the top 100 list the same 17 Romanian regions (12 of which located in the upper half of the top 100 $I_{eq–en–SVI,1}$ ranking, Figure 45b vs Figure 46b), while it adds to the bottom 23 regions of higher $AAELR_{eq}$ from Bulgaria, Greece, Italy, and Croatia (Table B. 6 vs Table B. 10).

$I_{eq–en–SVI,2}$ is useful for investigating renovation scenarios (based on economic terms) while considering socioeconomic aspects and loss of life (i.e. *AALLR*) (Equation (28), Figure 43a). The integrated indicator was able to capture 78% of the unique regions obtained separately from the top 100 $I_{eq,1}$, $AAELR_{en}$, and *SVI* rankings (i.e. 184 out of 236). Given the similarity of $AAELR_{eq}$ and *AALLR* modes of prioritisation (Section 3.1), which comprise the seismic component $I_{eq,1}$, the top 100 $I_{eq–en–SVI,2}$ introduces only three different regions compared to $I_{eq–en–SVI,1}$, located near the bottom of the list (Figure 45c, Table B. 7). These include two regions in north-eastern Hungary (i.e. HU311, HU312) and one in southern Bulgaria (BG422), substituting three Greek regions (i.e. EL413, EL651), EL431) (Table 11). Although the Greek regions present higher average annual economic loss due to earthquakes ($AAELR_{eq}$), the consideration of *AALLR* in their seismic component reduces $I_{eq,1}$ and increases the effect of $AAELR_{en}$ and *SVI* on $I_{eq–en–SVI,2}$ (i.e. higher in the case of Hungarian and Bulgarian regions). $I^*_{eq–en–SVI,2}$ (Figure 43b)

(60) https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en.
(61) https://ec.europa.eu/regional_policy/en/2021_2027/.

top 100 ranking shares 75 common regions to $I_{eq-en-SVI,2}$, excluding approximately the same regions as $I^*_{eq-en-SVI,1}$ (Figure 46), and introducing 25 regions from Croatia, Greece, Italy, and Bulgaria with higher $I_{eq,1}$ values (Table B. 11).

Finally, $I_{eq-en-SVI,3}$ integrates all relevant normalised indicators, while aiming to capture the effect of both absolute and normalised indicators (Equation (29), Figure 44a). Apart from economic loss ratio (i.e. $AAELR_{eq}$, $AAELR_{en}$), the indicator additionally considers economic loss per building (i.e. $AAEL_{eq/bldg}$, $AAEL_{en/bldg}$), which promotes renovation of urban regions. $I_{eq-en-SVI,3}$ further considers energy consumption per building and *HDD* (i.e. $AAEC_{bldg/HDD}$), which in turn promotes regions with building envelopes, network systems or user behaviour of low energy efficiency. By integrating loss of life (*AALLR*), energy consumption (implicitly indicating also GHG emissions), and socioeconomic aspects (*SVI*), $I_{eq-en-SVI,3}$ attempts to shift the focus from a purely economic perspective. The integrated indicator captures 73% of the unique regions obtained separately from the top 100 $I_{eq,2}$, I_{en}, and *SVI* rankings (i.e. 178 out of 245). Furthermore, $I_{eq-en-SVI,3}$ top 100 ranking has 77 regions in common with $I_{eq-en-SVI,2}$. It excludes north-western regions of Romania and Ilfov (RO322) surrounding the capital region, seven regions from northern and western Greece, four regions of Bulgaria (i.e. BG332, BG342, BG422, BG424), and one in Croatia (i.e. HR061). On the other hand, it introduces the capital regions of France (FR101), Greece (EL303, EL304), Italy (ITI43), along with 19 additional Italian regions (including the urban regions of Milan, ITC4C, Turin, ITC11, Palermo, ITG12, Bologna, ITH55, Florence, ITI14, and Bari, ITF47) most of which are located in the lower half of the top 100 ranking (Figure 45d, Table B. 8). $I^*_{eq-en-SVI,3}$ top 100 ranking has 80 common regions to $I_{eq-en-SVI,3}$, introducing mainly regions of Italy and Greece with high $I_{eq,2}$ values (Figure 44b, Figure 46d, Table B. 12).

Table 11. Distribution of top 100 priority NUTS-3 regions to Member States considering multi-sectoral integrated indicators.

Member State	I_{eq-en}	I^*_{eq-en}	$I_{eq-en-SVI,1}$	$I^*_{eq-en-SVI,1}$	$I_{eq-en-SVI,2}$	$I^*_{eq-en-SVI,2}$	$I_{eq-en-SVI,3}$	$I^*_{eq-en-SVI,3}$
Bulgaria	2	3	14	13	15	13	11	7
Cyprus	-	1	-	-	-	-	-	-
Greece	24	32	26	35	23	33	18	26
France	-	-	-	-	-	-	1	-
Croatia	4	5	1	4	1	5	-	-
Hungary	-	-	1	-	3	-	3	-
Italy	18	26	16	23	16	24	36	44
Romania	41	25	42	25	42	25	31	23
Slovenia	11	8	-	-	-	-	-	-
SUM	100	100	100	100	100	100	100	100

Figure 41. (a) $I_{eq\text{-}en}$, and (b) $I^{*}_{eq\text{-}en}$ in the EU-27 at NUTS-3 level (in red: top 100 regions with the highest index value)

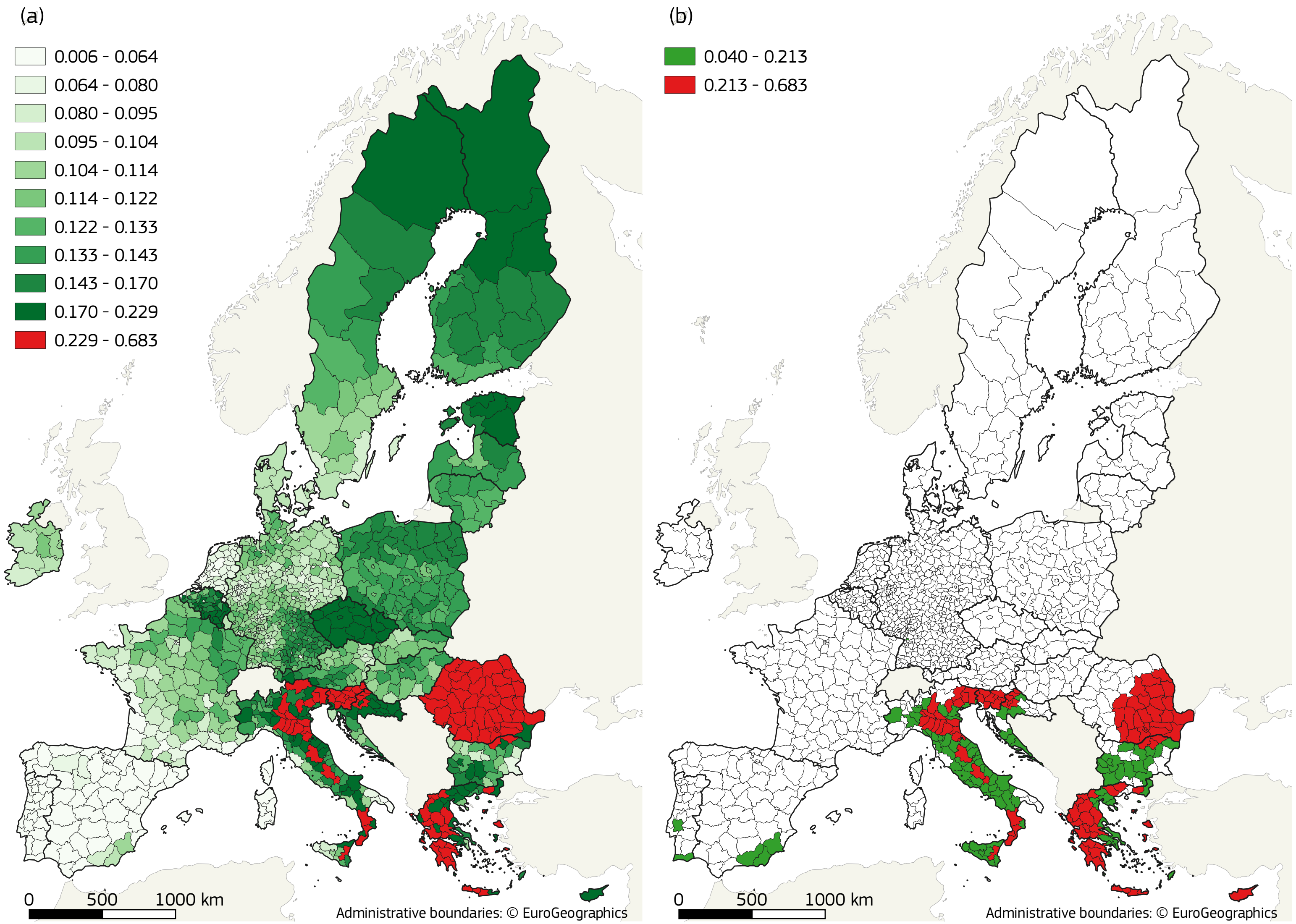


Figure 42. (a) $I_{eq\text{-}en\text{-}SVI,1}$, and (b) $I^{*}_{eq\text{-}en\text{-}SVI,1}$ in the EU-27 at NUTS-3 level (in red: top 100 regions with the highest index value)

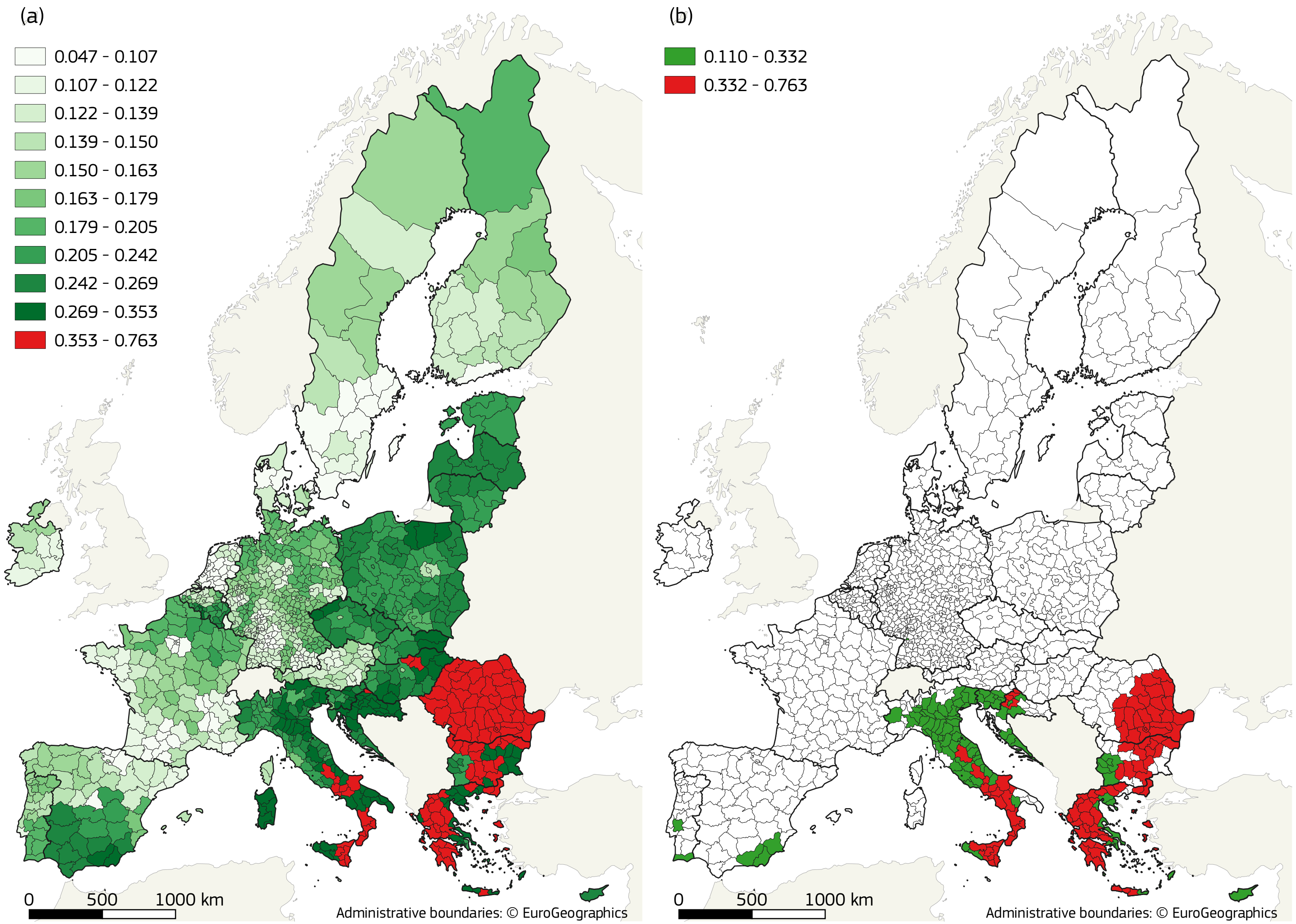


Figure 43. (a) $I_{eq\text{-}en\text{-}SVI,2}$, and (b) $I^{*}_{eq\text{-}en\text{-}SVI,2}$ in the EU-27 at NUTS-3 level (in red: top 100 regions with the highest index value)

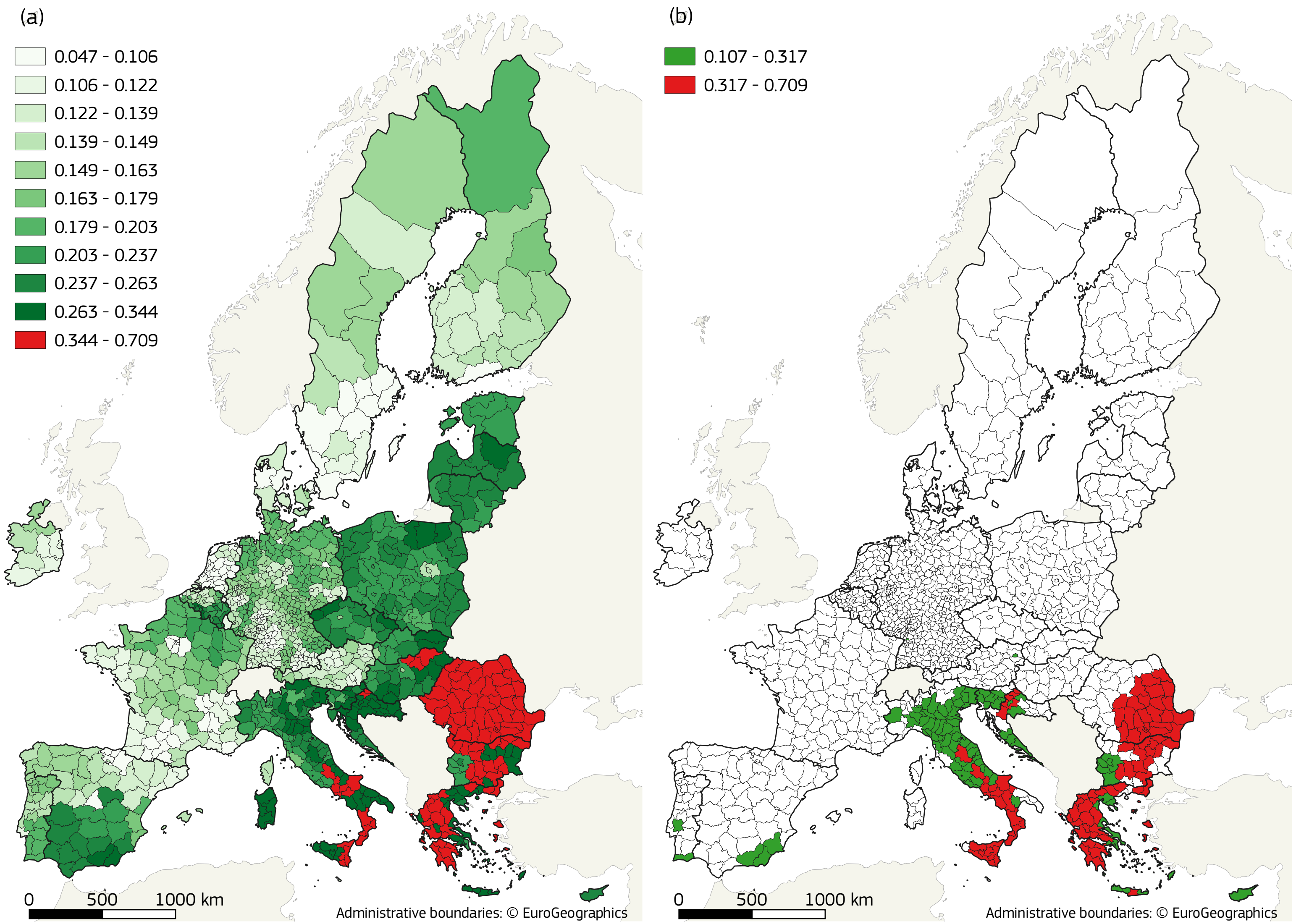


Figure 44. (a) $I_{eq-en-SVI,3}$, and (b) $I^*_{eq-en-SVI,3}$ in the EU-27 at NUTS-3 level (in red: top 100 regions with the highest index value)

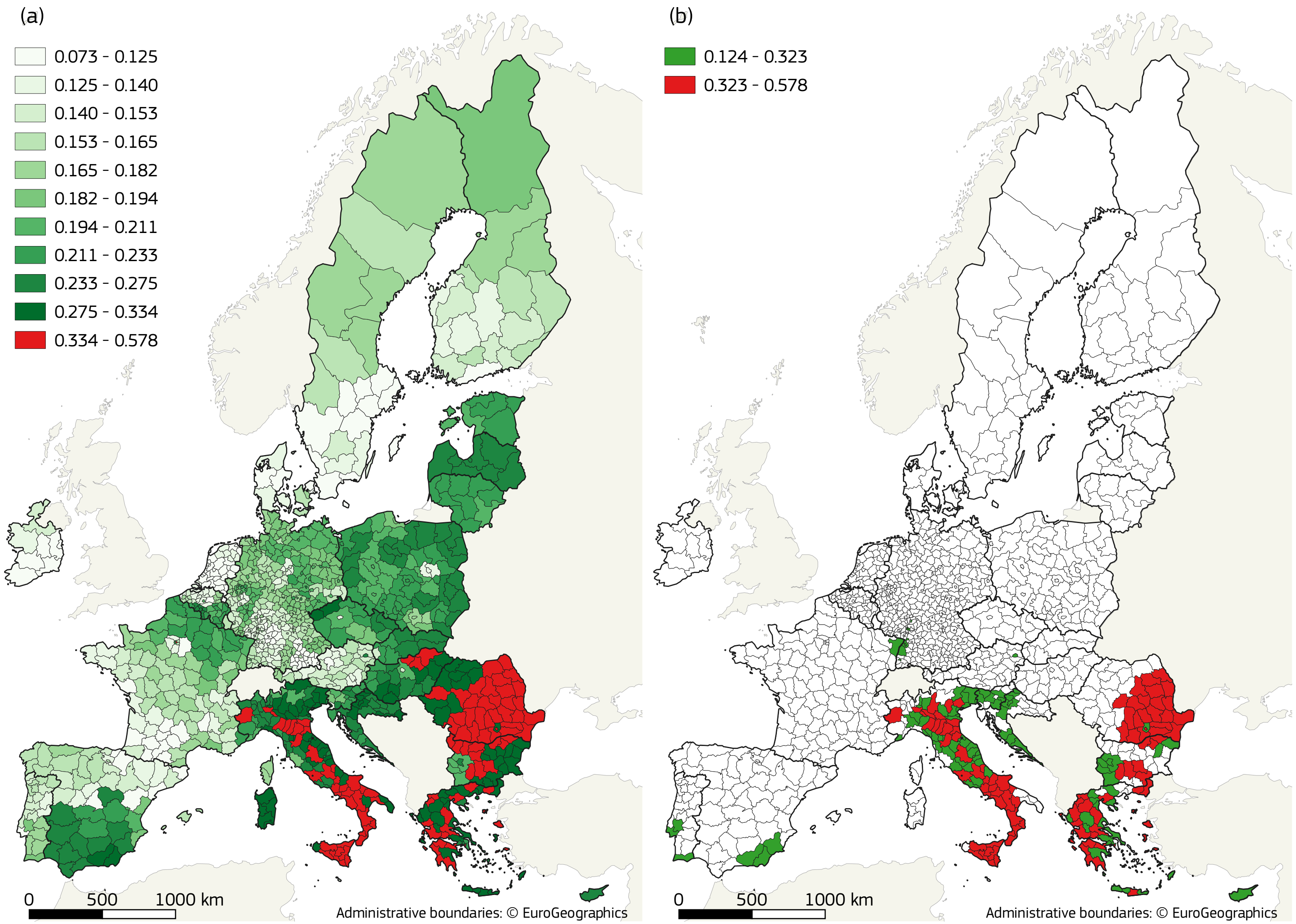


Figure 45. Residential buildings: Top 50 priority regions based on (a) $I_{eq\text{-}en}$, (b) $I_{eq\text{-}en.SVI,1}$ (c) $I_{eq\text{-}en.SVI,2}$, and (d) $I_{eq\text{-}en.SVI,2}$

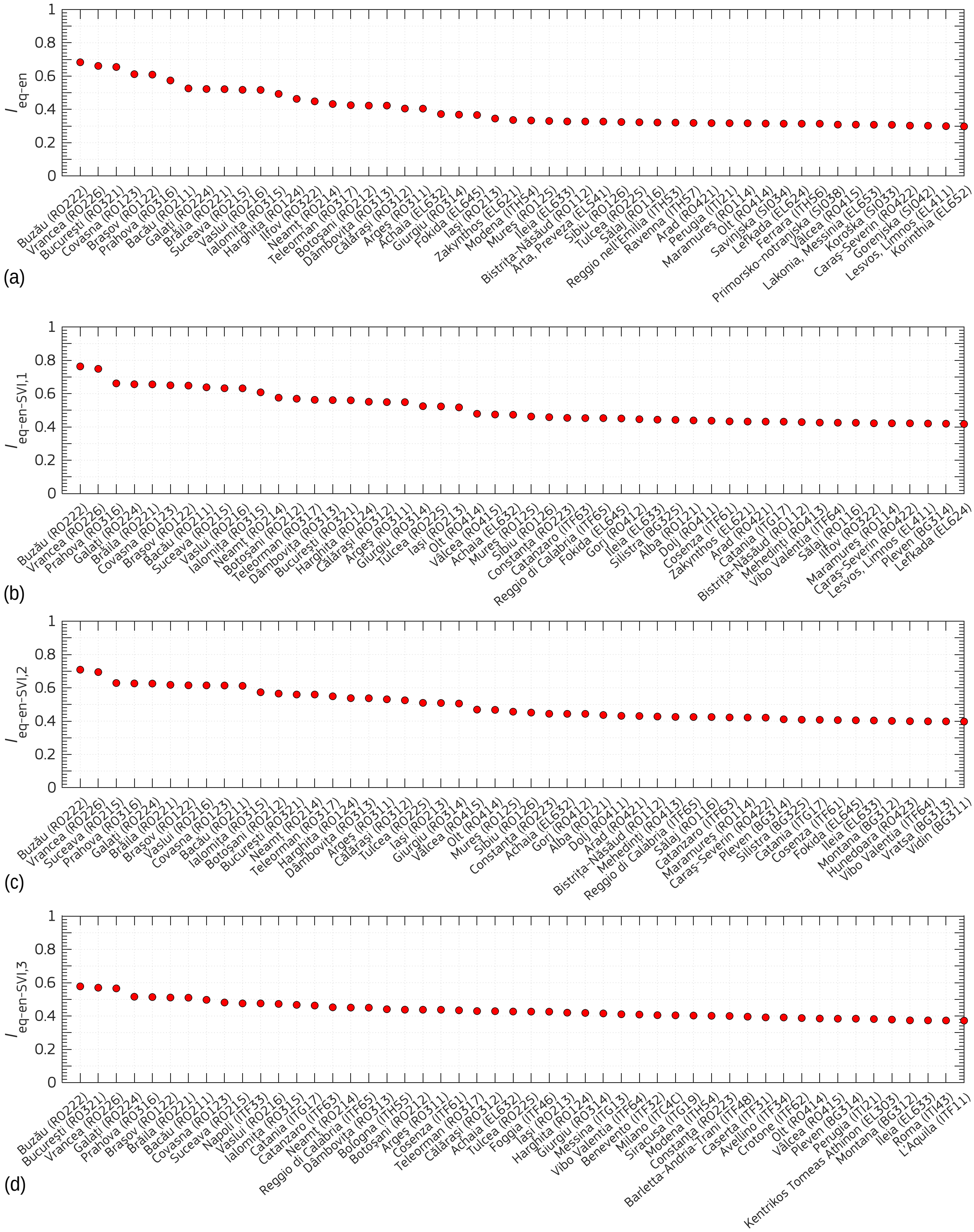
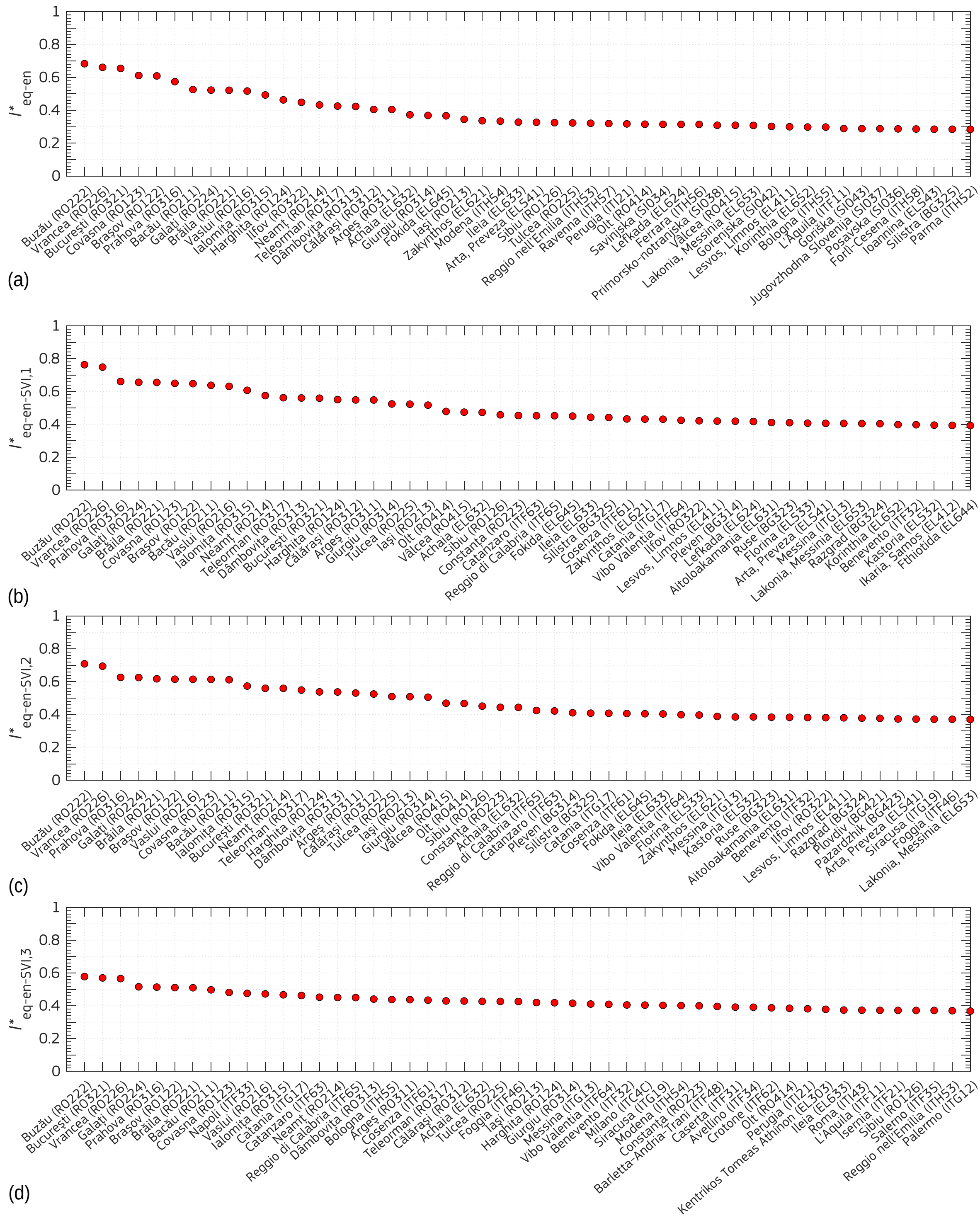


Figure 46. Residential buildings: Top 50 priority regions based on (a) $I^*_{eq\text{-}en}$, (b) $I^*_{eq\text{-}en.SVI,1}$ (c) $I^*_{eq\text{-}en.SVI,2}$, and (d) $I^*_{eq\text{-}en.SVI,3}$



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 GHG emissions, by improving the energy efficiency of the EU building stock. The regional assessment presented in this report had the goal to identify regions in the EU which should be prioritised for renovation interventions. Yet, in conjunction with 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 to 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. Ultimately, holistic building renovation promotes socioeconomic development, smart, inclusive growth, and social progress. 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 identification of priority regions considering seismic risk, energy performance of buildings, and socioeconomic aspects, both independently and in an integrated way.

To identify priority regions, an **integrated analysis framework** was first presented along with the primary metrics adopted for the regional assessment and prioritisation of existing residential and commercial buildings across the EU-27. Metrics address loss of life, economic loss associated with cost for seismic repair and space heating energy, and energy consumption. The framework combines three assessment routes addressing *i*) seismic risk to residential and commercial buildings, and occupants, *ii*) energy performance of residential buildings, and *iii*) socioeconomic indicators, using as a reference a common exposure model. Herein, a recently released seismic exposure model was adopted as a starting point, and subsequently extended to address both structural and energy attributes of the European building stock. A wealth of open-access state-of-the-art data and models related to seismic hazard, climatic, physical and social vulnerability, along with energy performance modelling in Europe were employed in support of the analysis framework. A frequency-based seismic performance assessment approach, a physics-based artificial neural network, and composite socioeconomic indicators were used to estimate seismic risk, energy performance, and socioeconomic vulnerability, respectively.

The estimated metrics from each assessment route were used to form indicators and subsequently explore their impact on the prioritisation of building renovation. The proposed indicators address separately single metrics of seismic risk, energy performance of buildings and socioeconomic vulnerability, or combine multiple metrics to form single or multi-sectoral (seismic and/or energy and/or socioeconomic) integrated indicators.

Absolute average annual loss rankings in terms of **repair cost** and **fatalities** highlight European regions of moderate-to-high seismicity and vulnerability, emphasising densely built and populated (urban, big city) areas. Italian regions govern absolute loss rankings, both in terms of frequency (i.e. number of regions within the top 100) and priority (i.e. relevant ranking position), especially in the case of economic loss to residential buildings. Considering frequency, they are followed by Greek or Romanian regions depending on the considered measure, along with dense urban areas of Spain, Croatia, Bulgaria, France, Germany, Cyprus, Portugal, Austria, and Slovenia. On many occasions, the number of buildings and occupants and the value of buildings bring regions of moderate hazard ahead of high seismicity regions, e.g. Spanish regions ahead of Greek ones or an Austrian ahead of Italian ones, in the cases of residential and commercial buildings, respectively. On the other hand, normalising loss to the above variables, places Romanian and Greek regions on top of Italian ones (or in general increases their priority), increases their frequency, and excludes regions of France, Portugal, Austria, and Germany. Generally, regions from Italy, over the Balkans to Greece are of high priority for seismic retrofitting interventions.

Absolute average annual loss rankings in terms of **energy consumption** and **cost** highlight densely built and populated regions, extending from Spain and France westwards to Austria and Hungary, and towards the north to Sweden and Finland; most of the regions belong to France and Italy. From an economical point of view, renovations addressing the energy efficiency of the building stock in the above regions will have the highest impact, given the effect of energy performance improvements on savings in energy bills. Average annual loss indicators normalised to the number of buildings shift priority towards northern Europe (Sweden and Finland), but still focus on urban areas with a strong presence of German regions, followed by French and Italian ones. Evaluation of energy inefficiency of buildings by integrating energy consumption with the number of buildings and climatic conditions shifts priority from northern to central and southern Europe, mainly Italy, followed by Germany and France. Overall, French, Italian and German regions emerge as those of high priority for energy retrofitting interventions, followed by northern EU regions. Conversely, when exploring the cost of energy integrated with the size and value of the building stock, the prioritisation introduces many regions in south-eastern and central Europe (Romania, Czechia, Belgium, Slovenia and Croatia).

The results presented in this report clearly show that prioritisation of building renovation is a multidimensional problem, with no 'one-size-fits-all' solution. Different indicators should be employed depending on the sectoral and geographical focus, and the objective of specific policy measures. In addition to direct benefits (i.e. structural safety and energy efficiency improvement), building renovation may serve as a **socioeconomic driver** in a region, with a potential employment boost and improvements in living conditions of socially vulnerable groups. This is very much in line with relevant EU policies and initiatives such as the Renovation Wave, the Recovery and Resilience Facility ([62]), and the Cohesion Policy 2021–2027 ([63]). Prioritisation based on socioeconomic indicators shifts the focus to southern and eastern European regions, following more closely the trends of seismic risk. Such trends may be omitted when looking at heating energy consumption alone.

Single and multi-sectoral **integrated indicators** were found capable of capturing the above modes of prioritisation by assigning an equal weight (i.e. importance) to normalised component indicators, as a means to handle complexity and filter out severe disparities among different aspects (e.g. disproportionate economic loss due to energy cost and due to seismic repair cost). Importantly, when integrating seismic risk with the energy performance of the building stock, regions benefitting from an integrated seismic and energy retrofitting approach are highlighted. In these regions, integrated renovation is expected to be more beneficial over separate interventions. Integrated indicators in pure economic loss terms were first assessed, resulting in a high priority of seismic regions in Romania, Greece, Italy, as well as Slovenia, Croatia, and Bulgaria (ordered by decreasing number of priority regions within the top 100). In such regions, the highest economic benefit from integrated retrofitting was found (Gkatzogias et al., 2022). Integrating additionally socioeconomic vulnerability, results in a shift of priority to south-eastern Europe. A multi-sectoral integrated indicator combining all normalised indicators of economic loss, loss of life, energy consumption, and socioeconomic vulnerability was found capable of encompassing all previous trends, promoting renovation in regions of Romania, Italy, Greece, Bulgaria, Hungary and France (ordered once again by decreasing number of regions). An alternative prioritisation approach, promoting regions of high seismic risk over regions of high average annual energy loss ratios, differentiated prioritisation in the bottom quarter of the top 100 rankings, while maintaining the general geographical trends.

Depending on priorities, different integrated indicators should be used to inform policies that accomplish the highest relative or most spread impact. The work presented herein provides a set of data, indicators and rankings, which can be used to achieve a more focussed approach in local, regional or European policy making. In this context, the output of this report was used in Gkatzogias et al. (2022) to propose and analyse plausible regional renovation scenarios across the EU-27. Intervention scenarios were defined considering seismic, energy, and integrated retrofit of various combinations of building classes per region or multiple regions at the same time. The impact of these scenarios was evaluated at the regional level through cost–benefit analysis and additional metrics of benefit with a view to providing insight on savings, considering the effect of variable planning period (remaining economic life of the assets), and cost of renovation.

The REEBUILD team will continue fostering holistic approaches of renovation in support of the EU policies with additional explorations of priority indicators along with improvements on data, models and methodologies presented herein.

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

([63]) https://ec.europa.eu/regional_policy/en/2021_2027/.

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Annex A Input data for regional prioritisation (supplement to Chapter 2)

Table A. 1. Source data on residential buildings (Source: seismic variables obtained from ESRM20, Crowley et al., 2020a, available from EFEHR; JRC mapping to NUTS and energy variables)

Variables	Member State		
	Austria (AT)	**Belgium (BE)**	**Bulgaria (BG)**
Residential model development data			
Distribution of residential buildings	2011 Population and Housing Census http://www.statistik.at	-	2011 Population and Housing Census https://www.nsi.bg
Distribution of dwellings	-	2011 Population and Housing Census http://census2011.fgov.be	-
Admin level resolution/aggregation	GADM1	GADM4	GADM2
Distribution of dwellings per construction period (1)	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b)
Distribution of occupied dwellings (3)	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data (4)	2011 Population and Housing Census	2011 Population and Housing Census	2011 Population and Housing Census
Mapping scheme	Academic literature	Academic literature	Academic literature
Number of separate mapping scheme variables	one	one	one
Mapping scheme variables	Material with year of construction	Dwelling type with year of construction	Material
Division	Urban/rural	Urban/rural	Urban/rural
Urban/rural distinction (5)	All assumed rural (except Vienna)	According to census	According to GADM1 % urban/rural in census (applied to GADM2)
Big cities (6)	Vienna	Antwerpen, Bruxelles, Vlaams, Brabant, West-Vlaanderen, Oost-Vlaanderen, Hainaut, Liege, Limburg, Namur	Burgas, Varna, Grad Sofiya
National (calibration) data			
Total floor area (m^2): definition (7)	-	The residential building floor area correspond to the useful floor area (8)	The residential building floor area correspond to the useful floor area (8)
Total floor area (m^2): source	NERA project: https://tinyurl.com/w4awj9k	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en
Total number of buildings	-	2011 Population and Housing Census	-
Total number of dwellings (9)	2011 Population and Housing Census	NERA project: https://tinyurl.com/w4awj9k	2011 Population and Housing Census
Ratio of heated to occupied dwellings' number (11)	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance (12)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values (12)	-	-	-

Variables	Member State		
	Croatia (HR)	Cyprus (CY) ([13])	Czechia (CZ)
Residential model development data			
Distribution of residential buildings	-	-	GED4GEM (Gamba et al., 2012)
Distribution of dwellings	2011 Population and Housing Census https://www.dzs.hr	2011 Population and Housing Census http://www.cystat.gov.cy	-
Admin level resolution/aggregation	GADM2	GADM2	GADM2
Distribution of dwellings per construction period ([1])	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b)
Distribution of occupied dwellings ([3])	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data ([4])	2011 Population and Housing Census	2011 Population and Housing Census	2011 Population and Housing Census https://www.czso.cz
Mapping scheme	Academic literature	Academic literature	GED4GEM (Gamba et al., 2012)
Number of separate mapping scheme variables	one	one	-
Mapping scheme variables	Year of construction	Dwelling type	-
Division	Urban/rural	Urban/rural	-
Urban/rural distinction ([6])	According to census	According to census	GED4GEM (Gamba et al., 2012)
Big cities ([6])	Primorsko-Goranska, Osjecko-Baranjska, Split, Grad Zagreb	-	-
National (calibration) data			
Total floor area (m^2): definition ([7])	Useful floor area of a dwelling is a floor area of a dwelling, measured inside the walls of the dwelling (Statistics Denmark, 2011)	The residential building floor area correspond to the useful floor area ([8])	-
Total floor area (m^2): source	https://www.dzs.hr	https://ec.europa.eu/energy/eu-buildings-database_en	-
Total number of buildings	-	TABULA project: https://episcope.eu/iee-project/tabula/	-
Total number of dwellings ([9])	-	-	2011 Population and Housing Census https://www.czso.cz
Ratio of heated to occupied dwellings' number ([11])	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance ([12])	ENTRANZE and Enerdata (2008a, b)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values ([12])	Marđetko Škoro (2016)	-	-

Variables	Member State		
	Denmark (DK)	Estonia (EE)	Finland (FI)
Residential model development data			
Distribution of residential buildings	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)
Distribution of dwellings	-	-	-
Admin level resolution/aggregation	GADM2	GADM1	GADM2
Distribution of dwellings per construction period (1)	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b) (2)
Distribution of occupied dwellings (3)	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data (4)	2011 Population and Housing Census https://www.dst.dk	2011 Population and Housing Census https://www.stat.ee	2011 Population and Housing Census https://www.stat.fi
Mapping scheme	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)
Number of separate mapping scheme variables	-	-	-
Mapping scheme variables	-	-	-
Division	-	-	-
Urban/rural distinction (6)	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)
Big cities (6)	-	-	-
National (calibration) data			
Total floor area (m^2): definition (7)	-	-	-
Total floor area (m^2): source	-	-	-
Total number of buildings		2011 Population and Housing Census https://www.stat.ee	2011 Population and Housing Census https://www.stat.fi
Total number of dwellings (9)	Eurostat 2011 (10) https://tinyurl.com/3ymrfu33	2011 Population and Housing Census	Eurostat 2011 (10) https://tinyurl.com/3ymrfu33
Ratio of heated to occupied dwellings' number (11)	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance (12)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values (12)	-	-	-

Variables	Member State		
	France (FR) ([14])	Germany (DE)	Greece (EL)
Residential model development data			
Distribution of residential buildings	-	2011 Population and Housing Census https://ergebnisse.zensus2011.de	2011 Population and Housing Census http://www.statistics.gr
Distribution of dwellings	2014 Population and Housing Census https://www.insee.fr	-	-
Admin level resolution/aggregation	GADM5	GADM4	GADM3
Distribution of dwellings per construction period ([1])	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b)
Distribution of occupied dwellings ([3])	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data ([4])	2014 Population and Housing Census	2011 Population and Housing Census	2011 Population and Housing Census
Mapping scheme	Academic literature	Academic literature	Academic literature
Number of separate mapping scheme variables	one	one	-
Mapping scheme variables	Dwelling type with year of construction	Dwelling type	-
Division	Urban/rural/historic	Urban/rural	Urban/rural
Urban/rural distinction ([6])	According to the census	Municipalities with 'Stadt' are urban	According to census
Big cities ([6])	Nice, Marseille, Toulouse, Bordeaux, Montpellier, Nantes, Lille, Strasbourg, Lyon, Paris	Berlin, Munchen, Hamburg, Stuttgart, Koln, Dresden	Alexandroupoli, Ioannina, Larissa, Volos, Rhodes, Heraklion, Thessaloniki, Athens
National (calibration) data			
Total floor area (m^2): definition ([7])	The residential building floor area correspond to the useful floor area ([8])	Floor area of the entire dwelling in m^2. The dwelling includes rooms outside the dwelling unit (e.g. attics) and cellars and compartments which have been developed for habitation.	The residential building floor area correspond to the useful floor area ([8])
Total floor area (m^2): source	https://ec.europa.eu/energy/eu-buildings-database_en	2011 Population and Housing Census	https://ec.europa.eu/energy/eu-buildings-database_en
Total number of buildings	TABULA project: https://episcope.eu/iee-project/tabula/	-	-
Total number of dwellings ([9])	-	2011 Population and Housing Census	2011 Population and Housing Census
Ratio of heated to occupied dwellings' number ([11])	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance ([12])	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values ([12])	Bordier et al., (2016)	-	KENAK (2017)

Variables	Member State		
	Hungary (HU)	**Ireland (IE)**	**Italy (IT) ([15])**
Residential model development data			
Distribution of residential buildings	-	GED4GEM (Gamba et al., 2012)	2011 Population and Housing Census https://www.istat.it
Distribution of dwellings	2011 Population and Housing Census https://www.ksh.hu	-	2011 Population and Housing Census https://www.istat.it
Admin level resolution/aggregation	GADM1	GADM1	GADM3
Distribution of dwellings per construction period ([1])	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b)
Distribution of occupied dwellings ([3])	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data ([4])	2011 Population and Housing Census	2011 Population and Housing Census http://www.cso.ie	2011 Population and Housing Census
Mapping scheme	Academic literature	GED4GEM (Gamba et al., 2012)	see data_Italy_RES_README.txt ([5])
Number of separate mapping scheme variables	two	-	-
Mapping scheme variables	Material and year of construction	-	-
Division	Urban/rural/big_cities	-	-
Urban/rural distinction ([6])	Községek: rural Többi város: urban	GED4GEM (Gamba et al., 2012)	population >10,000 = urban
Big cities ([6])	All those assigned "Kecskemét mjv" in census data	-	Milan, Rome
National (calibration) data			
Total floor area (m^2): definition ([7])	Average floor space	-	Total surface area
Total floor area (m^2): source	NERA project: https://tinyurl.com/w4awj9k	-	2011 Population and Housing Census
Total number of buildings	2011 Population and Housing Census	2011 Population and Housing Census http://www.cso.ie	-
Total number of dwellings ([9])	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33
Ratio of heated to occupied dwellings' number ([11])	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance ([12])	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values ([12])	-	-	Costanzo et al. (2016)

Variables	Member State		
	Latvia (LV)	**Lithuania (LT)**	**Luxenbourg (LU)**
Residential model development data			
Distribution of residential buildings	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)
Distribution of dwellings	-	-	-
Admin level resolution/aggregation	GADM1	GADM2	GADM2
Distribution of dwellings per construction period ([1])	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b)
Distribution of occupied dwellings ([3])	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data ([4])	2009 Population and Housing Census http://www.csb.gov.lv	2001 Population and Housing Census https://osp.stat.gov.lt	2001 Population and Housing Census http://www.statistiques.public.lu
Mapping scheme	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)
Number of separate mapping scheme variables	-	-	-
Mapping scheme variables	-	-	-
Division	-	-	-
Urban/rural distinction ([6])	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)	GED4GEM (Gamba et al., 2012)
Big cities ([6])	-	-	-
National (calibration) data			
Total floor area (m^2): definition ([7])	-	-	-
Total floor area (m^2): source	-	-	-
Total number of buildings	-	-	2001 Population and Housing Census
Total number of dwellings ([9])	2009 Population and Housing Census	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33
Ratio of heated to occupied dwellings' number ([11])	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance ([12])	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values ([12])	-	-	-

Variables	Member State		
	Malta (MT)	Netherlands (NL)	Poland (PL)
Residential model development data			
Distribution of residential buildings	-	-	GED4GEM (Gamba et al., 2012)
Distribution of dwellings	2005 Population and Housing Census https://nso.gov.mt	2017 Population and Housing Census https://www.cbs.nl	-
Admin level resolution/aggregation	GADM1	GADM2	GADM2
Distribution of dwellings per construction period (1)	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b)
Distribution of occupied dwellings (3)	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data (4)	2005 Population and Housing Census	2017 Population and Housing Census	https://www.citypopulation.de/en/poland/admin/
Mapping scheme	Academic literature	Academic literature	GED4GEM (Gamba et al., 2012)
Number of separate mapping scheme variables	one	two	-
Mapping scheme variables	Year of construction	Dwelling type and year of construction	-
Division	Rural	Urban/rural	-
Urban/rural distinction (6)	All rural	Based on the population (>= 20.000 is considered an urban municipality) - European Commission	GED4GEM (Gamba et al., 2012)
Big cities (6)	-	Amsterdam, Delft, Eindhoven, Groningen, Rotterdam, Utrecht	-
National (calibration) data			
Total floor area (m^2): definition (7)	The residential building floor area correspond to the useful floor area (8)	Average area of use of homes (residential property with at least one residential function). (https://statline.cbs.nl/StatWeb/selection/?DM=SLNL&PA=82550NED)	-
Total floor area (m^2): source	https://ec.europa.eu/energy/eu-buildings-database_en	2017 Population and Housing Census	-
Total number of buildings	NERA project: https://tinyurl.com/w4awj9k	-	-
Total number of dwellings (9)	Eurostat 2011 (10) https://tinyurl.com/3ymrfu33	-	Eurostat 2011 (10) https://tinyurl.com/3ymrfu33
Ratio of heated to occupied dwellings' number (11)	Eurostat (2012)	Eurostat (2012)	Assumed equal to 100%
Building envelope thermal transmittance (12)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values (12)	-	-	-

Variables	Member State		
	Portugal (PT) ([16])	Romania (RO)	Slovakia (SK)
Residential model development data			
Distribution of residential buildings	2011 Population and Housing Census https://ine.pt	2011 Population and Housing Census http://www.recensamantromania.ro	-
Distribution of dwellings	2011 Population and Housing Census https://ine.pt	-	2001 Population and Housing Census https://bit.ly/2GhTgeL
Admin level resolution/aggregation	GADM3	GADM2	GADM2
Distribution of dwellings per construction period ([1])	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b) ([2])
Distribution of occupied dwellings ([3])	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data ([4])	2011 Population and Housing Census	2011 Population and Housing Census	2001 Population and Housing Census
Mapping scheme	see data_Portugal_RES_README.txt ([5])	see data_Romania_RES_README.txt ([5])	Academic literature
Number of separate mapping scheme variables	-	-	two
Mapping scheme variables	-	-	Material and dwelling type
Division	-	Urban/rural	Urban
Urban/rural distinction ([6])	Not specified	Rural: Arad, Botosani, Salaj, Suceana, Teleorman, Vaslui and Caras-Severin	Urban
Big cities ([6])	Lisboa, Porto, Setubal	municipalities of Constanta and Bucuresti	Zilina, Bytca, Cadca, Dolny Kubin, Kysucke Nove Mesto
National (calibration) data			
Total floor area (m^2): definition ([7])	-	-	Total area of dwellings
Total floor area (m^2): source	-	-	http://sodb.infostat.sk/scitanie/eng/2001/format.htm
Total number of buildings	-	-	2001 Population and Housing Census
Total number of dwellings ([9])	2011 Population and Housing Census	2011 Population and Housing Census	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33
Ratio of heated to occupied dwellings' number ([11])	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance ([12])	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values ([12])	Fragoso and Baptista (2016)	-	-

Variables	**Member State**		
	Slovenia (SI)	**Spain (ES) ([17])**	**Sweden (SE)**
Residential model development data			
Distribution of residential buildings	2002 Population and Housing Census http://www.stat.si/	2011 Population and Housing Census http://www.ine.es	GED4GEM (Gamba et al., 2012)
Distribution of dwellings	-	-	-
Admin level resolution/aggregation	GADM2	GADM2	GADM2
Distribution of dwellings per construction period ([1])	Eurostat (2011b)	Eurostat (2011b)	Eurostat (2011b)
Distribution of occupied dwellings ([3])	Eurostat (2011a)	Eurostat (2011a)	Eurostat (2011a)
Admin level resolution/aggregation	NUTS-3	NUTS-3	NUTS-3
Population spatial distribution data ([4])	2002 Population and Housing Census	2011 Population and Housing Census	2011 Population and Housing Census http://www.statistikdatabasen.scb.se
Mapping scheme	Academic literature	Academic literature	GED4GEM (Gamba et al., 2012)
Number of separate mapping scheme variables	one	two	-
Mapping scheme variables	Material	Year of construction and number of floors	-
Division	Urban/rural	Urban/rural	-
Urban/rural distinction ([6])	According to GADM1 % urban/rural in census (applied to GADM2)	% urban/rural buildings in census (applied then to other parameters)	GED4GEM (Gamba et al., 2012)
Big cities ([6])	Ljubljana	Barcelona, Madrid	-
National (calibration) data			
Total floor area (m^2): definition ([7])	Useful floor space is defined as: - the floor space measured inside the outer walls excluding non-habitable cellars and attics and, in multi-dwelling buildings, all common spaces; or - the total floor space of rooms falling under the concept of 'room'.	The residential building floor area correspond to the useful floor area ([8])	-
Total floor area (m^2): source	2002 Population and Housing Census	https://ec.europa.eu/energy/eu-buildings-database_en	-
Total number of buildings	-	-	-
Total number of dwellings ([9])	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33	2011 Population and Housing Census	Eurostat 2011 ([10]) https://tinyurl.com/3ymrfu33
Ratio of heated to occupied dwellings' number ([11])	Eurostat (2012)	Eurostat (2012)	Eurostat (2012)
Building envelope thermal transmittance ([12])	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)	INSPIRE project (Birchall et al., 2014)
Max regional thermal transmittance values ([12])	-	DBHE (2019)	-

(1) Percentages of buldings per construction period were estimated considering conventional dwellings (i.e. occupied, unoccupied, unknown) in all building types (i.e. residential, non-residential, unknown) (definitions according to Eurostat: https://ec.europa.eu/eurostat/cache/metadata/en/cens_11r_esmscs.htm).

(2) Percentages of buldings per construction period were estimated considering occupied conventional dwellings in residential buildings.

(3) I.e. ratios of occupied to total (i.e. occupied, unoccupied, unknown) number of conventional dwellings in all building types.

(4) Sources included in this row represent original data. Population retrieved from these sources was subsequently scaled to 2019 values (provided by the World Bank).

(5) https://gitlab.seismo.ethz.ch/efehr/esrm20_exposure

(6) The settlement type (big city, urban, rural) defines the replacement cost in euro 2020 values.

(7) In the final exposure model, the total floor area obtained from source files was considered as 'useful' floor area for the purpose of assigning construction costs. On the conrary, in energy performance calculations, it was reduced to represent heated occupied area.

(8) The useful floor area is different from the gross floor area which includes common areas in multi family buildings, attics, basement or verandas. It is expressed in million m^2. The floor area that is heated during most of the winter months. Rooms that are unoccupied and/or unheated during the heating season, unheated garages or other unheated areas in the basement and/or the attic are not considered.

(9) The number of dwellings in the final exposure model represents the total number of conventional dwellings (i.e. occupied, unoccupied, unknown) in all building types (i.e. residential, non-residential, unknown).

(10) The number of dwellings retrieved from the national census was scaled to match the total number of conventional dwellings in all buildings types provided by Eurostat (census round 2011).

(11) Ratios were obtained from variable HC050 'dwelling equipped with heating facilities', collected at household level, by summing the percentages of households heated by 'central heating or similar' and 'other fixed heating' (definitions according to Eurostat: https://ec.europa.eu/eurostat/web/income-and-living-conditions/data/ad-hoc-modules).

(12) Thermal transmittance values of external walls and roofs.

(13) Only buildings in government controlled area included in final model. Total population in government controlled area in 2018 was obtained from http://www.cystat.gov.cy and scaled up to an estimated 2019 value.

(14) Historic centres use the replacement cost of urban areas and are identified as such in the final exposure model.

(15) The processed 2011 census data for the exposure model for Italy was provided by the Department of Civil Protection and is not currently publicly available.

(16) Buildings in Azores are not included in final model, and an estimated population of 243,862 was thus removed from the total population in the social indicators folder (see [5]).

(17) Buildings in Canary islands are not included in final model.

Table A. 2. Source data on commercial buildings (Source: ESRM20, Crowley et al., 2020a, available from EFEHR)

Variables	**Member State**		
	Austria (AT)	**Belgium (BE)**	**Bulgaria (BG)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Total number of buildings per sector distributed according to labour force distribution in each sector (both from census)	Number of buildings per sector (from Eurostat) distributed according to total labour force (from census)	Number of enterprises per sector (from Eurostat) divided by 2 for offices and by 3 for trade, distributed according to labour force per sector (from census)
Sources	2011 Population and Housing Census: http://www.statistik.at	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2011 Population and Housing Census: https://statbel.fgov.be	Eurostat 2011: http://bit.ly/2GjGHMW 2011 Population and Housing Census: http://www.nsi.bg & https://infostat.nsi.bg/infostat/pages/reports/query.jsf?x_2=754
Admin level resolution/aggregation	GADM1	GADM2	GADM1
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/en/eu-buildings-database	Offices: https://ec.europa.eu/energy/eu-buildings-database_en & Trade and Hotels: http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf
Additional information			Change in CDL lateral force coefficients not considered (due to year not being in mapping scheme)
Variables	**Member State**		
	Croatia (HR)	**Cyprus (CY)**	**Czechia (CZ)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of enterprises per sector (from Eurostat) divided by 2 and distributed according to labour force per sector (from census)	Number of enterprises per sector (from Eurostat) divided by 2 for trade, 70% for offices and 80% for hotels and distributed according to labour force per sector (from census)	Number of buildings per sector (from Eurostat) distributed according to labour force by sector (from census)
Sources	Eurostat 2015: http://bit.ly/2GjGHMW 2011 Population and Housing Census: https://www.dzs.hr	Eurostat 2011: http://bit.ly/2GjGHMW 2011 Population and Housing Census: http://www.cystat.gov.cy	European Commission 2014: https://ec.europa.eu/energy/eu-buildings-database_en 2011 Population and Housing Census: https://www.czso.cz
Admin level resolution/aggregation	GADM2	GADM1	GADM1
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en	Offices: https://ec.europa.eu/energy/eu-buildings-database_en & Trade and Hotels: http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf
Additional information		Only buildings in government controlled area included in final model	

Variables	Member State		
	Denmark (DK)	**Estonia (EE)**	**Finland (FI)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of buildings per sector distributed according to labour force per sector (both from census)	Number of buildings per sector (from Eurostat) distributed according to labour force by sector (from census)	Number of buildings per sector distributed according to labour force per sector (both from census)
Sources	2011 Statistics: https://www.dst.dk	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2011 Population and Housing Census: https://www.stat.ee	2011 Population and Housing Census https://www.stat.fi
Admin level resolution/aggregation	GADM2	GADM1	GADM2
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en
Additional information			

Variables	Member State		
	France (FR)	**Germany (DE)**	**Greece (EL)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of enterprises per sector (from Eurostat) divided by 2.6 and distributd according to labour force (from census)	Number of enterprises per sector (from Eurostat) divided by 2 and distributed according to labour force (from census)	Number of buildings per sector (from Eurostat) distributed according to labour force per sector (from census)
Sources	Eurostat 2015: http://bit.ly/2GjGHMW 2014 Population and Housing Census https://www.insee.fr	Eurostat 2011: http://bit.ly/2GjGHMW 2011 Population and Housing Census https://www.destatis.de	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2011 Population and Housing Census: http://www.statistics.gr
Admin level resolution/aggregation	GADM2	GADM2	GADM3
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf	http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf	https://ec.europa.eu/energy/eu-buildings-database_en
Additional information			Reduced values used in model to produce similar IND/COM ratio to De Bono and Chatenoux (2014)

Variables	**Member State**		
	Hungary (HU)	**Ireland (IE)**	**Italy (IT)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of enterprises per sector (from Eurostat) divided by 3 and distributed according to labour force (from census)	Number of buildings per sector (from Eurostat) distributed according to labour force per sector (from census)	Number of buildings per sector distributed according to labour force per sector (both from census)
Sources	Eurostat 2011: http://bit.ly/2GjGHMW 2011 Population and Housing Census: https://www.ksh.hu	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2011 Population and Housing Census https://www.cso.ie	2011 Population and Housing Census: www.istat.it
Admin level resolution/aggregation	GADM1	GADM1	GADM3
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en
Additional information			

Variables	**Member State**		
	Latvia (LV)	**Lithuania (LT)**	**Luxembourg (LU)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of buildings per sector (from Eurostat) distributed according to labour force per sector (from census)	Number of buildings (from Eurostat) distributed according to labour force per sector (from census)	Number of buildings (from Eurostat) distributed according to labour force per sector (from census)
Sources	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2009 Population and Housing Census: http://www.csb.gov.lv	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2001 Population and Housing Census https://osp.stat.gov.lt	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2001 Population and Housing Census http://www.statistiques.public.lu
Admin level resolution/aggregation	GADM1	GADM1	GADM2
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en
Additional information			

Variables	Member State		
	Malta (MT)	**Netherlands (NL)**	**Poland (PL)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of buildings (from Eurostat) distributed according to labour force (from census)	Number of buildings for offices and trade from OpenData (see below), and number of enterprises for hotels (Eurostat) reduced by 50% and distributed by labour force (from census)	Number of enterprises (from Eurostat) reduced by 30% for offices and trade and 10% for hotels, distributed by labour force per sector (from census)
Sources	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2005 Population and Housing Census https://nso.gov.mt	Eurostat 2011: http://bit.ly/2GjGHMW https://opendata.cbs.nl/statline/#/CBS/en/dataset/81955eng/table?dl=1117E 2017 Population and Housing Census: https://www.cbs.nl	Eurostat 2015: http://bit.ly/2GjGHMW 2016 Statistics: http://stat.gov.pl
Admin level resolution/aggregation	GADM1	GADM1	GADM1
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en	Offices: https://ec.europa.eu/energy/eu-buildings-database_en , Trade and Hotel: http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf
Additional information			

Variables	Member State		
	Portugal (PT)	**Romania (RO)**	**Slovakia (SK)**
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of enterprises per sector per admin level 3 reduced by 50%	Number of buildings per sector (from Eurostat) distributed by labour force per sector (from census)	Number of enterprises per sector reduced by 50% for offices and trade and 10% for hotels, distributed according to labour force (both from census)
Sources	2011 Population and Housing Census https://ine.pt	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2011 Population and Housing Census http://www.recensamantromania.ro	2016 Statistics: http://statdat.statistics.sk
Admin level resolution/aggregation	GADM3	GADM1	GADM2
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	https://ec.europa.eu/energy/eu-buildings-database_en		https://ec.europa.eu/energy/eu-buildings-database_en
Additional information	Buildings in Azores are not included in final model.	Change in CDM lateral force coefficients not considered (due to year not being in mapping scheme)	

Variables	Member State		
	Slovenia (SI)	Spain (ES)	Sweden (SE)
Commercial model development data			
Method to calculate and distribute commercial buildings per sector (offices, retail/trade, hotels)	Number of enterprises per sector (from Eurostat) reduced by 50% and distributed according to labour force (from census)	Number of enterprises per sector (from Eurostat) reduced by 60% and distributed according to labour force (from census)	Number of buildings per sector (from Eurostat) distributed according to labour force (from census)
Sources	Eurostat 2015: http://bit.ly/2GjGHMW 2002 Population and Housing Census http://www.stat.si/	Eurostat 2015: http://bit.ly/2GjGHMW 2011 Population and Housing Census http://www.ine.es	European Commission 2011: https://ec.europa.eu/energy/eu-buildings-database_en 2011 Population and Housing Census http://www.statistikdatabasen.scb.se
Admin level resolution/aggregation	GADM2	GADM1	GADM2
National calibration data			
Total floor area: offices; wholesale and retail trade; hotels and restaurants	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en	https://ec.europa.eu/energy/eu-buildings-database_en
Additional information		Change in CDL lateral force coefficients not considered (due to year not being in mapping scheme). Buildings in Canary Islands are not included in final model.	

Table A. 3. Seismic design code levels (CD) and energy efficiency design levels (in terms of thermal tranmittance values of walls U_w and roofs U_r in W/(m^{2}K)) (Source: CD data according to Crowley et al., 2021b; JRC mapping of U values to CD).

No	Country	Class variable	Seismic and energy design code level															
1	Austria	Years	< 1946	1946–1970	1971–1978				1979–1990	1991–2000	2001–2006						> 2006	
		CD	CDN						CDL								CDH	
		U_w	1.60	1.30	0.90				0.70	0.50	0.50						0.50	
		U_r	1.30	0.80	0.60				0.40	0.30	0.20						0.20	
2	Belgium	Years	< 1971	1971–1980	1981–1990	1991–2000	> 2000											
		CD	CDN															
		U_w	1.90	1.70	1.60	1.20	0.80											
		U_r	2.30	2.30	1.10	0.90	0.60											
3	Bulgaria	Years	< 1957						1957–1970	1971–1980	1981–1987			1988–1990	1991–2000	> 2000		
		CD	CDN						CDL					CDM				
		U_w	1.60						1.60	1.50	1.20			1.20	1.00	0.50		
		U_r	1.30						1.30	1.20	1.10			1.10	0.50	0.30		
4	Croatia	Years	< 1946	1946–1963					1964–1970	1971–1981				1982–1990	1991–2000	> 2000		
		CD	CDN						CDL					CDM				
		U_w	1.28	1.46					1.46	1.28				1.28	0.83	0.34		
		U_r	1.14	1.14					1.14	1.16				1.16	0.69	0.29		
5	Cyprus	Years	< 1946	1946–1970	1971–1992									> 1992				
		CD	CDN											CDM				
		U_w	2.1	1.6	1.4									1.4				
		U_r	3.3	3.3	3.3									0.6				
6	Czechia	Years	< 1946	1946–1970	1971–1980	1981–1988			1989–2000	> 2000								
		CD	CDN						CDL									
		U_w	1.1	1	0.9	0.8			0.4	0.4								
		U_r	1.1	0.9	0.6	0.5			0.4	0.2								
7	Denmark	Years	< 1946	1946–1970	1971–1980	1981–2000	> 2000											
		CD	CDN						same as CDN									
		U_w	0.9	0.9	0.5	0.4	0.3											
		U_r	0.6	0.4	0.3	0.2	0.1											
8	Estonia	Years	< 1971	1971–1980	1981–1990	> 1990												
		CD	CDN						same as CDN									
		U_w	0.5	0.3	0.3	0.2												
		U_r	0.5	0.4	0.2	0.2												
9	Finland	Years	< 1946	1946–1970	1971–1980	1981–2000	> 2000											
		CD	CDN						same as CDN									
		U_w	0.6	0.6	0.4	0.3	0.2											
		U_r	0.4	0.3	0.3	0.2	0.2											

No	Country	Class variable	Seismic and energy design code level															
10	France	Years	< 1946	1946–1968					1969–1980	1981–1991				1992–2000	> 2000			
		CD	CDN						CDL					CDM				
		U_w	2.4	2.4					1	0.7				0.5	0.4			
		U_r	2.5	2.4					1.1	0.7				0.6	0.2			
11	Germany	Years	< 1946	1946–1956					1957–1970	1971–1981				1982–1990	1991–2000	2001–2005	> 2005	
		CD	CDN						CDL					CDM			CDH	
		U_w	1.7	1.3					1.3	0.8				0.6	0.4	0.4	0.4	
		U_r	1.5	1.5					1.5	0.6				0.4	0.3	0.2	0.2	
12	Greece	Years	< 1959						1959–1980	1981–1984				1985–1995			1996–2000	> 2000
		CD	CDN						CDL					CDM			CDH	
		U_w	1.6						1.6	0.9				0.9			0.9	0.7
		U_r	2.5						2.5	1.1				1.1			1.1	0.5
13	Hungary	Years	< 1971	1971–1977					1978–1980	1981–2000	2001–2006						> 2006	
		CD	CDN						CDL								CDH	
		U_w	1.6	1.5					1.5	0.8	0.5						0.5	
		U_r	1.2	0.9					0.9	0.6	0.3						0.3	
14	Ireland	Years	< 1971	1971–1980	1981–2000	> 2000												
		CD	CDN						same as CDN									
		U_w	1.9	1.7	0.7	0.3												
		U_r	1	0.8	0.4	0.3												
15	Italy	Years	< 1915						1915–1945	1946–1970	1971–1980	1981–1990	1991–1996	1997–2000	> 2000			
		CD	CDN						CDL					CDM				
		U_w	1.8						1.8	1.6	1.6	1	0.9	0.9	0.9			
		U_r	2.2						2.2	2	1.7	1.2	1	1	0.9			
16	Latvia	Years	< 1971	1971–1980	1981–2000	> 2000												
		CD	CDN						same as CDN									
		U_w	1	1	0.9	0.5												
		U_r	1.2	1.1	0.9	0.5												
17	Lithuania	Years	< 1971	1971–2000	> 2000													
		CD	CDN						same as CDN									
		U_w	1	0.5	0.2													
		U_r	0.8	0.5	0.2													
18	Luxembourg	Years	< 1946	1946–1970	1971–1980	1981–1990	1991–2000	> 2000										
		CD	CDN						same as CDN									
		U_w	1.6	1.6	1.6	0.6	0.5	0.4										
		U_r	2.6	1.8	1.1	0.6	0.6	0.4										

No	Country	Class variable	Seismic and energy design code level															
19	Malta	Years	< 1971	1971–1990	1991–1996				> 1996									
		CD	CDN						CDL									
		U_w	2	1.5	1.5				1.5									
		U_r	1.9	1.9	1.8				1.8									
20	Netherlands	Years	< 1946	1946–1970	1971–1980	1981–2000	> 2000											
		CD	CDN															
		U_w	1.8	1.7	1.6	0.5	0.4											
		U_r	2.6	1.8	1.1	0.6	0.4											
21	Poland	Years	< 1946	1946–1970	1971–1990	1991–2000	> 2000		same as CDN									
		CD	CDN															
		U_w	1.7	1.4	0.9	0.6	0.4											
		U_r	0.8	0.7	0.6	0.6	0.6											
22	Portugal	Years	< 1946	1946–1957					1958–1970	1971–1980	1981–1983			1984–1990	1991–2000	> 2000		
		CD	CDN						CDL					CDM				
		U_w	2	1.5					1.5	1.5	1.4			1.4	1.2	0.8		
		U_r	3.1	3					3	2.7	2.6			2.6	2.4	1.3		
23	Romania	Years	< 1946	1946–1962					1963–1978					1979–2000	2001–2006		> 2006	
		CD	CDN						CDL					CDM			CDH	
		U_w	1.9	1.7					1.7					1.3	0.9		0.9	
		U_r	1.4	1.3					1.3					1.2	1.2		1.2	
24	Slovakia	Years	< 1946	1946–1970	1971–1980	1981–1988			1989–2000	> 2000								
		CD	CDN						CDM									
		U_w	1.5	1.2	1.1	0.8			0.8	0.5								
		U_r	2	1.5	1.1	0.7			0.6	0.6								
25	Slovenia	Years	< 1946	1946–1963					1964–1970	1971–1981				1982–1990	1991–2000	> 2000		
		CD	CDN						CDL					CDM				
		U_w	1.5	1.5					1.5	1.4				0.8	0.6	0.2		
		U_r	1.3	1.2					1.2	1				0.7	0.4	0.2		
26	Spain	Years	< 1946	1946–1961					1962–1980	1981–1994				1995–2000	2001–2002		> 2002	
		CD	CDN						CDL					CDM			CDH	
		U_w	2.5	2.1					2.1	1.6				1.6	0.8		0.8	
		U_r	1.8	1.4					1.4	1				1	0.5		0.5	
27	Sweden	Years	< 1946	1946–1970	1971–1990	> 1990			same as CDN									
		CD	CDN															
		U_w	0.6	0.4	0.3	0.2												
		U_r	0.4	0.4	0.2	0.1												

Table A. 4. Ratios of regional to national required *U* values.

Country	Climatic zones	Wall ratio	Roof ratio
Greece ([1])	A	1.207	1.138
	B	1.006	1.024
	C	0.906	0.910
	D	0.805	0.796
Spain ([2])	alpha	1.572	1.353
	A	1.375	1.230
	B	1.100	1.083
	C	0.963	0.984
	D	0.805	0.861
	E	0.727	0.812
France ([3])	H1	0.970	0.972
	H2	0.970	1.016
	H3	1.248	1.104
Croatia ([4])	Continental climate	0.859	0.938
	Littoral climate	1.288	1.126
Italy ([5])	A, B	1.332	1.261
	C	1.122	1.261
	D	0.981	0.890
	E	0.841	0.816
	F	0.771	0.742
Portugal ([6])	I1	1.084	1.053
	I2	0.867	0.922
	I3	0.758	0.790

([1]) Climatic zones according to Decision (2017/178581).
([2]) Climatic zones according to DBHE (2013).
([3]) Climatic zones according to Order (2008).
([4]) Climatic zones according to Eurostat NUTS-2 statistical regions (Continental and Littoral zones).
([5]) Climatic zones according to Decree (1993/412).
([6]) Climatic zones according to Order (15793-F/2013).

Table A. 5. Building count at national level in the EU-27. ([1])

Country/EU	Buildings (number)		
	Residential	**Commercial**	**Total**
Austria	2191280	94262	2285542
Belgium	3681643	105620	3787263
Bulgaria	2060744	80750	2141494
Croatia	1609059	33961	1643021
Cyprus	264315	15470	279785
Czechia	2184310	108910	2293220
Denmark	1536290	81990	1618279
Estonia	212146	12890	225036
Finland	1236900	61620	1298520
France	14449761	596577	15046338
Germany	18922618	623809	19546427
Greece	3051158	249708	3300866
Hungary	2681291	80678	2761969
Ireland	1854314	46390	1900704
Italy	11354381	546327	11900708
Latvia	349765	20310	370076
Lithuania	507533	69890	577423
Luxembourg	119597	9190	128787
Malta	94355	13030	107385
Netherlands	5125317	248033	5373351
Poland	6314899	536920	6851819
Portugal	3353762	173608	3527370
Romania	5260264	173480	5433744
Slovakia	862278	58532	920810
Slovenia	463029	27460	490489
Spain	9305735	510052	9815787
Sweden	2021201	258160	2279361
EU-27	101067947	4837629	105905575

Table A. 6. Average number of occupants at the national level in the EU-27. ([1])

Country/EU	Occupants (average number over 24hrs)		
	Residential	**Commercial**	**Total**
Austria	4947154	812237	5759390
Belgium	6400720	1058774	7459494
Bulgaria	3906872	608742	4515614
Croatia	2394219	326776	2720995
Cyprus	487825	77418	565243
Czechia	5767224	1030432	6797656
Denmark	3126157	574009	3700166
Estonia	730699	120197	850896
Finland	3032807	515594	3548400
France	40013853	4621824	44635677
Germany	44580501	8181774	52762275
Greece	6110619	898171	7008790
Hungary	5630762	819506	6450268
Ireland	2696249	461337	3157585
Italy	34704149	5085980	39790129
Latvia	1063474	166619	1230094
Lithuania	1597006	226505	1823511
Luxembourg	356744	53456	410200
Malta	292161	41964	334125
Netherlands	9753117	1563387	11316504
Poland	21815048	3062951	24877999
Portugal	5455543	931976	6387519
Romania	11490796	1335519	12826315
Slovakia	3040125	494515	3534640
Slovenia	1135557	198550	1334106
Spain	24096657	4404187	28500844
Sweden	5600575	991799	6592374
EU-27	250226611	38664200	288890811

Table A. 7. Total replacement cost at the national level in the EU-27. ([1])

Country/EU	Total replacement cost (10^6 €)		
	Residential	**Commercial**	**Total**
Austria	712990	268491	981481
Belgium	665751	321061	986813
Bulgaria	148433	46896	195330
Croatia	119343	24602	143946
Cyprus	57377	13425	70802
Czechia	296576	135533	432109
Denmark	516505	216981	733485
Estonia	35674	10297	45971
Finland	344478	99174	443651
France	4917045	1333790	6250835
Germany	7176111	2559863	9735973
Greece	448870	96691	545561
Hungary	312265	110576	422841
Ireland	295160	167741	462901
Italy	3857558	500667	4358225
Latvia	55928	18252	74180
Lithuania	67810	42962	110772
Luxembourg	45636	26769	72405
Malta	17673	5315	22988
Netherlands	1594183	485267	2079450
Poland	717295	421470	1138765
Portugal	504074	121414	625488
Romania	235457	32230	267687
Slovakia	159979	38216	198196
Slovenia	49221	18114	67335
Spain	2892631	417872	3310503
Sweden	738348	296099	1034446
EU-27	26982371	7829768	34812139

([1]) Source: ESRM20 (Crowley et al., 2021a, available from EFEHR)

Table A. 8. Mapping of building classes to fragility/vulnerability classes. ([1, 2])

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
1	CR+PC/LFM+CDN/H:1	CR_LFM-CDN-0_H1	**61**	CR/LWAL+CDH+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4
2	CR/LFM+CDN/H:1	CR_LFM-CDN-0_H1	**62**	CR/LWAL+CDH+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6
3	CR/LWAL+CDN/H:2	CR_LWAL-DUL_H2	**63**	CR/LWAL+CDM+LFC:12.0/H:1	CR_LWAL-DUM_H1
4	MUR/LWAL+CDN/H:1	MUR_LWAL-DNO_H1	**64**	CR/LWAL+CDM+LFC:12.0/H:2	CR_LWAL-DUM_H2
5	S+SL/LFM+CDN/H:1	S_LFM-DUM_H1	**65**	CR+PC/LWAL+CDH+LFC:0.0/H:2	CR_LWAL-DUL_H2
6	S/LFM+CDN/H:1	S_LFM-DUM_H1	**66**	CR+PC/LWAL+CDH+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4
7	W/LWAL+CDN/H:1	W_LFM-DUL_H1	**67**	CR/LWAL+CDM+LFC:4.0/H:2	CR_LWAL-DUL_H2
8	CR+PC/LWAL+CDN/H:1	CR_LWAL-DUL_H1	**68**	CR/LWAL+CDM+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4
9	CR+PC/LWAL+CDN/H:2	CR_LWAL-DUL_H2	**69**	CR+PC/LWAL+CDH+LFC:0.0/H:1	CR_LWAL-DUL_H1
10	CR+PC/LWAL+CDN/HBET:3-5	CR_LWAL-DUL_H4	**70**	CR/LWAL+CDM+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6
11	CR/LFINF+CDN/H:1	CR_LFINF-CDN-0_H1	**71**	CR/LWAL+CDM+LFC:4.0/H:1	CR_LWAL-DUL_H1
12	CR/LFINF+CDN/H:2	CR_LFINF-CDN-0_H2	**72**	CR/LWAL+CDH+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6
13	CR/LFINF+CDN/HBET:3-5	CR_LFINF-CDN-0_H4	**73**	CR/LWAL+CDH+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4
14	MUR+CL/LWAL+CDN/H:1	MUR-CL99_LWAL-DNO_H1	**74**	CR/LWAL+CDH+LFC:0.0/H:2	CR_LWAL-DUL_H2
15	MUR+CL/LWAL+CDN/H:2	MUR-CL99_LWAL-DNO_H2	**75**	CR/LWAL+CDH+LFC:0.0/H:1	CR_LWAL-DUL_H1
16	MUR+ST/LWAL+CDN/H:1	MUR-STDRE_LWAL-DNO_H1	**76**	CR+PC/LWAL+CDM+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6
17	MUR+ST/LWAL+CDN/H:2	MUR-STDRE_LWAL-DNO_H2	**77**	CR+PC/LWAL+CDM+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4
18	CR+PC/LWAL+CDH+LFC:20.0/H:2	CR_LWAL-DUH_H2	**78**	CR+PC/LWAL+CDM+LFC:4.0/H:2	CR_LWAL-DUL_H2
19	CR+PC/LWAL+CDH+LFC:20.0/H:1	CR_LWAL-DUH_H1	**79**	CR+PC/LWAL+CDM+LFC:4.0/H:1	CR_LWAL-DUL_H1
20	CR+PC/LWAL+CDN/HBET:6-	CR_LWAL-DUL_H6	**80**	CR+PC/LWAL+CDH+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6
21	CR/LWAL+CDH+LFC:20.0/H:1	CR_LWAL-DUH_H1	**81**	CR+PC/LWAL+CDH+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6
22	CR/LWAL+CDH+LFC:20.0/H:2	CR_LWAL-DUH_H2	**82**	CR+PC/LWAL+CDH+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4
23	CR/LWAL+CDH+LFC:20.0/HBET:3-5	CR_LWAL-DUH_H4	**83**	CR+PC/LWAL+CDH+LFC:10.0/H:2	CR_LWAL-DUM_H2
24	CR/LWAL+CDH+LFC:20.0/HBET:6-	CR_LWAL-DUH_H6	**84**	CR+PC/LWAL+CDH+LFC:10.0/H:1	CR_LWAL-DUM_H1
25	CR/LWAL+CDM+LFC:16.0/H:1	CR_LWAL-DUM_H1	**85**	CR/LWAL+CDH+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6
26	CR/LWAL+CDM+LFC:16.0/H:2	CR_LWAL-DUM_H2	**86**	CR/LWAL+CDH+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4
27	CR/LWAL+CDM+LFC:16.0/HBET:3-5	CR_LWAL-DUM_H4	**87**	CR/LWAL+CDH+LFC:10.0/H:2	CR_LWAL-DUM_H2
28	CR/LWAL+CDM+LFC:16.0/HBET:6-	CR_LWAL-DUM_H6	**88**	CR/LWAL+CDH+LFC:10.0/H:1	CR_LWAL-DUM_H1
29	CR/LWAL+CDN/H:1	CR_LWAL-DUL_H1	**89**	CR+PC/LFM+CDL/H:1	CR_LFM-CDL-0_H1
30	CR/LWAL+CDN/HBET:3-5	CR_LWAL-DUL_H4	**90**	CR/LFINF+CDL/H:2	CR_LFINF-CDL-0_H2
31	MUR/LWAL+CDN/H:2	MUR_LWAL-DNO_H2	**91**	CR/LFM+CDM/H:1	CR_LFM-CDM-0_H1
32	S/LFBR+CDH/H:1	S_LFBR-DUM_H1	**92**	CR/LWAL+CDM/H:2	CR_LWAL-DUM_H2
33	S/LFBR+CDH/H:2	S_LFBR-DUM_H2	**93**	MCF/LWAL+CDL/H:1	MCF_LWAL-DUL_H1
34	S/LFBR+CDH/HBET:3-5	S_LFBR-DUM_H4	**94**	S/LFBR+CDM/H:1	S_LFBR-DUM_H1
35	S/LFM+CDH/H:1	S_LFM-DUM_H1	**95**	S/LFBR+CDM/HBET:3-5	S_LFBR-DUM_H4
36	S/LFM+CDH/H:2	S_LFM-DUM_H2	**96**	S/LFBR+CDM/HBET:6-	S_LFBR-DUM_H6
37	S/LFM+CDH/HBET:3-5	S_LFM-DUM_H4	**97**	S/LFINF+CDL/H:1	S_LFINF-DUM_H1
38	W/LWAL+CDH/H:1	W_LFM-DUH_H1	**98**	S/LFM+CDL/H:1	S_LFM-DUM_H1
39	W/LWAL+CDH/H:2	W_LFM-DUH_H2	**99**	S/LFM+CDL/HBET:3-5	S_LFM-DUM_H4
40	W/LWAL+CDM/H:1	W_LFM-DUM_H1	**100**	CR/LFM+CDN/H:2	CR_LFM-CDN-0_H2
41	W/LWAL+CDM/H:2	W_LFM-DUM_H2	**101**	S/LFBR+CDN/H:1	S_LFBR-DUM_H1
42	W/LWAL+CDN/H:2	W_LFM-DUL_H2	**102**	MUR+CL/LWAL+CDN/HBET:1-3	MUR-CL99_LWAL-DNO_H2
43	CR+PC/LWAL+CDH+LFC:20.0/HBET:3-5	CR_LWAL-DUH_H4	**103**	CR/LDUAL+CDN/HBET:3-5	CR_LDUAL-DUL_H4
44	CR+PC/LWAL+CDH+LFC:20.0/HBET:6-	CR_LWAL-DUH_H6	**104**	CR/LDUAL+CDN/HBET:6-	CR_LDUAL-DUL_H6
45	CR+PC/LWAL+CDM+LFC:16.0/H:1	CR_LWAL-DUM_H1	**105**	CR/LWAL+CDN/HBET:6-	CR_LWAL-DUL_H6
46	CR+PC/LWAL+CDM+LFC:16.0/H:2	CR_LWAL-DUM_H2	**106**	S/LFINF+CDN/H:2	S_LFINF-DUM_H2
47	CR+PC/LWAL+CDM+LFC:16.0/HBET:3-5	CR_LWAL-DUM_H4	**107**	S/LWAL+CDN/HBET:3-5	S_LWAL-DUM_H4
48	CR+PC/LWAL+CDM+LFC:16.0/HBET:6-	CR_LWAL-DUM_H6	**108**	S/LWAL+CDN/HBET:6-	S_LWAL-DUM_H6
49	CR/LWAL+CDM+LFC:12.0/HBET:3-5	CR_LWAL-DUM_H4	**109**	W/LFM+CDN/H:1	W_LFM-DUL_H1
50	CR+PC/LWAL+CDH+LFC:8.0/H:1	CR_LWAL-DUM_H1	**110**	W/LFM+CDN/H:2	W_LFM-DUL_H2
51	CR+PC/LWAL+CDH+LFC:8.0/H:2	CR_LWAL-DUM_H2	**111**	CR/LFM+CDL/H:2	CR_LFM-CDL-0_H2
52	CR+PC/LWAL+CDH+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4	**112**	CR/LWAL+CDL/H:1	CR_LWAL-DUL_H1
53	CR+PC/LWAL+CDH+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6	**113**	CR+PC/LWAL+CDL/HBET:3-5	CR_LWAL-DUL_H4
54	CR+PC/LWAL+CDM+LFC:12.0/H:1	CR_LWAL-DUM_H1	**114**	CR+PC/LWAL+CDL/HBET:6-	CR_LWAL-DUL_H6
55	CR+PC/LWAL+CDM+LFC:12.0/H:2	CR_LWAL-DUM_H2	**115**	CR+PC/LWAL+CDM/H:1	CR_LWAL-DUM_H1
56	CR+PC/LWAL+CDM+LFC:12.0/HBET:3-5	CR_LWAL-DUM_H4	**116**	CR+PC/LWAL+CDM/H:2	CR_LWAL-DUM_H2
57	CR+PC/LWAL+CDM+LFC:12.0/HBET:6-	CR_LWAL-DUM_H6	**117**	CR+PC/LWAL+CDM/HBET:3-5	CR_LWAL-DUM_H4
58	CR/LWAL+CDM+LFC:12.0/HBET:6-	CR_LWAL-DUM_H6	**118**	CR+PC/LWAL+CDM/HBET:6-	CR_LWAL-DUM_H6
59	CR/LWAL+CDH+LFC:8.0/H:1	CR_LWAL-DUM_H1	**119**	CR/LDUAL+CDH/HBET:3-5	CR_LDUAL-DUH_H4
60	CR/LWAL+CDH+LFC:8.0/H:2	CR_LWAL-DUM_H2	**120**	CR/LDUAL+CDH/HBET:6-	CR_LDUAL-DUH_H6

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
121	CR/LDUAL+CDL/HBET:3-5	CR_LDUAL-DUL_H4	**187**	CR/LFINF+CDL+LFC:10.0/H:2	CR_LFINF-CDL-10_H2
122	CR/LDUAL+CDL/HBET:6-	CR_LDUAL-DUL_H6	**188**	CR+PC/LWAL+CDL+LFC:10.0/HBET:6-	CR_LWAL-DUL_H6
123	CR/LDUAL+CDM/HBET:3-5	CR_LDUAL-DUM_H4	**189**	CR+PC/LWAL+CDL+LFC:18.0/HBET:3-5	CR_LWAL-DUM_H4
124	CR/LDUAL+CDM/HBET:6-	CR_LDUAL-DUM_H6	**190**	CR/LFINF+CDL+LFC:18.0/HBET:3-5	CR_LFINF-CDL-20_H4
125	CR/LFINF+CDL/HBET:3-5	CR_LFINF-CDL-0_H4	**191**	CR+PC/LWAL+CDL+LFC:18.0/HBET:6-	CR_LWAL-DUM_H6
126	CR/LFINF+CDM/H:1	CR_LFINF-CDM-0_H1	**192**	CR/LWAL+CDL+LFC:18.0/HBET:3-5	CR_LWAL-DUM_H4
127	CR/LFINF+CDM/H:2	CR_LFINF-CDM-0_H2	**193**	CR/LWAL+CDL+LFC:18.0/HBET:6-	CR_LWAL-DUM_H6
128	CR/LFINF+CDM/HBET:3-5	CR_LFINF-CDM-0_H4	**194**	CR/LFINF+CDL+LFC:18.0/H:2	CR_LFINF-CDL-20_H2
129	CR/LFINF+CDN/HBET:6-	CR_LFINF-CDN-0_H6	**195**	CR/LDUAL+CDL+LFC:18.0/HBET:6-	CR_LDUAL-DUM_H6
130	MCF/LWAL+CDL/H:2	MCF_LWAL-DUL_H2	**196**	CR/LDUAL+CDL+LFC:18.0/HBET:3-5	CR_LDUAL-DUM_H4
131	MCF/LWAL+CDL/HBET:3-5	MCF_LWAL-DUL_H4	**197**	CR+PC/LWAL+CDL+LFC:18.0/H:2	CR_LWAL-DUM_H2
132	MUR+CL/LWAL+CDN/HBET:3-5	MUR-CL99_LWAL-DNO_H4	**198**	CR+PC/LWAL+CDL+LFC:9.0/HBET:3-5	CR_LWAL-DUL_H4
133	MUR+ST/LWAL+CDN/HBET:3-5	MUR-STDRE_LWAL-DNO_H4	**199**	CR+PC/LWAL+CDL+LFC:9.0/HBET:6-	CR_LWAL-DUL_H6
134	MR/LWAL+CDL/H:2	MR_LWAL-DUL_H2	**200**	CR/LWAL+CDL+LFC:9.0/HBET:6-	CR_LWAL-DUL_H6
135	S/LWAL+CDL/H:1	S_LWAL-DUM_H1	**201**	CR/LWAL+CDL+LFC:9.0/HBET:3-5	CR_LWAL-DUL_H4
136	W/LFM+CDL/H:1	W_LFM-DUL_H1	**202**	CR/LDUAL+CDL+LFC:9.0/HBET:3-5	CR_LDUAL-DUL_H4
137	CR/LDUAL+CDL+LFC:0.0/HBET:6-	CR_LDUAL-DUL_H6	**203**	CR+PC/LWAL+CDL+LFC:9.0/H:2	CR_LWAL-DUL_H2
138	CR/LDUAL+CDM+LFC:19.0/HBET:3-5	CR_LDUAL-DUM_H4	**204**	CR/LDUAL+CDL+LFC:9.0/HBET:6-	CR_LDUAL-DUL_H6
139	CR/LDUAL+CDM+LFC:19.0/HBET:6-	CR_LDUAL-DUM_H6	**205**	CR/LFINF+CDL+LFC:9.0/HBET:3-5	CR_LFINF-CDL-10_H4
140	CR/LWAL+CDL+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	**206**	CR/LFINF+CDL+LFC:9.0/H:2	CR_LFINF-CDL-10_H2
141	CR/LWAL+CDL+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	**207**	CR/LDUAL+CDM+LFC:11.0/HBET:3-5	CR_LDUAL-DUM_H4
142	CR/LFINF+CDM+LFC:19.0/HBET:3-5	CR_LFINF-CDM-20_H4	**208**	CR/LDUAL+CDM+LFC:11.0/HBET:6-	CR_LDUAL-DUM_H6
143	MIX/LH+CDL/H:1	MCF_LWAL-DUL_H1	**209**	CR/LFINF+CDM+LFC:11.0/HBET:3-5	CR_LFINF-CDM-10_H4
144	MUR+CL/LWAL+CDN/H:2/FC	MUR-CL99_LWAL-DNO_H2	**210**	CR/LWAL+CDM+LFC:11.0/HBET:3-5	CR_LWAL-DUM_H4
145	MUR+CL/LWAL+CDN/H:1/FW	MUR-CL99_LWAL-DNO_H1	**211**	CR/LWAL+CDM+LFC:11.0/HBET:6-	CR_LWAL-DUM_H6
146	MUR+CL/LWAL+CDN/H:1/FC	MUR-CL99_LWAL-DNO_H1	**212**	CR/LFINF+CDM+LFC:11.0/H:2	CR_LFINF-CDM-10_H2
147	CR/LWAL+CDM+LFC:19.0/HBET:3-5	CR_LWAL-DUM_H4	**213**	CR/LDUAL+CDM+LFC:7.0/HBET:3-5	CR_LDUAL-DUL_H4
148	CR/LWAL+CDM+LFC:19.0/HBET:6-	CR_LWAL-DUM_H6	**214**	CR/LFINF+CDM+LFC:7.0/HBET:3-5	CR_LFINF-CDM-5_H4
149	MCF/LWAL+CDN/H:2	MCF_LWAL-DUL_H2	**215**	CR/LDUAL+CDM+LFC:7.0/HBET:6-	CR_LDUAL-DUL_H6
150	MCF/LWAL+CDN/HBET:3-5	MCF_LWAL-DUL_H4	**216**	CR/LWAL+CDM+LFC:7.0/HBET:6-	CR_LWAL-DUL_H6
151	MUR+ADO/LWAL+CDN/H:1	MUR-ADO_LWAL-DNO_H1	**217**	CR/LWAL+CDM+LFC:7.0/HBET:3-5	CR_LWAL-DUL_H4
152	MUR+CL/LWAL+CDN/H:2/FW	MUR-CL99_LWAL-DNO_H2	**218**	CR/LFINF+CDM+LFC:7.0/H:2	CR_LFINF-CDM-5_H2
153	CR+PC/LWAL+CDL+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	**219**	CR/LFINF+CDM+LFC:4.0/HBET:3-5	CR_LFINF-CDM-5_H4
154	W/LWAL+CDL/H:1	W_LFM-DUL_H1	**220**	CR/LDUAL+CDM+LFC:4.0/HBET:3-5	CR_LDUAL-DUL_H4
155	W/LWAL+CDL/H:2	W_LFM-DUL_H2	**221**	CR/LFINF+CDM+LFC:4.0/H:2	CR_LFINF-CDM-5_H2
156	CR+PC/LWAL+CDL+LFC:0.0/H:2	CR_LWAL-DUL_H2	**222**	CR/LDUAL+CDM+LFC:4.0/HBET:6-	CR_LDUAL-DUL_H6
157	CR/LFINF+CDL+LFC:0.0/HBET:3-5	CR_LFINF-CDL-0_H4	**223**	CR/LFINF+CDM/HBET:6-	CR_LFINF-CDM-0_H6
158	CR+PC/LWAL+CDL+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	**224**	W/LFM+CDM/H:1	W_LFM-DUM_H1
159	CR/LFINF+CDM+LFC:19.0/H:2	CR_LFINF-CDM-20_H2	**225**	W/LFM+CDM/H:2	W_LFM-DUM_H2
160	CR/LFINF+CDL+LFC:0.0/H:2	CR_LFINF-CDL-0_H2	**226**	CR/LFINF+CDN/H:3	CR_LFINF-CDN-0_H3
161	CR/LDUAL+CDL+LFC:0.0/HBET:3-5	CR_LDUAL-DUL_H4	**227**	CR/LWAL+CDN/HBET:4-10	CR_LWAL-DUL_H7
162	CR/LWAL+CDL+LFC:2.5/HBET:6-	CR_LWAL-DUL_H6	**228**	MUR+CB/LWAL+CDN/HBET:1-2	MUR-CB99_LWAL-DNO_H1
163	CR/LWAL+CDL+LFC:4.5/HBET:6-	CR_LWAL-DUL_H6	**229**	MUR+CB/LWAL+CDN/HBET:1-4	MUR-CB99_LWAL-DNO_H2
164	CR/LWAL+CDL+LFC:4.5/HBET:3-5	CR_LWAL-DUL_H4	**230**	MUR+CL/LWAL+CDN/HBET:1-4	MUR-CL99_LWAL-DNO_H2
165	CR/LFINF+CDL+LFC:2.5/HBET:3-5	CR_LFINF-CDL-0_H4	**231**	W/LPB+CDL/HBET:1-3	W_LFM-DUL_H2
166	CR/LFINF+CDL+LFC:4.5/HBET:3-5	CR_LFINF-CDL-5_H4	**232**	W/LWAL+CDL/HBET:1-3	W_LFM-DUL_H2
167	CR/LFINF+CDL+LFC:4.5/H:2	CR_LFINF-CDL-5_H2	**233**	CR/LFINF+CDL/H:1	CR_LFINF-CDL-0_H1
168	CR/LDUAL+CDL+LFC:4.5/HBET:6-	CR_LDUAL-DUL_H6	**234**	CR/LWAL+CDM/HBET:3-5	CR_LWAL-DUM_H4
169	CR/LDUAL+CDL+LFC:4.5/HBET:3-5	CR_LDUAL-DUL_H4	**235**	CR/LWAL+CDM/HBET:6-	CR_LWAL-DUM_H6
170	CR+PC/LWAL+CDL+LFC:2.5/HBET:6-	CR_LWAL-DUL_H6	**236**	MUR+CB/LWAL+CDN/H:1	MUR-CB99_LWAL-DNO_H1
171	CR+PC/LWAL+CDL+LFC:4.5/HBET:6-	CR_LWAL-DUL_H6	**237**	MUR+CB/LWAL+CDN/H:2	MUR-CB99_LWAL-DNO_H2
172	CR+PC/LWAL+CDL+LFC:2.5/HBET:3-5	CR_LWAL-DUL_H4	**238**	W/LPB+CDM/H:1	W_LFM-DUM_H1
173	CR+PC/LWAL+CDL+LFC:4.5/HBET:3-5	CR_LWAL-DUL_H4	**239**	W/LPB+CDM/H:2	W_LFM-DUM_H2
174	CR/LFINF+CDL+LFC:2.5/H:2	CR_LFINF-CDL-0_H2	**240**	CR+PC/LWAL+CDM+LFC:6.0/HBET:3-5	CR_LWAL-DUL_H4
175	CR+PC/LWAL+CDL+LFC:2.5/H:2	CR_LWAL-DUL_H2	**241**	CR/LFINF+CDH+LFC:11.0/H:1	CR_LFINF-CDH-10_H1
176	CR+PC/LWAL+CDL+LFC:4.5/H:2	CR_LWAL-DUL_H2	**242**	CR/LFINF+CDH+LFC:11.0/H:2	CR_LFINF-CDH-10_H2
177	CR/LFINF+CDL+LFC:5.0/HBET:3-5	CR_LFINF-CDL-5_H4	**243**	CR/LFINF+CDH+LFC:11.0/HBET:3-5	CR_LFINF-CDH-10_H4
178	CR/LFINF+CDL+LFC:5.0/H:2	CR_LFINF-CDL-5_H2	**244**	CR/LFINF+CDM+LFC:6.0/H:1	CR_LFINF-CDM-5_H1
179	CR/LWAL+CDL+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6	**245**	CR/LFINF+CDM+LFC:6.0/H:2	CR_LFINF-CDM-5_H2
180	CR+PC/LWAL+CDL+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6	**246**	CR/LFINF+CDM+LFC:6.0/HBET:3-5	CR_LFINF-CDM-5_H4
181	CR+PC/LWAL+CDL+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4	**247**	CR/LFINF+CDM+LFC:6.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4
182	CR+PC/LWAL+CDL+LFC:5.0/H:2	CR_LWAL-DUL_H2	**248**	CR/LFINF+CDM+LFC:6.0/HBET:6-	CR_LFINF-CDM-5_H6
183	CR/LFINF+CDL+LFC:10.0/HBET:3-5	CR_LFINF-CDL-10_H4	**249**	CR/LFINF+CDM+LFC:6.0/HBET:6-/SOS	CR_LFINF-CDM-5_H6
184	CR/LWAL+CDL+LFC:10.0/HBET:6-	CR_LWAL-DUL_H6	**250**	CR/LWAL+CDH+LFC:11.0/H:1	CR_LWAL-DUM_H1
185	CR+PC/LWAL+CDL+LFC:10.0/H:2	CR_LWAL-DUL_H2	**251**	CR/LFINF+CDN/HBET:3-5/SOS	CR_LFINF-CDN-0_H4
186	CR+PC/LWAL+CDL+LFC:10.0/HBET:3-5	CR_LWAL-DUL_H4	**252**	CR/LFINF+CDN/HBET:6-/SOS	CR_LFINF-CDN-0_H6

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
253	CR/LWAL+CDH+LFC:11.0/H:2	CR_LWAL-DUM_H2	**309**	MCF/LWAL+CDN/H:1	MCF_LWAL-DUL_H1
254	CR/LWAL+CDH+LFC:11.0/HBET:3-5	CR_LWAL-DUM_H4	**310**	CR/LFINF+CDM+LFC:0.0/HBET:3-5	CR_LFINF-CDM-0_H4
255	CR/LWAL+CDH+LFC:11.0/HBET:6-	CR_LWAL-DUM_H6	**311**	CR/LFINF+CDM+LFC:0.0/H:1	CR_LFINF-CDM-0_H1
256	CR/LWAL+CDM+LFC:6.0/H:2	CR_LWAL-DUL_H2	**312**	CR/LDUAL+CDM+LFC:0.0/HBET:6-	CR_LDUAL-DUL_H6
257	CR/LWAL+CDM+LFC:6.0/HBET:3-5	CR_LWAL-DUL_H4	**313**	CR/LDUAL+CDM+LFC:0.0/HBET:3-5	CR_LDUAL-DUL_H4
258	CR/LWAL+CDM+LFC:6.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	**314**	CR/LFINF+CDM+LFC:2.5/HBET:3-5	CR_LFINF-CDM-0_H4
259	CR/LWAL+CDN/HBET:3-5/SOS	CR_LWAL-DUL_H4	**315**	CR/LFINF+CDM+LFC:2.5/HBET:6-	CR_LFINF-CDM-0_H6
260	S/LFINF+CDH/HBET:3-5	S_LFINF-DUM_H4	**316**	CR/LDUAL+CDM+LFC:2.5/HBET:3-5	CR_LDUAL-DUL_H4
261	S/LFINF+CDH/HBET:6-	S_LFINF-DUM_H6	**317**	CR/LDUAL+CDM+LFC:2.5/HBET:6-	CR_LDUAL-DUL_H6
262	W/LWAL+CDH/HBET:3-5	W_LFM-DUH_H4	**318**	CR/LFINF+CDM+LFC:2.5/H:1	CR_LFINF-CDM-0_H1
263	W/LWAL+CDM/HBET:3-5	W_LFM-DUM_H4	**319**	CR/LFINF+CDM+LFC:2.5/H:2	CR_LFINF-CDM-0_H2
264	CR/LWAL+CDM+LFC:3.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	**320**	CR/LFINF+CDM+LFC:5.0/H:1	CR_LFINF-CDM-5_H1
265	CR/LWAL+CDM+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	**321**	CR/LFINF+CDM+LFC:5.0/HBET:3-5	CR_LFINF-CDM-5_H4
266	CR/LWAL+CDM+LFC:3.0/H:2	CR_LWAL-DUL_H2	**322**	CR/LDUAL+CDM+LFC:5.0/HBET:3-5	CR_LDUAL-DUL_H4
267	CR/LWAL+CDH+LFC:5.0/HBET:6-	CR_LWAL-DUM_H6	**323**	CR/LFINF+CDM+LFC:5.0/HBET:6-	CR_LFINF-CDM-5_H6
268	CR/LWAL+CDH+LFC:5.0/HBET:3-5	CR_LWAL-DUM_H4	**324**	CR/LFINF+CDM+LFC:5.0/H:2	CR_LFINF-CDM-5_H2
269	CR/LWAL+CDH+LFC:5.0/H:2	CR_LWAL-DUM_H2	**325**	CR/LDUAL+CDM+LFC:5.0/HBET:6-	CR_LDUAL-DUL_H6
270	CR/LWAL+CDH+LFC:5.0/H:1	CR_LWAL-DUM_H1	**326**	CR/LFINF+CDM+LFC:10.0/HBET:6-	CR_LFINF-CDM-10_H6
271	CR/LFINF+CDH+LFC:5.0/H:1	CR_LFINF-CDH-5_H1	**327**	CR/LFINF+CDM+LFC:10.0/HBET:3-5	CR_LFINF-CDM-10_H4
272	CR+PC/LWAL+CDM+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	**328**	CR/LFINF+CDM+LFC:10.0/H:2	CR_LFINF-CDM-10_H2
273	CR/LFINF+CDM+LFC:3.0/HBET:6-/SOS	CR_LFINF-CDM-5_H6	**329**	CR/LFINF+CDM+LFC:10.0/H:1	CR_LFINF-CDM-10_H1
274	CR/LFINF+CDM+LFC:3.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	**330**	CR/LDUAL+CDM+LFC:10.0/HBET:6-	CR_LDUAL-DUM_H6
275	CR/LFINF+CDM+LFC:3.0/HBET:6-	CR_LFINF-CDM-5_H6	**331**	CR/LDUAL+CDM+LFC:10.0/HBET:3-5	CR_LDUAL-DUM_H4
276	CR/LFINF+CDM+LFC:3.0/HBET:3-5	CR_LFINF-CDM-5_H4	**332**	CR/LFINF+CDM+LFC:2.0/HBET:3-5	CR_LFINF-CDM-0_H4
277	CR/LFINF+CDH+LFC:5.0/H:2	CR_LFINF-CDH-5_H2	**333**	CR/LFINF+CDL+LFC:7.5/HBET:3-5	CR_LFINF-CDL-5_H4
278	CR/LFINF+CDH+LFC:5.0/HBET:3-5	CR_LFINF-CDH-5_H4	**334**	W/LWAL+CDL/HBET:3-5	W_LFM-DUL_H4
279	CR/LFINF+CDM+LFC:3.0/H:1	CR_LFINF-CDM-5_H1	**335**	CR/LWAL+CDM+LFC:2.0/HBET:6-	CR_LWAL-DUL_H6
280	CR/LFINF+CDM+LFC:3.0/H:2	CR_LFINF-CDM-5_H2	**336**	MIX(MUR+CR)/LWAL+CDL+LFC:7.5/HBET:3-5	MCF_LWAL-DUL_H4
281	CR/LFINF+CDH+LFC:14.0/HBET:3-5	CR_LFINF-CDH-15_H4	**337**	CR/LFINF+CDL+LFC:7.5/H:2	CR_LFINF-CDL-5_H2
282	CR/LFINF+CDH+LFC:14.0/H:1	CR_LFINF-CDH-15_H1	**338**	CR/LFINF+CDM+LFC:2.0/HBET:6-	CR_LFINF-CDM-0_H6
283	CR/LFINF+CDH+LFC:14.0/H:2	CR_LFINF-CDH-15_H2	**339**	S/LFINF+CDN/HBET:3-5	S_LFINF-DUM_H4
284	CR/LWAL+CDH+LFC:14.0/H:1	CR_LWAL-DUM_H1	**340**	MIX(MUR+CR)/LWAL+CDM+LFC:2.0/HBET:3-5	MCF_LWAL-DUL_H4
285	CR+PC/LWAL+CDM+LFC:7.0/HBET:3-5	CR_LWAL-DUL_H4	**341**	CR/LWAL+CDL+LFC:7.5/HBET:3-5	CR_LWAL-DUL_H4
286	CR/LWAL+CDM+LFC:7.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	**342**	CR/LWAL+CDL+LFC:7.5/HBET:6-	CR_LWAL-DUL_H6
287	CR/LWAL+CDM+LFC:7.0/H:2	CR_LWAL-DUL_H2	**343**	CR/LWAL+CDM+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4
288	CR/LWAL+CDH+LFC:14.0/HBET:6-	CR_LWAL-DUM_H6	**344**	CR/LFINF+CDM+LFC:2.0/H:2	CR_LFINF-CDM-0_H2
289	CR/LWAL+CDH+LFC:14.0/HBET:3-5	CR_LWAL-DUM_H4	**345**	CR/LFINF+CDL+LFC:7.5/HBET:6-	CR_LFINF-CDL-5_H6
290	CR/LWAL+CDH+LFC:14.0/H:2	CR_LWAL-DUM_H2	**346**	W/LWAL+CDN/HBET:5-8	W_LFM-DUL_H6
291	CR/LFINF+CDM+LFC:7.0/HBET:6-/SOS	CR_LFINF-CDM-5_H6	**347**	CR/LFINF+CDM+LFC:4.0/HBET:6-	CR_LFINF-CDM-5_H6
292	CR/LFINF+CDM+LFC:7.0/HBET:6-	CR_LFINF-CDM-5_H6	**348**	MIX(MUR+CR)/LWAL+CDM+LFC:4.0/HBET:3-5	MCF_LWAL-DUL_H4
293	CR/LFINF+CDM+LFC:7.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	**349**	MIX(MUR+CR)/LWAL+CDL+LFC:0.0/HBET:3-5	MCF_LWAL-DUL_H4
294	CR/LFINF+CDM+LFC:7.0/H:1	CR_LFINF-CDM-5_H1	**350**	MIX(MUR+CR)/LWAL+CDM+LFC:7.0/HBET:3-5	MCF_LWAL-DUL_H4
295	CR/LFINF+CDH+LFC:8.0/HBET:3-5	CR_LFINF-CDH-10_H4	**351**	CR/LFINF+CDL+LFC:0.0/HBET:6-	CR_LFINF-CDL-0_H6
296	CR/LFINF+CDH+LFC:8.0/H:2	CR_LFINF-CDH-10_H2	**352**	CR/LWAL+CDL+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4
297	CR/LFINF+CDH+LFC:8.0/H:1	CR_LFINF-CDH-10_H1	**353**	MIX(MUR+CR)/LWAL+CDL+LFC:4.0/HBET:3-5	MCF_LWAL-DUL_H4
298	CR/LFINF+CDL/HBET:6-	CR_LFINF-CDL-0_H6	**354**	CR/LFINF+CDL+LFC:4.0/HBET:3-5	CR_LFINF-CDL-5_H4
299	CR/LWAL+CDL/HBET:3-5	CR_LWAL-DUL_H4	**355**	CR/LFINF+CDL+LFC:4.0/H:2	CR_LFINF-CDL-5_H2
300	CR/LWAL+CDL/HBET:6-	CR_LWAL-DUL_H6	**356**	CR/LFINF+CDL+LFC:4.0/HBET:6-	CR_LFINF-CDL-5_H6
301	W/LPB+CDL/H:1	W_LFM-DUL_H1	**357**	CR/LWAL+CDL+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6
302	W/LPB+CDL/H:2	W_LFM-DUL_H2	**358**	CR/LFINF+CDH+LFC:6.0/H:2	CR_LFINF-CDH-5_H2
303	CR/LFM+CDM/H:2	CR_LFM-CDM-0_H2	**359**	CR/LWAL+CDH+LFC:6.0/HBET:3-5	CR_LWAL-DUM_H4
304	S+SL/LFM+CDL/H:1	S_LFM-DUM_H1	**360**	CR/LWAL+CDH+LFC:6.0/HBET:6-	CR_LWAL-DUM_H6
305	CR/LWAL+CDH/H:1	CR_LWAL-DUH_H1	**361**	CR/LWAL+CDM+LFC:1.0/HBET:3-5	CR_LWAL-DUL_H4
306	MR/LWAL+CDL/H:1	MR_LWAL-DUL_H1	**362**	CR/LWAL+CDM+LFC:1.0/HBET:6-	CR_LWAL-DUL_H6
307	CR/LFINF+CDM+LFC:0.0/H:2	CR_LFINF-CDM-0_H2	**363**	CR/LFINF+CDM+LFC:1.0/H:2	CR_LFINF-CDM-0_H2
308	CR/LFINF+CDM+LFC:0.0/HBET:6-	CR_LFINF-CDM-0_H6	**364**	CR/LFINF+CDM+LFC:1.0/HBET:6-	CR_LFINF-CDM-0_H6

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
365	MIX(MUR+CR)/LWAL+CDM+LFC:1.0/HBET:3-5	MCF_LWAL-DUL_H4	**429**	CR/LFINF+CDL+LFC:3.75/H:1	CR_LFINF-CDL-5_H1
366	CR/LFINF+CDM+LFC:1.0/HBET:3-5	CR_LFINF-CDM-0_H4	**430**	CR/LFINF+CDL+LFC:7.5/H:1	CR_LFINF-CDL-5_H1
367	CR/LWAL+CDM+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	**431**	CR/LFINF+CDL+LFC:15.0/HBET:3-5	CR_LFINF-CDL-15_H4
368	MIX(MUR+CR)/LWAL+CDM+LFC:0.0/HBET:3-5	MCF_LWAL-DUL_H4	**432**	CR/LFINF+CDL+LFC:15.0/HBET:6-	CR_LFINF-CDL-15_H6
369	CR/LWAL+CDM+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	**433**	CR/LFINF+CDL+LFC:15.0/H:1	CR_LFINF-CDL-15_H1
370	CR/LWAL+CDH+LFC:4.0/HBET:3-5	CR_LWAL-DUM_H4	**434**	CR/LFINF+CDL+LFC:15.0/H:2	CR_LFINF-CDL-15_H2
371	CR/LFINF+CDH+LFC:4.0/H:2	CR_LFINF-CDH-5_H2	**435**	CR+PC/LFM+CDM/H:2	CR_LFM-CDM-0_H2
372	CR/LWAL+CDH+LFC:4.0/HBET:6-	CR_LWAL-DUM_H6	**436**	CR/LFM+CDH/H:2	CR_LFM-CDH-0_H2
373	CR/LFINF+CDH+LFC:0.0/H:2	CR_LFINF-CDH-0_H2	**437**	S+SL/LFM+CDH/H:1	S_LFM-DUM_H1
374	CR/LFINF+CDN/HBET:4-10	CR_LFINF-CDN-0_H6	**438**	CR/LWAL+CDM+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4
375	MUR+ST/LWAL+CDN/HBET:1-4	MUR-STDRE_LWAL-DNO_H2	**439**	CR/LWAL+CDM+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6
376	CR/LFM+CDL/HBET:3-5	CR_LFM-CDL-0_H4	**440**	MCF/LWAL+CDL/HBET:6-	MCF_LWAL-DUL_H5
377	S/LFBR+CDL/H:1	S_LFBR-DUM_H1	**441**	MIX/LH+CDL/HBET:3-5	MCF_LWAL-DUL_H4
378	W/LWAL+CDN/HBET:3-5	W_LFM-DUL_H4	**442**	W/LFM+CDL/H:2	W_LFM-DUL_H2
379	CR+PC/LWAL+CDL+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	**443**	CR+PC/LWAL+CDL+LFC:3.75/HBET:6-	CR_LWAL-DUL_H6
380	CR/LFINF+CDL+LFC:3.0/H:2	CR_LFINF-CDL-5_H2	**444**	CR/LWAL+CDM+LFC:5.0/H:2	CR_LWAL-DUL_H2
381	CR/LFINF+CDL+LFC:3.0/HBET:3-5	CR_LFINF-CDL-5_H4	**445**	CR/LWAL+CDM+LFC:5.0/H:1	CR_LWAL-DUL_H1
382	CR/LWAL+CDL+LFC:3.0/H:1	CR_LWAL-DUL_H1	**446**	MCF/LWAL+CDN/HBET:6-	MCF_LWAL-DUL_H5
383	CR/LWAL+CDL+LFC:3.0/H:2	CR_LWAL-DUL_H2	**447**	CR+PC/LWAL+CDL+LFC:7.5/HBET:6-	CR_LWAL-DUL_H6
384	CR/LWAL+CDL+LFC:3.0/HBET:3-5	CR_LWAL-DUL_H4	**448**	CR+PC/LWAL+CDL+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6
385	MIX(MUR+W)/LWAL+CDL/H:1	MUR_LWAL-DNO_H1	**449**	CR/LWAL+CDM+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6
386	MIX(MUR+W)/LWAL+CDL/H:2	MUR_LWAL-DNO_H2	**450**	CR/LWAL+CDM+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4
387	MIX(MUR+W)/LWAL+CDN/H:1	MUR_LWAL-DNO_H1	**451**	CR/LWAL+CDM+LFC:10.0/H:2	CR_LWAL-DUM_H2
388	MIX(MUR+W)/LWAL+CDN/H:2	MUR_LWAL-DNO_H2	**452**	CR/LWAL+CDM+LFC:10.0/H:1	CR_LWAL-DUM_H1
389	MIX/LH+CDL/H:2	MCF_LWAL-DUL_H2	**453**	CR/LWAL+CDM+LFC:2.5/H:2	CR_LWAL-DUL_H2
390	MIX/LH+CDN/H:2	MUR_LWAL-DNO_H2	**454**	CR/LWAL+CDM+LFC:2.5/HBET:3-5	CR_LWAL-DUL_H4
391	CR+PC/LWAL+CDH+LFC:5.0/HBET:3-5	CR_LWAL-DUM_H4	**455**	CR/LWAL+CDM+LFC:2.5/H:1	CR_LWAL-DUL_H1
392	CR/LWAL+CDL+LFC:5.0/H:1	CR_LWAL-DUL_H1	**456**	CR/LWAL+CDM+LFC:2.5/HBET:6-	CR_LWAL-DUL_H6
393	CR/LWAL+CDL+LFC:5.0/H:2	CR_LWAL-DUL_H2	**457**	CR/LWAL+CDM+LFC:0.0/H:1	CR_LWAL-DUL_H1
394	CR/LWAL+CDL+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4	**458**	CR/LWAL+CDM+LFC:0.0/H:2	CR_LWAL-DUL_H2
395	CR/LWAL+CDL+LFC:8.0/HBET:3-5	CR_LWAL-DUL_H4	**459**	CR/LDUAL+CDL+LFC:12.0/H:1	CR_LDUAL-DUL_H1
396	CR/LWAL+CDL+LFC:8.0/H:2	CR_LWAL-DUL_H2	**460**	CR/LDUAL+CDH+LFC:15.0/HBET:6-	CR_LDUAL-DUM_H6
397	CR/LWAL+CDL+LFC:8.0/H:1	CR_LWAL-DUL_H1	**461**	CR/LDUAL+CDH+LFC:15.0/HBET:3-5	CR_LDUAL-DUM_H4
398	CR/LWAL+CDH+LFC:7.0/HBET:3-5	CR_LWAL-DUM_H4	**462**	CR/LDUAL+CDH+LFC:15.0/H:2	CR_LDUAL-DUM_H2
399	CR/LFINF+CDL+LFC:8.0/HBET:3-5	CR_LFINF-CDL-10_H4	**463**	CR/LDUAL+CDH+LFC:15.0/H:1	CR_LDUAL-DUM_H1
400	CR/LFINF+CDL+LFC:8.0/H:2	CR_LFINF-CDL-10_H2	**464**	CR/LDUAL+CDM+LFC:12.0/HBET:3-5	CR_LDUAL-DUM_H4
401	CR+PC/LWAL+CDH+LFC:7.0/HBET:3-5	CR_LWAL-DUM_H4	**465**	CR/LFINF+CDM+LFC:12.0/HBET:3-5	CR_LFINF-CDM-10_H4
402	CR+PC/LWAL+CDL+LFC:8.0/HBET:3-5	CR_LWAL-DUL_H4	**466**	S/LFM+CDM/H:2	S_LFM-DUM_H2
403	CR/LWAL+CDL+LFC:9.0/H:1	CR_LWAL-DUL_H1	**467**	S/LFM+CDL/H:2	S_LFM-DUM_H2
404	CR/LWAL+CDL+LFC:9.0/H:2	CR_LWAL-DUL_H2	**468**	S/LFINF+CDN/H:1	S_LFINF-DUM_H1
405	CR/LFINF+CDH+LFC:10.0/HBET:6-	CR_LFINF-CDH-10_H6	**469**	S/LFINF+CDM/H:2	S_LFINF-DUM_H2
406	CR/LFINF+CDH+LFC:10.0/HBET:3-5	CR_LFINF-CDH-10_H4	**470**	S/LFINF+CDM/H:1	S_LFINF-DUM_H1
407	CR+PC/LWAL+CDL+LFC:3.0/HBET:6-	CR_LWAL-DUL_H6	**471**	S/LFINF+CDL/H:2	S_LFINF-DUM_H2
408	CR/LFINF+CDL+LFC:3.0/HBET:6-	CR_LFINF-CDL-5_H6	**472**	S/LFINF+CDH/H:2	S_LFINF-DUM_H2
409	CR/LWAL+CDL+LFC:3.0/HBET:6-	CR_LWAL-DUL_H6	**473**	S/LFINF+CDH/H:1	S_LFINF-DUM_H1
410	CR+PC/LWAL+CDH+LFC:4.0/HBET:3-5	CR_LWAL-DUM_H4	**474**	CR/LFINF+CDH+LFC:15.0/HBET:3-5	CR_LFINF-CDH-15_H4
411	CR/LWAL+CDL+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	**475**	CR/LFINF+CDH+LFC:15.0/HBET:6-	CR_LFINF-CDH-15_H6
412	CR/LWAL+CDL+LFC:13.0/H:2	CR_LWAL-DUM_H2	**476**	CR/LFINF+CDH+LFC:15.0/H:2	CR_LFINF-CDH-15_H2
413	CR/LWAL+CDL+LFC:13.0/H:1	CR_LWAL-DUM_H1	**477**	CR/LDUAL+CDM+LFC:8.0/HBET:3-5	CR_LDUAL-DUM_H4
414	CR/LWAL+CDH+LFC:15.0/HBET:3-5	CR_LWAL-DUM_H4	**478**	CR/LDUAL+CDM+LFC:8.0/HBET:6-	CR_LDUAL-DUM_H6
415	CR/LFINF+CDL+LFC:13.0/HBET:3-5	CR_LFINF-CDL-15_H4	**479**	CR/LDUAL+CDM+LFC:8.0/H:1	CR_LDUAL-DUM_H1
416	CR/LFINF+CDL+LFC:13.0/H:2	CR_LFINF-CDL-15_H2	**480**	CR/LDUAL+CDN/H:1	CR_LDUAL-DUL_H1
417	CR+PC/LWAL+CDL+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	**481**	CR/LDUAL+CDN/H:2	CR_LDUAL-DUL_H2
418	CR+PC/LWAL+CDH+LFC:15.0/HBET:3-5	CR_LWAL-DUM_H4	**482**	CR/LFINF+CDH+LFC:15.0/H:1	CR_LFINF-CDH-15_H1
419	CR+PC/LFM+CDM/H:1	CR_LFM-CDM-0_H1	**483**	CR/LDUAL+CDM+LFC:8.0/H:2	CR_LDUAL-DUM_H2
420	CR/LFM+CDL/H:1	CR_LFM-CDL-0_H1	**484**	CR/LFINF+CDM+LFC:12.0/HBET:6-	CR_LFINF-CDM-10_H6
421	S+SL/LFM+CDM/H:1	S_LFM-DUM_H1	**485**	CR/LFINF+CDM+LFC:12.0/H:2	CR_LFINF-CDM-10_H2
422	S/LFM+CDM/H:1	S_LFM-DUM_H1	**486**	CR/LFINF+CDM+LFC:12.0/H:1	CR_LFINF-CDM-10_H1
423	CR/LFINF+CDL/H:3	CR_LFINF-CDL-0_H3	**487**	CR/LFINF+CDL+LFC:12.0/H:2	CR_LFINF-CDL-10_H2
424	MUR/LWAL+CDN/HBET:3-5	MUR_LWAL-DNO_H4	**488**	CR/LFINF+CDL+LFC:12.0/H:1	CR_LFINF-CDL-10_H1
425	CR/LFINF+CDL+LFC:3.75/HBET:6-	CR_LFINF-CDL-5_H6	**489**	S/LFM+CDN/H:2	S_LFM-DUM_H2
426	CR/LFINF+CDL+LFC:3.75/HBET:3-5	CR_LFINF-CDL-5_H4	**490**	CR/LDUAL+CDM+LFC:12.0/HBET:6-	CR_LDUAL-DUM_H6
427	CR/LFINF+CDL+LFC:3.75/H:2	CR_LFINF-CDL-5_H2	**491**	CR/LDUAL+CDM+LFC:12.0/H:2	CR_LDUAL-DUM_H2
428	CR/LFINF+CDL+LFC:0.0/H:1	CR_LFINF-CDL-0_H1	**492**	CR/LDUAL+CDM+LFC:12.0/H:1	CR_LDUAL-DUM_H1

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
493	CR/LDUAL+CDL+LFC:12.0/H:2	CR_LDUAL-DUL_H2	**550**	MIX(MUR+CR)/LWAL+CDH+LFC:8.0/HBET:3-5	MCF_LWAL-DUM_H4
494	CR/LDUAL+CDL+LFC:8.0/H:1	CR_LDUAL-DUL_H1	**551**	CR+PC/LWAL+CDL/H:1	CR_LWAL-DUL_H1
495	CR/LFINF+CDM+LFC:8.0/HBET:6-	CR_LFINF-CDM-10_H6	**552**	CR/LFM+CDL/HBET:6-	CR_LFM-CDL-0_H6
496	CR/LDUAL+CDL+LFC:8.0/H:2	CR_LDUAL-DUL_H2	**553**	MR/LWAL+CDL/HBET:3-5	MR_LWAL-DUL_H4
497	CR/LFINF+CDL+LFC:8.0/H:1	CR_LFINF-CDL-10_H1	**554**	S/LFM+CDL/HBET:6-	S_LFM-DUM_H6
498	CR/LFINF+CDM+LFC:8.0/H:1	CR_LFINF-CDM-10_H1	**555**	S/LWAL+CDL/H:2	S_LWAL-DUM_H2
499	CR/LFINF+CDM+LFC:8.0/H:2	CR_LFINF-CDM-10_H2	**556**	S/LWAL+CDL/HBET:3-5	S_LWAL-DUM_H4
500	CR/LFINF+CDM+LFC:8.0/HBET:3-5	CR_LFINF-CDM-10_H4	**557**	S/LWAL+CDL/HBET:6-	S_LWAL-DUM_H6
501	CR/LFINF+CDL+LFC:6.0/H:2	CR_LFINF-CDL-5_H2	**558**	CR+PC/LWAL+CDL+LFC:0.0/H:1	CR_LWAL-DUL_H1
502	CR/LFINF+CDL+LFC:6.0/H:1	CR_LFINF-CDL-5_H1	**559**	CR/LFINF+CDM+LFC:19.0/H:1	CR_LFINF-CDM-20_H1
503	CR/LDUAL+CDL+LFC:6.0/H:2	CR_LDUAL-DUL_H2	**560**	CR/LFINF+CDL+LFC:9.0/H:1	CR_LFINF-CDL-10_H1
504	CR/LDUAL+CDM+LFC:6.0/H:1	CR_LDUAL-DUL_H1	**561**	CR+PC/LWAL+CDL+LFC:9.0/H:1	CR_LWAL-DUL_H1
505	CR/LDUAL+CDL+LFC:6.0/H:1	CR_LDUAL-DUL_H1	**562**	CR+PC/LWAL+CDL+LFC:4.5/H:1	CR_LWAL-DUL_H1
506	CR/LDUAL+CDM+LFC:6.0/H:2	CR_LDUAL-DUL_H2	**563**	CR/LFINF+CDL+LFC:4.5/H:1	CR_LFINF-CDL-5_H1
507	CR/LDUAL+CDM+LFC:6.0/HBET:3-5	CR_LDUAL-DUL_H4	**564**	CR/LFINF+CDM+LFC:11.0/H:1	CR_LFINF-CDM-10_H1
508	CR/LDUAL+CDM+LFC:6.0/HBET:6-	CR_LDUAL-DUL_H6	**565**	MUR+ADO/LWAL+CDN/H:2	MUR-ADO_LWAL-DNO_H2
509	CR/LDUAL+CDH+LFC:10.0/HBET:6-	CR_LDUAL-DUM_H6	**566**	W/LFM+CDL/HBET:3-5	W_LFM-DUL_H4
510	CR/LFINF+CDH+LFC:10.0/H:1	CR_LFINF-CDH-10_H1	**567**	W/LFM+CDN/HBET:3-5	W_LFM-DUL_H4
511	CR/LFINF+CDH+LFC:10.0/H:2	CR_LFINF-CDH-10_H2	**568**	CR+PC/LFM+CDH/H:1	CR_LFM-CDH-0_H1
512	CR/LDUAL+CDH+LFC:10.0/H:1	CR_LDUAL-DUM_H1	**569**	CR+PC/LFM+CDN/H:2	CR_LFM-CDN-0_H2
513	CR/LDUAL+CDH+LFC:10.0/H:2	CR_LDUAL-DUM_H2	**570**	MUR+CL/LWAL+CDN/H:3	MUR-CL99_LWAL-DNO_H3
514	CR/LDUAL+CDH+LFC:10.0/HBET:3-5	CR_LDUAL-DUM_H4	**571**	MUR+ST/LWAL+CDN/H:3	MUR-STDRE_LWAL-DNO_H3
515	CR/LFINF+CDH+LFC:23.0/HBET:6-	CR_LFINF-CDH-25_H6	**572**	CR/LWAL+CDM+LFC:13.0/H:1	CR_LWAL-DUM_H1
516	CR/LDUAL+CDH+LFC:23.0/H:1	CR_LDUAL-DUH_H1	**573**	CR/LWAL+CDL+LFC:7.0/HBET:3-5	CR_LWAL-DUL_H4
517	CR/LDUAL+CDH+LFC:23.0/H:2	CR_LDUAL-DUH_H2	**574**	CR/LDUAL+CDH+LFC:20.0/H:2	CR_LDUAL-DUH_H2
518	CR/LDUAL+CDH+LFC:23.0/HBET:3-5	CR_LDUAL-DUH_H4	**575**	CR/LDUAL+CDH+LFC:20.0/HBET:3-5	CR_LDUAL-DUH_H4
519	CR/LDUAL+CDH+LFC:23.0/HBET:6-	CR_LDUAL-DUH_H6	**576**	CR/LWAL+CDL+LFC:7.0/H:1	CR_LWAL-DUL_H1
520	CR/LFINF+CDH+LFC:23.0/H:1	CR_LFINF-CDH-25_H1	**577**	CR/LWAL+CDM+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4
521	CR/LFINF+CDH+LFC:23.0/H:2	CR_LFINF-CDH-25_H2	**578**	CR/LWAL+CDL+LFC:7.0/H:2	CR_LWAL-DUL_H2
522	CR/LFINF+CDH+LFC:23.0/HBET:3-5	CR_LFINF-CDH-25_H4	**579**	CR/LWAL+CDM+LFC:13.0/H:2	CR_LWAL-DUM_H2
523	CR/LWAL+CDL+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4	**580**	CR/LWAL+CDM+LFC:7.0/H:1	CR_LWAL-DUL_H1
524	CR/LWAL+CDL+LFC:2.0/HBET:3-5/SOS	CR_LWAL-DUL_H4	**581**	CR/LWAL+CDM+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6
525	CR/LFINF+CDL+LFC:2.0/HBET:6-/SOS	CR_LFINF-CDL-0_H6	**582**	CR/LDUAL+CDH+LFC:20.0/HBET:6-	CR_LDUAL-DUH_H6
526	CR/LFINF+CDL+LFC:2.0/H:2	CR_LFINF-CDL-0_H2	**583**	CR/LWAL+CDH+LFC:15.0/H:1	CR_LWAL-DUM_H1
527	CR+PC/LWAL+CDL+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4	**584**	CR/LWAL+CDH+LFC:15.0/H:2	CR_LWAL-DUM_H2
528	CR/LFINF+CDL+LFC:2.0/HBET:6-	CR_LFINF-CDL-0_H6	**585**	CR/LDUAL+CDH+LFC:8.0/HBET:3-5	CR_LDUAL-DUM_H4
529	CR/LFINF+CDL+LFC:2.0/HBET:3-5	CR_LFINF-CDL-0_H4	**586**	CR/LDUAL+CDH+LFC:8.0/H:2	CR_LDUAL-DUM_H2
530	MIX(MUR+CR)/LWAL+CDM+LFC:6.0/HBET:3-5	MCF_LWAL-DUL_H4	**587**	CR/LWAL+CDM+LFC:8.0/H:2	CR_LWAL-DUM_H2
531	MIX(MUR+CR)/LWAL+CDL+LFC:2.0/HBET:3-5	MCF_LWAL-DUL_H4	**588**	CR/LWAL+CDM+LFC:8.0/H:1	CR_LWAL-DUM_H1
532	CR/LWAL+CDL+LFC:2.0/H:2	CR_LWAL-DUL_H2	**589**	CR/LWAL+CDM+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4
533	CR/LFINF+CDL+LFC:2.0/HBET:3-5/SOS	CR_LFINF-CDL-0_H4	**590**	CR/LDUAL+CDH+LFC:8.0/HBET:6-	CR_LDUAL-DUM_H6
534	MIX(MUR+CR)/LWAL+CDH+LFC:11.0/HBET:3-5	MCF_LWAL-DUM_H4	**591**	CR/LDUAL+CDH+LFC:5.0/HBET:3-5	CR_LDUAL-DUM_H4
535	CR/LFINF+CDL+LFC:2.0/H:1	CR_LFINF-CDL-0_H1	**592**	CR/LDUAL+CDH+LFC:5.0/H:2	CR_LDUAL-DUM_H2
536	MIX(MUR+CR)/LWAL+CDM+LFC:3.0/HBET:3-5	MCF_LWAL-DUL_H4	**593**	CR/LDUAL+CDH+LFC:5.0/HBET:6-	CR_LDUAL-DUM_H6
537	MIX(MUR+CR)/LWAL+CDM+LFC:9.0/HBET:3-5	MCF_LWAL-DUM_H4	**594**	CR/LWAL+CDM+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6
538	CR/LWAL+CDM+LFC:9.0/HBET:3-5	CR_LWAL-DUM_H4	**595**	CR/LDUAL+CDH+LFC:0.0/H:2	CR_LDUAL-DUL_H2
539	CR/LWAL+CDM+LFC:9.0/H:2	CR_LWAL-DUM_H2	**596**	CR/LWAL+CDM+LFC:3.0/H:1	CR_LWAL-DUL_H1
540	CR/LFINF+CDM+LFC:9.0/H:2	CR_LFINF-CDM-10_H2	**597**	CR/LDUAL+CDH+LFC:0.0/HBET:3-5	CR_LDUAL-DUL_H4
541	CR/LFINF+CDM+LFC:9.0/H:1	CR_LFINF-CDM-10_H1	**598**	S+SL/LFM+CDM/H:2	S_LFM-DUM_H2
542	CR/LFINF+CDM+LFC:9.0/HBET:3-5	CR_LFINF-CDM-10_H4	**599**	CR/LFM+CDM+LFC:5.0/H:2	CR_LFM-CDM-5_H2
543	CR/LFINF+CDM+LFC:9.0/HBET:6-	CR_LFINF-CDM-10_H6	**600**	CR/LFM+CDM+LFC:5.0/H:1	CR_LFM-CDM-5_H1
544	CR+PC/LWAL+CDM+LFC:9.0/HBET:3-5	CR_LWAL-DUM_H4	**601**	CR/LDUAL+CDM+LFC:5.0/H:2	CR_LDUAL-DUL_H2
545	MIX(MUR+CR)/LWAL+CDH+LFC:5.0/HBET:3-5	MCF_LWAL-DUM_H4	**602**	S/LFBR+CDM/H:2	S_LFBR-DUM_H2
546	MIX(MUR+CR)/LWAL+CDH+LFC:14.0/HBET:3-5	MCF_LWAL-DUM_H4	**603**	S/LWAL+CDM/HBET:3-5	S_LWAL-DUM_H4
547	CR/LWAL+CDM+LFC:9.0/HBET:3-5/SOS	CR_LWAL-DUM_H4	**604**	CR+PC/LWAL+CDM+LFC:5.0/H:1	CR_LWAL-DUL_H1
548	CR/LFINF+CDM+LFC:9.0/HBET:6-/SOS	CR_LFINF-CDM-10_H6	**605**	CR+PC/LWAL+CDM+LFC:5.0/H:2	CR_LWAL-DUL_H2
549	CR/LFINF+CDM+LFC:9.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4	**606**	CR+PC/LWAL+CDM+LFC:5.0/HBET:3-5	CR_LWAL-DUL_H4

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
607	CR/LDUAL+CDM+LFC:5.0/H:1	CR_LDUAL-DUL_H1	**657**	CR/LDUAL+CDL+LFC:8.0/HBET:6-	CR_LDUAL-DUL_H6
608	S/LWAL+CDM/H:2	S_LWAL-DUM_H2	**658**	CR/LFINF+CDM+LFC:8.0/H:2/SOS	CR_LFINF-CDM-10_H2
609	S/LWAL+CDM/H:1	S_LWAL-DUM_H1	**659**	CR/LFINF+CDM+LFC:8.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4
610	S/LFM+CDM/HBET:3-5	S_LFM-DUM_H4	**660**	CR/LFINF+CDM+LFC:8.0/HBET:6-/SOS	CR_LFINF-CDM-10_H6
611	CR/LDUAL+CDM+LFC:10.0/H:2	CR_LDUAL-DUM_H2	**661**	CR/LDUAL+CDL+LFC:8.0/H:2/SOS	CR_LDUAL-DUL_H2
612	CR/LDUAL+CDM+LFC:10.0/H:1	CR_LDUAL-DUM_H1	**662**	CR/LDUAL+CDM+LFC:8.0/H:2/SOS	CR_LDUAL-DUM_H2
613	CR+PC/LWAL+CDM+LFC:10.0/HBET:3-5	CR_LWAL-DUM_H4	**663**	CR/LDUAL+CDM+LFC:8.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4
614	CR+PC/LWAL+CDM+LFC:10.0/H:2	CR_LWAL-DUM_H2	**664**	CR/LDUAL+CDM+LFC:8.0/HBET:6-/SOS	CR_LDUAL-DUM_H6
615	CR+PC/LWAL+CDM+LFC:10.0/H:1	CR_LWAL-DUM_H1	**665**	CR/LFINF+CDL+LFC:8.0/HBET:6-/SOS	CR_LFINF-CDL-10_H6
616	CR/LFM+CDM+LFC:10.0/H:1	CR_LFM-CDM-10_H1	**666**	CR/LFINF+CDL+LFC:8.0/HBET:3-5/SOS	CR_LFINF-CDL-10_H4
617	CR/LFM+CDM+LFC:10.0/H:2	CR_LFM-CDM-10_H2	**667**	CR/LFINF+CDL+LFC:8.0/H:2/SOS	CR_LFINF-CDL-10_H2
618	CR/LDUAL+CDM+LFC:2.5/H:2	CR_LDUAL-DUL_H2	**668**	CR/LDUAL+CDL+LFC:8.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4
619	CR/LDUAL+CDM+LFC:2.5/H:1	CR_LDUAL-DUL_H1	**669**	CR/LDUAL+CDL+LFC:6.0/HBET:3-5	CR_LDUAL-DUL_H4
620	CR+PC/LWAL+CDM+LFC:2.5/HBET:3-5	CR_LWAL-DUL_H4	**670**	CR/LDUAL+CDL+LFC:6.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4
621	CR+PC/LWAL+CDM+LFC:2.5/H:2	CR_LWAL-DUL_H2	**671**	CR/LDUAL+CDL+LFC:6.0/HBET:6-	CR_LDUAL-DUL_H6
622	CR+PC/LWAL+CDM+LFC:2.5/H:1	CR_LWAL-DUL_H1	**672**	CR/LDUAL+CDL+LFC:6.0/HBET:6-/SOS	CR_LDUAL-DUL_H6
623	CR/LFM+CDM+LFC:2.5/H:1	CR_LFM-CDM-0_H1	**673**	CR/LFINF+CDL+LFC:6.0/H:2/SOS	CR_LFINF-CDL-5_H2
624	CR/LFM+CDM+LFC:2.5/H:2	CR_LFM-CDM-0_H2	**674**	CR/LFINF+CDM+LFC:6.0/H:2/SOS	CR_LFINF-CDM-5_H2
625	CR/LFM+CDM+LFC:0.0/H:1	CR_LFM-CDM-0_H1	**675**	CR/LFINF+CDL+LFC:6.0/HBET:6-/SOS	CR_LFINF-CDL-5_H6
626	CR/LFM+CDM+LFC:0.0/H:2	CR_LFM-CDM-0_H2	**676**	CR/LFINF+CDL+LFC:6.0/HBET:6-	CR_LFINF-CDL-5_H6
627	CR/LDUAL+CDM+LFC:0.0/H:2	CR_LDUAL-DUL_H2	**677**	CR/LFINF+CDL+LFC:6.0/HBET:3-5/SOS	CR_LFINF-CDL-5_H4
628	CR/LDUAL+CDM+LFC:0.0/H:1	CR_LDUAL-DUL_H1	**678**	CR/LFINF+CDL+LFC:6.0/HBET:3-5	CR_LFINF-CDL-5_H4
629	CR+PC/LWAL+CDM+LFC:0.0/HBET:3-5	CR_LWAL-DUL_H4	**679**	CR/LDUAL+CDM+LFC:6.0/H:2/SOS	CR_LDUAL-DUL_H2
630	CR+PC/LWAL+CDM+LFC:0.0/H:2	CR_LWAL-DUL_H2	**680**	CR/LDUAL+CDM+LFC:6.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4
631	CR+PC/LWAL+CDM+LFC:0.0/H:1	CR_LWAL-DUL_H1	**681**	CR/LDUAL+CDM+LFC:6.0/HBET:6-/SOS	CR_LDUAL-DUL_H6
632	CR/LFINF+CDH+LFC:15.0/HBET:3-5/SOS	CR_LFINF-CDH-15_H4	**682**	CR/LDUAL+CDL+LFC:6.0/H:2/SOS	CR_LDUAL-DUL_H2
633	CR/LFINF+CDH+LFC:15.0/H:2/SOS	CR_LFINF-CDH-15_H2	**683**	CR/LFINF+CDH+LFC:10.0/HBET:6-/SOS	CR_LFINF-CDH-10_H6
634	CR/LDUAL+CDH+LFC:15.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4	**684**	CR/LFINF+CDH+LFC:10.0/HBET:3-5/SOS	CR_LFINF-CDH-10_H4
635	CR/LFINF+CDL+LFC:12.0/H:2/SOS	CR_LFINF-CDL-10_H2	**685**	CR/LFINF+CDH+LFC:10.0/H:2/SOS	CR_LFINF-CDH-10_H2
636	CR/LFINF+CDL+LFC:12.0/HBET:6-	CR_LFINF-CDL-10_H6	**686**	CR/LDUAL+CDH+LFC:10.0/H:2/SOS	CR_LDUAL-DUM_H2
637	CR/LFINF+CDL+LFC:12.0/HBET:3-5	CR_LFINF-CDL-10_H4	**687**	CR/LDUAL+CDH+LFC:10.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4
638	CR/LDUAL+CDL+LFC:12.0/HBET:3-5	CR_LDUAL-DUL_H4	**688**	CR/LDUAL+CDH+LFC:10.0/HBET:6-/SOS	CR_LDUAL-DUM_H6
639	CR/LDUAL+CDL+LFC:12.0/HBET:3-5/SOS	CR_LDUAL-DUL_H4	**689**	CR/LFINF+CDH+LFC:23.0/HBET:3-5/SOS	CR_LFINF-CDH-25_H4
640	CR/LFINF+CDL+LFC:12.0/HBET:3-5/SOS	CR_LFINF-CDL-10_H4	**690**	CR/LFINF+CDH+LFC:23.0/H:2/SOS	CR_LFINF-CDH-25_H2
641	CR/LDUAL+CDM+LFC:12.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	**691**	CR/LDUAL+CDH+LFC:23.0/H:2/SOS	CR_LDUAL-DUH_H2
642	CR/LDUAL+CDM+LFC:12.0/HBET:3-5/SOS	CR_LDUAL-DUM_H4	**692**	CR/LDUAL+CDH+LFC:23.0/HBET:3-5/SOS	CR_LDUAL-DUH_H4
643	CR/LDUAL+CDL+LFC:8.0/HBET:3-5	CR_LDUAL-DUL_H4	**693**	CR/LFINF+CDH+LFC:23.0/HBET:6-/SOS	CR_LFINF-CDH-25_H6
644	CR/LDUAL+CDL+LFC:12.0/HBET:6-	CR_LDUAL-DUL_H6	**694**	CR/LDUAL+CDH+LFC:23.0/HBET:6-/SOS	CR_LDUAL-DUH_H6
645	CR/LDUAL+CDL+LFC:12.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	**695**	CR+PC/LWAL+CDL/H:2	CR_LWAL-DUL_H2
646	CR/LDUAL+CDH+LFC:15.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	**696**	S/LFM+CDN/HBET:3-5	S_LFM-DUM_H4
647	CR/LDUAL+CDH+LFC:15.0/H:2/SOS	CR_LDUAL-DUM_H2	**697**	S/LFM+CDN/HBET:6-	S_LFM-DUM_H6
648	CR/LFINF+CDM+LFC:12.0/HBET:6-/SOS	CR_LFINF-CDM-10_H6	**698**	CR/LFINF+CDL/HBET:4-10	CR_LFINF-CDL-0_H6
649	CR/LFINF+CDM+LFC:12.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4	**699**	CR/LWAL+CDL/HBET:4-10	CR_LWAL-DUL_H7
650	CR/LFINF+CDM+LFC:12.0/H:2/SOS	CR_LFINF-CDM-10_H2	**700**	CR+PC/LWAL+CDH/HBET:6-	CR_LWAL-DUH_H6
651	CR/LFINF+CDL+LFC:12.0/HBET:6-/SOS	CR_LFINF-CDL-10_H6	**701**	CR/LFINF+CDH/HBET:6-	CR_LFINF-CDH-0_H6
652	CR/LFINF+CDH+LFC:15.0/HBET:6-/SOS	CR_LFINF-CDH-15_H6	**702**	CR/LFINF+CDL+LFC:3.0/H:1	CR_LFINF-CDL-5_H1
653	CR/LDUAL+CDM+LFC:12.0/H:2/SOS	CR_LDUAL-DUM_H2	**703**	CR/LWAL+CDH/HBET:3-5	CR_LWAL-DUH_H4
654	CR/LDUAL+CDL+LFC:12.0/H:2/SOS	CR_LDUAL-DUL_H2	**704**	CR+PC/LWAL+CDH/HBET:3-5	CR_LWAL-DUH_H4
655	CR/LFINF+CDL+LFC:8.0/HBET:6-	CR_LFINF-CDL-10_H6	**705**	CR+PC/LWAL+CDL+LFC:8.0/HBET:6-	CR_LWAL-DUL_H6
656	CR/LDUAL+CDL+LFC:8.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	**706**	CR/LFINF+CDL+LFC:9.0/HBET:6-	CR_LFINF-CDL-10_H6

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
707	CR/LFINF+CDL+LFC:5.0/HBET:6-	CR_LFINF-CDL-5_H6	**768**	CR/LFINF+CDH+LFC:19.0/HBET:6-	CR_LFINF-CDH-20_H6
708	CR/LFINF+CDL+LFC:5.0/H:1	CR_LFINF-CDL-5_H1	**769**	CR+PC/LWAL+CDL+LFC:4.0/H:2	CR_LWAL-DUL_H2
709	CR+PC/LWAL+CDL+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6	**770**	CR+PC/LWAL+CDL+LFC:4.0/HBET:3-5	CR_LWAL-DUL_H4
710	CR/LFINF+CDL+LFC:13.0/H:1	CR_LFINF-CDL-15_H1	**771**	CR+PC/LWAL+CDL+LFC:4.0/HBET:6-	CR_LWAL-DUL_H6
711	CR/LFINF+CDL+LFC:13.0/HBET:6-	CR_LFINF-CDL-15_H6	**772**	CR/LFINF+CDH+LFC:19.0/H:1	CR_LFINF-CDH-20_H1
712	CR/LFINF+CDM+LFC:4.0/H:1	CR_LFINF-CDM-5_H1	**773**	CR+PC/LWAL+CDL+LFC:4.0/H:1	CR_LWAL-DUL_H1
713	CR/LFINF+CDM+LFC:1.0/H:1	CR_LFINF-CDM-0_H1	**774**	CR/LFINF+CDH+LFC:16.0/HBET:3-5	CR_LFINF-CDH-15_H4
714	CR/LFINF+CDL+LFC:4.0/H:1	CR_LFINF-CDL-5_H1	**775**	CR/LFINF+CDH+LFC:16.0/H:2	CR_LFINF-CDH-15_H2
715	CR/LFINF+CDH+LFC:6.0/HBET:3-5	CR_LFINF-CDH-5_H4	**776**	CR/LFINF+CDH+LFC:16.0/HBET:6-	CR_LFINF-CDH-15_H6
716	CR/LFINF+CDH+LFC:6.0/H:1	CR_LFINF-CDH-5_H1	**777**	CR/LFINF+CDH+LFC:16.0/H:1	CR_LFINF-CDH-15_H1
717	CR/LFINF+CDM+LFC:2.0/H:1	CR_LFINF-CDM-0_H1	**778**	CR/LFINF+CDH+LFC:14.0/HBET:6-	CR_LFINF-CDH-15_H6
718	CR/LFINF+CDH+LFC:4.0/H:1	CR_LFINF-CDH-5_H1	**779**	CR/LFINF+CDH+LFC:11.0/HBET:6-	CR_LFINF-CDH-10_H6
719	CR/LFINF+CDH+LFC:4.0/HBET:3-5	CR_LFINF-CDH-5_H4	**780**	CR+PC/LPB+CDN/H:1	CR_LFM-CDN-0_H1
720	CR/LFINF+CDH+LFC:0.0/HBET:3-5	CR_LFINF-CDH-0_H4	**781**	W+S/LPB+CDN/H:1	W_LFM-DUL_H1
721	CR/LFINF+CDH+LFC:0.0/H:1	CR_LFINF-CDH-0_H1	**782**	MUR+STRUB/LWAL+CDN/H:1	MUR-STRUB_LWAL-DNO_H1
722	CR+PC/LWAL+CDM+LFC:9.0/H:2	CR_LWAL-DUM_H2	**783**	MUR+STRUB/LWAL+CDN/H:2	MUR-STRUB_LWAL-DNO_H2
723	CR+PC/LWAL+CDM+LFC:9.0/HBET:6-	CR_LWAL-DUM_H6	**784**	MUR+STRUB/LWAL+CDN/H:3	MUR-STRUB_LWAL-DNO_H3
724	CR/LDUAL+CDM+LFC:9.0/HBET:6-	CR_LDUAL-DUM_H6	**785**	MUR+STDRE/LWAL+CDN/HBET:4-	MUR-STDRE_LWAL-DNO_H4
725	CR/LDUAL+CDM+LFC:9.0/HBET:6-/SOS	CR_LDUAL-DUM_H6	**786**	CR/LFINF+CDL+LFC:0.0/H:3	CR_LFINF-CDL-0_H3
726	CR/LDUAL+CDM+LFC:4.0/HBET:6-/SOS	CR_LDUAL-DUL_H6	**787**	CR/LFINF+CDL+LFC:0.0/HBET:4-	CR_LFINF-CDL-0_H4
727	CR/LDUAL+CDL+LFC:5.0/HBET:6-	CR_LDUAL-DUL_H6	**788**	CR/LFINF+CDM+LFC:0.0/H:3	CR_LFINF-CDM-0_H3
728	CR/LFINF+CDM+LFC:4.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	**789**	MCF/LWAL+CDN/H:3	MCF_LWAL-DUL_H3
729	CR+PC/LWAL+CDM+LFC:0.0/HBET:6-	CR_LWAL-DUL_H6	**790**	MCF/LWAL+CDN/HBET:4-	MCF_LWAL-DUL_H4
730	CR+PC/LFM+CDL/H:2	CR_LFM-CDL-0_H2	**791**	CR/LFINF+CDM+LFC:0.0/HBET:4-	CR_LFINF-CDM-0_H4
731	CR+PC/LWAL+CDM+LFC:2.0/HBET:3-5	CR_LWAL-DUL_H4	**792**	CR/LFINF+CDL+LFC:7.0/H:2	CR_LFINF-CDL-5_H2
732	CR+PC/LWAL+CDM+LFC:2.0/H:2	CR_LWAL-DUL_H2	**793**	CR/LFINF+CDL+LFC:7.0/H:3	CR_LFINF-CDL-5_H3
733	CR/LFINF+CDH+LFC:8.0/HBET:6-	CR_LFINF-CDH-10_H6	**794**	CR/LFINF+CDM+LFC:7.0/H:3	CR_LFINF-CDM-5_H3
734	CR+PC/LWAL+CDM+LFC:2.0/HBET:6-	CR_LWAL-DUL_H6	**795**	CR/LFINF+CDL+LFC:7.0/H:1	CR_LFINF-CDL-5_H1
735	CR+PC/LWAL+CDM+LFC:2.0/H:1	CR_LWAL-DUL_H1	**796**	CR/LFINF+CDL+LFC:7.0/HBET:4-	CR_LFINF-CDL-5_H4
736	CR/LFINF+CDH+LFC:5.0/HBET:6-	CR_LFINF-CDH-5_H6	**797**	CR/LFINF+CDM+LFC:7.0/HBET:4-	CR_LFINF-CDM-5_H4
737	CR/LFINF+CDM+LFC:6.5/H:2	CR_LFINF-CDM-5_H2	**798**	CR/LFINF+CDL+LFC:10.0/H:1	CR_LFINF-CDL-10_H1
738	CR/LFINF+CDH+LFC:22.0/HBET:6-	CR_LFINF-CDH-20_H6	**799**	CR/LFINF+CDL+LFC:10.0/H:3	CR_LFINF-CDL-10_H3
739	CR/LFINF+CDM+LFC:6.5/HBET:3-5	CR_LFINF-CDM-5_H4	**800**	CR/LFINF+CDM+LFC:10.0/H:3	CR_LFINF-CDM-10_H3
740	CR/LFINF+CDM+LFC:6.5/HBET:6-	CR_LFINF-CDM-5_H6	**801**	CR/LFINF+CDL+LFC:10.0/HBET:4-	CR_LFINF-CDL-10_H4
741	CR/LFINF+CDL+LFC:8.5/HBET:6-	CR_LFINF-CDL-10_H6	**802**	CR/LFINF+CDM+LFC:10.0/HBET:4-	CR_LFINF-CDM-10_H4
742	CR+PC/LWAL+CDM+LFC:6.5/HBET:6-	CR_LWAL-DUL_H6	**803**	CR/LFINF+CDL+LFC:12.5/H:1	CR_LFINF-CDL-10_H1
743	CR/LFINF+CDH+LFC:22.0/H:2	CR_LFINF-CDH-20_H2	**804**	MCF/LWAL+CDL/H:3	MCF_LWAL-DUL_H3
744	CR+PC/LWAL+CDM+LFC:10.0/HBET:6-	CR_LWAL-DUM_H6	**805**	MCF/LWAL+CDL/HBET:4-	MCF_LWAL-DUL_H4
745	CR/LFINF+CDL+LFC:17.5/H:1	CR_LFINF-CDL-15_H1	**806**	CR/LFINF+CDL+LFC:12.5/H:3	CR_LFINF-CDL-10_H3
746	CR+PC/LWAL+CDL+LFC:17.5/H:2	CR_LWAL-DUM_H2	**807**	CR/LFINF+CDL+LFC:12.5/H:2	CR_LFINF-CDL-10_H2
747	CR/LFINF+CDL+LFC:17.5/HBET:6-	CR_LFINF-CDL-15_H6	**808**	CR/LFINF+CDL+LFC:12.5/HBET:4-	CR_LFINF-CDL-10_H4
748	CR/LFINF+CDL+LFC:17.5/HBET:3-5	CR_LFINF-CDL-15_H4	**809**	CR/LFINF+CDL+LFC:4.0/H:3	CR_LFINF-CDL-5_H3
749	CR/LFINF+CDH+LFC:22.0/H:1	CR_LFINF-CDH-20_H1	**810**	CR/LFINF+CDL+LFC:4.0/HBET:4-	CR_LFINF-CDL-5_H4
750	CR/LFINF+CDL+LFC:17.5/H:2	CR_LFINF-CDL-15_H2	**811**	CR/LFINF+CDM+LFC:4.0/H:3	CR_LFINF-CDM-5_H3
751	CR/LFINF+CDH+LFC:22.0/HBET:3-5	CR_LFINF-CDH-20_H4	**812**	CR/LFINF+CDM+LFC:4.0/HBET:4-	CR_LFINF-CDM-5_H4
752	CR+PC/LWAL+CDL+LFC:17.5/H:1	CR_LWAL-DUM_H1	**813**	CR+PC/LFM+CDL/HBET:1-3	CR_LFM-CDL-0_H2
753	CR+PC/LWAL+CDL+LFC:17.5/HBET:6-	CR_LWAL-DUM_H6	**814**	CR/LFM+CDL/HBET:1-3	CR_LFM-CDL-0_H2
754	CR+PC/LWAL+CDL+LFC:17.5/HBET:3-5	CR_LWAL-DUM_H4	**815**	CR/LFM+CDL/HBET:4-6	CR_LFM-CDL-0_H5
755	CR+PC/LWAL+CDM+LFC:6.5/HBET:3-5	CR_LWAL-DUL_H4	**816**	CR/LWAL+CDL/HBET:1-3	CR_LWAL-DUL_H2
756	CR+PC/LWAL+CDM+LFC:6.5/H:2	CR_LWAL-DUL_H2	**817**	MUR+STRUB/LWAL+CDN/HBET:1-3	MUR-STRUB_LWAL-DNO_H2
757	CR+PC/LWAL+CDL+LFC:8.5/H:1	CR_LWAL-DUL_H1	**818**	S/LFM+CDL/HBET:1-3	S_LFM-DUM_H2
758	CR+PC/LWAL+CDM+LFC:6.5/H:1	CR_LWAL-DUL_H1	**819**	CR/LDUAL+CDL/HBET:1-3	CR_LDUAL-DUL_H2
759	CR+PC/LWAL+CDL+LFC:8.5/HBET:6-	CR_LWAL-DUL_H6	**820**	SRC/LFM+CDH/HBET:1-3	S_LFM-DUM_H2
760	CR+PC/LWAL+CDL+LFC:8.5/HBET:3-5	CR_LWAL-DUL_H4	**821**	W/LFM+CDL/HBET:1-3	W_LFM-DUL_H2
761	CR+PC/LWAL+CDL+LFC:8.5/H:2	CR_LWAL-DUL_H2	**822**	CR+PC/LFM+CDL/HBET:4-6	CR_LFM-CDL-0_H5
762	CR/LFINF+CDM+LFC:6.5/H:1	CR_LFINF-CDM-5_H1	**823**	CR/LDUAL+CDL/HBET:4-6	CR_LDUAL-DUL_H5
763	CR/LFINF+CDL+LFC:8.5/H:1	CR_LFINF-CDL-10_H1	**824**	CR/LWAL+CDL/HBET:4-6	CR_LWAL-DUL_H5
764	CR/LFINF+CDL+LFC:8.5/H:2	CR_LFINF-CDL-10_H2	**825**	SRC/LFM+CDH/HBET:4-6	S_LFM-DUM_H5
765	CR/LFINF+CDL+LFC:8.5/HBET:3-5	CR_LFINF-CDL-10_H4	**826**	CR/LDUAL+CDL+LFC:15.0/HBET:6-	CR_LDUAL-DUM_H6
766	CR/LFINF+CDH+LFC:19.0/H:2	CR_LFINF-CDH-20_H2	**827**	CR/LFINF+CDM+LFC:2.5/HBET:3-5/SOS	CR_LFINF-CDM-0_H4
767	CR/LFINF+CDH+LFC:19.0/HBET:3-5	CR_LFINF-CDH-20_H4	**828**	CR/LFINF+CDL+LFC:15.0/HBET:3-5/SOS	CR_LFINF-CDL-15_H4

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
829	CR/LDUAL+CDL+LFC:15.0/HBET:3-5	CR_LDUAL-DUM_H4	**890**	CR/LFLS+CDN/H:5	CR_LFINF-CDN-0_H5
830	CR/LWAL+CDL+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6	**891**	CR/LDUAL+CDH+LFC:9.0/H:6	CR_LDUAL-DUM_H6
831	CR/LDUAL+CDL+LFC:3.75/HBET:6-	CR_LDUAL-DUL_H6	**892**	CR/LDUAL+CDH+LFC:9.0/H:7	CR_LDUAL-DUM_H7
832	CR/LFINF+CDL+LFC:3.75/HBET:3-5/SOS	CR_LFINF-CDL-5_H4	**893**	CR/LDUAL+CDH+LFC:9.0/H:8	CR_LDUAL-DUM_H8
833	CR/LDUAL+CDL+LFC:3.75/HBET:3-5	CR_LDUAL-DUL_H4	**894**	CR/LDUAL+CDH+LFC:9.0/H:9	CR_LDUAL-DUM_H9
834	CR/LWAL+CDL+LFC:3.75/HBET:6-	CR_LWAL-DUL_H6	**895**	CR/LDUAL+CDH+LFC:9.0/HBET:10-15	CR_LDUAL-DUM_H12
835	CR/LDUAL+CDL+LFC:7.5/HBET:6-	CR_LDUAL-DUL_H6	**896**	CR/LDUAL+CDL+LFC:0.0/HBET:10-15	CR_LDUAL-DUL_H12
836	CR/LFINF+CDL+LFC:7.5/HBET:3-5/SOS	CR_LFINF-CDL-5_H4	**897**	CR/LDUAL+CDL+LFC:4.0/HBET:10-15	CR_LDUAL-DUL_H12
837	CR/LFINF+CDM+LFC:5.0/HBET:3-5/SOS	CR_LFINF-CDM-5_H4	**898**	CR/LDUAL+CDM+LFC:5.0/HBET:10-15	CR_LDUAL-DUL_H12
838	CR/LDUAL+CDL+LFC:7.5/HBET:3-5	CR_LDUAL-DUL_H4	**899**	CR/LFINF+CDH+LFC:9.0/H:2	CR_LFINF-CDH-10_H2
839	CR/LFINF+CDM+LFC:10.0/HBET:3-5/SOS	CR_LFINF-CDM-10_H4	**900**	CR/LFINF+CDH+LFC:9.0/H:3	CR_LFINF-CDH-10_H3
840	CR/LFINF+CDL+LFC:0.0/HBET:3-5/SOS	CR_LFINF-CDL-0_H4	**901**	CR/LFINF+CDH+LFC:9.0/H:4	CR_LFINF-CDH-10_H4
841	CR/LFINF+CDM+LFC:0.0/HBET:3-5/SOS	CR_LFINF-CDM-0_H4	**902**	CR/LFINF+CDH+LFC:9.0/H:6	CR_LFINF-CDH-10_H6
842	MR/LWAL+CDL/HBET:1-2	MR_LWAL-DUL_H1	**903**	CR/LFLS+CDN/H:6	CR_LFINF-CDN-0_H6
843	MUR+ST/LWAL+CDN/H:4	MUR-STDRE_LWAL-DNO_H4	**904**	CR/LFLS+CDN/H:7	CR_LFINF-CDN-0_H6
844	MUR+ST/LWAL+CDN/H:5	MUR-STDRE_LWAL-DNO_H5	**905**	CR/LFLS+CDN/H:8	CR_LFINF-CDN-0_H6
845	MUR+ST/LWAL+CDN/H:6	MUR-STDRE_LWAL-DNO_H5	**906**	CR/LFLS+CDN/H:9	CR_LFINF-CDN-0_H6
846	CR/LFINF+CDL+LFC:4.0/H:7	CR_LFINF-CDL-5_H6	**907**	MUR+CL/LWAL+CDN/H:4	MUR-CL99_LWAL-DNO_H4
847	CR/LFINF+CDL+LFC:0.0/H:7	CR_LFINF-CDL-0_H6	**908**	CR/LFINF+CDH+LFC:9.0/H:7	CR_LFINF-CDH-10_H6
848	CR/LFINF+CDL+LFC:4.0/H:6	CR_LFINF-CDL-5_H6	**909**	CR/LFINF+CDH+LFC:9.0/H:8	CR_LFINF-CDH-10_H6
849	CR/LFINF+CDL+LFC:0.0/H:6	CR_LFINF-CDL-0_H6	**910**	CR/LFINF+CDH+LFC:9.0/H:9	CR_LFINF-CDH-10_H6
850	CR/LFLS+CDL+LFC:4.0/H:2	CR_LFINF-CDL-5_H2	**911**	CR/LFINF+CDH+LFC:9.0/HBET:10-15	CR_LFINF-CDH-10_H6
851	CR/LFLS+CDL+LFC:0.0/H:2	CR_LFINF-CDL-0_H2	**912**	CR/LFINF+CDL+LFC:0.0/H:4	CR_LFINF-CDL-0_H4
852	CR/LFINF+CDN/HBET:10-15	CR_LFINF-CDN-0_H6	**913**	CR/LFINF+CDL+LFC:4.0/H:4	CR_LFINF-CDL-5_H4
853	CR/LFINF+CDN/H:9	CR_LFINF-CDN-0_H6	**914**	CR/LFINF+CDL+LFC:0.0/H:5	CR_LFINF-CDL-0_H5
854	CR/LFINF+CDN/H:8	CR_LFINF-CDN-0_H6	**915**	CR/LFINF+CDL+LFC:4.0/H:5	CR_LFINF-CDL-5_H5
855	CR/LFINF+CDN/H:7	CR_LFINF-CDN-0_H6	**916**	MUR+CL/LWAL+CDN/H:6	MUR-CL99_LWAL-DNO_H5
856	CR/LFINF+CDM+LFC:5.0/HBET:10-15	CR_LFINF-CDM-5_H6	**917**	MUR+CL/LWAL+CDN/H:5	MUR-CL99_LWAL-DNO_H5
857	CR/LFINF+CDM+LFC:5.0/H:9	CR_LFINF-CDM-5_H6	**918**	CR/LFLS+CDL+LFC:0.0/H:3	CR_LFINF-CDL-0_H3
858	CR/LFINF+CDM+LFC:5.0/H:8	CR_LFINF-CDM-5_H6	**919**	CR/LFLS+CDL+LFC:4.0/H:3	CR_LFINF-CDL-5_H3
859	CR/LFINF+CDM+LFC:5.0/H:7	CR_LFINF-CDM-5_H6	**920**	CR/LFLS+CDL+LFC:0.0/H:4	CR_LFINF-CDL-0_H4
860	CR/LFINF+CDM+LFC:5.0/H:6	CR_LFINF-CDM-5_H6	**921**	CR/LFLS+CDL+LFC:4.0/H:4	CR_LFINF-CDL-5_H4
861	CR/LFINF+CDM+LFC:5.0/H:5	CR_LFINF-CDM-5_H5	**922**	CR/LFLS+CDL+LFC:0.0/H:5	CR_LFINF-CDL-0_H5
862	CR/LFINF+CDM+LFC:5.0/H:4	CR_LFINF-CDM-5_H4	**923**	CR/LFLS+CDL+LFC:4.0/H:5	CR_LFINF-CDL-5_H5
863	CR/LFINF+CDM+LFC:5.0/H:3	CR_LFINF-CDM-5_H3	**924**	CR/LFLS+CDL+LFC:0.0/H:6	CR_LFINF-CDL-0_H6
864	MCF/LWAL+CDL/H:4	MCF_LWAL-DUL_H4	**925**	CR/LFLS+CDL+LFC:4.0/H:6	CR_LFINF-CDL-5_H6
865	CR/LFINF+CDL+LFC:0.0/HBET:10-15	CR_LFINF-CDL-0_H6	**926**	CR/LDUAL+CDL+LFC:20.0/HBET:10-15	CR_LDUAL-DUM_H12
866	CR/LFINF+CDL+LFC:4.0/H:9	CR_LFINF-CDL-5_H6	**927**	CR/LFLS+CDM+LFC:12.0/H:8	CR_LFINF-CDM-10_H6
867	MCF/LWAL+CDL/H:6	MCF_LWAL-DUL_H5	**928**	CR/LFLS+CDL+LFC:20.0/H:2	CR_LFINF-CDL-20_H2
868	MCF/LWAL+CDL/H:5	MCF_LWAL-DUL_H5	**929**	CR/LFLS+CDL+LFC:10.0/H:2	CR_LFINF-CDL-10_H2
869	CR/LFINF+CDL+LFC:4.0/H:8	CR_LFINF-CDL-5_H6	**930**	CR/LFLS+CDL+LFC:20.0/H:9	CR_LFINF-CDL-20_H6
870	CR/LFINF+CDL+LFC:0.0/H:9	CR_LFINF-CDL-0_H6	**931**	CR/LFLS+CDL+LFC:10.0/H:9	CR_LFINF-CDL-10_H6
871	CR/LFINF+CDH+LFC:9.0/H:5	CR_LFINF-CDH-10_H5	**932**	CR/LFINF+CDM+LFC:12.0/HBET:10-15	CR_LFINF-CDM-10_H6
872	CR/LFINF+CDL+LFC:0.0/H:8	CR_LFINF-CDL-0_H6	**933**	CR/LFINF+CDM+LFC:12.0/H:9	CR_LFINF-CDM-10_H6
873	CR/LFINF+CDL+LFC:4.0/HBET:10-15	CR_LFINF-CDL-5_H6	**934**	CR/LFINF+CDM+LFC:12.0/H:8	CR_LFINF-CDM-10_H6
874	CR/LFLS+CDL+LFC:0.0/H:7	CR_LFINF-CDL-0_H6	**935**	CR/LFINF+CDM+LFC:12.0/H:7	CR_LFINF-CDM-10_H6
875	CR/LFLS+CDL+LFC:4.0/H:7	CR_LFINF-CDL-5_H6	**936**	CR/LFINF+CDM+LFC:12.0/H:6	CR_LFINF-CDM-10_H6
876	CR/LFLS+CDL+LFC:0.0/H:8	CR_LFINF-CDL-0_H6	**937**	CR/LFINF+CDM+LFC:12.0/H:5	CR_LFINF-CDM-10_H5
877	CR/LFLS+CDL+LFC:4.0/H:8	CR_LFINF-CDL-5_H6	**938**	CR/LFINF+CDM+LFC:12.0/H:4	CR_LFINF-CDM-10_H4
878	CR/LFLS+CDL+LFC:0.0/H:9	CR_LFINF-CDL-0_H6	**939**	CR/LFINF+CDM+LFC:12.0/H:3	CR_LFINF-CDM-10_H3
879	CR/LFLS+CDL+LFC:4.0/H:9	CR_LFINF-CDL-5_H6	**940**	CR/LFINF+CDL+LFC:20.0/HBET:10-15	CR_LFINF-CDL-20_H6
880	CR/LFLS+CDM+LFC:5.0/H:3	CR_LFINF-CDM-5_H3	**941**	CR/LFINF+CDL+LFC:10.0/HBET:10-15	CR_LFINF-CDL-10_H6
881	CR/LFLS+CDM+LFC:5.0/H:4	CR_LFINF-CDM-5_H4	**942**	CR/LFINF+CDL+LFC:20.0/H:9	CR_LFINF-CDL-20_H6
882	CR/LFLS+CDM+LFC:5.0/H:5	CR_LFINF-CDM-5_H5	**943**	CR/LFINF+CDL+LFC:10.0/H:9	CR_LFINF-CDL-10_H6
883	CR/LFLS+CDM+LFC:5.0/H:6	CR_LFINF-CDM-5_H6	**944**	CR/LFINF+CDL+LFC:20.0/H:8	CR_LFINF-CDL-20_H6
884	CR/LFLS+CDM+LFC:5.0/H:7	CR_LFINF-CDM-5_H6	**945**	CR/LFINF+CDL+LFC:10.0/H:8	CR_LFINF-CDL-10_H6
885	CR/LFLS+CDM+LFC:5.0/H:8	CR_LFINF-CDM-5_H6	**946**	CR/LFINF+CDL+LFC:20.0/H:7	CR_LFINF-CDL-20_H6
886	CR/LFLS+CDM+LFC:5.0/H:9	CR_LFINF-CDM-5_H6	**947**	CR/LFINF+CDL+LFC:10.0/H:7	CR_LFINF-CDL-10_H6
887	CR/LFLS+CDN/H:2	CR_LFINF-CDN-0_H2	**948**	CR/LFINF+CDL+LFC:20.0/H:6	CR_LFINF-CDL-20_H6
888	CR/LFLS+CDN/H:3	CR_LFINF-CDN-0_H3	**949**	CR/LFINF+CDL+LFC:10.0/H:6	CR_LFINF-CDL-10_H6
889	CR/LFLS+CDN/H:4	CR_LFINF-CDN-0_H4	**950**	CR/LFINF+CDL+LFC:20.0/H:5	CR_LFINF-CDL-20_H5

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
951	CR/LFINF+CDL+LFC:10.0/H:5	CR_LFINF-CDL-10_H5	**1017**	CR/LFINF+CDL+LFC:8.0/H:4	CR_LFINF-CDL-10_H4
952	CR/LFINF+CDL+LFC:20.0/H:4	CR_LFINF-CDL-20_H4	**1018**	CR/LFINF+CDL+LFC:8.0/H:3	CR_LFINF-CDL-10_H3
953	CR/LFLS+CDL+LFC:10.0/H:3	CR_LFINF-CDL-10_H3	**1019**	CR/LFLS+CDL+LFC:2.0/H:2	CR_LFINF-CDL-0_H2
954	CR/LFLS+CDL+LFC:20.0/H:3	CR_LFINF-CDL-20_H3	**1020**	CR/LFLS+CDL+LFC:2.0/H:3	CR_LFINF-CDL-0_H3
955	CR/LFLS+CDL+LFC:20.0/H:4	CR_LFINF-CDL-20_H4	**1021**	CR/LFLS+CDL+LFC:2.0/H:4	CR_LFINF-CDL-0_H4
956	CR/LFLS+CDL+LFC:10.0/H:5	CR_LFINF-CDL-10_H5	**1022**	CR/LFLS+CDL+LFC:2.0/H:5	CR_LFINF-CDL-0_H5
957	CR/LFLS+CDL+LFC:20.0/H:5	CR_LFINF-CDL-20_H5	**1023**	CR/LFINF+CDL+LFC:2.0/H:7	CR_LFINF-CDL-0_H6
958	CR/LFLS+CDL+LFC:10.0/H:7	CR_LFINF-CDL-10_H6	**1024**	CR/LFLS+CDL+LFC:2.0/H:6	CR_LFINF-CDL-0_H6
959	CR/LFLS+CDL+LFC:20.0/H:6	CR_LFINF-CDL-20_H6	**1025**	CR/LFLS+CDL+LFC:2.0/H:7	CR_LFINF-CDL-0_H6
960	CR/LFLS+CDL+LFC:20.0/H:7	CR_LFINF-CDL-20_H6	**1026**	CR/LFLS+CDL+LFC:2.0/H:8	CR_LFINF-CDL-0_H6
961	CR/LFLS+CDL+LFC:10.0/H:8	CR_LFINF-CDL-10_H6	**1027**	CR/LFLS+CDL+LFC:2.0/H:9	CR_LFINF-CDL-0_H6
962	CR/LFLS+CDL+LFC:20.0/H:8	CR_LFINF-CDL-20_H6	**1028**	CR/LFINF+CDH+LFC:5.0/H:8	CR_LFINF-CDH-5_H6
963	CR/LFLS+CDM+LFC:12.0/H:3	CR_LFINF-CDM-10_H3	**1029**	CR/LFINF+CDH+LFC:5.0/HBET:10-15	CR_LFINF-CDH-5_H6
964	CR/LDUAL+CDH+LFC:14.0/H:8	CR_LDUAL-DUM_H8	**1030**	CR/LFINF+CDL+LFC:2.0/H:3	CR_LFINF-CDL-0_H3
965	CR/LDUAL+CDH+LFC:14.0/H:7	CR_LDUAL-DUM_H7	**1031**	CR/LFINF+CDL+LFC:2.0/H:5	CR_LFINF-CDL-0_H5
966	CR/LDUAL+CDH+LFC:14.0/H:6	CR_LDUAL-DUM_H6	**1032**	CR/LDUAL+CDL+LFC:2.0/HBET:10-15	CR_LDUAL-DUL_H12
967	CR/LDUAL+CDH+LFC:14.0/H:9	CR_LDUAL-DUM_H9	**1033**	CR/LFINF+CDL+LFC:2.0/H:6	CR_LFINF-CDL-0_H6
968	CR/LDUAL+CDH+LFC:14.0/HBET:10-15	CR_LDUAL-DUM_H12	**1034**	CR/LDUAL+CDH+LFC:5.0/HBET:10-15	CR_LDUAL-DUM_H12
969	CR/LDUAL+CDL+LFC:10.0/HBET:10-15	CR_LDUAL-DUL_H12	**1035**	CR/LDUAL+CDH+LFC:5.0/H:8	CR_LDUAL-DUM_H8
970	CR/LFLS+CDM+LFC:12.0/H:4	CR_LFINF-CDM-10_H4	**1036**	CR/LDUAL+CDH+LFC:5.0/H:7	CR_LDUAL-DUM_H7
971	CR/LFLS+CDM+LFC:12.0/H:5	CR_LFINF-CDM-10_H5	**1037**	CR/LDUAL+CDH+LFC:5.0/H:6	CR_LDUAL-DUM_H6
972	CR/LFLS+CDM+LFC:12.0/H:6	CR_LFINF-CDM-10_H6	**1038**	CR/LFINF+CDH+LFC:5.0/H:9	CR_LFINF-CDH-5_H6
973	CR/LFLS+CDM+LFC:12.0/H:7	CR_LFINF-CDM-10_H6	**1039**	CR/LDUAL+CDH+LFC:5.0/H:9	CR_LDUAL-DUM_H9
974	CR/LFLS+CDM+LFC:12.0/H:9	CR_LFINF-CDM-10_H6	**1040**	CR/LFINF+CDL+LFC:2.0/H:8	CR_LFINF-CDL-0_H6
975	CR/LFINF+CDL+LFC:10.0/H:4	CR_LFINF-CDL-10_H4	**1041**	CR/LFINF+CDL+LFC:2.0/H:9	CR_LFINF-CDL-0_H6
976	CR/LFLS+CDL+LFC:10.0/H:6	CR_LFINF-CDL-10_H6	**1042**	CR/LFINF+CDL+LFC:2.0/HBET:10-15	CR_LFINF-CDL-0_H6
977	CR/LFLS+CDL+LFC:10.0/H:4	CR_LFINF-CDL-10_H4	**1043**	CR/LFINF+CDL+LFC:2.0/H:4	CR_LFINF-CDL-0_H4
978	CR/LDUAL+CDM+LFC:12.0/HBET:10-15	CR_LDUAL-DUM_H12	**1044**	CR/LFINF+CDH+LFC:5.0/H:3	CR_LFINF-CDH-5_H3
979	CR/LFINF+CDH+LFC:14.0/H:3	CR_LFINF-CDH-15_H3	**1045**	CR/LFINF+CDH+LFC:5.0/H:4	CR_LFINF-CDH-5_H4
980	CR/LFINF+CDH+LFC:14.0/H:4	CR_LFINF-CDH-15_H4	**1046**	CR/LFINF+CDH+LFC:5.0/H:5	CR_LFINF-CDH-5_H5
981	CR/LFINF+CDH+LFC:14.0/H:5	CR_LFINF-CDH-15_H5	**1047**	CR/LFINF+CDH+LFC:5.0/H:6	CR_LFINF-CDH-5_H6
982	CR/LFINF+CDH+LFC:14.0/H:6	CR_LFINF-CDH-15_H6	**1048**	CR/LFINF+CDH+LFC:5.0/H:7	CR_LFINF-CDH-5_H6
983	CR/LFINF+CDH+LFC:14.0/H:7	CR_LFINF-CDH-15_H6	**1049**	CR/LFINF+CDM+LFC:1.0/H:4	CR_LFINF-CDM-0_H4
984	CR/LFINF+CDH+LFC:14.0/H:8	CR_LFINF-CDH-15_H6	**1050**	CR/LFLS+CDM+LFC:1.0/H:4	CR_LFINF-CDM-0_H4
985	CR/LFINF+CDH+LFC:14.0/H:9	CR_LFINF-CDH-15_H6	**1051**	CR/LFLS+CDM+LFC:1.0/H:5	CR_LFINF-CDM-0_H5
986	CR/LFINF+CDH+LFC:14.0/HBET:10-15	CR_LFINF-CDH-15_H6	**1052**	CR/LFLS+CDM+LFC:1.0/H:7	CR_LFINF-CDM-0_H6
987	CR/LFINF+CDL+LFC:20.0/H:3	CR_LFINF-CDL-20_H3	**1053**	CR/LFLS+CDM+LFC:1.0/H:8	CR_LFINF-CDM-0_H6
988	CR/LDUAL+CDH+LFC:13.0/HBET:10-15	CR_LDUAL-DUM_H12	**1054**	CR/LFLS+CDM+LFC:1.0/H:9	CR_LFINF-CDM-0_H6
989	CR/LDUAL+CDH+LFC:13.0/H:7	CR_LDUAL-DUM_H7	**1055**	CR/LFLS+CDM+LFC:1.0/H:6	CR_LFINF-CDM-0_H6
990	CR/LDUAL+CDH+LFC:13.0/H:8	CR_LDUAL-DUM_H8	**1056**	CR/LFINF+CDM+LFC:1.0/H:9	CR_LFINF-CDM-0_H6
991	CR/LDUAL+CDH+LFC:13.0/H:9	CR_LDUAL-DUM_H9	**1057**	CR/LFINF+CDM+LFC:1.0/H:8	CR_LFINF-CDM-0_H6
992	CR/LFINF+CDH+LFC:13.0/H:8	CR_LFINF-CDH-15_H6	**1058**	CR/LFINF+CDM+LFC:1.0/H:7	CR_LFINF-CDM-0_H6
993	CR/LFINF+CDH+LFC:13.0/H:7	CR_LFINF-CDH-15_H6	**1059**	CR/LFINF+CDM+LFC:1.0/H:6	CR_LFINF-CDM-0_H6
994	CR/LFINF+CDH+LFC:13.0/H:6	CR_LFINF-CDH-15_H6	**1060**	CR/LFLS+CDM+LFC:1.0/H:3	CR_LFINF-CDM-0_H3
995	CR/LFINF+CDH+LFC:13.0/H:5	CR_LFINF-CDH-15_H5	**1061**	CR/LFINF+CDH+LFC:2.0/H:6	CR_LFINF-CDH-0_H6
996	CR/LFINF+CDH+LFC:13.0/H:4	CR_LFINF-CDH-15_H4	**1062**	CR/LDUAL+CDH+LFC:2.0/H:7	CR_LDUAL-DUL_H7
997	CR/LFINF+CDH+LFC:13.0/H:9	CR_LFINF-CDH-15_H6	**1063**	CR/LDUAL+CDH+LFC:2.0/H:8	CR_LDUAL-DUL_H8
998	CR/LFINF+CDH+LFC:13.0/HBET:10-15	CR_LFINF-CDH-15_H6	**1064**	CR/LDUAL+CDH+LFC:2.0/H:9	CR_LDUAL-DUL_H9
999	CR/LDUAL+CDH+LFC:13.0/H:6	CR_LDUAL-DUM_H6	**1065**	CR/LFINF+CDH+LFC:2.0/H:2	CR_LFINF-CDH-0_H2
1000	CR/LFINF+CDH+LFC:13.0/H:3	CR_LFINF-CDH-15_H3	**1066**	CR/LFINF+CDH+LFC:2.0/H:3	CR_LFINF-CDH-0_H3
1001	CR/LFINF+CDH+LFC:13.0/H:2	CR_LFINF-CDH-15_H2	**1067**	CR/LFINF+CDH+LFC:2.0/H:4	CR_LFINF-CDH-0_H4
1002	CR/LDUAL+CDL+LFC:8.0/HBET:10-15	CR_LDUAL-DUL_H12	**1068**	CR/LFINF+CDH+LFC:2.0/H:5	CR_LFINF-CDH-0_H5
1003	CR/LFLS+CDL+LFC:8.0/H:9	CR_LFINF-CDL-10_H6	**1069**	CR/LFINF+CDH+LFC:2.0/H:7	CR_LFINF-CDH-0_H6
1004	CR/LFLS+CDL+LFC:8.0/H:8	CR_LFINF-CDL-10_H6	**1070**	CR/LFINF+CDM+LFC:1.0/H:5	CR_LFINF-CDM-0_H5
1005	CR/LFLS+CDL+LFC:8.0/H:7	CR_LFINF-CDL-10_H6	**1071**	CR/LFINF+CDM+LFC:1.0/H:3	CR_LFINF-CDM-0_H3
1006	CR/LFLS+CDL+LFC:8.0/H:6	CR_LFINF-CDL-10_H6	**1072**	CR/LDUAL+CDH+LFC:2.0/H:6	CR_LDUAL-DUL_H6
1007	CR/LFLS+CDL+LFC:8.0/H:5	CR_LFINF-CDL-10_H5	**1073**	CR/LFINF+CDH+LFC:2.0/H:9	CR_LFINF-CDH-0_H6
1008	CR/LFINF+CDL+LFC:8.0/HBET:10-15	CR_LFINF-CDL-10_H6	**1074**	CR/LFINF+CDH+LFC:2.0/H:8	CR_LFINF-CDH-0_H6
1009	CR/LFINF+CDL+LFC:8.0/H:9	CR_LFINF-CDL-10_H6	**1075**	CR/LFINF+CDM+LFC:1.0/HBET:10-15	CR_LFINF-CDM-0_H6
1010	CR/LFLS+CDL+LFC:8.0/H:4	CR_LFINF-CDL-10_H4	**1076**	CR/LDUAL+CDM+LFC:1.0/HBET:10-15	CR_LDUAL-DUL_H12
1011	CR/LFLS+CDL+LFC:8.0/H:3	CR_LFINF-CDL-10_H3	**1077**	CR/LFINF+CDH+LFC:2.0/HBET:10-15	CR_LFINF-CDH-0_H6
1012	CR/LFLS+CDL+LFC:8.0/H:2	CR_LFINF-CDL-10_H2	**1078**	CR/LDUAL+CDH+LFC:2.0/HBET:10-15	CR_LDUAL-DUL_H12
1013	CR/LFINF+CDL+LFC:8.0/H:8	CR_LFINF-CDL-10_H6	**1079**	CR/LFLS+CDL+LFC:14.0/H:8	CR_LFINF-CDL-15_H6
1014	CR/LFINF+CDL+LFC:8.0/H:7	CR_LFINF-CDL-10_H6	**1080**	CR/LFLS+CDL+LFC:14.0/H:9	CR_LFINF-CDL-15_H6
1015	CR/LFINF+CDL+LFC:8.0/H:6	CR_LFINF-CDL-10_H6	**1081**	CR/LDUAL+CDL+LFC:14.0/HBET:10-15	CR_LDUAL-DUM_H12
1016	CR/LFINF+CDL+LFC:8.0/H:5	CR_LFINF-CDL-10_H5	**1082**	CR/LFINF+CDL+LFC:14.0/H:3	CR_LFINF-CDL-15_H3

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
1083	CR/LFINF+CDL+LFC:14.0/H:4	CR_LFINF-CDL-15_H4	**1144**	CR/LFINF+CDH+LFC:13.0/HBET:3-5	CR_LFINF-CDH-15_H4
1084	CR/LFINF+CDL+LFC:14.0/H:5	CR_LFINF-CDL-15_H5	**1145**	CR/LFINF+CDH+LFC:13.0/HBET:6-	CR_LFINF-CDH-15_H6
1085	CR/LFINF+CDL+LFC:14.0/H:6	CR_LFINF-CDL-15_H6	**1146**	CR+PC/LWAL+CDH+LFC:13.0/H:1	CR_LWAL-DUM_H1
1086	CR/LFINF+CDL+LFC:14.0/H:7	CR_LFINF-CDL-15_H6	**1147**	CR+PC/LWAL+CDH+LFC:13.0/H:2	CR_LWAL-DUM_H2
1087	CR/LFINF+CDL+LFC:14.0/H:8	CR_LFINF-CDL-15_H6	**1148**	CR+PC/LWAL+CDH+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6
1088	CR/LFINF+CDL+LFC:14.0/H:9	CR_LFINF-CDL-15_H6	**1149**	CR+PC/LWAL+CDH+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4
1089	CR/LFLS+CDL+LFC:14.0/H:7	CR_LFINF-CDL-15_H6	**1150**	CR/LFINF+CDL+LFC:11.0/HBET:6-	CR_LFINF-CDL-10_H6
1090	CR/LFLS+CDL+LFC:14.0/H:2	CR_LFINF-CDL-15_H2	**1151**	CR/LFINF+CDL+LFC:11.0/HBET:3-5	CR_LFINF-CDL-10_H4
1091	CR/LFLS+CDL+LFC:14.0/H:3	CR_LFINF-CDL-15_H3	**1152**	CR/LFINF+CDL+LFC:11.0/H:2	CR_LFINF-CDL-10_H2
1092	CR/LFLS+CDL+LFC:14.0/H:4	CR_LFINF-CDL-15_H4	**1153**	CR+PC/LWAL+CDL+LFC:11.0/H:1	CR_LWAL-DUL_H1
1093	CR/LFLS+CDL+LFC:14.0/H:5	CR_LFINF-CDL-15_H5	**1154**	CR+PC/LWAL+CDL+LFC:11.0/H:2	CR_LWAL-DUL_H2
1094	CR/LFLS+CDL+LFC:14.0/H:6	CR_LFINF-CDL-15_H6	**1155**	CR/LDUAL+CDL+LFC:11.0/HBET:6-	CR_LDUAL-DUL_H6
1095	CR/LFINF+CDL+LFC:14.0/HBET:10-15	CR_LFINF-CDL-15_H6	**1156**	CR+PC/LWAL+CDL+LFC:11.0/HBET:6-	CR_LWAL-DUL_H6
1096	CR/LDUAL+CDM+LFC:2.5/HBET:6-9	CR_LDUAL-DUL_H7	**1157**	CR+PC/LWAL+CDL+LFC:11.0/HBET:3-5	CR_LWAL-DUL_H4
1097	CR/LDUAL+CDM+LFC:2.5/H:5	CR_LDUAL-DUL_H5	**1158**	CR/LFINF+CDL+LFC:11.0/H:1	CR_LFINF-CDL-10_H1
1098	CR/LFINF+CDM+LFC:2.5/H:3	CR_LFINF-CDM-0_H3	**1159**	CR/LFM+CDM/HBET:3-5	CR_LFM-CDM-0_H4
1099	CR/LFINF+CDM+LFC:2.5/H:4	CR_LFINF-CDM-0_H4	**1160**	CR/LFM+CDM/HBET:6-	CR_LFM-CDM-0_H6
1100	CR/LFINF+CDM+LFC:2.5/H:5	CR_LFINF-CDM-0_H5	**1161**	S/LFINF+CDM/HBET:6-	S_LFINF-DUM_H6
1101	MIX/LH+CDM/H:1	MCF_LWAL-DUL_H1	**1162**	S/LFINF+CDM/HBET:3-5	S_LFINF-DUM_H4
1102	MIX/LH+CDM/H:2	MCF_LWAL-DUL_H2	**1163**	CR/LFM+CDM+LFC:12.0/H:2	CR_LFM-CDM-10_H2
1103	MIX/LH+CDM/H:3	MCF_LWAL-DUL_H3	**1164**	CR/LFM+CDM+LFC:12.0/H:1	CR_LFM-CDM-10_H1
1104	MIX/LH+CDM/H:4	MCF_LWAL-DUL_H4	**1165**	CR/LFM+CDM+LFC:9.0/H:1	CR_LFM-CDM-10_H1
1105	MIX/LH+CDN/H:1	MUR_LWAL-DNO_H1	**1166**	CR/LFM+CDM+LFC:9.0/H:2	CR_LFM-CDM-10_H2
1106	MIX/LH+CDN/H:3	MUR_LWAL-DNO_H3	**1167**	CR/LFINF+CDL+LFC:15.0/HBET:1-3	CR_LFINF-CDL-15_H2
1107	MIX/LH+CDN/H:4	MUR_LWAL-DNO_H4	**1168**	W/LFM+CDN/HBET:1-3	W_LFM-DUL_H2
1108	S/LFM+CDM/H:4	S_LFM-DUM_H4	**1169**	MUR+STRUB/LWAL+CDN/HBET:4-6	MUR-STRUB_LWAL-DNO_H5
1109	S/LFM+CDM/H:3	S_LFM-DUM_H3	**1170**	MUR+CBH/LWAL+CDN/HBET:1-3	MUR-CB99_LWAL-DNO_H2
1110	MUR/LWAL+CDN/H:3	MUR_LWAL-DNO_H3	**1171**	MUR+ADO/LWAL+CDN/HBET:1-3	MUR-ADO_LWAL-DNO_H2
1111	MCF/LWAL+CDN/H:4	MCF_LWAL-DUL_H4	**1172**	CR/LWAL+CDL+LFC:15.0/HBET:4-6	CR_LWAL-DUM_H5
1112	CR/LDUAL+CDM+LFC:10.0/H:5	CR_LDUAL-DUM_H5	**1173**	CR/LWAL+CDL+LFC:15.0/HBET:1-3	CR_LWAL-DUM_H2
1113	CR/LDUAL+CDM+LFC:10.0/HBET:6-9	CR_LDUAL-DUM_H7	**1174**	CR/LWAL+CDH+LFC:19.0/HBET:7-	CR_LWAL-DUH_H7
1114	CR/LFINF+CDM+LFC:10.0/H:4	CR_LFINF-CDM-10_H4	**1175**	CR/LWAL+CDH+LFC:19.0/HBET:4-6	CR_LWAL-DUH_H5
1115	CR/LFINF+CDM+LFC:10.0/H:5	CR_LFINF-CDM-10_H5	**1176**	CR/LWAL+CDH+LFC:19.0/HBET:1-3	CR_LWAL-DUH_H2
1116	CR/LDUAL+CDM+LFC:5.0/H:5	CR_LDUAL-DUL_H5	**1177**	CR/LFINF+CDN/HBET:1-3	CR_LFINF-CDN-0_H2
1117	CR/LDUAL+CDM+LFC:5.0/HBET:6-9	CR_LDUAL-DUL_H7	**1178**	CR/LFINF+CDL+LFC:15.0/HBET:7-	CR_LFINF-CDL-15_H6
1118	CR/LFM+CDN/HBET:3-5	CR_LFM-CDN-0_H4	**1179**	CR/LFINF+CDL+LFC:15.0/HBET:4-6	CR_LFINF-CDL-15_H5
1119	CR/LFM+CDN/HBET:6-	CR_LFM-CDN-0_H6	**1180**	CR/LFINF(CL)+CDL+LFC:15.0/HBET:7-	CR_LFINF-CDL-15_H6
1120	S/LFBR+CDN/H:2	S_LFBR-DUM_H2	**1181**	CR/LFINF(CL)+CDL+LFC:15.0/HBET:4-6	CR_LFINF-CDL-15_H5
1121	S/LFBR+CDN/HBET:3-5	S_LFBR-DUM_H4	**1182**	CR/LFINF(CL)+CDL+LFC:15.0/HBET:1-3	CR_LFINF-CDL-15_H2
1122	S/LFBR+CDN/HBET:6-	S_LFBR-DUM_H6	**1183**	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:7-	CR_LFINF-CDL-15_H6
1123	W/LFM+CDH/HBET:3-5	W_LFM-DUH_H4	**1184**	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:4-6	CR_LFINF-CDL-15_H5
1124	W/LFM+CDH/H:2	W_LFM-DUH_H2	**1185**	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:1-3	CR_LFINF-CDL-15_H2
1125	W/LFM+CDH/H:1	W_LFM-DUH_H1	**1186**	CR/LDUAL+CDH+LFC:19.0/HBET:7-	CR_LDUAL-DUH_H7
1126	CR+PC/LWAL+CDH+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6	**1187**	CR/LDUAL+CDH+LFC:19.0/HBET:4-6	CR_LDUAL-DUH_H5
1127	CR+PC/LWAL+CDH+LFC:15.0/H:2	CR_LWAL-DUM_H2	**1188**	CR/LDUAL+CDH+LFC:19.0/HBET:1-3	CR_LDUAL-DUH_H2
1128	CR+PC/LWAL+CDH+LFC:15.0/H:1	CR_LWAL-DUM_H1	**1189**	CR+PC/LWAL+CDL+LFC:15.0/HBET:1-3	CR_LWAL-DUM_H2
1129	CR/LFINF+CDH+LFC:18.0/HBET:6-	CR_LFINF-CDH-20_H6	**1190**	W/LWAL+CDN/HBET:1-3	W_LFM-DUL_H2
1130	CR/LFINF+CDH+LFC:18.0/HBET:3-5	CR_LFINF-CDH-20_H4	**1191**	CR+PC/LWAL+CDL+LFC:0.0/HBET:1-3	CR_LWAL-DUL_H2
1131	CR/LFINF+CDH+LFC:18.0/H:2	CR_LFINF-CDH-20_H2	**1192**	CR/LFINF+CDL+LFC:0.0/HBET:7-	CR_LFINF-CDL-0_H6
1132	CR/LFINF+CDH+LFC:18.0/H:1	CR_LFINF-CDH-20_H1	**1193**	CR/LFINF+CDL+LFC:0.0/HBET:4-6	CR_LFINF-CDL-0_H5
1133	CR/LDUAL+CDH+LFC:18.0/HBET:6-	CR_LDUAL-DUH_H6	**1194**	CR/LFINF+CDL+LFC:0.0/HBET:1-3	CR_LFINF-CDL-0_H2
1134	CR+PC/LWAL+CDL+LFC:6.0/H:2	CR_LWAL-DUL_H2	**1195**	CR/LFINF(CL)+CDL+LFC:0.0/HBET:7-	CR_LFINF-CDL-0_H6
1135	CR+PC/LWAL+CDH+LFC:18.0/H:1	CR_LWAL-DUH_H1	**1196**	CR/LFINF(CL)+CDL+LFC:0.0/HBET:4-6	CR_LFINF-CDL-0_H5
1136	CR+PC/LWAL+CDH+LFC:18.0/H:2	CR_LWAL-DUH_H2	**1197**	CR/LFINF(CL)+CDL+LFC:0.0/HBET:1-3	CR_LFINF-CDL-0_H2
1137	CR+PC/LWAL+CDH+LFC:18.0/HBET:3-5	CR_LWAL-DUH_H4	**1198**	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:4-6	CR_LFINF-CDL-0_H5
1138	CR+PC/LWAL+CDH+LFC:18.0/HBET:6-	CR_LWAL-DUH_H6	**1199**	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:1-3	CR_LFINF-CDL-0_H2
1139	CR+PC/LWAL+CDL+LFC:6.0/H:1	CR_LWAL-DUL_H1	**1200**	CR/LWAL+CDL+LFC:0.0/HBET:4-6	CR_LWAL-DUL_H5
1140	CR+PC/LWAL+CDL+LFC:6.0/HBET:3-5	CR_LWAL-DUL_H4	**1201**	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:7-	CR_LFINF-CDL-0_H6
1141	CR+PC/LWAL+CDL+LFC:6.0/HBET:6-	CR_LWAL-DUL_H6	**1202**	CR/LWAL+CDL+LFC:0.0/HBET:1-3	CR_LWAL-DUL_H2
1142	CR/LFINF+CDH+LFC:13.0/H:1	CR_LFINF-CDH-15_H1	**1203**	CR/LFINF(CL)+CDL+LFC:6.0/HBET:1-3	CR_LFINF-CDL-5_H2
1143	CR/LDUAL+CDH+LFC:13.0/HBET:6-	CR_LDUAL-DUM_H6	**1204**	CR/LFINF(CL)+CDL+LFC:6.0/HBET:7-	CR_LFINF-CDL-5_H6

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
1205	CR/LWAL+CDL+LFC:6.0/HBET:1-3	CR_LWAL-DUL_H2	**1252**	CR/LDUAL+CDL+LFC:19.0/HBET:1-3	CR_LDUAL-DUM_H2
1206	CR/LFINF+CDL+LFC:6.0/HBET:7-	CR_LFINF-CDL-5_H6	**1253**	CR/LDUAL+CDL+LFC:19.0/HBET:4-6	CR_LDUAL-DUM_H5
1207	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:7-	CR_LFINF-CDL-5_H6	**1254**	CR/LWAL+CDH+LFC:0.0/HBET:4-6	CR_LWAL-DUL_H5
1208	CR/LWAL+CDL+LFC:6.0/HBET:4-6	CR_LWAL-DUL_H5	**1255**	CR/LWAL+CDH+LFC:0.0/HBET:7-	CR_LWAL-DUL_H7
1209	CR+PC/LWAL+CDL+LFC:6.0/HBET:1-3	CR_LWAL-DUL_H2	**1256**	CR/LWAL+CDH+LFC:0.0/HBET:1-3	CR_LWAL-DUL_H2
1210	CR/LFINF+CDL+LFC:6.0/HBET:4-6	CR_LFINF-CDL-5_H5	**1257**	CR/LDUAL+CDH+LFC:0.0/HBET:7-	CR_LDUAL-DUL_H7
1211	CR/LFINF+CDL+LFC:6.0/HBET:1-3	CR_LFINF-CDL-5_H2	**1258**	CR/LDUAL+CDH+LFC:0.0/HBET:4-6	CR_LDUAL-DUL_H5
1212	CR/LFINF(CL)+CDL+LFC:6.0/HBET:4-6	CR_LFINF-CDL-5_H5	**1259**	CR/LDUAL+CDH+LFC:0.0/HBET:1-3	CR_LDUAL-DUL_H2
1213	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:4-6	CR_LFINF-CDL-5_H5	**1260**	CR/LDUAL+CDH+LFC:6.0/HBET:7-	CR_LDUAL-DUM_H7
1214	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:1-3	CR_LFINF-CDL-5_H2	**1261**	CR/LWAL+CDH+LFC:6.0/HBET:4-6	CR_LWAL-DUM_H5
1215	CR/LFINF(CL)+CDL+LFC:19.0/HBET:7-	CR_LFINF-CDL-20_H6	**1262**	CR/LWAL+CDH+LFC:6.0/HBET:1-3	CR_LWAL-DUM_H2
1216	CR+PC/LWAL+CDL+LFC:19.0/HBET:1-3	CR_LWAL-DUM_H2	**1263**	CR/LWAL+CDH+LFC:6.0/HBET:7-	CR_LWAL-DUM_H7
1217	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:4-6	CR_LFINF-CDL-20_H5	**1264**	CR/LDUAL+CDH+LFC:6.0/HBET:1-3	CR_LDUAL-DUM_H2
1218	CR/LWAL+CDL+LFC:19.0/HBET:4-6	CR_LWAL-DUM_H5	**1265**	CR/LDUAL+CDH+LFC:6.0/HBET:4-6	CR_LDUAL-DUM_H5
1219	CR/LWAL+CDL+LFC:19.0/HBET:1-3	CR_LWAL-DUM_H2	**1266**	CR/LDUAL+CDL+LFC:6.0/HBET:7-	CR_LDUAL-DUL_H7
1220	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:7-	CR_LFINF-CDL-20_H6	**1267**	CR/LDUAL+CDL+LFC:6.0/HBET:4-6	CR_LDUAL-DUL_H5
1221	CR/LFINF+CDL+LFC:19.0/HBET:7-	CR_LFINF-CDL-20_H6	**1268**	CR/LDUAL+CDL+LFC:6.0/HBET:1-3	CR_LDUAL-DUL_H2
1222	CR/LFINF+CDL+LFC:19.0/HBET:4-6	CR_LFINF-CDL-20_H5	**1269**	CR/LDUAL+CDL+LFC:0.0/HBET:1-3	CR_LDUAL-DUL_H2
1223	CR/LFINF(CL)+CDL+LFC:19.0/HBET:4-6	CR_LFINF-CDL-20_H5	**1270**	CR/LDUAL+CDL+LFC:0.0/HBET:4-6	CR_LDUAL-DUL_H5
1224	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:1-3	CR_LFINF-CDL-20_H2	**1271**	CR/LDUAL+CDL+LFC:0.0/HBET:7-	CR_LDUAL-DUL_H7
1225	CR/LFINF(CL)+CDL+LFC:19.0/HBET:1-3	CR_LFINF-CDL-20_H2	**1272**	CR/LWAL+CDH+LFC:13.0/HBET:4-6	CR_LWAL-DUM_H5
1226	CR/LFINF+CDL+LFC:19.0/HBET:1-3	CR_LFINF-CDL-20_H2	**1273**	CR/LDUAL+CDH+LFC:13.0/HBET:7-	CR_LDUAL-DUM_H7
1227	CR/LFINF+CDL+LFC:11.0/HBET:7-	CR_LFINF-CDL-10_H6	**1274**	CR/LWAL+CDH+LFC:13.0/HBET:7-	CR_LWAL-DUM_H7
1228	CR/LFINF+CDL+LFC:11.0/HBET:4-6	CR_LFINF-CDL-10_H5	**1275**	CR/LDUAL+CDH+LFC:13.0/HBET:4-6	CR_LDUAL-DUM_H5
1229	CR/LFINF+CDL+LFC:11.0/HBET:1-3	CR_LFINF-CDL-10_H2	**1276**	CR/LDUAL+CDH+LFC:13.0/HBET:1-3	CR_LDUAL-DUM_H2
1230	CR/LFINF(CL)+CDL+LFC:11.0/HBET:7-	CR_LFINF-CDL-10_H6	**1277**	CR/LWAL+CDH+LFC:13.0/HBET:1-3	CR_LWAL-DUM_H2
1231	CR/LFINF(CL)+CDL+LFC:11.0/HBET:4-6	CR_LFINF-CDL-10_H5	**1278**	MUR+CLBRS/LWAL+CDN/HBET:2-5/BPD/RSH3+RMT1+RWO/FC	MUR-CL99_LWAL-DNO_H3
1232	CR/LFINF(CL)+CDL+LFC:11.0/HBET:1-3	CR_LFINF-CDL-10_H2	**1279**	EU+ETR/LWAL+CDN/H:1/BPD/RSH3+RMT1+RWO	MUR-ADO_LWAL-DNO_H1
1233	CR+PC/LWAL+CDL+LFC:11.0/HBET:1-3	CR_LWAL-DUL_H2	**1280**	MUR+CLBRS/LWAL+CDN/HBET:1-3/BPD/RSH3+RMT1+RWO/FM	MUR-CL99_LWAL-DNO_H2
1234	CR/LWAL+CDL+LFC:11.0/HBET:1-3	CR_LWAL-DUL_H2	**1281**	MUR+CLBRS/LWAL+CDN/H:1/BPD/RSH2+RMT1+RWO	MUR-CL99_LWAL-DNO_H1
1235	CR/LWAL+CDL+LFC:11.0/HBET:4-6	CR_LWAL-DUL_H5	**1282**	MCF+CLBLH/LWAL+CDL/HBET:1-3/BPD/RSH3+RMT1+RWO/FC	MCF_LWAL-DUL_H2
1236	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:7-	CR_LFINF-CDL-10_H6	**1283**	MUR+CLBLH/LWAL+CDN/HBET:1-2/BPD/RSH3+RMT1+RWO/FM	MUR-CL99_LWAL-DNO_H1
1237	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:1-3	CR_LFINF-CDL-10_H2	**1284**	W+WLI/LWAL+CDN/H:1/BPD/EWE/RSH3+RMT1	W_LFM-DUL_H1
1238	CR/LDUAL+CDL+LFC:11.0/HBET:7-	CR_LDUAL-DUL_H7	**1285**	MUR+CLBRS/LWAL+CDN/HBET:3-5/BPD/RSH3+RMT1+RWO/FC	MUR-CL99_LWAL-DNO_H4
1239	CR/LDUAL+CDL+LFC:11.0/HBET:4-6	CR_LDUAL-DUL_H5	**1286**	MUR+CLBRS/LWAL+CDN/HBET:1-2/RSH3+RMT1+RWO/FW	MUR-CL99_LWAL-DNO_H1
1240	CR/LDUAL+CDL+LFC:11.0/HBET:1-3	CR_LDUAL-DUL_H2	**1287**	CR+CIP/LDUAL+CDM+LFC:5.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5
1241	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:4-6	CR_LFINF-CDL-10_H5	**1288**	MUR/LWAL+CDN/HBET:1-3	MUR_LWAL-DNO_H2
1242	CR/LDUAL+CDL+LFC:15.0/HBET:7-	CR_LDUAL-DUM_H7	**1289**	CR+CIP/LDUAL+CDL+LFC:7.5/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5
1243	CR/LDUAL+CDL+LFC:15.0/HBET:4-6	CR_LDUAL-DUM_H5	**1290**	CR+CIP/LDUAL+CDN/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5
1244	CR/LDUAL+CDL+LFC:15.0/HBET:1-3	CR_LDUAL-DUM_H2	**1291**	CR+CIP/LFINF+CDL+LFC:7.5/HBET:4-7	CR_LFINF-CDL-5_H5
1245	CR/LDUAL+CDH+LFC:25.0/HBET:4-6	CR_LDUAL-DUH_H5	**1292**	MCF/LWAL+CDL/HBET:1-3	MCF_LWAL-DUL_H2
1246	CR/LDUAL+CDH+LFC:25.0/HBET:1-3	CR_LDUAL-DUH_H2	**1293**	CR+CIP/LDUAL+CDL+LFC:7.5/HBET:4-7	CR_LDUAL-DUL_H5
1247	CR/LWAL+CDH+LFC:25.0/HBET:7-	CR_LWAL-DUH_H7	**1294**	MUR+CLBRS/LWAL+CDN/HBET:3-5	MUR-CL99_LWAL-DNO_H4
1248	CR/LWAL+CDH+LFC:25.0/HBET:4-6	CR_LWAL-DUH_H5	**1295**	MUR+CLBRS/LWAL+CDN/HBET:1-3	MUR-CL99_LWAL-DNO_H2
1249	CR/LWAL+CDH+LFC:25.0/HBET:1-3	CR_LWAL-DUH_H2	**1296**	EU/LWAL+CDN/H:1	MUR-ADO_LWAL-DNO_H1
1250	CR/LDUAL+CDH+LFC:25.0/HBET:7-	CR_LDUAL-DUH_H7	**1297**	MUR+CLBRS/LWAL+CDN/HBET:1-2	MUR-CL99_LWAL-DNO_H1
1251	CR/LDUAL+CDL+LFC:19.0/HBET:7-	CR_LDUAL-DUM_H7	**1298**	CR+PC/LWAL+CDM+LFC:5.0/HBET:5-10	CR_LWAL-DUL_H7

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
1299	CR+CIP/LFINF+CDN/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDN-0_H5	**1336**	MCF+CLBLH/LWAL+CDN/HBET:1-3	MCF_LWAL-DUL_H2
1300	CR+CIP/LFINF+CDN/HBET:4-7	CR_LFINF-CDN-0_H5	**1337**	MCF+CLBLH/LWAL+CDN/HBET:1-3/BPD/RSH3+RMT1+RWO/FC	MCF_LWAL-DUL_H2
1301	CR+PC/LWAL+CDL+LFC:7.5/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	**1338**	CR+CIP/LDUAL+CDL+LFC:0.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5
1302	CR+CIP/LFINF+CDM+LFC:5.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-5_H5	**1339**	CR+CIP/LFINF+CDL+LFC:0.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-0_H5
1303	CR+CIP/LFINF+CDM+LFC:5.0/HBET:4-7	CR_LFINF-CDM-5_H5	**1340**	CR+CIP/LFINF+CDM+LFC:2.5/HBET:4-7	CR_LFINF-CDM-0_H5
1304	CR+CIP/LFINF+CDL+LFC:7.5/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-5_H5	**1341**	CR+CIP/LFINF+CDM+LFC:2.5/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-0_H5
1305	CR+CIP/LDUAL+CDM+LFC:5.0/HBET:4-7	CR_LDUAL-DUL_H5	**1342**	CR+PC/LWAL+CDM+LFC:2.5/HBET:5-10	CR_LWAL-DUL_H7
1306	CR+CIP/LDUAL+CDL+LFC:15.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUM_H5	**1343**	CR+PC/LWAL+CDM+LFC:2.5/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7
1307	CR+CIP/LFINF+CDL+LFC:15.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-15_H5	**1344**	CR+CIP/LDUAL+CDM+LFC:2.5/HBET:4-7	CR_LDUAL-DUL_H5
1308	CR+PC/LWAL+CDL+LFC:15.0/HBET:5-10/RSH1/FC	CR_LWAL-DUM_H7	**1345**	CR+PC/LWAL+CDL+LFC:0.0/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7
1309	CR+PC/LWAL+CDM+LFC:5.0/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	**1346**	CR+CIP/LDUAL+CDL+LFC:0.0/HBET:4-7	CR_LDUAL-DUL_H5
1310	CR+PC/LWAL+CDN/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	**1347**	CR+CIP/LFINF+CDL+LFC:0.0/HBET:4-7	CR_LFINF-CDL-0_H5
1311	MCF+CLBLH/LWAL+CDL/HBET:1-3	MCF_LWAL-DUL_H2	**1348**	CR+PC/LWAL+CDL+LFC:0.0/HBET:5-10	CR_LWAL-DUL_H7
1312	MUR+CLBLH/LWAL+CDN/HBET:1-2	MUR-CL99_LWAL-DNO_H1	**1349**	MCF/LWAL+CDN/HBET:1-3	MCF_LWAL-DUL_H2
1313	CR+CIP/LDUAL+CDL+LFC:3.75/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	**1350**	CR+CIP/LDUAL+CDM+LFC:0.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5
1314	CR+CIP/LFINF+CDL+LFC:3.75/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDL-5_H5	**1351**	CR+PC/LWAL+CDM+LFC:0.0/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7
1315	CR+PC/LWAL+CDL+LFC:3.75/HBET:5-10/RSH1/FC	CR_LWAL-DUL_H7	**1352**	CR+CIP/LFINF+CDM+LFC:0.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-0_H5
1316	CR+CIP/LDUAL+CDN/HBET:4-7	CR_LDUAL-DUL_H5	**1353**	CR+CIP/LDUAL+CDM+LFC:0.0/HBET:4-7	CR_LDUAL-DUL_H5
1317	CR+PC/LWAL+CDN/HBET:5-10	CR_LWAL-DUL_H7	**1354**	CR+CIP/LFINF+CDM+LFC:0.0/HBET:4-7	CR_LFINF-CDM-0_H5
1318	CR+PC/LWAL+CDL+LFC:7.5/HBET:5-10	CR_LWAL-DUL_H7	**1355**	CR+PC/LWAL+CDM+LFC:0.0/HBET:5-10	CR_LWAL-DUL_H7
1319	W+WLI/LWAL+CDN/H:1	W_LFM-DUL_H1	**1356**	CR/LFLS+CDN/HBET:6-	CR_LFINF-CDN-0_H6
1320	MUR+CLBRS/LWAL+CDN/HBET:1-2/FW	MUR-CL99_LWAL-DNO_H1	**1357**	CR/LDUAL+CDL+LFC:4.0/HBET:3-5	CR_LDUAL-DUL_H4
1321	MUR+CLBRS/LWAL+CDN/HBET:2-5	MUR-CL99_LWAL-DNO_H3	**1358**	S/LFM+CDM/HBET:6-	S_LFM-DUM_H6
1322	MUR+CLBRS/LWAL+CDN/H:1	MUR-CL99_LWAL-DNO_H1	**1359**	CR/LDUAL+CDL+LFC:4.0/HBET:6-	CR_LDUAL-DUL_H6
1323	CR+CIP/LDUAL+CDM+LFC:10.0/HBET:4-7/RSH1/FC	CR_LDUAL-DUM_H5	**1360**	CR/LFLS+CDN/HBET:3-5	CR_LFINF-CDN-0_H4
1324	CR+CIP/LDUAL+CDM+LFC:10.0/HBET:4-7	CR_LDUAL-DUM_H5	**1361**	CR/LFLS+CDN/H:1	CR_LFINF-CDN-0_H1
1325	CR+CIP/LFINF+CDL+LFC:15.0/HBET:4-7	CR_LFINF-CDL-15_H5	**1362**	CR/LDUAL+CDL+LFC:4.0/H:10	CR_LDUAL-DUL_H12
1326	CR+PC/LWAL+CDM+LFC:10.0/HBET:5-10	CR_LWAL-DUM_H7	**1363**	CR/LFINF+CDL+LFC:4.0/H:10	CR_LFINF-CDL-5_H6
1327	CR+PC/LWAL+CDL+LFC:15.0/HBET:5-10	CR_LWAL-DUM_H7	**1364**	CR/LFINF+CDN/H:10	CR_LFINF-CDN-0_H6
1328	CR+CIP/LFINF+CDM+LFC:10.0/HBET:4-7	CR_LFINF-CDM-10_H5	**1365**	CR/LFLS+CDL+LFC:4.0/H:1	CR_LFINF-CDL-5_H1
1329	CR+CIP/LFINF+CDM+LFC:10.0/HBET:4-7/BPD/EWMA/RSH1/FC	CR_LFINF-CDM-10_H5	**1366**	CR/LDUAL+CDL+LFC:0.0/H:10	CR_LDUAL-DUL_H12
1330	CR+PC/LWAL+CDM+LFC:10.0/HBET:5-10/RSH1/FC	CR_LWAL-DUM_H7	**1367**	MCF/LWAL+CDN/H:5	MCF_LWAL-DUL_H5
1331	CR+CIP/LDUAL+CDL+LFC:15.0/HBET:4-7	CR_LDUAL-DUM_H5	**1368**	CR/LFLS+CDL+LFC:0.0/H:1	CR_LFINF-CDL-0_H1
1332	CR+PC/LWAL+CDL+LFC:3.75/HBET:5-10	CR_LWAL-DUL_H7	**1369**	CR/LFINF+CDL+LFC:0.0/H:10	CR_LFINF-CDL-0_H6
1333	CR+CIP/LFINF+CDL+LFC:3.75/HBET:4-7	CR_LFINF-CDL-5_H5	**1370**	CR/LFLS+CDL+LFC:8.0/H:1	CR_LFINF-CDL-10_H1
1334	CR+CIP/LDUAL+CDL+LFC:3.75/HBET:4-7	CR_LDUAL-DUL_H5	**1371**	CR/LDUAL+CDL+LFC:8.0/H:10	CR_LDUAL-DUL_H12
1335	CR+CIP/LDUAL+CDM+LFC:2.5/HBET:4-7/RSH1/FC	CR_LDUAL-DUL_H5	**1372**	CR/LFINF+CDL+LFC:8.0/H:10	CR_LFINF-CDL-10_H6

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
1373	CR/LWAL+CDL/H:2	CR_LWAL-DUL_H2	**1434**	CR+PC/LFM+CDM+LFC:5.0/HBET:3-5	CR_LFM-CDM-5_H4
1374	S+SR/LFM+CDL/HBET:3-5	S_LFM-DUM_H4	**1435**	CR+PC/LFM+CDL+LFC:0.0/H:2	CR_LFM-CDL-0_H2
1375	MIX/LH+CDL/H:4	MCF_LWAL-DUL_H4	**1436**	CR+CIP/LFINF+CDM+LFC:5.0/HBET:3-5	CR_LFINF-CDM-5_H4
1376	CR/LFINF+CDM+LFC:2.5/HBET:6-9	CR_LFINF-CDM-0_H6	**1437**	MUR/LWAL+CDL/H:2	MUR_LWAL-DNO_H2
1377	MUR/LWAL+CDN/H:4	MUR_LWAL-DNO_H4	**1438**	MUR/LWAL+CDL/HBET:3-5	MUR_LWAL-DNO_H4
1378	MUR/LWAL+CDN/H:5	MUR_LWAL-DNO_H5	**1439**	CR+CIP/LFINF+CDM+LFC:2.0/HBET:3-5	CR_LFINF-CDM-0_H4
1379	MIX/LH+CDL/H:3	MCF_LWAL-DUL_H3	**1440**	CR+PC/LFM+CDL+LFC:0.0/HBET:3-5	CR_LFM-CDL-0_H4
1380	CR/LFINF+CDL+LFC:3.75/H:3	CR_LFINF-CDL-5_H3	**1441**	CR+PC/LFM+CDL+LFC:0.0/H:1	CR_LFM-CDL-0_H1
1381	CR/LFINF+CDL+LFC:3.75/H:4	CR_LFINF-CDL-5_H4	**1442**	CR+PC/LFM+CDM+LFC:5.0/H:2	CR_LFM-CDM-5_H2
1382	CR/LFINF+CDL+LFC:3.75/H:5	CR_LFINF-CDL-5_H5	**1443**	CR+CIP/LFINF+CDM+LFC:5.0/H:2	CR_LFINF-CDM-5_H2
1383	CR/LDUAL+CDM+LFC:2.5/HBET:10-14	CR_LDUAL-DUL_H12	**1444**	CR+CIP/LFINF+CDM+LFC:4.0/HBET:3-5	CR_LFINF-CDM-5_H4
1384	CR/LDUAL+CDM+LFC:2.5/HBET:15-	CR_LDUAL-DUL_H12	**1445**	CR+CIP/LFINF+CDM+LFC:4.0/H:2	CR_LFINF-CDM-5_H2
1385	CR/LFINF+CDL+LFC:0.0/HBET:6-9	CR_LFINF-CDL-0_H6	**1446**	CR+CIP/LFINF+CDM+LFC:4.0/H:1	CR_LFINF-CDM-5_H1
1386	CR/LFINF+CDM+LFC:2.5/HBET:10-14	CR_LFINF-CDM-0_H6	**1447**	CR+PC/LWAL+CDM+LFC:3.0/H:1	CR_LWAL-DUL_H1
1387	CR/LFINF+CDM+LFC:2.5/HBET:15-	CR_LFINF-CDM-0_H6	**1448**	CR+CIP/LFINF+CDM+LFC:3.0/H:1	CR_LFINF-CDM-5_H1
1388	CR/LFINF+CDL+LFC:0.0/HBET:10-14	CR_LFINF-CDL-0_H6	**1449**	CR+PC/LDUAL+CDM+LFC:3.0/H:1	CR_LDUAL-DUL_H1
1389	CR/LFINF+CDL+LFC:3.75/HBET:6-9	CR_LFINF-CDL-5_H6	**1450**	CR+PC/LDUAL+CDM+LFC:3.0/HBET:3-5	CR_LDUAL-DUL_H4
1390	CR/LFINF+CDN/HBET:6-9	CR_LFINF-CDN-0_H6	**1451**	CR+PC/LFM+CDM+LFC:3.0/H:1	CR_LFM-CDM-5_H1
1391	CR/LFINF+CDN/H:5	CR_LFINF-CDN-0_H5	**1452**	CR+PC/LDUAL+CDM+LFC:3.0/H:2	CR_LDUAL-DUL_H2
1392	CR/LFINF+CDM+LFC:10.0/HBET:6-9	CR_LFINF-CDM-10_H6	**1453**	CR+PC/LWAL+CDM+LFC:3.0/H:2	CR_LWAL-DUL_H2
1393	CR/LFINF+CDM+LFC:10.0/HBET:15-	CR_LFINF-CDM-10_H6	**1454**	CR+PC/LWAL+CDM+LFC:5.0/HBET:6-	CR_LWAL-DUL_H6
1394	CR/LFINF+CDM+LFC:10.0/HBET:10-14	CR_LFINF-CDM-10_H6	**1455**	CR+CIP/LFINF+CDM+LFC:2.0/HBET:6-	CR_LFINF-CDM-0_H6
1395	CR/LFINF+CDL+LFC:15.0/HBET:6-9	CR_LFINF-CDL-15_H6	**1456**	CR+CIP/LFINF+CDN/HBET:6-	CR_LFINF-CDN-0_H6
1396	CR/LFINF+CDL+LFC:15.0/HBET:10-14	CR_LFINF-CDL-15_H6	**1457**	CR+PC/LDUAL+CDM+LFC:6.5/H:1	CR_LDUAL-DUL_H1
1397	CR/LFINF+CDL+LFC:15.0/H:5	CR_LFINF-CDL-15_H5	**1458**	CR+PC/LDUAL+CDM+LFC:6.5/HBET:3-5	CR_LDUAL-DUL_H4
1398	CR/LFINF+CDL+LFC:15.0/H:4	CR_LFINF-CDL-15_H4	**1459**	CR+PC/LDUAL+CDM+LFC:6.5/H:2	CR_LDUAL-DUL_H2
1399	CR/LFINF+CDL+LFC:15.0/H:3	CR_LFINF-CDL-15_H3	**1460**	CR+PC/LFM+CDM+LFC:6.5/H:1	CR_LFM-CDM-5_H1
1400	CR/LDUAL+CDM+LFC:10.0/HBET:15-	CR_LDUAL-DUM_H12	**1461**	CR+CIP/LFINF+CDM+LFC:6.5/H:1	CR_LFINF-CDM-5_H1
1401	CR/LDUAL+CDM+LFC:10.0/HBET:10-14	CR_LDUAL-DUM_H12	**1462**	CR+CIP/LFINF+CDL+LFC:4.0/H:2	CR_LFINF-CDL-5_H2
1402	CR/LFINF+CDM+LFC:5.0/HBET:6-9	CR_LFINF-CDM-5_H6	**1463**	CR+CIP/LFINF+CDL+LFC:4.0/H:1	CR_LFINF-CDL-5_H1
1403	CR/LFINF+CDL+LFC:7.5/H:4	CR_LFINF-CDL-5_H4	**1464**	CR+PC/LFM+CDL+LFC:4.0/H:1	CR_LFM-CDL-5_H1
1404	CR/LFINF+CDL+LFC:7.5/H:3	CR_LFINF-CDL-5_H3	**1465**	CR+PC/LFM+CDM+LFC:5.0/HBET:6-	CR_LFM-CDM-5_H6
1405	CR/LFINF+CDL+LFC:7.5/H:5	CR_LFINF-CDL-5_H5	**1466**	CR+CIP/LFINF+CDH+LFC:8.0/HBET:6-	CR_LFINF-CDH-10_H6
1406	CR/LFINF+CDL+LFC:7.5/HBET:6-9	CR_LFINF-CDL-5_H6	**1467**	CR+PC/LFM+CDL+LFC:0.0/HBET:6-	CR_LFM-CDL-0_H6
1407	CR/LDUAL+CDM+LFC:5.0/HBET:15-	CR_LDUAL-DUL_H12	**1468**	CR+CIP/LFINF+CDL+LFC:0.0/HBET:6-	CR_LFINF-CDL-0_H6
1408	CR/LFINF+CDM+LFC:5.0/HBET:15-	CR_LFINF-CDM-5_H6	**1469**	CR+PC/LDUAL+CDM+LFC:8.0/H:1	CR_LDUAL-DUM_H1
1409	CR/LFINF+CDM+LFC:5.0/HBET:10-14	CR_LFINF-CDM-5_H6	**1470**	CR+PC/LWAL+CDM+LFC:8.0/H:1	CR_LWAL-DUM_H1
1410	CR/LDUAL+CDM+LFC:5.0/HBET:10-14	CR_LDUAL-DUL_H12	**1471**	CR+PC/LDUAL+CDM+LFC:8.0/H:2	CR_LDUAL-DUM_H2
1411	CR/LFINF+CDL+LFC:3.75/HBET:10-14	CR_LFINF-CDL-5_H6	**1472**	CR+PC/LWAL+CDM+LFC:8.0/H:2	CR_LWAL-DUM_H2
1412	CR/LFINF+CDL+LFC:3.75/HBET:15-	CR_LFINF-CDL-5_H6	**1473**	CR+CIP/LFINF+CDM+LFC:6.5/HBET:3-5	CR_LFINF-CDM-5_H4
1413	CR/LFINF+CDL+LFC:15.0/HBET:15-	CR_LFINF-CDL-15_H6	**1474**	CR+PC/LFM+CDM+LFC:6.5/HBET:3-5	CR_LFM-CDM-5_H4
1414	CR/LFINF+CDN/HBET:10-14	CR_LFINF-CDN-0_H6	**1475**	CR+PC/LDUAL+CDM+LFC:6.5/HBET:6-	CR_LDUAL-DUL_H6
1415	CR+PC/LWAL+CDM+LFC:9.0/H:1	CR_LWAL-DUM_H1	**1476**	CR+PC/LDUAL+CDM+LFC:3.0/HBET:6-	CR_LDUAL-DUL_H6
1416	CR+CIP/LFINF+CDN/H:1	CR_LFINF-CDN-0_H1	**1477**	CR+PC/LFM+CDM+LFC:3.0/HBET:3-5	CR_LFM-CDM-5_H4
1417	CR+CIP/LFINF+CDM+LFC:2.0/H:2	CR_LFINF-CDM-0_H2	**1478**	CR+CIP/LFINF+CDM+LFC:3.0/HBET:3-5	CR_LFINF-CDM-5_H4
1418	CR+CIP/LFINF+CDM+LFC:2.0/H:1	CR_LFINF-CDM-0_H1	**1479**	CR+PC/LWAL+CDM+LFC:3.0/HBET:6-	CR_LWAL-DUL_H6
1419	CR+PC/LDUAL+CDM+LFC:5.0/H:1	CR_LDUAL-DUL_H1	**1480**	CR+CIP/LFINF+CDL+LFC:4.0/HBET:3-5	CR_LFINF-CDL-5_H4
1420	CR+CIP/LFINF+CDH+LFC:8.0/H:1	CR_LFINF-CDH-10_H1	**1481**	CR+CIP/LFINF+CDH+LFC:5.0/H:1	CR_LFINF-CDH-5_H1
1421	CR+CIP/LFINF+CDH+LFC:8.0/H:2	CR_LFINF-CDH-10_H2	**1482**	CR+CIP/LFINF+CDH+LFC:5.0/H:2	CR_LFINF-CDH-5_H2
1422	CR+PC/LDUAL+CDM+LFC:5.0/H:2	CR_LDUAL-DUL_H2	**1483**	CR+PC/LFM+CDM+LFC:3.0/H:2	CR_LFM-CDM-5_H2
1423	CR+CIP/LFINF+CDL+LFC:0.0/HBET:3-5	CR_LFINF-CDL-0_H4	**1484**	CR+CIP/LFINF+CDH+LFC:5.0/HBET:3-5	CR_LFINF-CDH-5_H4
1424	CR+CIP/LFINF+CDL+LFC:0.0/H:2	CR_LFINF-CDL-0_H2	**1485**	CR+CIP/LFINF+CDM+LFC:3.0/H:2	CR_LFINF-CDM-5_H2
1425	CR+CIP/LFINF+CDL+LFC:0.0/H:1	CR_LFINF-CDL-0_H1	**1486**	CR+CIP/LFINF+CDH+LFC:5.0/HBET:6-	CR_LFINF-CDH-5_H6
1426	MUR/LWAL+CDL/H:1	MUR_LWAL-DNO_H1	**1487**	CR+PC/LFM+CDM+LFC:3.0/HBET:6-	CR_LFM-CDM-5_H6
1427	CR+CIP/LFINF+CDN/H:2	CR_LFINF-CDN-0_H2	**1488**	MUR/LWAL+CDL/HBET:6-	MUR_LWAL-DNO_H5
1428	CR+PC/LDUAL+CDM+LFC:5.0/HBET:3-5	CR_LDUAL-DUL_H4	**1489**	CR+PC/LDUAL+CDM+LFC:10.0/H:2	CR_LDUAL-DUM_H2
1429	CR+CIP/LFINF+CDH+LFC:8.0/HBET:3-5	CR_LFINF-CDH-10_H4	**1490**	CR+PC/LDUAL+CDM+LFC:10.0/H:1	CR_LDUAL-DUM_H1
1430	CR+CIP/LFINF+CDM+LFC:5.0/H:1	CR_LFINF-CDM-5_H1	**1491**	CR+CIP/LFINF+CDM+LFC:6.5/H:2	CR_LFINF-CDM-5_H2
1431	CR+PC/LFM+CDM+LFC:5.0/H:1	CR_LFM-CDM-5_H1	**1492**	CR+CIP/LFINF+CDL+LFC:8.5/HBET:3-5	CR_LFINF-CDL-10_H4
1432	CR+CIP/LFINF+CDN/HBET:3-5	CR_LFINF-CDN-0_H4	**1493**	CR+CIP/LFINF+CDL+LFC:8.5/H:2	CR_LFINF-CDL-10_H2
1433	CR+PC/LDUAL+CDM+LFC:5.0/HBET:6-	CR_LDUAL-DUL_H6	**1494**	CR+CIP/LFINF+CDH+LFC:22.0/H:2	CR_LFINF-CDH-20_H2

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
1495	CR+CIP/LFINF+CDH+LFC:22.0/HBET:3-5	CR_LFINF-CDH-20_H4	**1544**	CR+CIP/LFINF+CDM+LFC:13.0/H:2	CR_LFINF-CDM-15_H2
1496	CR+PC/LFM+CDM+LFC:10.0/HBET:3-5	CR_LFM-CDM-10_H4	**1545**	CR+PC/LFM+CDM+LFC:13.0/H:2	CR_LFM-CDM-15_H2
1497	CR+PC/LFM+CDM+LFC:10.0/H:1	CR_LFM-CDM-10_H1	**1546**	CR+PC/LFM+CDM+LFC:10.0/HBET:6-	CR_LFM-CDM-10_H6
1498	CR+CIP/LFINF+CDM+LFC:10.0/H:1	CR_LFINF-CDM-10_H1	**1547**	CR+CIP/LFINF+CDL+LFC:8.5/HBET:6-	CR_LFINF-CDL-10_H6
1499	CR+PC/LDUAL+CDM+LFC:10.0/HBET:3-5	CR_LDUAL-DUM_H4	**1548**	CR+PC/LFM+CDL+LFC:8.5/HBET:6-	CR_LFM-CDL-10_H6
1500	CR+CIP/LFINF+CDH+LFC:22.0/H:1	CR_LFINF-CDH-20_H1	**1549**	CR+PC/LFM+CDM+LFC:10.0/H:2	CR_LFM-CDM-10_H2
1501	CR+CIP/LFINF+CDM+LFC:10.0/HBET:3-5	CR_LFINF-CDM-10_H4	**1550**	CR+CIP/LFINF+CDH+LFC:16.0/H:2	CR_LFINF-CDH-15_H2
1502	CR+CIP/LFINF+CDL+LFC:8.5/H:1	CR_LFINF-CDL-10_H1	**1551**	CR+CIP/LFINF+CDH+LFC:16.0/H:1	CR_LFINF-CDH-15_H1
1503	CR+PC/LFM+CDL+LFC:8.5/H:1	CR_LFM-CDL-10_H1	**1552**	CR+CIP/LFINF+CDH+LFC:16.0/HBET:3-5	CR_LFINF-CDH-15_H4
1504	CR+PC/LWAL+CDM+LFC:13.0/HBET:3-5	CR_LWAL-DUM_H4	**1553**	CR+CIP/LFINF+CDH+LFC:16.0/HBET:6-	CR_LFINF-CDH-15_H6
1505	CR+PC/LDUAL+CDM+LFC:13.0/H:1	CR_LDUAL-DUM_H1	**1554**	CR+PC/LFM+CDM+LFC:8.0/H:2	CR_LFM-CDM-10_H2
1506	CR+PC/LWAL+CDM+LFC:13.0/H:1	CR_LWAL-DUM_H1	**1555**	CR+CIP/LFINF+CDM+LFC:8.0/H:2	CR_LFINF-CDM-10_H2
1507	CR+CIP/LFINF+CDM+LFC:10.0/H:2	CR_LFINF-CDM-10_H2	**1556**	CR+CIP/LFINF+CDH+LFC:14.0/HBET:3-5	CR_LFINF-CDH-15_H4
1508	CR+PC/LFM+CDL+LFC:17.5/H:1	CR_LFM-CDL-15_H1	**1557**	CR+CIP/LFINF+CDH+LFC:14.0/H:2	CR_LFINF-CDH-15_H2
1509	CR+PC/LDUAL+CDM+LFC:13.0/HBET:3-5	CR_LDUAL-DUM_H4	**1558**	CR+CIP/LFINF+CDH+LFC:14.0/H:1	CR_LFINF-CDH-15_H1
1510	CR+CIP/LFINF+CDL+LFC:17.5/H:1	CR_LFINF-CDL-15_H1	**1559**	CR+CIP/LFINF+CDM+LFC:4.0/HBET:6-	CR_LFINF-CDM-5_H6
1511	CR+CIP/LFINF+CDL+LFC:17.5/HBET:3-5	CR_LFINF-CDL-15_H4	**1560**	CR+CIP/LFINF+CDH+LFC:14.0/HBET:6-	CR_LFINF-CDH-15_H6
1512	CR+PC/LDUAL+CDM+LFC:13.0/HBET:6-	CR_LDUAL-DUM_H6	**1561**	CR+CIP/LFINF+CDM+LFC:5.0/HBET:6-	CR_LFINF-CDM-5_H6
1513	CR+CIP/LFINF+CDL+LFC:17.5/H:2	CR_LFINF-CDL-15_H2	**1562**	CR+PC/LFM+CDM+LFC:6.5/H:2	CR_LFM-CDM-5_H2
1514	CR+PC/LFM+CDM+LFC:13.0/HBET:3-5	CR_LFM-CDM-15_H4	**1563**	CR+PC/LFM+CDM+LFC:6.5/HBET:6-	CR_LFM-CDM-5_H6
1515	CR+PC/LFM+CDL+LFC:17.5/HBET:3-5	CR_LFM-CDL-15_H4	**1564**	CR+CIP/LFINF+CDH+LFC:11.0/H:1	CR_LFINF-CDH-10_H1
1516	CR+PC/LWAL+CDM+LFC:13.0/H:2	CR_LWAL-DUM_H2	**1565**	CR+CIP/LFINF+CDH+LFC:11.0/H:2	CR_LFINF-CDH-10_H2
1517	CR+CIP/LFINF+CDM+LFC:13.0/HBET:3-5	CR_LFINF-CDM-15_H4	**1566**	CR+CIP/LFINF+CDH+LFC:11.0/HBET:3-5	CR_LFINF-CDH-10_H4
1518	CR+PC/LWAL+CDM+LFC:13.0/HBET:6-	CR_LWAL-DUM_H6	**1567**	CR+CIP/LFINF+CDH+LFC:11.0/HBET:6-	CR_LFINF-CDH-10_H6
1519	CR+PC/LDUAL+CDM+LFC:13.0/H:2	CR_LDUAL-DUM_H2	**1568**	MUR+CL/LWAL+CDN/HBET:6-	MUR-CL99_LWAL-DNO_H5
1520	CR+CIP/LFINF+CDM+LFC:10.0/HBET:6-	CR_LFINF-CDM-10_H6	**1569**	MUR+STDRE/LWAL+CDN/HBET:3-5	MUR-STDRE_LWAL-DNO_H4
1521	CR+PC/LDUAL+CDM+LFC:8.0/HBET:3-5	CR_LDUAL-DUM_H4	**1570**	MUR+STRUB/LWAL+CDN/HBET:3-5	MUR-STRUB_LWAL-DNO_H4
1522	CR+CIP/LFINF+CDM+LFC:13.0/H:1	CR_LFINF-CDM-15_H1	**1571**	CR/LFINF+CDL+LFC:7.0/HBET:3-5	CR_LFINF-CDL-5_H4
1523	CR+PC/LFM+CDM+LFC:13.0/H:1	CR_LFM-CDM-15_H1	**1572**	CR/LFINF+CDL+LFC:7.0/HBET:6-	CR_LFINF-CDL-5_H6
1524	CR+PC/LDUAL+CDM+LFC:10.0/HBET:6-	CR_LDUAL-DUM_H6	**1573**	CR/LFINF+CDL+LFC:10.0/HBET:6-	CR_LFINF-CDL-10_H6
1525	CR+CIP/LFINF+CDH+LFC:19.0/H:1	CR_LFINF-CDH-20_H1	**1574**	S+SR/LFM+CDH/H:1	S_LFM-DUM_H1
1526	CR+CIP/LFINF+CDH+LFC:19.0/H:2	CR_LFINF-CDH-20_H2	**1575**	CR+PC/LFM+CDH/H:2	CR_LFM-CDH-0_H2
1527	CR+CIP/LFINF+CDH+LFC:19.0/HBET:3-5	CR_LFINF-CDH-20_H4	**1576**	CR/LFLS+CDL+LFC:4.0/HBET:3-5	CR_LFINF-CDL-5_H4
1528	CR+PC/LWAL+CDM+LFC:8.0/HBET:3-5	CR_LWAL-DUM_H4	**1577**	CR/LFLS+CDM+LFC:4.0/HBET:3-5	CR_LFINF-CDM-5_H4
1529	CR+PC/LFM+CDL+LFC:8.5/HBET:3-5	CR_LFM-CDL-10_H4	**1578**	CR/LFLS+CDM+LFC:0.0/HBET:3-5	CR_LFINF-CDM-0_H4
1530	CR+CIP/LFINF+CDM+LFC:6.5/HBET:6-	CR_LFINF-CDM-5_H6	**1579**	CR/LFLS+CDL+LFC:0.0/HBET:3-5	CR_LFINF-CDL-0_H4
1531	CR+CIP/LFINF+CDH+LFC:19.0/HBET:6-	CR_LFINF-CDH-20_H6	**1580**	CR/LFLS+CDM+LFC:7.0/HBET:3-5	CR_LFINF-CDM-5_H4
1532	CR+CIP/LFINF+CDM+LFC:8.0/HBET:3-5	CR_LFINF-CDM-10_H4	**1581**	CR/LFLS+CDM+LFC:11.0/HBET:3-5	CR_LFINF-CDM-10_H4
1533	CR+PC/LFM+CDM+LFC:8.0/HBET:6-	CR_LFM-CDM-10_H6	**1582**	CR/LFLS+CDL+LFC:8.0/HBET:3-5	CR_LFINF-CDL-10_H4
1534	CR+PC/LFM+CDL+LFC:4.0/HBET:3-5	CR_LFM-CDL-5_H4	**1583**	CR/LFINF+CDN/H:2/SOS	CR_LFINF-CDN-0_H2
1535	CR+PC/LDUAL+CDM+LFC:8.0/HBET:6-	CR_LDUAL-DUM_H6	**1584**	CR/LDUAL+CDN/H:2/SOS	CR_LDUAL-DUL_H2
1536	CR+PC/LFM+CDL+LFC:4.0/HBET:6-	CR_LFM-CDL-5_H6	**1585**	CR/LDUAL+CDN/HBET:3-5/SOS	CR_LDUAL-DUL_H4
1537	CR+CIP/LFINF+CDL+LFC:4.0/HBET:6-	CR_LFINF-CDL-5_H6	**1586**	CR+PC/LFM+CDL/HBET:3-5	CR_LFM-CDL-0_H4
1538	CR+PC/LFM+CDM+LFC:8.0/HBET:3-5	CR_LFM-CDM-10_H4	**1587**	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:4-6/SOS	CR_LFINF-CDL-15_H5
1539	CR+PC/LFM+CDM+LFC:8.0/H:1	CR_LFM-CDM-10_H1	**1588**	CR/LFINF(CBH)+CDL+LFC:15.0/HBET:7-/SOS	CR_LFINF-CDL-15_H6
1540	CR+PC/LWAL+CDM+LFC:8.0/HBET:6-	CR_LWAL-DUM_H6	**1589**	CR/LWAL+CDL+LFC:15.0/HBET:4-6/SOS	CR_LWAL-DUM_H5
1541	CR+CIP/LFINF+CDM+LFC:8.0/H:1	CR_LFINF-CDM-10_H1	**1590**	CR/LFINF+CDL+LFC:15.0/HBET:7-/SOS	CR_LFINF-CDL-15_H6
1542	CR+PC/LFM+CDL+LFC:4.0/H:2	CR_LFM-CDL-5_H2	**1591**	CR/LFINF+CDL+LFC:15.0/HBET:4-6/SOS	CR_LFINF-CDL-15_H5
1543	CR+PC/LFM+CDL+LFC:8.5/H:2	CR_LFM-CDL-10_H2	**1592**	CR/LFINF(CL)+CDL+LFC:15.0/HBET:7-/SOS	CR_LFINF-CDL-15_H6

No	Building class	Fragility/vulnerability	No	Building class	Fragility/vulnerability
1593	CR/LFINF(CL)+CDL+LFC:15.0/HBET:4-6/SOS	CR_LFINF-CDL-15_H5	**1640**	CR/LFINF+CDM+LFC:16.5/H:1	CR_LFINF-CDM-15_H1
1594	CR/LFINF(CL)+CDL+LFC:0.0/HBET:7-/SOS	CR_LFINF-CDL-0_H6	**1641**	CR/LFINF+CDM+LFC:16.5/H:2	CR_LFINF-CDM-15_H2
1595	CR/LFINF(CL)+CDL+LFC:0.0/HBET:4-6/SOS	CR_LFINF-CDL-0_H5	**1642**	CR/LFINF+CDM+LFC:16.5/HBET:3-5	CR_LFINF-CDM-15_H4
1596	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:7-/SOS	CR_LFINF-CDL-0_H6	**1643**	CR/LWAL+CDM+LFC:16.5/H:1	CR_LWAL-DUM_H1
1597	CR/LFINF(CBH)+CDL+LFC:0.0/HBET:4-6/SOS	CR_LFINF-CDL-0_H5	**1644**	CR/LWAL+CDM+LFC:16.5/H:2	CR_LWAL-DUM_H2
1598	CR/LWAL+CDL+LFC:0.0/HBET:4-6/SOS	CR_LWAL-DUL_H5	**1645**	CR/LFM+CDM+LFC:16.5/HBET:3-5	CR_LFM-CDM-15_H4
1599	CR/LFINF+CDL+LFC:0.0/HBET:7-/SOS	CR_LFINF-CDL-0_H6	**1646**	CR/LWAL+CDM+LFC:16.5/HBET:3-5	CR_LWAL-DUM_H4
1600	CR/LFINF+CDL+LFC:0.0/HBET:4-6/SOS	CR_LFINF-CDL-0_H5	**1647**	CR/LWAL+CDM+LFC:16.5/HBET:6-	CR_LWAL-DUM_H6
1601	CR/LFINF(CL)+CDL+LFC:6.0/HBET:7-/SOS	CR_LFINF-CDL-5_H6	**1648**	CR/LWAL+CDM+LFC:9.0/H:1	CR_LWAL-DUM_H1
1602	CR/LFINF(CL)+CDL+LFC:6.0/HBET:4-6/SOS	CR_LFINF-CDL-5_H5	**1649**	CR/LWAL+CDM+LFC:9.0/HBET:6-	CR_LWAL-DUM_H6
1603	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:7-/SOS	CR_LFINF-CDL-5_H6	**1650**	CR/LWAL+CDH+LFC:6.0/H:2	CR_LWAL-DUM_H2
1604	CR/LFINF(CBH)+CDL+LFC:6.0/HBET:4-6/SOS	CR_LFINF-CDL-5_H5	**1651**	CR/LWAL+CDH+LFC:6.0/H:1	CR_LWAL-DUM_H1
1605	CR/LFINF+CDL+LFC:6.0/HBET:4-6/SOS	CR_LFINF-CDL-5_H5	**1652**	CR/LFM+CDM+LFC:9.0/HBET:3-5	CR_LFM-CDM-10_H4
1606	CR/LFINF+CDL+LFC:6.0/HBET:7-/SOS	CR_LFINF-CDL-5_H6	**1653**	CR/LFM+CDH+LFC:6.0/HBET:3-5	CR_LFM-CDH-5_H4
1607	CR/LWAL+CDL+LFC:6.0/HBET:4-6/SOS	CR_LWAL-DUL_H5	**1654**	CR/LFINF+CDM+LFC:4.5/H:1	CR_LFINF-CDM-5_H1
1608	CR/LFINF(CL)+CDL+LFC:11.0/HBET:4-6/SOS	CR_LFINF-CDL-10_H5	**1655**	CR/LWAL+CDM+LFC:4.5/H:2	CR_LWAL-DUL_H2
1609	CR/LFINF(CL)+CDL+LFC:11.0/HBET:7-/SOS	CR_LFINF-CDL-10_H6	**1656**	CR/LWAL+CDM+LFC:4.5/H:1	CR_LWAL-DUL_H1
1610	CR/LWAL+CDL+LFC:11.0/HBET:4-6/SOS	CR_LWAL-DUL_H5	**1657**	CR/LWAL+CDM+LFC:4.5/HBET:6-	CR_LWAL-DUL_H6
1611	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:7-/SOS	CR_LFINF-CDL-20_H6	**1658**	CR/LWAL+CDM+LFC:4.5/HBET:3-5	CR_LWAL-DUL_H4
1612	CR/LFINF+CDL+LFC:19.0/HBET:7-/SOS	CR_LFINF-CDL-20_H6	**1659**	CR/LFM+CDM+LFC:4.5/HBET:3-5	CR_LFM-CDM-5_H4
1613	CR/LWAL+CDL+LFC:19.0/HBET:4-6/SOS	CR_LWAL-DUM_H5	**1660**	CR/LFINF+CDM+LFC:4.5/HBET:3-5	CR_LFINF-CDM-5_H4
1614	CR/LFINF(CL)+CDL+LFC:19.0/HBET:4-6/SOS	CR_LFINF-CDL-20_H5	**1661**	CR/LFINF+CDM+LFC:4.5/H:2	CR_LFINF-CDM-5_H2
1615	CR/LFINF(CL)+CDL+LFC:19.0/HBET:7-/SOS	CR_LFINF-CDL-20_H6	**1662**	CR/LWAL+CDH+LFC:15.0/HBET:6-	CR_LWAL-DUM_H6
1616	CR/LFINF(CBH)+CDL+LFC:19.0/HBET:4-6/SOS	CR_LFINF-CDL-20_H5	**1663**	CR/LFM+CDH+LFC:15.0/HBET:3-5	CR_LFM-CDH-15_H4
1617	CR/LFINF+CDL+LFC:19.0/HBET:4-6/SOS	CR_LFINF-CDL-20_H5	**1664**	CR/LFINF+CDH+LFC:20.0/H:1	CR_LFINF-CDH-20_H1
1618	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:4-6/SOS	CR_LFINF-CDL-10_H5	**1665**	CR/LFINF+CDH+LFC:20.0/H:2	CR_LFINF-CDH-20_H2
1619	CR/LFINF(CBH)+CDL+LFC:11.0/HBET:7-/SOS	CR_LFINF-CDL-10_H6	**1666**	CR/LFINF+CDH+LFC:20.0/HBET:3-5	CR_LFINF-CDH-20_H4
1620	CR/LFINF+CDL+LFC:11.0/HBET:4-6/SOS	CR_LFINF-CDL-10_H5	**1667**	CR/LFM+CDH+LFC:20.0/HBET:3-5	CR_LFM-CDH-20_H4
1621	CR/LFINF+CDL+LFC:11.0/HBET:7-/SOS	CR_LFINF-CDL-10_H6	**1668**	CR/LWAL+CDH+LFC:25.0/HBET:3-5	CR_LWAL-DUH_H4
1622	CR+PC/LFM+CDN/HBET:3-5	CR_LFM-CDN-0_H4	**1669**	CR/LFINF+CDH+LFC:25.0/H:2	CR_LFINF-CDH-25_H2
1623	S+SR/LFM+CDH/H:2	S_LFM-DUM_H2	**1670**	CR/LFINF+CDH+LFC:25.0/HBET:3-5	CR_LFINF-CDH-25_H4
1624	S+SR/LFM+CDN/H:1	S_LFM-DUM_H1	**1671**	CR/LWAL+CDH+LFC:25.0/HBET:6-	CR_LWAL-DUH_H6
1625	CR/LDUAL+CDL+LFC:0.0/H:1	CR_LDUAL-DUL_H1	**1672**	CR/LFINF+CDH+LFC:25.0/H:1	CR_LFINF-CDH-25_H1
1626	CR/LDUAL+CDH+LFC:18.0/HBET:3-5	CR_LDUAL-DUH_H4	**1673**	CR/LFM+CDH+LFC:25.0/HBET:3-5	CR_LFM-CDH-25_H4
1627	CR/LDUAL+CDH+LFC:18.0/H:1	CR_LDUAL-DUH_H1	**1674**	CR/LWAL+CDH+LFC:25.0/H:1	CR_LWAL-DUH_H1
1628	CR/LDUAL+CDH+LFC:13.0/HBET:3-5	CR_LDUAL-DUM_H4	**1675**	CR/LWAL+CDH+LFC:25.0/H:2	CR_LWAL-DUH_H2
1629	CR/LDUAL+CDH+LFC:13.0/H:1	CR_LDUAL-DUM_H1	**1676**	MUR/LWAL+CDN/H:3/FC	MUR_LWAL-DNO_H3
1630	CR/LDUAL+CDL+LFC:11.0/H:1	CR_LDUAL-DUL_H1	**1677**	MUR/LWAL+CDN/H:2/FC	MUR_LWAL-DNO_H2
1631	CR/LDUAL+CDL+LFC:11.0/HBET:3-5	CR_LDUAL-DUL_H4	**1678**	MUR/LWAL+CDN/H:1/FC	MUR_LWAL-DNO_H1
1632	CR/LFINF+CDN/HBET:4-7	CR_LFINF-CDN-0_H5	**1679**	MUR/LWAL+CDN/H:1/FW	MUR_LWAL-DNO_H1
1633	SRC/LFM+CDM/H:2	S_LFM-DUM_H2	**1680**	UNK/CDM/H:1	MR_LWAL-DUM_H1
1634	SRC/LFM+CDM/H:1	S_LFM-DUM_H1	**1681**	MUR/LWAL+CDN/H:3/FW	MUR_LWAL-DNO_H3
1635	SRC/LFM+CDH/HBET:6-	S_LFM-DUM_H6	**1682**	MUR/LWAL+CDN/H:2/FW	MUR_LWAL-DNO_H2
1636	SRC/LFM+CDH/H:2	S_LFM-DUM_H2	**1683**	MUR/LWAL+CDN/H:6/FC	MUR_LWAL-DNO_H5
1637	SRC/LFM+CDH/H:1	S_LFM-DUM_H1	**1684**	MUR/LWAL+CDN/H:4/FW	MUR_LWAL-DNO_H4
1638	CR/LFM+CDH+LFC:11.0/HBET:3-5	CR_LFM-CDH-10_H4	**1685**	MUR/LWAL+CDN/H:5/FC	MUR_LWAL-DNO_H5
1639	CR/LFM+CDM+LFC:12.0/HBET:3-5	CR_LFM-CDM-10_H4	**1686**	MUR/LWAL+CDN/H:4/FC	MUR_LWAL-DNO_H4

No	Building class	Fragility/vulnerability
1687	UNK/CDN/H:1	MUR_LWAL-DNO_H1
1688	CR/LFINF+CDM/H:4	CR_LFINF-CDM-0_H4
1689	CR/LFINF+CDM/H:3	CR_LFINF-CDM-0_H3
1690	UNK/CDL/H:1	MUR_LWAL-DNO_H1
1691	CR/LFINF+CDL+LFC:5.0/HBET:7-20	CR_LFINF-CDL-5_H6
1692	CR/LFINF+CDL+LFC:5.0/H:3	CR_LFINF-CDL-5_H3
1693	CR/LFINF+CDL+LFC:5.0/H:5	CR_LFINF-CDL-5_H5
1694	CR/LFINF+CDN/HBET:7-20	CR_LFINF-CDN-0_H6
1695	CR/LFINF+CDN/H:4	CR_LFINF-CDN-0_H4
1696	CR/LFINF+CDL+LFC:5.0/H:4	CR_LFINF-CDL-5_H4
1697	UNK/CDN/H:3	MUR_LWAL-DNO_H3
1698	UNK/CDM/H:2	MR_LWAL-DUM_H2
1699	UNK/CDL/H:3	MUR_LWAL-DNO_H3
1700	UNK/CDL/H:2	MUR_LWAL-DNO_H2
1701	UNK/CDN/H:2	MUR_LWAL-DNO_H2
1702	MUR/LWAL+CDN/H:5/FW	MUR_LWAL-DNO_H5
1703	CR/LFINF+CDM/HBET:7-20	CR_LFINF-CDM-0_H6
1704	CR/LFINF+CDM/H:5	CR_LFINF-CDM-0_H5
1705	CR/LFINF+CDM+LFC:12.0/HBET:7-20	CR_LFINF-CDM-10_H6
1706	MUR/LWAL+CDN/HBET:7-20/FC	MUR_LWAL-DNO_H5
1707	CR/LFINF+CDN/H:6	CR_LFINF-CDN-0_H6
1708	CR/LFINF+CDM/H:6	CR_LFINF-CDM-0_H6
1709	CR/LFINF+CDL+LFC:5.0/H:6	CR_LFINF-CDL-5_H6
1710	UNK/CDM/H:3	MR_LWAL-DUM_H3
1711	UNK/CDN/H:4	MUR_LWAL-DNO_H4
1712	UNK/CDM/HBET:7-20	MR_LWAL-DUM_H5
1713	UNK/CDL/H:4	MUR_LWAL-DNO_H4
1714	UNK/CDN/H:5	MUR_LWAL-DNO_H5
1715	UNK/CDL/HBET:7-20	MUR_LWAL-DNO_H5
1716	CR/LFINF+CDM+LFC:16.5/H:3	CR_LFINF-CDM-15_H3
1717	CR/LFINF+CDM+LFC:16.5/HBET:7-20	CR_LFINF-CDM-15_H6
1718	CR/LFINF+CDM+LFC:16.5/H:6	CR_LFINF-CDM-15_H6
1719	CR/LFINF+CDM+LFC:16.5/H:5	CR_LFINF-CDM-15_H5
1720	CR/LFINF+CDM+LFC:16.5/H:4	CR_LFINF-CDM-15_H4
1721	CR/LFINF+CDL+LFC:10.0/HBET:7-20	CR_LFINF-CDL-10_H6
1722	UNK/CDM/H:6	MR_LWAL-DUM_H5
1723	UNK/CDM/H:4	MR_LWAL-DUM_H4
1724	UNK/CDN/H:6	MUR_LWAL-DNO_H5
1725	UNK/CDN/HBET:7-20	MUR_LWAL-DNO_H5
1726	UNK/CDM/H:5	MR_LWAL-DUM_H5
1727	UNK/CDL/H:6	MUR_LWAL-DNO_H5
1728	UNK/CDL/H:5	MUR_LWAL-DNO_H5
1729	CR/LFINF+CDM+LFC:9.0/H:3	CR_LFINF-CDM-10_H3
1730	CR/LFINF+CDM+LFC:9.0/H:4	CR_LFINF-CDM-10_H4
1731	CR/LFINF+CDM+LFC:9.0/H:6	CR_LFINF-CDM-10_H6
1732	CR/LFINF+CDM+LFC:9.0/H:5	CR_LFINF-CDM-10_H5
1733	CR/LFINF+CDL+LFC:0.0/HBET:7-20	CR_LFINF-CDL-0_H6
1734	CR/LFINF+CDM+LFC:9.0/HBET:7-20	CR_LFINF-CDM-10_H6
1735	CR/LFINF+CDM+LFC:4.5/H:3	CR_LFINF-CDM-5_H3
1736	CR/LFINF+CDM+LFC:4.5/H:5	CR_LFINF-CDM-5_H5
1737	CR/LFINF+CDM+LFC:4.5/H:4	CR_LFINF-CDM-5_H4
1738	CR/LFINF+CDM+LFC:4.5/H:6	CR_LFINF-CDM-5_H6
1739	CR/LFINF+CDM+LFC:4.5/HBET:7-20	CR_LFINF-CDM-5_H6

([1]) Source: ESRM20 (Crowley et al., 2021a, available from EFEHR)
([2]) Definitions according to https://github.com/gem/gem_taxonomy.

Table A. 9. 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_H1	PGA	1.388	2.213	2.735	3.123	0.359
2	CR_LDUAL-DUH_H2	PGA	0.729	1.406	1.857	2.205	0.394
3	CR_LDUAL-DUH_H4	PGA	0.598	1.207	1.713	2.143	0.525
4	CR_LDUAL-DUH_H5	Sa(T=0.3)	1.101	2.591	4.062	5.441	0.617
5	CR_LDUAL-DUH_H6	Sa(T=0.6)	0.607	1.411	2.278	3.132	0.582
6	CR_LDUAL-DUH_H7	Sa(T=0.6)	0.758	1.540	2.370	3.179	0.522
7	CR_LDUAL-DUL_H1	PGA	0.663	1.110	1.368	1.554	0.391
8	CR_LDUAL-DUL_H12	Sa(T=1.0)	0.484	0.708	0.945	1.172	0.428
9	CR_LDUAL-DUL_H2	PGA	0.347	0.791	1.091	1.326	0.506
10	CR_LDUAL-DUL_H4	Sa(T=0.6)	0.221	0.658	1.082	1.477	0.595
11	CR_LDUAL-DUL_H5	Sa(T=0.6)	0.261	0.678	1.086	1.467	0.512
12	CR_LDUAL-DUL_H6	Sa(T=0.6)	0.324	0.737	1.143	1.522	0.485
13	CR_LDUAL-DUL_H7	Sa(T=0.6)	0.402	0.821	1.242	1.639	0.465
14	CR_LDUAL-DUL_H8	Sa(T=0.6)	0.503	0.925	1.351	1.752	0.450
15	CR_LDUAL-DUL_H9	Sa(T=0.6)	0.630	1.036	1.444	1.825	0.435
16	CR_LDUAL-DUM_H1	PGA	0.984	1.609	1.991	2.271	0.365
17	CR_LDUAL-DUM_H12	Sa(T=0.6)	1.267	1.771	2.287	2.768	0.431
18	CR_LDUAL-DUM_H2	PGA	0.514	1.072	1.442	1.729	0.440
19	CR_LDUAL-DUM_H4	PGA	0.437	1.005	1.488	1.905	0.639
20	CR_LDUAL-DUM_H5	Sa(T=0.6)	0.365	0.992	1.637	2.256	0.595
21	CR_LDUAL-DUM_H6	Sa(T=0.6)	0.439	1.057	1.692	2.302	0.540
22	CR_LDUAL-DUM_H7	Sa(T=0.6)	0.542	1.149	1.771	2.365	0.506
23	CR_LDUAL-DUM_H8	Sa(T=0.6)	0.679	1.262	1.853	2.411	0.472
24	CR_LDUAL-DUM_H9	Sa(T=0.6)	0.832	1.393	1.965	2.504	0.451
25	CR_LFINF-CDH-0_H1	PGA	1.345	3.218	5.030	6.709	0.494
26	CR_LFINF-CDH-0_H2	Sa(T=0.6)	0.587	1.340	2.123	2.877	0.615
27	CR_LFINF-CDH-0_H3	Sa(T=0.6)	0.601	1.174	1.737	2.261	0.455
28	CR_LFINF-CDH-0_H4	Sa(T=1.0)	0.309	0.608	0.917	1.213	0.450
29	CR_LFINF-CDH-0_H5	Sa(T=1.0)	0.335	0.628	0.926	1.208	0.406
30	CR_LFINF-CDH-0_H6	Sa(T=1.0)	0.406	0.723	1.048	1.356	0.471
31	CR_LFINF-CDH-10_H1	PGA	1.345	3.218	5.030	6.709	0.494
32	CR_LFINF-CDH-10_H2	Sa(T=0.6)	0.581	1.357	2.167	2.950	0.620
33	CR_LFINF-CDH-10_H3	Sa(T=0.6)	0.619	1.254	1.875	2.450	0.459
34	CR_LFINF-CDH-10_H4	Sa(T=1.0)	0.332	0.720	1.128	1.522	0.459
35	CR_LFINF-CDH-10_H5	Sa(T=1.0)	0.398	0.825	1.261	1.674	0.433
36	CR_LFINF-CDH-10_H6	Sa(T=1.0)	0.479	0.991	1.508	1.998	0.441
37	CR_LFINF-CDH-15_H1	PGA	1.347	3.222	5.035	6.716	0.494
38	CR_LFINF-CDH-15_H2	Sa(T=0.6)	0.592	1.438	2.326	3.188	0.614
39	CR_LFINF-CDH-15_H3	Sa(T=0.6)	0.658	1.430	2.175	2.862	0.465
40	CR_LFINF-CDH-15_H4	Sa(T=1.0)	0.387	0.975	1.602	2.215	0.490
41	CR_LFINF-CDH-15_H5	Sa(T=1.0)	0.471	1.143	1.854	2.547	0.462
42	CR_LFINF-CDH-15_H6	Sa(T=1.0)	0.538	1.254	1.997	2.712	0.423
43	CR_LFINF-CDH-20_H1	PGA	1.359	3.274	5.142	6.881	0.497
44	CR_LFINF-CDH-20_H2	Sa(T=0.6)	0.630	1.676	2.796	3.896	0.618
45	CR_LFINF-CDH-20_H4	Sa(T=0.6)	0.889	1.958	3.013	3.998	0.420
46	CR_LFINF-CDH-20_H6	Sa(T=1.0)	0.550	1.399	2.322	3.237	0.431
47	CR_LFINF-CDH-25_H1	PGA	1.368	3.321	5.235	7.022	0.497
48	CR_LFINF-CDH-25_H2	Sa(T=0.3)	1.457	3.396	5.300	7.077	0.612
49	CR_LFINF-CDH-25_H4	Sa(T=0.6)	0.934	2.122	3.318	4.449	0.394
50	CR_LFINF-CDH-25_H6	Sa(T=1.0)	0.556	1.465	2.470	3.478	0.436
51	CR_LFINF-CDH-5_H1	PGA	1.345	3.218	5.030	6.709	0.494
52	CR_LFINF-CDH-5_H2	Sa(T=0.6)	0.587	1.340	2.123	2.877	0.615
53	CR_LFINF-CDH-5_H3	Sa(T=0.6)	0.601	1.177	1.743	2.268	0.455
54	CR_LFINF-CDH-5_H4	Sa(T=1.0)	0.309	0.613	0.927	1.228	0.446
55	CR_LFINF-CDH-5_H5	Sa(T=1.0)	0.347	0.644	0.948	1.235	0.404
56	CR_LFINF-CDH-5_H6	Sa(T=1.0)	0.409	0.723	1.046	1.352	0.450
57	CR_LFINF-CDL-0_H1	Sa(T=0.6)	0.521	0.690	0.863	1.024	0.544
58	CR_LFINF-CDL-0_H2	Sa(T=0.6)	0.402	0.530	0.660	0.778	0.414

No	Fragility class	*IM*	θ_{DS1} (g)	θ_{DS2} (g)	θ_{DS3} (g)	θ_{DS4} (g)	β_{DS}
59	CR_LFINF-CDL-0_H3	Sa(T=1.0)	0.176	0.235	0.297	0.355	0.407
60	CR_LFINF-CDL-0_H4	Sa(T=1.0)	0.199	0.255	0.315	0.371	0.464
61	CR_LFINF-CDL-0_H5	Sa(T=1.0)	0.220	0.280	0.342	0.401	0.523
62	CR_LFINF-CDL-0_H6	Sa(T=1.0)	0.239	0.317	0.400	0.477	0.590
63	CR_LFINF-CDL-10_H1	Sa(T=0.6)	0.545	0.706	0.871	1.023	0.545
64	CR_LFINF-CDL-10_H2	Sa(T=0.6)	0.422	0.547	0.675	0.792	0.428
65	CR_LFINF-CDL-10_H3	Sa(T=1.0)	0.175	0.239	0.305	0.368	0.411
66	CR_LFINF-CDL-10_H4	Sa(T=1.0)	0.186	0.241	0.298	0.352	0.421
67	CR_LFINF-CDL-10_H5	Sa(T=1.0)	0.175	0.226	0.280	0.330	0.439
68	CR_LFINF-CDL-10_H6	Sa(T=1.0)	0.192	0.243	0.297	0.347	0.498
69	CR_LFINF-CDL-15_H1	Sa(T=0.6)	0.519	0.701	0.888	1.062	0.565
70	CR_LFINF-CDL-15_H2	Sa(T=0.6)	0.397	0.541	0.687	0.821	0.414
71	CR_LFINF-CDL-15_H3	Sa(T=1.0)	0.164	0.234	0.306	0.374	0.410
72	CR_LFINF-CDL-15_H4	Sa(T=1.0)	0.169	0.229	0.293	0.352	0.410
73	CR_LFINF-CDL-15_H5	Sa(T=1.0)	0.175	0.231	0.289	0.344	0.399
74	CR_LFINF-CDL-15_H6	Sa(T=1.0)	0.189	0.242	0.297	0.350	0.445
75	CR_LFINF-CDL-20_H2	Sa(T=0.6)	0.403	0.568	0.736	0.892	0.409
76	CR_LFINF-CDL-20_H3	Sa(T=0.6)	0.382	0.530	0.677	0.811	0.422
77	CR_LFINF-CDL-20_H4	Sa(T=1.0)	0.170	0.229	0.290	0.347	0.409
78	CR_LFINF-CDL-20_H5	Sa(T=1.0)	0.183	0.243	0.305	0.363	0.399
79	CR_LFINF-CDL-20_H6	Sa(T=1.0)	0.182	0.238	0.296	0.350	0.411
80	CR_LFINF-CDL-5_H1	Sa(T=0.6)	0.521	0.688	0.860	1.020	0.545
81	CR_LFINF-CDL-5_H2	Sa(T=0.6)	0.406	0.529	0.653	0.767	0.421
82	CR_LFINF-CDL-5_H3	Sa(T=1.0)	0.167	0.228	0.292	0.352	0.415
83	CR_LFINF-CDL-5_H4	Sa(T=1.0)	0.178	0.230	0.285	0.336	0.435
84	CR_LFINF-CDL-5_H5	Sa(T=1.0)	0.175	0.221	0.270	0.314	0.479
85	CR_LFINF-CDL-5_H6	Sa(T=1.0)	0.187	0.236	0.288	0.337	0.499
86	CR_LFINF-CDM-0_H1	Sa(T=0.3)	1.115	1.637	2.146	2.608	0.638
87	CR_LFINF-CDM-0_H2	Sa(T=0.6)	0.425	0.575	0.730	0.875	0.417
88	CR_LFINF-CDM-0_H3	Sa(T=1.0)	0.188	0.245	0.305	0.361	0.411
89	CR_LFINF-CDM-0_H4	Sa(T=1.0)	0.218	0.284	0.353	0.417	0.407
90	CR_LFINF-CDM-0_H5	Sa(T=1.0)	0.228	0.299	0.373	0.442	0.493
91	CR_LFINF-CDM-0_H6	Sa(T=1.0)	0.248	0.339	0.435	0.524	0.557
92	CR_LFINF-CDM-10_H1	Sa(T=0.3)	1.136	1.667	2.186	2.659	0.629
93	CR_LFINF-CDM-10_H2	Sa(T=0.6)	0.417	0.571	0.731	0.880	0.417
94	CR_LFINF-CDM-10_H3	Sa(T=1.0)	0.178	0.248	0.321	0.390	0.429
95	CR_LFINF-CDM-10_H4	Sa(T=1.0)	0.233	0.313	0.398	0.476	0.376
96	CR_LFINF-CDM-10_H5	Sa(T=1.0)	0.248	0.335	0.425	0.509	0.378
97	CR_LFINF-CDM-10_H6	Sa(T=1.0)	0.289	0.387	0.490	0.586	0.412
98	CR_LFINF-CDM-15_H1	Sa(T=0.3)	1.125	1.692	2.249	2.758	0.632
99	CR_LFINF-CDM-15_H2	Sa(T=0.6)	0.420	0.581	0.747	0.902	0.421
100	CR_LFINF-CDM-15_H3	Sa(T=0.6)	0.459	0.664	0.874	1.071	0.425
101	CR_LFINF-CDM-15_H4	Sa(T=1.0)	0.261	0.391	0.527	0.658	0.420
102	CR_LFINF-CDM-15_H5	Sa(T=1.0)	0.287	0.417	0.552	0.681	0.377
103	CR_LFINF-CDM-15_H6	Sa(T=1.0)	0.323	0.451	0.586	0.714	0.364
104	CR_LFINF-CDM-20_H1	Sa(T=0.6)	0.490	0.787	1.097	1.392	0.631
105	CR_LFINF-CDM-20_H2	Sa(T=0.6)	0.436	0.626	0.820	1.001	0.442
106	CR_LFINF-CDM-20_H4	Sa(T=0.6)	0.577	0.866	1.163	1.442	0.428
107	CR_LFINF-CDM-5_H1	Sa(T=0.3)	1.115	1.637	2.146	2.608	0.638
108	CR_LFINF-CDM-5_H2	Sa(T=0.6)	0.424	0.573	0.727	0.871	0.417
109	CR_LFINF-CDM-5_H3	Sa(T=1.0)	0.183	0.241	0.302	0.359	0.409
110	CR_LFINF-CDM-5_H4	Sa(T=1.0)	0.206	0.269	0.336	0.398	0.395
111	CR_LFINF-CDM-5_H5	Sa(T=1.0)	0.215	0.277	0.342	0.402	0.459
112	CR_LFINF-CDM-5_H6	Sa(T=1.0)	0.250	0.327	0.408	0.485	0.521
113	CR_LFINF-CDN-0_H1	Sa(T=0.6)	0.570	0.705	0.847	0.977	0.509
114	CR_LFINF-CDN-0_H2	Sa(T=0.6)	0.412	0.549	0.687	0.814	0.431
115	CR_LFINF-CDN-0_H3	Sa(T=1.0)	0.195	0.256	0.321	0.381	0.424
116	CR_LFINF-CDN-0_H4	Sa(T=1.0)	0.224	0.285	0.351	0.412	0.506
117	CR_LFINF-CDN-0_H5	Sa(T=1.0)	0.224	0.288	0.356	0.419	0.559
118	CR_LFINF-CDN-0_H6	Sa(T=1.0)	0.256	0.338	0.425	0.506	0.591

No	Fragility class	*IM*	θ_{DS1} (g)	θ_{DS2} (g)	θ_{DS3} (g)	θ_{DS4} (g)	β_{DS}
119	CR_LFM-CDH-0_H1	PGA	1.543	2.420	3.279	4.064	0.469
120	CR_LFM-CDH-0_H2	Sa(T=0.6)	0.977	1.582	2.187	2.751	0.445
121	CR_LFM-CDH-10_H4	Sa(T=1.0)	0.517	0.947	1.390	1.812	0.460
122	CR_LFM-CDH-15_H4	Sa(T=1.0)	0.637	1.140	1.659	2.154	0.427
123	CR_LFM-CDH-20_H4	Sa(T=1.0)	0.715	1.313	1.954	2.581	0.443
124	CR_LFM-CDH-25_H4	Sa(T=0.6)	1.478	2.505	3.550	4.534	0.437
125	CR_LFM-CDH-5_H4	Sa(T=1.0)	0.482	0.863	1.258	1.636	0.525
126	CR_LFM-CDL-0_H1	Sa(T=0.6)	0.711	1.028	1.349	1.646	0.454
127	CR_LFM-CDL-0_H2	Sa(T=1.0)	0.247	0.343	0.441	0.533	0.397
128	CR_LFM-CDL-0_H4	Sa(T=1.0)	0.297	0.403	0.512	0.615	0.573
129	CR_LFM-CDL-0_H5	Sa(T=1.0)	0.337	0.456	0.581	0.698	0.604
130	CR_LFM-CDL-0_H6	Sa(T=1.0)	0.412	0.565	0.724	0.873	0.662
131	CR_LFM-CDL-10_H1	Sa(T=0.6)	0.734	1.050	1.370	1.667	0.454
132	CR_LFM-CDL-10_H2	Sa(T=1.0)	0.248	0.340	0.435	0.523	0.402
133	CR_LFM-CDL-10_H4	Sa(T=1.0)	0.253	0.324	0.399	0.468	0.447
134	CR_LFM-CDL-10_H6	Sa(T=1.0)	0.288	0.358	0.431	0.499	0.509
135	CR_LFM-CDL-15_H1	Sa(T=0.6)	0.722	1.042	1.366	1.666	0.452
136	CR_LFM-CDL-15_H4	Sa(T=1.0)	0.199	0.263	0.328	0.389	0.394
137	CR_LFM-CDL-5_H1	Sa(T=0.6)	0.711	1.026	1.344	1.638	0.452
138	CR_LFM-CDL-5_H2	Sa(T=1.0)	0.240	0.335	0.432	0.524	0.402
139	CR_LFM-CDL-5_H4	Sa(T=1.0)	0.246	0.307	0.371	0.431	0.482
140	CR_LFM-CDL-5_H6	Sa(T=1.0)	0.305	0.368	0.435	0.498	0.571
141	CR_LFM-CDM-0_H1	Sa(T=0.6)	0.702	1.058	1.427	1.775	0.516
142	CR_LFM-CDM-0_H2	Sa(T=1.0)	0.259	0.381	0.509	0.630	0.432
143	CR_LFM-CDM-0_H4	Sa(T=1.0)	0.297	0.458	0.626	0.786	0.519
144	CR_LFM-CDM-0_H6	Sa(T=1.0)	0.374	0.585	0.807	1.019	0.664
145	CR_LFM-CDM-10_H1	Sa(T=0.6)	0.700	1.056	1.424	1.771	0.515
146	CR_LFM-CDM-10_H2	Sa(T=1.0)	0.256	0.375	0.502	0.623	0.434
147	CR_LFM-CDM-10_H4	Sa(T=1.0)	0.317	0.477	0.642	0.798	0.398
148	CR_LFM-CDM-10_H6	Sa(T=1.0)	0.429	0.618	0.817	1.005	0.459
149	CR_LFM-CDM-15_H1	Sa(T=0.6)	0.700	1.056	1.424	1.771	0.516
150	CR_LFM-CDM-15_H2	Sa(T=0.6)	0.544	0.792	1.047	1.287	0.436
151	CR_LFM-CDM-15_H4	Sa(T=1.0)	0.352	0.562	0.781	0.989	0.387
152	CR_LFM-CDM-5_H1	Sa(T=0.6)	0.701	1.057	1.425	1.772	0.515
153	CR_LFM-CDM-5_H2	Sa(T=1.0)	0.259	0.381	0.509	0.631	0.432
154	CR_LFM-CDM-5_H4	Sa(T=1.0)	0.289	0.439	0.597	0.746	0.493
155	CR_LFM-CDM-5_H6	Sa(T=1.0)	0.366	0.551	0.744	0.928	0.600
156	CR_LFM-CDN-0_H1	Sa(T=0.6)	0.675	0.963	1.256	1.528	0.439
157	CR_LFM-CDN-0_H2	Sa(T=1.0)	0.244	0.345	0.449	0.546	0.404
158	CR_LFM-CDN-0_H4	Sa(T=1.0)	0.306	0.432	0.564	0.688	0.580
159	CR_LFM-CDN-0_H6	Sa(T=1.0)	0.421	0.602	0.792	0.972	0.692
160	CR_LWAL-DUH_H1	PGA	1.516	2.930	3.969	4.802	0.409
161	CR_LWAL-DUH_H2	PGA	0.738	1.639	2.277	2.785	0.419
162	CR_LWAL-DUH_H4	PGA	0.693	1.406	2.035	2.586	0.467
163	CR_LWAL-DUH_H5	Sa(T=0.3)	1.302	2.809	4.306	5.710	0.529
164	CR_LWAL-DUH_H6	Sa(T=0.3)	1.500	2.942	4.396	5.765	0.569
165	CR_LWAL-DUH_H7	Sa(T=0.6)	0.853	1.661	2.547	3.427	0.544
166	CR_LWAL-DUL_H1	PGA	0.605	1.241	1.597	1.856	0.416
167	CR_LWAL-DUL_H2	PGA	0.327	0.820	1.143	1.394	0.493
168	CR_LWAL-DUL_H4	Sa(T=0.3)	0.566	1.494	2.352	3.130	0.605
169	CR_LWAL-DUL_H5	Sa(T=0.6)	0.285	0.735	1.184	1.607	0.549
170	CR_LWAL-DUL_H6	Sa(T=0.6)	0.344	0.792	1.245	1.676	0.499
171	CR_LWAL-DUL_H7	Sa(T=0.6)	0.427	0.859	1.295	1.708	0.456
172	CR_LWAL-DUM_H1	PGA	1.008	1.889	2.448	2.869	0.391
173	CR_LWAL-DUM_H2	PGA	0.498	1.200	1.671	2.042	0.442
174	CR_LWAL-DUM_H4	PGA	0.513	1.117	1.640	2.096	0.566
175	CR_LWAL-DUM_H5	Sa(T=0.3)	0.959	2.233	3.472	4.623	0.588
176	CR_LWAL-DUM_H6	Sa(T=0.6)	0.499	1.191	1.943	2.687	0.568
177	CR_LWAL-DUM_H7	Sa(T=0.6)	0.632	1.306	2.022	2.720	0.506
178	MCF_LWAL-DUL_H1	PGA	0.533	0.840	1.044	1.198	0.403

No	Fragility class	*IM*	θ_{DS1} (g)	θ_{DS2} (g)	θ_{DS3} (g)	θ_{DS4} (g)	β_{DS}
179	MCF_LWAL-DUL_H2	PGA	0.330	0.719	1.016	1.259	0.529
180	MCF_LWAL-DUL_H3	Sa(T=0.3)	0.478	1.206	1.863	2.450	0.610
181	MCF_LWAL-DUL_H4	Sa(T=0.6)	0.221	0.566	0.912	1.239	0.496
182	MCF_LWAL-DUL_H5	Sa(T=0.6)	0.266	0.602	0.937	1.253	0.463
183	MCF_LWAL-DUM_H4	Sa(T=0.6)	0.305	0.785	1.276	1.745	0.579
184	MR_LWAL-DUL_H1	PGA	0.366	0.716	0.954	1.138	0.439
185	MR_LWAL-DUL_H2	PGA	0.289	0.648	0.935	1.176	0.566
186	MR_LWAL-DUL_H4	Sa(T=0.6)	0.213	0.553	0.895	1.220	0.481
187	MR_LWAL-DUM_H1	PGA	0.517	0.920	1.196	1.409	0.412
188	MR_LWAL-DUM_H2	PGA	0.366	0.792	1.127	1.407	0.530
189	MR_LWAL-DUM_H3	Sa(T=0.3)	0.548	1.453	2.294	3.058	0.609
190	MR_LWAL-DUM_H4	Sa(T=0.6)	0.256	0.720	1.196	1.654	0.526
191	MR_LWAL-DUM_H5	Sa(T=0.6)	0.314	0.788	1.277	1.747	0.479
192	MUR_LWAL-DNO_H1	PGA	0.315	0.587	0.783	0.940	0.456
193	MUR_LWAL-DNO_H2	Sa(T=0.3)	0.362	0.903	1.383	1.807	0.606
194	MUR_LWAL-DNO_H3	Sa(T=0.6)	0.153	0.407	0.655	0.886	0.539
195	MUR_LWAL-DNO_H4	Sa(T=0.6)	0.183	0.440	0.693	0.931	0.478
196	MUR_LWAL-DNO_H5	Sa(T=0.6)	0.235	0.491	0.748	0.990	0.456
197	MUR-ADO_LWAL-DNO_H1	PGA	0.216	0.446	0.609	0.737	0.487
198	MUR-ADO_LWAL-DNO_H2	Sa(T=0.6)	0.105	0.290	0.463	0.620	0.588
199	MUR-CB99_LWAL-DNO_H1	PGA	0.317	0.615	0.825	0.991	0.454
200	MUR-CB99_LWAL-DNO_H2	Sa(T=0.3)	0.406	0.998	1.522	1.984	0.601
201	MUR-CL99_LWAL-DNO_H1	PGA	0.277	0.516	0.694	0.836	0.487
202	MUR-CL99_LWAL-DNO_H2	Sa(T=0.3)	0.335	0.812	1.240	1.621	0.611
203	MUR-CL99_LWAL-DNO_H3	Sa(T=0.6)	0.145	0.371	0.592	0.800	0.512
204	MUR-CL99_LWAL-DNO_H4	Sa(T=0.6)	0.175	0.407	0.639	0.857	0.474
205	MUR-CL99_LWAL-DNO_H5	Sa(T=0.6)	0.219	0.455	0.692	0.915	0.462
206	MUR-STDRE_LWAL-DNO_H1	PGA	0.287	0.518	0.691	0.831	0.484
207	MUR-STDRE_LWAL-DNO_H2	Sa(T=0.3)	0.299	0.781	1.209	1.589	0.611
208	MUR-STDRE_LWAL-DNO_H3	Sa(T=0.6)	0.134	0.356	0.572	0.772	0.529
209	MUR-STDRE_LWAL-DNO_H4	Sa(T=0.6)	0.167	0.393	0.618	0.828	0.478
210	MUR-STDRE_LWAL-DNO_H5	Sa(T=0.6)	0.210	0.442	0.675	0.895	0.458
211	MUR-STRUB_LWAL-DNO_H1	PGA	0.238	0.487	0.661	0.799	0.472
212	MUR-STRUB_LWAL-DNO_H2	Sa(T=0.3)	0.292	0.749	1.156	1.518	0.619
213	MUR-STRUB_LWAL-DNO_H3	Sa(T=0.6)	0.133	0.339	0.539	0.724	0.528
214	MUR-STRUB_LWAL-DNO_H4	Sa(T=0.6)	0.153	0.365	0.576	0.774	0.478
215	MUR-STRUB_LWAL-DNO_H5	Sa(T=0.6)	0.196	0.410	0.625	0.827	0.458
216	S_LFBR-DUM_H1	PGA	0.559	1.383	2.200	2.968	0.516
217	S_LFBR-DUM_H2	Sa(T=0.3)	0.826	2.156	3.523	4.836	0.427
218	S_LFBR-DUM_H4	Sa(T=0.6)	0.456	1.130	1.838	2.527	0.413
219	S_LFBR-DUM_H6	Sa(T=0.6)	0.541	1.186	1.828	2.432	0.416
220	S_LFINF-DUM_H1	PGA	0.630	1.117	1.486	1.785	0.567
221	S_LFINF-DUM_H2	PGA	0.464	0.885	1.223	1.504	0.551
222	S_LFINF-DUM_H4	Sa(T=0.3)	0.788	1.672	2.480	3.202	0.573
223	S_LFINF-DUM_H6	Sa(T=0.6)	0.419	0.947	1.471	1.961	0.551
224	S_LFM-DUM_H1	PGA	0.437	1.081	1.707	2.288	0.514
225	S_LFM-DUM_H2	Sa(T=0.3)	0.735	1.978	3.256	4.485	0.548
226	S_LFM-DUM_H3	Sa(T=0.6)	0.413	1.092	1.803	2.494	0.423
227	S_LFM-DUM_H4	Sa(T=0.6)	0.456	1.095	1.740	2.351	0.377
228	S_LFM-DUM_H5	Sa(T=1.0)	0.237	0.605	1.000	1.387	0.433
229	S_LFM-DUM_H6	Sa(T=1.0)	0.277	0.662	1.060	1.445	0.377
230	S_LWAL-DUM_H1	PGA	0.474	1.301	2.046	2.714	0.547
231	S_LWAL-DUM_H2	PGA	0.320	0.861	1.347	1.781	0.529
232	S_LWAL-DUM_H4	Sa(T=0.3)	0.534	1.478	2.414	3.297	0.565
233	S_LWAL-DUM_H6	Sa(T=0.6)	0.284	0.838	1.428	2.006	0.487
234	W_LFM-DUH_H1	PGA	0.888	1.316	1.756	2.169	0.450
235	W_LFM-DUH_H2	Sa(T=0.3)	1.684	2.701	3.761	4.771	0.335
236	W_LFM-DUH_H4	Sa(T=0.6)	1.454	2.286	3.233	4.187	0.515
237	W_LFM-DUL_H1	PGA	0.394	0.685	0.967	1.224	0.504
238	W_LFM-DUL_H2	Sa(T=0.3)	0.758	1.495	2.240	2.943	0.438

No	Fragility class	*IM*	θ_{DS1} (g)	θ_{DS2} (g)	θ_{DS3} (g)	θ_{DS4} (g)	β_{DS}
239	W_LFM-DUL_H4	Sa(T=0.6)	0.543	0.965	1.419	1.862	0.475
240	W_LFM-DUL_H6	Sa(T=0.6)	0.893	1.237	1.599	1.940	0.331
241	W_LFM-DUM_H1	PGA	0.635	1.006	1.382	1.732	0.499
242	W_LFM-DUM_H2	Sa(T=0.3)	1.235	2.159	3.121	4.041	0.360
243	W_LFM-DUM_H4	Sa(T=0.6)	0.972	1.651	2.417	3.188	0.498

([1]) Source: ESRM20 (Romão et al., 2021, available from EFEHR)

Table A. 10. Damage-to-loss of life model. (1)

No	Vulneravility class	$P_{lethal\|DS4}$	*cf*	$P_{entrapment, day}$	$P_{entrapment, night}$	$P_{LL\|entrapment}$
1	CR_LDUAL-DUH_H1	0.01	1	0.25	0.95	0.4
2	CR_LDUAL-DUH_H2	0.01	1	0.5	0.95	0.4
3	CR_LDUAL-DUH_H4	0.01	1	0.75	0.95	0.4
4	CR_LDUAL-DUH_H5	0.01	1	0.95	0.95	0.7
5	CR_LDUAL-DUH_H6	0.01	1	0.95	0.95	0.7
6	CR_LDUAL-DUH_H7	0.01	1	0.95	0.95	0.7
7	CR_LDUAL-DUL_H1	0.01	2	0.25	0.95	0.4
8	CR_LDUAL-DUL_H12	0.01	2	0.95	0.95	0.7
9	CR_LDUAL-DUL_H2	0.01	2	0.5	0.95	0.4
10	CR_LDUAL-DUL_H4	0.01	2	0.75	0.95	0.4
11	CR_LDUAL-DUL_H5	0.01	2	0.95	0.95	0.7
12	CR_LDUAL-DUL_H6	0.01	2	0.95	0.95	0.7
13	CR_LDUAL-DUL_H7	0.01	2	0.95	0.95	0.7
14	CR_LDUAL-DUL_H8	0.01	2	0.95	0.95	0.7
15	CR_LDUAL-DUL_H9	0.01	2	0.95	0.95	0.7
16	CR_LDUAL-DUM_H1	0.01	1	0.25	0.95	0.4
17	CR_LDUAL-DUM_H12	0.01	1	0.95	0.95	0.7
18	CR_LDUAL-DUM_H2	0.01	1	0.5	0.95	0.4
19	CR_LDUAL-DUM_H4	0.01	1	0.75	0.95	0.4
20	CR_LDUAL-DUM_H5	0.01	1	0.95	0.95	0.7
21	CR_LDUAL-DUM_H6	0.01	1	0.95	0.95	0.7
22	CR_LDUAL-DUM_H7	0.01	1	0.95	0.95	0.7
23	CR_LDUAL-DUM_H8	0.01	1	0.95	0.95	0.7
24	CR_LDUAL-DUM_H9	0.01	1	0.95	0.95	0.7
25	CR_LFINF-CDH-0_H1	0.01	1	0.25	0.95	0.4
26	CR_LFINF-CDH-0_H2	0.01	1	0.5	0.95	0.4
27	CR_LFINF-CDH-0_H3	0.01	1	0.75	0.95	0.4
28	CR_LFINF-CDH-0_H4	0.01	1	0.75	0.95	0.4
29	CR_LFINF-CDH-0_H5	0.01	1	0.95	0.95	0.7
30	CR_LFINF-CDH-0_H6	0.01	1	0.95	0.95	0.7
31	CR_LFINF-CDH-10_H1	0.01	1	0.25	0.95	0.4
32	CR_LFINF-CDH-10_H2	0.01	1	0.5	0.95	0.4
33	CR_LFINF-CDH-10_H3	0.01	1	0.75	0.95	0.4
34	CR_LFINF-CDH-10_H4	0.01	1	0.75	0.95	0.4
35	CR_LFINF-CDH-10_H5	0.01	1	0.95	0.95	0.7
36	CR_LFINF-CDH-10_H6	0.01	1	0.95	0.95	0.7
37	CR_LFINF-CDH-15_H1	0.01	1	0.25	0.95	0.4
38	CR_LFINF-CDH-15_H2	0.01	1	0.5	0.95	0.4
39	CR_LFINF-CDH-15_H3	0.01	1	0.75	0.95	0.4
40	CR_LFINF-CDH-15_H4	0.01	1	0.75	0.95	0.4
41	CR_LFINF-CDH-15_H5	0.01	1	0.95	0.95	0.7
42	CR_LFINF-CDH-15_H6	0.01	1	0.95	0.95	0.7
43	CR_LFINF-CDH-20_H1	0.01	1	0.25	0.95	0.4
44	CR_LFINF-CDH-20_H2	0.01	1	0.5	0.95	0.4
45	CR_LFINF-CDH-20_H4	0.01	1	0.75	0.95	0.4
46	CR_LFINF-CDH-20_H6	0.01	1	0.95	0.95	0.7
47	CR_LFINF-CDH-25_H1	0.01	1	0.25	0.95	0.4
48	CR_LFINF-CDH-25_H2	0.01	1	0.5	0.95	0.4
49	CR_LFINF-CDH-25_H4	0.01	1	0.75	0.95	0.4
50	CR_LFINF-CDH-25_H6	0.01	1	0.95	0.95	0.7
51	CR_LFINF-CDH-5_H1	0.01	1	0.25	0.95	0.4
52	CR_LFINF-CDH-5_H2	0.01	1	0.5	0.95	0.4
53	CR_LFINF-CDH-5_H3	0.01	1	0.75	0.95	0.4
54	CR_LFINF-CDH-5_H4	0.01	1	0.75	0.95	0.4
55	CR_LFINF-CDH-5_H5	0.01	1	0.95	0.95	0.7
56	CR_LFINF-CDH-5_H6	0.01	1	0.95	0.95	0.7
57	CR_LFINF-CDL-0_H1	0.01	2	0.25	0.95	0.4
58	CR_LFINF-CDL-0_H2	0.01	2	0.5	0.95	0.4

No	Vulneravility class	$P_{lethal\|DS\ 4}$	cf	$P_{entrapment,\ day}$	$P_{entrapment,\ night}$	$P_{LL\ \|entrapment}$
59	CR_LFINF-CDL-0_H3	0.01	2	0.75	0.95	0.4
60	CR_LFINF-CDL-0_H4	0.01	2	0.75	0.95	0.4
61	CR_LFINF-CDL-0_H5	0.01	2	0.95	0.95	0.7
62	CR_LFINF-CDL-0_H6	0.01	2	0.95	0.95	0.7
63	CR_LFINF-CDL-10_H1	0.01	2	0.25	0.95	0.4
64	CR_LFINF-CDL-10_H2	0.01	2	0.5	0.95	0.4
65	CR_LFINF-CDL-10_H3	0.01	2	0.75	0.95	0.4
66	CR_LFINF-CDL-10_H4	0.01	2	0.75	0.95	0.4
67	CR_LFINF-CDL-10_H5	0.01	2	0.95	0.95	0.7
68	CR_LFINF-CDL-10_H6	0.01	2	0.95	0.95	0.7
69	CR_LFINF-CDL-15_H1	0.01	2	0.25	0.95	0.4
70	CR_LFINF-CDL-15_H2	0.01	2	0.5	0.95	0.4
71	CR_LFINF-CDL-15_H3	0.01	2	0.75	0.95	0.4
72	CR_LFINF-CDL-15_H4	0.01	2	0.75	0.95	0.4
73	CR_LFINF-CDL-15_H5	0.01	2	0.95	0.95	0.7
74	CR_LFINF-CDL-15_H6	0.01	2	0.95	0.95	0.7
75	CR_LFINF-CDL-20_H2	0.01	2	0.5	0.95	0.4
76	CR_LFINF-CDL-20_H3	0.01	2	0.75	0.95	0.4
77	CR_LFINF-CDL-20_H4	0.01	2	0.75	0.95	0.4
78	CR_LFINF-CDL-20_H5	0.01	2	0.95	0.95	0.7
79	CR_LFINF-CDL-20_H6	0.01	2	0.95	0.95	0.7
80	CR_LFINF-CDL-5_H1	0.01	2	0.25	0.95	0.4
81	CR_LFINF-CDL-5_H2	0.01	2	0.5	0.95	0.4
82	CR_LFINF-CDL-5_H3	0.01	2	0.75	0.95	0.4
83	CR_LFINF-CDL-5_H4	0.01	2	0.75	0.95	0.4
84	CR_LFINF-CDL-5_H5	0.01	2	0.95	0.95	0.7
85	CR_LFINF-CDL-5_H6	0.01	2	0.95	0.95	0.7
86	CR_LFINF-CDM-0_H1	0.01	1	0.25	0.95	0.4
87	CR_LFINF-CDM-0_H2	0.01	1	0.5	0.95	0.4
88	CR_LFINF-CDM-0_H3	0.01	1	0.75	0.95	0.4
89	CR_LFINF-CDM-0_H4	0.01	1	0.75	0.95	0.4
90	CR_LFINF-CDM-0_H5	0.01	1	0.95	0.95	0.7
91	CR_LFINF-CDM-0_H6	0.01	1	0.95	0.95	0.7
92	CR_LFINF-CDM-10_H1	0.01	1	0.25	0.95	0.4
93	CR_LFINF-CDM-10_H2	0.01	1	0.5	0.95	0.4
94	CR_LFINF-CDM-10_H3	0.01	1	0.75	0.95	0.4
95	CR_LFINF-CDM-10_H4	0.01	1	0.75	0.95	0.4
96	CR_LFINF-CDM-10_H5	0.01	1	0.95	0.95	0.7
97	CR_LFINF-CDM-10_H6	0.01	1	0.95	0.95	0.7
98	CR_LFINF-CDM-15_H1	0.01	1	0.25	0.95	0.4
99	CR_LFINF-CDM-15_H2	0.01	1	0.5	0.95	0.4
100	CR_LFINF-CDM-15_H3	0.01	1	0.75	0.95	0.4
101	CR_LFINF-CDM-15_H4	0.01	1	0.75	0.95	0.4
102	CR_LFINF-CDM-15_H5	0.01	1	0.95	0.95	0.7
103	CR_LFINF-CDM-15_H6	0.01	1	0.95	0.95	0.7
104	CR_LFINF-CDM-20_H1	0.01	1	0.25	0.95	0.4
105	CR_LFINF-CDM-20_H2	0.01	1	0.5	0.95	0.4
106	CR_LFINF-CDM-20_H4	0.01	1	0.75	0.95	0.4
107	CR_LFINF-CDM-5_H1	0.01	1	0.25	0.95	0.4
108	CR_LFINF-CDM-5_H2	0.01	1	0.5	0.95	0.4
109	CR_LFINF-CDM-5_H3	0.01	1	0.75	0.95	0.4
110	CR_LFINF-CDM-5_H4	0.01	1	0.75	0.95	0.4
111	CR_LFINF-CDM-5_H5	0.01	1	0.95	0.95	0.7
112	CR_LFINF-CDM-5_H6	0.01	1	0.95	0.95	0.7
113	CR_LFINF-CDN-0_H1	0.01	3	0.25	0.95	0.4
114	CR_LFINF-CDN-0_H2	0.01	3	0.5	0.95	0.4
115	CR_LFINF-CDN-0_H3	0.01	3	0.75	0.95	0.4
116	CR_LFINF-CDN-0_H4	0.01	3	0.75	0.95	0.4
117	CR_LFINF-CDN-0_H5	0.01	3	0.95	0.95	0.7
118	CR_LFINF-CDN-0_H6	0.01	3	0.95	0.95	0.7

No	**Vulneravility class**	$P_{lethal|DS\,4}$	cf	$P_{entrapment,\,day}$	$P_{entrapment,\,night}$	$P_{LL\,|entrapment}$
119	CR_LFM-CDH-0_H1	0.01	1	0.25	0.95	0.4
120	CR_LFM-CDH-0_H2	0.01	1	0.5	0.95	0.4
121	CR_LFM-CDH-10_H4	0.01	1	0.75	0.95	0.4
122	CR_LFM-CDH-15_H4	0.01	1	0.75	0.95	0.4
123	CR_LFM-CDH-20_H4	0.01	1	0.75	0.95	0.4
124	CR_LFM-CDH-25_H4	0.01	1	0.75	0.95	0.4
125	CR_LFM-CDH-5_H4	0.01	1	0.75	0.95	0.4
126	CR_LFM-CDL-0_H1	0.01	2	0.25	0.95	0.4
127	CR_LFM-CDL-0_H2	0.01	2	0.5	0.95	0.4
128	CR_LFM-CDL-0_H4	0.01	2	0.75	0.95	0.4
129	CR_LFM-CDL-0_H5	0.01	2	0.95	0.95	0.7
130	CR_LFM-CDL-0_H6	0.01	2	0.95	0.95	0.7
131	CR_LFM-CDL-10_H1	0.01	2	0.25	0.95	0.4
132	CR_LFM-CDL-10_H2	0.01	2	0.5	0.95	0.4
133	CR_LFM-CDL-10_H4	0.01	2	0.75	0.95	0.4
134	CR_LFM-CDL-10_H6	0.01	2	0.95	0.95	0.7
135	CR_LFM-CDL-15_H1	0.01	2	0.25	0.95	0.4
136	CR_LFM-CDL-15_H4	0.01	2	0.75	0.95	0.4
137	CR_LFM-CDL-5_H1	0.01	2	0.25	0.95	0.4
138	CR_LFM-CDL-5_H2	0.01	2	0.5	0.95	0.4
139	CR_LFM-CDL-5_H4	0.01	2	0.75	0.95	0.4
140	CR_LFM-CDL-5_H6	0.01	2	0.95	0.95	0.7
141	CR_LFM-CDM-0_H1	0.01	1	0.25	0.95	0.4
142	CR_LFM-CDM-0_H2	0.01	1	0.5	0.95	0.4
143	CR_LFM-CDM-0_H4	0.01	1	0.75	0.95	0.4
144	CR_LFM-CDM-0_H6	0.01	1	0.95	0.95	0.7
145	CR_LFM-CDM-10_H1	0.01	1	0.25	0.95	0.4
146	CR_LFM-CDM-10_H2	0.01	1	0.5	0.95	0.4
147	CR_LFM-CDM-10_H4	0.01	1	0.75	0.95	0.4
148	CR_LFM-CDM-10_H6	0.01	1	0.95	0.95	0.7
149	CR_LFM-CDM-15_H1	0.01	1	0.25	0.95	0.4
150	CR_LFM-CDM-15_H2	0.01	1	0.5	0.95	0.4
151	CR_LFM-CDM-15_H4	0.01	1	0.75	0.95	0.4
152	CR_LFM-CDM-5_H1	0.01	1	0.25	0.95	0.4
153	CR_LFM-CDM-5_H2	0.01	1	0.5	0.95	0.4
154	CR_LFM-CDM-5_H4	0.01	1	0.75	0.95	0.4
155	CR_LFM-CDM-5_H6	0.01	1	0.95	0.95	0.7
156	CR_LFM-CDN-0_H1	0.01	3	0.25	0.95	0.4
157	CR_LFM-CDN-0_H2	0.01	3	0.5	0.95	0.4
158	CR_LFM-CDN-0_H4	0.01	3	0.75	0.95	0.4
159	CR_LFM-CDN-0_H6	0.01	3	0.95	0.95	0.7
160	CR_LWAL-DUH_H1	0.01	1	0.25	0.95	0.4
161	CR_LWAL-DUH_H2	0.01	1	0.5	0.95	0.4
162	CR_LWAL-DUH_H4	0.01	1	0.75	0.95	0.4
163	CR_LWAL-DUH_H5	0.01	1	0.95	0.95	0.7
164	CR_LWAL-DUH_H6	0.01	1	0.95	0.95	0.7
165	CR_LWAL-DUH_H7	0.01	1	0.95	0.95	0.7
166	CR_LWAL-DUL_H1	0.01	2	0.25	0.95	0.4
167	CR_LWAL-DUL_H2	0.01	2	0.5	0.95	0.4
168	CR_LWAL-DUL_H4	0.01	2	0.75	0.95	0.4
169	CR_LWAL-DUL_H5	0.01	2	0.95	0.95	0.7
170	CR_LWAL-DUL_H6	0.01	2	0.95	0.95	0.7
171	CR_LWAL-DUL_H7	0.01	2	0.95	0.95	0.7
172	CR_LWAL-DUM_H1	0.01	1	0.25	0.95	0.4
173	CR_LWAL-DUM_H2	0.01	1	0.5	0.95	0.4
174	CR_LWAL-DUM_H4	0.01	1	0.75	0.95	0.4
175	CR_LWAL-DUM_H5	0.01	1	0.95	0.95	0.7
176	CR_LWAL-DUM_H6	0.01	1	0.95	0.95	0.7
177	CR_LWAL-DUM_H7	0.01	1	0.95	0.95	0.7
178	MCF_LWAL-DUL_H1	0.01	2	0.25	0.95	0.4

No	Vulneravility class	$P_{lethal\|DS4}$	*cf*	$P_{entrapment, day}$	$P_{entrapment, night}$	$P_{LL\|entrapment}$
179	MCF_LWAL-DUL_H2	0.01	2	0.5	0.95	0.7
180	MCF_LWAL-DUL_H3	0.01	2	0.75	0.95	0.7
181	MCF_LWAL-DUL_H4	0.01	2	0.75	0.95	0.7
182	MCF_LWAL-DUL_H5	0.01	2	0.95	0.95	0.7
183	MCF_LWAL-DUM_H4	0.01	1	0.75	0.95	0.4
184	MR_LWAL-DUL_H1	0.01	1	0.25	0.95	0.4
185	MR_LWAL-DUL_H2	0.01	1	0.5	0.95	0.4
186	MR_LWAL-DUL_H4	0.01	1	0.75	0.95	0.4
187	MR_LWAL-DUM_H1	0.01	1	0.25	0.95	0.4
188	MR_LWAL-DUM_H2	0.01	1	0.5	0.95	0.4
189	MR_LWAL-DUM_H3	0.01	1	0.75	0.95	0.4
190	MR_LWAL-DUM_H4	0.01	1	0.75	0.95	0.4
191	MR_LWAL-DUM_H5	0.01	1	0.95	0.95	0.7
192	MUR_LWAL-DNO_H1	0.01	3	0.25	0.95	0.4
193	MUR_LWAL-DNO_H2	0.01	3	0.5	0.95	0.4
194	MUR_LWAL-DNO_H3	0.01	3	0.75	0.95	0.4
195	MUR_LWAL-DNO_H4	0.01	3	0.75	0.95	0.4
196	MUR_LWAL-DNO_H5	0.01	3	0.95	0.95	0.7
197	MUR-ADO_LWAL-DNO_H1	0.01	5	0.25	0.95	0.4
198	MUR-ADO_LWAL-DNO_H2	0.01	5	0.5	0.95	0.4
199	MUR-CB99_LWAL-DNO_H1	0.01	2	0.25	0.95	0.4
200	MUR-CB99_LWAL-DNO_H2	0.01	2	0.5	0.95	0.4
201	MUR-CL99_LWAL-DNO_H1	0.01	2	0.25	0.95	0.4
202	MUR-CL99_LWAL-DNO_H2	0.01	2	0.5	0.95	0.4
203	MUR-CL99_LWAL-DNO_H3	0.01	2	0.75	0.95	0.4
204	MUR-CL99_LWAL-DNO_H4	0.01	2	0.75	0.95	0.4
205	MUR-CL99_LWAL-DNO_H5	0.01	2	0.95	0.95	0.7
206	MUR-STDRE_LWAL-DNO_H1	0.01	3	0.25	0.95	0.4
207	MUR-STDRE_LWAL-DNO_H2	0.01	3	0.5	0.95	0.4
208	MUR-STDRE_LWAL-DNO_H3	0.01	3	0.75	0.95	0.4
209	MUR-STDRE_LWAL-DNO_H4	0.01	3	0.75	0.95	0.4
210	MUR-STDRE_LWAL-DNO_H5	0.01	3	0.95	0.95	0.7
211	MUR-STRUB_LWAL-DNO_H1	0.01	5	0.25	0.95	0.4
212	MUR-STRUB_LWAL-DNO_H2	0.01	5	0.5	0.95	0.4
213	MUR-STRUB_LWAL-DNO_H3	0.01	5	0.75	0.95	0.4
214	MUR-STRUB_LWAL-DNO_H4	0.01	5	0.75	0.95	0.4
215	MUR-STRUB_LWAL-DNO_H5	0.01	5	0.95	0.95	0.7
216	S_LFBR-DUM_H1	0.01	0.5	0.25	0.95	0.4
217	S_LFBR-DUM_H2	0.01	0.5	0.5	0.95	0.4
218	S_LFBR-DUM_H4	0.01	0.5	0.75	0.95	0.4
219	S_LFBR-DUM_H6	0.01	0.5	0.95	0.95	0.7
220	S_LFINF-DUM_H1	0.01	0.5	0.25	0.95	0.4
221	S_LFINF-DUM_H2	0.01	0.5	0.5	0.95	0.4
222	S_LFINF-DUM_H4	0.01	0.5	0.75	0.95	0.4
223	S_LFINF-DUM_H6	0.01	0.5	0.95	0.95	0.7
224	S_LFM-DUM_H1	0.01	0.5	0.25	0.95	0.4
225	S_LFM-DUM_H2	0.01	0.5	0.5	0.95	0.4
226	S_LFM-DUM_H3	0.01	0.5	0.75	0.95	0.4
227	S_LFM-DUM_H4	0.01	0.5	0.75	0.95	0.4
228	S_LFM-DUM_H5	0.01	0.5	0.95	0.95	0.7
229	S_LFM-DUM_H6	0.01	0.5	0.95	0.95	0.7
230	S_LWAL-DUM_H1	0.01	0.5	0.25	0.95	0.4
231	S_LWAL-DUM_H2	0.01	0.5	0.5	0.95	0.4
232	S_LWAL-DUM_H4	0.01	0.5	0.75	0.95	0.4
233	S_LWAL-DUM_H6	0.01	0.5	0.95	0.95	0.7
234	W_LFM-DUH_H1	0.01	0.5	0.25	0.95	0.4
235	W_LFM-DUH_H2	0.01	0.5	0.5	0.95	0.7
236	W_LFM-DUH_H4	0.01	0.5	0.75	0.95	0.7
237	W_LFM-DUL_H1	0.01	0.5	0.25	0.95	0.4
238	W_LFM-DUL_H2	0.01	0.5	0.5	0.95	0.7

No	Vulneravility class	$P_{lethal\|DS\ 4}$	*cf*	$P_{entrapment,\ day}$	$P_{entrapment,\ night}$	$P_{LL\ \|entrapment}$
239	W_LFM-DUL_H4	0.01	0.5	0.75	0.95	0.7
240	W_LFM-DUL_H6	0.01	0.5	0.95	0.95	0.7
241	W_LFM-DUM_H1	0.01	0.5	0.25	0.95	0.4
242	W_LFM-DUM_H2	0.01	0.5	0.5	0.95	0.7
243	W_LFM-DUM_H4	0.01	0.5	0.75	0.95	0.7

([1]) Source: ESRM20 (Romão et al., 2021, available from EFEHR)

Table A. 11. GDP per capita ([1]), EU-HDI ([2]), EU2020 ([3]), EU-SPI ([4]), and *SVI* for NUTS-2 ([5]) regions in the EU-27.

NUTS-2		Class	GDP/capita (2015-17)	EU-HDI	EU2020	EU-SPI	SVI
Code	**Name**						
AT11	Burgenland (AT)	TR	25700	0.59	80.57	71.40	0.30
AT12	Niederösterreich	MD	30067	0.62	87.02	72.20	0.26
AT13	Wien	MD	43867	0.68	84.03	74.00	0.25
AT21	Kärnten	MD	30700	0.64	98.13	73.00	0.22
AT22	Steiermark	MD	32967	0.64	98.39	74.10	0.21
AT31	Oberösterreich	MD	37200	0.66	99.38	74.30	0.20
AT32	Salzburg	MD	43600	0.71	84.91	76.70	0.23
AT33	Tirol	MD	38933	0.68	98.69	76.20	0.19
AT34	Vorarlberg	MD	40167	0.67	77.51	73.00	0.27
BE10	Brussels Region	MD	59800	0.73	68.99	68.50	0.30
BE21	Prov. Antwerpen (Antwerp)	MD	39933	0.71	96.73	69.00	0.21
BE22	Prov. Limburg (BE) (Limburg (BE))	TR	27533	0.64	80.56	69.80	0.29
BE23	Prov. OostVlaanderen (East Flanders)	MD	31133	0.67	94.81	70.70	0.22
BE24	Prov. VlaamsBrabant (Flemish Brabant)	MD	36700	0.76	99.54	71.70	0.18
BE25	Prov. WestVlaanderen (West Flanders)	MD	32800	0.68	81.74	69.40	0.27
BE31	Prov. Brabant Wallon (Walloon Brabant)	MD	38567	0.80	93.66	69.00	0.19
BE32	Prov. Hainaut	TR	21367	0.46	63.66	65.30	0.42
BE33	Prov. Liège	TR	24033	0.55	73.21	67.10	0.35
BE34	Prov. Luxembourg (BE)	LD	20900	0.53	73.05	68.20	0.35
BE35	Prov. Namur	TR	22967	0.54	71.40	68.60	0.35
BG31	Severozapaden (North West)	LD	8567	0.00	12.85	43.30	0.81
BG32	Severen tsentralen (North Central)	LD	9533	0.12	44.13	50.40	0.64
BG33	Severoiztochen (North East)	LD	11267	0.18	36.77	49.40	0.65
BG34	Yugoiztochen (South East)	LD	12000	0.15	25.77	46.30	0.71
BG41	Yugozapaden (South West)	TR	22567	0.42	77.72	54.20	0.42
BG42	Yuzhen tsentralen (South Central)	LD	9733	0.17	30.41	49.40	0.68
CY00	Kýpros	TR	24600	0.63	67.32	61.90	0.36
CZ01	Prague	MD	56200	0.77	93.56	73.50	0.19
CZ02	Střední Čechy (Central Bohemia)	TR	22967	0.51	84.48	67.80	0.32
CZ03	Jihozápad (Southwest)	TR	21633	0.48	75.82	69.00	0.36
CZ04	Severozápad (Northwest)	LD	17933	0.36	55.85	62.00	0.49
CZ05	Severovýchod (Northeast)	LD	20633	0.49	78.08	67.70	0.35
CZ06	Jihovýchod (Southeast)	TR	22767	0.53	90.93	70.70	0.28
CZ07	Střední Morava (Central Moravia)	LD	20400	0.48	75.79	67.80	0.36
CZ08	Moravskoslezsko (Moravian-Silesian)	LD	20667	0.43	75.05	65.10	0.39
DE11	Stuttgart	MD	46233	0.71	100.00	71.90	0.19
DE12	Karlsruhe	MD	39033	0.66	99.84	71.80	0.21
DE13	Freiburg	MD	33800	0.65	92.66	72.40	0.23
DE14	Tübingen	MD	38100	0.66	98.59	72.70	0.21
DE21	Oberbayern	MD	51400	0.77	100.00	72.90	0.17
DE22	Niederbayern	MD	34667	0.60	74.80	70.40	0.32
DE23	Oberpfalz	MD	37067	0.63	85.77	71.60	0.26
DE24	Oberfranken	MD	33233	0.61	83.30	71.70	0.28
DE25	Mittelfranken	MD	39200	0.65	96.09	71.10	0.23
DE26	Unterfranken	MD	35733	0.66	87.44	72.80	0.25
DE27	Schwaben	MD	34867	0.65	80.38	71.60	0.28
DE30	Berlin	MD	34500	0.67	90.07	71.80	0.24
DE40	Brandenburg	TR	25167	0.57	73.34	70.20	0.33
DE50	Bremen	MD	43033	0.61	80.15	71.90	0.29
DE60	Hamburg	MD	57233	0.72	88.62	75.30	0.22
DE71	Darmstadt	MD	45600	0.68	99.32	71.00	0.21
DE72	Gießen	MD	29867	0.58	92.39	72.00	0.26
DE73	Kassel	MD	32300	0.59	80.91	71.80	0.29
DE80	MecklenburgVorpommern	TR	23933	0.54	70.77	69.40	0.35
DE91	Braunschweig	MD	40833	0.63	93.83	73.00	0.24
DE92	Hannover	MD	33567	0.58	86.88	72.20	0.28
DE93	Lüneburg	TR	24300	0.53	68.30	71.90	0.35
DE94	WeserEms	MD	30867	0.57	68.33	71.60	0.34
DEA1	Düsseldorf	MD	36167	0.58	76.49	70.70	0.31
DEA2	Köln	MD	37367	0.62	94.28	72.50	0.24
DEA3	Münster	MD	29033	0.57	73.70	71.80	0.33
DEA4	Detmold	MD	33100	0.59	80.66	72.70	0.29
DEA5	Arnsberg	MD	30367	0.53	74.61	70.70	0.34
DEB1	Koblenz	MD	29133	0.56	66.39	72.40	0.35
DEB2	Trier	TR	26933	0.59	93.95	73.20	0.25

DEB3	RheinhessenPfalz	MD	33600	0.61	92.47	72.20	0.25
DEC0	Saarland	MD	32100	0.55	72.92	70.70	0.34
DED2	Dresden	TR	27033	0.62	93.73	70.60	0.25
DED4	Chemnitz	TR	24733	0.56	73.80	69.40	0.34
DED5	Leipzig	MD	28500	0.61	88.91	69.90	0.27
DEE0	SachsenAnhalt	TR	24400	0.51	67.53	66.30	0.38
DEF0	SchleswigHolstein	MD	28433	0.57	75.04	72.00	0.32
DEG0	Thüringen	TR	25333	0.56	78.23	71.50	0.31
DK01	Copenhagen Region	MD	47167	0.75	99.41	81.80	0.15
DK02	Sjælland	TR	25067	0.53	75.94	79.40	0.30
DK03	Syddanmark	MD	32767	0.61	85.96	81.50	0.24
DK04	Midtjylland	MD	32900	0.65	96.12	82.80	0.19
DK05	Nordjylland	MD	30767	0.58	86.75	81.90	0.24
EE00	Eesti	TR	22133	0.53	75.55	71.30	0.33
EL30	Attiki	TR	26200	0.60	49.74	57.60	0.44
EL41	Voreio Aigaio	LD	14400	0.38	31.19	57.20	0.58
EL42	Notio Aigaio	TR	20933	0.47	28.92	51.30	0.57
EL43	Kriti	LD	16400	0.45	47.13	58.00	0.50
EL51	Anatoliki Makedonia, Thraki	LD	13333	0.34	37.04	54.90	0.58
EL52	Kentriki Makedonia	LD	15033	0.44	42.60	55.80	0.52
EL53	Dytiki Makedonia	LD	19267	0.44	27.34	56.30	0.57
EL54	Ipeiros	LD	13733	0.43	44.71	58.90	0.51
EL61	Thessalia	LD	14500	0.43	38.96	55.50	0.54
EL62	Ionia Nisia	LD	17600	0.43	34.78	56.40	0.55
EL63	Dytiki Ellada	LD	14067	0.36	32.97	54.80	0.59
EL64	Sterea Ellada	LD	17400	0.44	39.20	52.40	0.55
EL65	Peloponnisos	LD	16300	0.42	43.65	53.40	0.53
ES11	Galicia	TR	23333	0.58	59.44	68.70	0.38
ES12	Principado de Asturias	TR	22867	0.59	57.40	68.50	0.38
ES13	Cantabria	TR	23767	0.61	62.69	70.50	0.35
ES21	País Vasco	MD	33667	0.75	84.88	73.90	0.22
ES22	Comunidad Foral de Navarra	MD	31900	0.72	82.23	73.60	0.24
ES23	La Rioja	TR	28033	0.61	70.82	71.70	0.32
ES24	Aragón	MD	28167	0.64	70.78	70.80	0.32
ES30	Comunidad de Madrid	MD	35733	0.77	80.28	69.70	0.24
ES41	Castilla y León	TR	24267	0.59	68.52	68.80	0.34
ES42	CastillaLa Mancha	LD	20400	0.47	29.41	63.40	0.53
ES43	Extremadura	LD	18700	0.40	17.55	64.30	0.59
ES51	Cataluña	MD	31100	0.65	75.30	67.10	0.31
ES52	Comunidad Valenciana	TR	22800	0.55	45.11	67.80	0.44
ES53	Illes Balears	TR	28233	0.59	57.36	65.20	0.39
ES61	Andalucía	LD	19267	0.45	16.04	61.80	0.59
ES62	Región de Murcia	TR	21733	0.48	32.57	65.20	0.51
ES63	Ciudad Autónoma de Ceuta	LD	20867	0.40	5.70	62.00	0.64
ES64	Ciudad Autónoma de Melilla	LD	19133	0.45	28.18	62.80	0.55
ES70	Canarias	TR	21333	0.51	22.82	67.40	0.53
FI19	LänsiSuomi (West Finland)	TR	27833	0.67	95.64	82.90	0.18
FI1B	Helsinki-Uusimaa	MD	41433	0.78	100.00	83.80	0.13
FI1C	EteläSuomi (South Finland)	TR	27733	0.65	87.10	81.80	0.22
FI1D	Pohjois-jaItä-Suomi (North and East Finland)	TR	25967	0.63	91.25	82.30	0.21
FI20	Åland	MD	37600	0.72	75.00	81.50	0.24
FR10	Ile-de-France	MD	50333	0.85	98.03	71.20	0.15
FRB0	Centre - Val de Loire	TR	24633	0.58	83.06	72.20	0.29
FRC1	Bourgogne	TR	24467	0.60	72.42	72.10	0.32
FRC2	Franche-Comté	TR	22700	0.58	95.13	72.00	0.25
FRD1	Basse-Normandie	TR	23467	0.56	74.05	71.70	0.33
FRD2	Haute-Normandie	TR	25667	0.56	73.17	70.30	0.33
FRE1	Nord-Pas de Calais	TR	24200	0.54	63.71	70.40	0.37
FRE2	Picardie	TR	22333	0.52	70.26	68.40	0.37
FRF1	Alsace	TR	27600	0.66	85.23	72.70	0.25
FRF2	Champagne-Ardenne	TR	24900	0.52	68.44	69.60	0.37
FRF3	Lorraine	TR	22100	0.54	71.81	71.80	0.34
FRG0	Pays de la Loire	TR	26400	0.64	81.19	74.70	0.27
FRH0	Bretagne	TR	25133	0.62	89.09	75.50	0.24
FRI1	Aquitaine	TR	26167	0.64	82.78	74.80	0.26
FRI2	Limousin	TR	22400	0.56	78.25	75.40	0.30
FRI3	Poitou-Charentes	TR	23967	0.60	76.05	73.80	0.30
FRJ1	Languedoc-Roussillon	TR	22367	0.61	77.16	70.50	0.30

FRJ2	Midi-Pyrénées	TR	27267	0.69	98.98	74.80	0.19
FRK1	Auvergne	TR	23633	0.58	88.11	74.20	0.27
FRK2	Rhône-Alpes	MD	29800	0.71	97.82	74.50	0.19
FRL0	Provence-Alpes-Côte d'Azur	TR	27933	0.66	87.63	69.20	0.26
FRM0	Corse	TR	23467	0.63	64.56	66.70	0.35
FRY1	Guadeloupe	LD	19533	0.42	40.19	64.30	0.51
FRY2	Martinique	TR	20567	0.47	53.50	64.40	0.45
FRY3	Guyane	LD	13333	0.25	32.98	48.40	0.64
FRY4	La Réunion	LD	18867	0.41	33.40	64.10	0.54
FRY5	Mayotte	LD	8033	0.00	35.03	48.10	0.72
HR03	Jadranska Hrvatska (Adriatic Croatia)	LD	17033	0.46	46.42	59.40	0.49
HR04	Kontinentalna Hrvatska (Continental Croatia)	LD	17567	0.40	57.84	55.30	0.49
HU11	Budapest	MD	39567	0.64	88.35	63.60	0.28
HU12	Pest	LD	15967	0.36	83.85	59.40	0.40
HU21	Közép-Dunántúl (Central Transdanubia)	LD	18467	0.33	66.40	59.70	0.47
HU22	Nyugat-Dunántúl (Western Transdanubia)	LD	21067	0.40	67.14	60.30	0.44
HU23	Dél-Dunántúl (Southern Transdanubia)	LD	13167	0.26	43.56	55.90	0.58
HU31	Észak-Magyarország (Northern Hungary)	LD	13233	0.17	30.89	50.90	0.67
HU32	Észak-Alföld (Northern Great Plain)	LD	12500	0.23	51.98	54.20	0.57
HU33	Dél-Alföld (Southern Great Plain)	LD	14133	0.29	68.70	56.80	0.48
IE04	Northern and Western	TR	23067	0.63	76.21	75.20	0.29
IE05	Southern	MD	62767	0.80	75.06	75.40	0.23
IE06	Eastern and Midland	MD	53533	0.83	78.51	75.20	0.21
ITC1	Piemonte	MD	29267	0.51	73.45	58.60	0.39
ITC2	Valle d'Aosta	MD	36333	0.53	54.85	61.40	0.44
ITC3	Liguria	MD	30267	0.55	59.70	59.90	0.42
ITC4	Lombardia	MD	36700	0.58	73.37	59.60	0.36
ITF1	Abruzzo	TR	24000	0.51	33.65	57.60	0.53
ITF2	Molise	LD	19700	0.44	19.13	60.60	0.59
ITF3	Campania	LD	17833	0.34	11.14	52.80	0.67
ITF4	Puglia	LD	17833	0.35	9.29	55.00	0.67
ITF5	Basilicata	LD	21367	0.45	18.64	57.20	0.60
ITF6	Calabria	LD	16400	0.34	5.79	54.70	0.69
ITG1	Sicilia	LD	17000	0.32	4.53	54.40	0.70
ITG2	Sardegna	LD	20133	0.39	6.41	59.30	0.65
ITH1	Bolzano	MD	43833	0.61	66.91	64.70	0.36
ITH2	Provincia Autonoma di Trento	MD	36067	0.62	81.26	66.50	0.30
ITH3	Veneto	MD	31233	0.55	71.75	60.80	0.38
ITH4	FriuliVenezia Giulia	MD	29667	0.56	75.79	63.40	0.35
ITH5	EmiliaRomagna	MD	33933	0.59	83.76	63.80	0.31
ITI1	Toscana	MD	29567	0.54	69.42	63.10	0.38
ITI2	Umbria	TR	24267	0.55	62.26	62.10	0.40
ITI3	Marche	TR	26033	0.52	60.19	61.60	0.42
ITI4	Lazio	MD	32100	0.60	54.74	60.80	0.42
LT01	Sostinės regionas (Capital region)	MD	31467	0.55	65.61	66.60	0.38
LT02	Vidurio ir vakarų Lietuvos regionas (Middle and western Lithuania)	LD	18000	0.39	65.61	63.90	0.44
LU00	Luxembourg	MD	76067	0.81	77.40	74.60	0.22
LV00	Latvija (Latvia)	LD	18700	0.35	63.47	63.00	0.46
MT00	Malta	TR	27867	0.53	64.99	67.20	0.38
NL11	Groningen	MD	36400	0.64	88.24	79.60	0.23
NL12	Friesland (NL)	TR	25267	0.58	79.45	78.20	0.28
NL13	Drenthe	TR	25200	0.57	76.97	77.20	0.29
NL21	Overijssel	MD	30333	0.63	88.16	78.70	0.24
NL22	Gelderland	MD	30800	0.63	92.23	78.90	0.22
NL23	Flevoland	TR	27400	0.61	84.52	79.00	0.25
NL31	Utrecht	MD	44867	0.79	93.18	81.00	0.16
NL32	Noord-Holland (North Holland)	MD	48067	0.76	88.26	80.10	0.18
NL33	Zuid-Holland (South Holland)	MD	36700	0.68	90.77	79.10	0.21
NL34	Zeeland	MD	29167	0.61	72.68	76.20	0.30
NL41	Noord-Brabant (North Brabant)	MD	37067	0.68	98.01	78.10	0.19
NL42	Limburg (NL)	MD	32167	0.61	89.30	76.90	0.24
PL21	Malopolskie	LD	17800	0.48	88.34	63.30	0.33
PL22	Slaskie	LD	20333	0.44	69.45	60.40	0.42
PL41	Wielkopolskie	TR	21400	0.47	77.18	61.90	0.38
PL42	Zachodniopomorskie	LD	16500	0.39	69.12	61.20	0.44
PL43	Lubuskie	LD	16400	0.36	66.64	59.70	0.46

PL51	Dolnoslaskie	TR	21800	0.46	74.80	61.90	0.39
PL52	Opolskie	LD	15700	0.40	71.81	60.10	0.43
PL61	KujawskoPomorskie	LD	16000	0.38	66.40	59.70	0.45
PL62	WarminskoMazurskie	LD	13933	0.32	62.15	60.40	0.49
PL63	Pomorskie	LD	18933	0.47	80.60	64.70	0.36
PL71	Łódzkie	LD	18367	0.40	77.37	58.50	0.41
PL72	Świętokrzyskie	LD	14100	0.38	68.23	57.70	0.45
PL81	Lubelskie	LD	13533	0.38	64.59	61.10	0.46
PL82	Podkarpackie	LD	13867	0.41	65.01	60.30	0.45
PL84	Podlaskie	LD	14033	0.40	65.74	63.20	0.44
PL91	Warszawski stoleczny	MD	42767	0.71	88.07	67.20	0.25
PL92	Mazowiecki regionalny	LD	16800	0.37	81.59	60.90	0.40
PT11	Norte	LD	18600	0.39	73.13	65.50	0.41
PT15	Algarve	TR	23433	0.43	56.39	62.60	0.46
PT16	Centro (PT)	LD	19000	0.41	77.47	65.60	0.38
PT17	Lisboa	MD	29000	0.59	81.17	68.90	0.30
PT18	Alentejo	LD	20667	0.37	61.40	61.60	0.47
PT20	Região Autónoma dos Açores	LD	19600	0.19	48.78	58.00	0.58
PT30	Região Autónoma da Madeira	LD	21433	0.32	49.71	59.90	0.53
RO11	Nord-Vest (North West)	LD	15400	0.29	52.88	51.00	0.56
RO12	Centru (Centre)	LD	16067	0.30	33.78	49.50	0.62
RO21	Nord-Est (North East)	LD	10500	0.15	25.40	44.80	0.72
RO22	Sud-Est (South East)	LD	14267	0.17	11.02	43.60	0.76
RO31	Sud-Muntenia (South Muntenia)	LD	13400	0.23	23.00	43.70	0.70
RO32	Bucureşti-Ilfov (Bucharest-Ilfov)	MD	39967	0.55	78.69	54.20	0.37
RO41	Sud-Vest Oltenia (South West Oltenia)	LD	12433	0.28	22.12	46.80	0.68
RO42	Vest (West)	LD	17767	0.30	45.60	51.10	0.58
SE11	Stockholm	MD	49233	0.83	100.00	81.90	0.12
SE12	Östra Mellansverige (East Middle Sweden)	MD	30200	0.67	100.00	82.30	0.17
SE21	Småland med öarna (Småland and the islands)	MD	30233	0.66	85.98	82.90	0.22
SE22	Sydsverige (South Sweden)	MD	30367	0.68	91.02	81.50	0.20
SE23	Västsverige (West Sweden)	MD	34633	0.71	100.00	82.60	0.16
SE31	Norra Mellansverige (North Middle Sweden)	TR	28033	0.62	82.48	82.40	0.24
SE32	Mellersta Norrland (Middle Norrland)	MD	29933	0.64	78.48	83.30	0.25
SE33	Övre Norrland (Upper Norrland)	MD	32233	0.68	97.16	85.10	0.17
SI03	Vzhodna Slovenija (Eastern Slovenia)	LD	19700	0.52	84.42	67.00	0.32
SI04	Zahodna Slovenija (Western Slovenia)	MD	28400	0.69	94.41	70.50	0.22
SK01	Bratislava	MD	51133	0.67	84.85	67.90	0.27
SK02	Západné Slovensko (Western Slovakia)	LD	19033	0.41	70.21	60.30	0.43
SK03	Stredné Slovensko (Central Slovakia)	LD	16667	0.36	68.54	57.90	0.46
SK04	Východné Slovensko (Eastern Slovakia)	LD	14700	0.34	55.63	56.10	0.51

(1) Average over 2015–2017 (Eurostat, 2019b).
(2) See source in Table 5.
(3) Becker et al. (2020).
(4) Annoni and Bolsi (2020).
(5) The NUTS 2016 classification was adopted for the calculation of socioeconomic indicators. The following table reports changes between the 2016 and 2021 classifications at NUTS-2 level. To estimate socioeconomic indicators at NUTS-2 level and 2021 classification, the reported changes were applied assuming HR04, HR05, HR02 indicator values equal to those of HR04. In a similar context, to estimate socioeconomic indicators at NUTS-3 level and 2021 classification, the NUTS-2 regional indicator scores were assigned to the relevant (i.e. enclosed) NUTS-3 regions.

Code 2016	**Code 2021**	**Label 2021**	**Change**
ES52	ES52	Comunitat Valenciana	name change
ES63	ES63	Ciudad de Ceuta	name change
ES64	ES64	Ciudad de Melilla	name change
HR04		Kontinentalna Hrvatska	discontinued; split into new HR02, HR05 and HR06
	HR05	Grad Zagreb	new
	HR06	Sjeverna Hrvatska	new
	HR02	Panonska Hrvatska	new

Annex B Indicators and ranking of priority regions (supplement to Chapter 3)

Table B. 1. Residential buildings: Seismic risk and energy performance indicators for NUTS-3 (1) regions in the EU-27. (2)

NUTS-3		**Seismic risk**		**Energy performance**	
Code	**Name**	$AAEL_{eq}$ **(10⁶ €)**	***AALL* (no. fatalities)**	$AAEL_{en}$ **(10⁶ €)**	***AAEC* (kWh)**
AT111	Mittelburgenland	0.25	0.005	28.58	310180894.44
AT112	Nordburgenland	0.99	0.019	108.30	1175279889.32
AT113	Südburgenland	0.62	0.012	76.48	830042655.61
AT121	Mostviertel-Eisenwurzen	0.81	0.015	161.80	1755952700.56
AT122	Niederösterreich-Süd	1.02	0.019	197.37	2142011265.96
AT123	Sankt Pölten	0.56	0.010	101.25	1098849760.72
AT124	Waldviertel	0.88	0.017	182.56	1981272615.85
AT125	Weinviertel	0.50	0.009	87.32	947682574.10
AT126	Wiener Umland/Nordteil	1.21	0.023	198.83	2157780123.78
AT127	Wiener Umland/Südteil	1.27	0.024	205.00	2224813249.22
AT130	Wien	51.50	2.908	673.01	7303894458.82
AT211	Klagenfurt-Villach	3.91	0.104	192.58	2090017241.60
AT212	Oberkärnten	1.70	0.045	95.98	1041650662.92
AT213	Unterkärnten	1.86	0.049	98.93	1073596384.66
AT221	Graz	1.82	0.044	256.41	2782701138.26
AT222	Liezen	0.37	0.009	62.13	674250284.10
AT223	Östliche Obersteiermark	0.79	0.019	132.77	1440873020.52
AT224	Oststeiermark	0.97	0.023	134.84	1463332441.01
AT225	West- und Südsteiermark	0.76	0.018	106.57	1156591506.57
AT226	Westliche Obersteiermark	0.45	0.011	83.26	903628029.76
AT311	Innviertel	0.17	0.003	146.08	1585336716.26
AT312	Linz-Wels	0.39	0.008	338.98	3678826496.49
AT313	Mühlviertel	0.12	0.002	113.46	1231310613.75
AT314	Steyr-Kirchdorf	0.10	0.002	92.23	1000923459.77
AT315	Traunviertel	0.16	0.003	139.31	1511836832.87
AT321	Lungau	0.03	0.001	12.47	135334241.68
AT322	Pinzgau-Pongau	0.27	0.010	99.51	1079919408.42
AT323	Salzburg und Umgebung	0.54	0.020	186.18	2020559442.12
AT331	Außerfern	0.17	0.006	21.05	228429901.31
AT332	Innsbruck	1.55	0.056	216.76	2352395033.68
AT333	Osttirol	0.22	0.008	33.93	368237184.42
AT334	Tiroler Oberland	0.47	0.017	70.81	768473590.89
AT335	Tiroler Unterland	1.31	0.048	152.86	1658925635.96
AT341	Bludenz-Bregenzer Wald	0.30	0.009	63.00	683693172.83
AT342	Rheintal-Bodenseegebiet	0.82	0.025	158.09	1715706221.08
BE100	Arr. de Bruxelles-Capitale/Arr. Brussel-Hoofdstad	1.23	0.052	538.89	5977155460.86
BE211	Arr. Antwerpen	2.32	0.137	528.20	5858581602.31
BE212	Arr. Mechelen	0.65	0.043	185.19	2054001465.15
BE213	Arr. Turnhout	1.06	0.072	254.11	2818491444.40
BE223	Arr. Tongeren	0.72	0.052	116.11	1287799960.10
BE224	Arr. Hasselt	1.24	0.077	225.37	2499731991.53
BE225	Arr. Maaseik	0.89	0.074	136.75	1516739158.39
BE231	Arr. Aalst	0.31	0.016	171.67	1904130930.93
BE232	Arr. Dendermonde	0.26	0.018	113.01	1253424580.03
BE233	Arr. Eeklo	0.08	0.005	48.47	537574572.99
BE234	Arr. Gent	0.66	0.037	299.27	3319418551.47
BE235	Arr. Oudenaarde	0.10	0.007	72.84	807942118.59
BE236	Arr. Sint-Niklaas	0.41	0.027	132.39	1468370655.68
BE241	Arr. Halle-Vilvoorde	0.65	0.044	340.65	3778345341.14
BE242	Arr. Leuven	0.85	0.054	290.73	3224718987.27
BE251	Arr. Brugge	0.28	0.014	152.52	1691680431.50
BE252	Arr. Diksmuide	0.03	0.003	30.39	337063844.39
BE253	Arr. Ieper	0.06	0.004	64.06	710511647.95
BE254	Arr. Kortrijk	0.25	0.015	170.32	1889097449.54
BE255	Arr. Oostende	0.21	0.008	81.05	899013532.27
BE256	Arr. Roeselare	0.12	0.008	87.74	973160294.72
BE257	Arr. Tielt	0.06	0.005	52.47	581939194.51
BE258	Arr. Veurne	0.10	0.004	31.53	349698029.48
BE310	Arr. Nivelles	0.68	0.047	215.19	2386772904.36
BE323	Arr. Mons	1.14	0.065	171.57	1902985943.08
BE328	Arr. Tournai-Mouscron	0.18	0.009	134.84	1495646226.76
BE329	Arr. La Louvière	0.81	0.045	92.89	1030336148.06
BE32A	Arr. Ath	0.23	0.016	79.24	878923754.86

NUTS-3		Seismic risk		Energy performance	
Code	Name	$AAEL_{eq}$ (10^6 €)	*AALL* (no. fatalities)	$AAEL_{en}$ (10^6 €)	*AAEC* (kWh)
BE32B	Arr. Charleroi	2.07	0.115	269.60	2990254531.22
BE32C	Arr. Soignies	0.40	0.031	63.07	699512783.39
BE32D	Arr. Thuin	0.20	0.014	65.35	724859130.64
BE331	Arr. Huy	0.18	0.013	73.16	811485944.64
BE332	Arr. Liège	2.40	0.130	393.99	4370019562.08
BE334	Arr. Waremme	0.16	0.012	46.38	514413233.87
BE335	Arr. Verviers — communes francophones	0.66	0.038	139.40	1546202169.76
BE336	Bezirk Verviers — Deutschsprachige Gemeinschaft	0.30	0.020	55.18	611987998.74
BE341	Arr. Arlon	0.02	0.001	41.55	460857435.07
BE342	Arr. Bastogne	0.06	0.004	32.59	361449065.97
BE343	Arr. Marche-en-Famenne	0.08	0.005	40.51	449349944.13
BE344	Arr. Neufchâteau	0.04	0.002	44.35	491858725.37
BE345	Arr. Virton	0.01	0.001	37.67	417854446.42
BE351	Arr. Dinant	0.11	0.007	76.83	852126050.53
BE352	Arr. Namur	0.48	0.029	190.00	2107447157.07
BE353	Arr. Philippeville	0.07	0.004	47.36	525245989.56
BG311	Vidin	0.20	0.008	19.48	309856102.87
BG312	Montana	0.71	0.035	33.70	535919982.66
BG313	Vratsa	0.64	0.034	32.55	517646704.42
BG314	Pleven	2.24	0.147	41.93	666908229.45
BG315	Lovech	0.40	0.015	27.29	434038739.40
BG321	Veliko Tarnovo	2.02	0.138	34.83	553981192.33
BG322	Gabrovo	0.39	0.022	17.25	274266944.18
BG323	Ruse	5.82	0.546	30.16	479629566.55
BG324	Razgrad	2.69	0.217	17.59	279806999.47
BG325	Silistra	3.25	0.301	17.22	273831644.10
BG331	Varna	2.58	0.206	44.38	705744185.64
BG332	Dobrich	2.73	0.227	25.07	398768411.77
BG333	Shumen	1.43	0.108	22.74	361627101.27
BG334	Targovishte	1.07	0.069	17.02	270748190.79
BG341	Burgas	2.05	0.221	31.97	508391529.29
BG342	Sliven	1.52	0.142	23.19	368839402.62
BG343	Yambol	0.65	0.076	13.84	220069646.83
BG344	Stara Zagora	2.73	0.419	32.15	511268311.06
BG411	Sofia (stolitsa)	16.78	3.214	76.64	1218821338.61
BG412	Sofia	3.92	0.225	52.53	835454526.27
BG413	Blagoevgrad	2.47	0.281	41.30	656807901.45
BG414	Pernik	2.30	0.157	25.27	401825718.34
BG415	Kyustendil	2.12	0.155	23.92	380373285.80
BG421	Plovdiv	8.50	1.581	68.76	1093475946.40
BG422	Haskovo	3.08	0.332	26.52	421837858.80
BG423	Pazardzhik	3.58	0.367	49.14	781561009.16
BG424	Smolyan	0.53	0.041	20.44	325060464.06
BG425	Kardzhali	0.56	0.050	15.41	245020404.82
CY000	Kýpros	89.48	3.947	158.63	1408041632.13
CZ010	Hlavní město Praha	0.03	0.003	426.42	5782022355.34
CZ020	Středočeský kraj	0.02	0.002	431.85	5855692509.49
CZ031	Jihočeský kraj	0.02	0.002	234.61	3181210753.70
CZ032	Plzeňský kraj	0.02	0.002	222.31	3014408852.36
CZ041	Karlovarský kraj	0.13	0.013	138.87	1883038193.79
CZ042	Ústecký kraj	0.08	0.010	315.45	4277292690.24
CZ051	Liberecký kraj	0.01	0.001	168.39	2283328168.27
CZ052	Královéhradecký kraj	0.03	0.004	220.72	2992852375.64
CZ053	Pardubický kraj	0.01	0.001	197.01	2671311626.92
CZ063	Kraj Vysočina	0.01	0.000	210.81	2858490348.54
CZ064	Jihomoravský kraj	0.12	0.013	547.12	7418679480.05
CZ071	Olomoucký kraj	0.03	0.000	261.63	3547539637.83
CZ072	Zlínský kraj	0.09	0.011	230.81	3129688366.55
CZ080	Moravskoslezský kraj	0.16	0.000	524.78	7115706222.79
DE111	Stuttgart, Stadtkreis	1.10	0.015	303.16	2818004068.80
DE112	Böblingen	1.10	0.020	211.46	1965685278.66
DE113	Esslingen	0.98	0.016	300.11	2789684358.97
DE114	Göppingen	0.33	0.006	160.52	1492147561.41
DE115	Ludwigsburg	0.85	0.014	284.43	2643907653.37
DE116	Rems-Murr-Kreis	0.43	0.007	231.63	2153131815.46
DE117	Heilbronn, Stadtkreis	0.13	0.002	66.13	614688254.66

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL*** $_{eq}$ **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL*** $_{en}$ **(10^6 €)**	***AAEC*** **(kWh)**
DE118	Heilbronn, Landkreis	0.37	0.006	179.40	1667666182.95
DE119	Hohenlohekreis	0.03	0.001	60.40	561491274.94
DE11A	Schwäbisch Hall	0.04	0.001	116.91	1086749005.48
DE11B	Main-Tauber-Kreis	0.04	0.001	82.90	770620517.01
DE11C	Heidenheim	0.15	0.003	89.43	831324161.73
DE11D	Ostalbkreis	0.18	0.003	205.38	1909127190.76
DE121	Baden-Baden, Stadtkreis	1.17	0.024	30.90	287200828.76
DE122	Karlsruhe, Stadtkreis	8.50	0.252	150.84	1402170218.91
DE123	Karlsruhe, Landkreis	5.41	0.140	236.95	2202612601.73
DE124	Rastatt	4.89	0.134	120.05	1115970145.36
DE125	Heidelberg, Stadtkreis	1.95	0.056	75.27	699657028.45
DE126	Mannheim, Stadtkreis	7.47	0.209	135.70	1261379534.82
DE127	Neckar-Odenwald-Kreis	0.11	0.002	85.46	794421038.62
DE128	Rhein-Neckar-Kreis	6.72	0.175	292.67	2720511824.61
DE129	Pforzheim, Stadtkreis	0.55	0.010	65.07	604843993.89
DE12A	Calw	0.67	0.011	92.92	863753526.32
DE12B	Enzkreis	0.66	0.013	111.50	1036472764.18
DE12C	Freudenstadt	0.52	0.009	74.62	693612309.94
DE131	Freiburg im Breisgau, Stadtkreis	5.23	0.152	100.41	933402395.38
DE132	Breisgau-Hochschwarzwald	4.10	0.108	147.00	1366457758.07
DE133	Emmendingen	2.38	0.059	88.60	823625368.12
DE134	Ortenaukreis	8.12	0.213	225.44	2095633629.74
DE135	Rottweil	0.46	0.007	98.70	917448224.15
DE136	Schwarzwald-Baar-Kreis	0.65	0.010	149.12	1386175344.39
DE137	Tuttlingen	0.33	0.005	94.28	876377712.05
DE138	Konstanz	1.05	0.021	168.27	1564139067.03
DE139	Lörrach	2.84	0.067	122.04	1134460723.38
DE13A	Waldshut	0.46	0.007	101.53	943737893.07
DE141	Reutlingen	1.06	0.019	195.36	1815973432.46
DE142	Tübingen, Landkreis	1.54	0.031	132.54	1232061447.83
DE143	Zollernalbkreis	2.18	0.040	140.59	1306895303.98
DE144	Ulm, Stadtkreis	0.30	0.006	77.88	723904322.14
DE145	Alb-Donau-Kreis	0.35	0.007	124.78	1159855545.16
DE146	Biberach	0.47	0.009	128.15	1191217149.22
DE147	Bodenseekreis	0.77	0.014	128.21	1191814802.63
DE148	Ravensburg	0.55	0.010	187.74	1745116728.82
DE149	Sigmaringen	0.79	0.016	90.21	838519288.48
DE211	Ingolstadt, Kreisfreie Stadt	0.49	0.012	80.67	749905792.95
DE212	München, Kreisfreie Stadt	0.58	0.011	647.16	6015705908.77
DE213	Rosenheim, Kreisfreie Stadt	0.05	0.001	31.96	297100622.35
DE214	Altötting	0.01	0.000	66.19	615238115.16
DE215	Berchtesgadener Land	0.05	0.001	64.80	602335575.06
DE216	Bad Tölz-Wolfratshausen	0.07	0.001	78.42	728934703.74
DE217	Dachau	0.03	0.001	81.51	757664286.37
DE218	Ebersberg	0.03	0.001	72.14	670605369.64
DE219	Eichstätt	0.14	0.003	77.24	717961703.32
DE21A	Erding	0.02	0.000	75.74	704059761.40
DE21B	Freising	0.02	0.000	98.03	911236646.98
DE21C	Fürstenfeldbruck	0.04	0.001	119.18	1107838919.58
DE21D	Garmisch-Partenkirchen	0.10	0.001	67.95	631620129.81
DE21E	Landsberg am Lech	0.02	0.000	82.69	768643412.13
DE21F	Miesbach	0.06	0.001	65.92	612802030.63
DE21G	Mühldorf a. Inn	0.01	0.000	65.53	609165633.46
DE21H	München, Landkreis	0.08	0.002	164.25	1526831831.47
DE21I	Neuburg-Schrobenhausen	0.07	0.002	57.46	534158228.82
DE21J	Pfaffenhofen a. d. Ilm	0.04	0.001	75.40	700884170.89
DE21K	Rosenheim, Landkreis	0.12	0.002	150.08	1395098364.15
DE21L	Starnberg	0.03	0.000	74.05	688306721.71
DE21M	Traunstein	0.05	0.001	107.73	1001429737.54
DE21N	Weilheim-Schongau	0.07	0.001	87.77	815889876.61
DE221	Landshut, Kreisfreie Stadt	0.01	0.000	38.18	354937172.21
DE222	Passau, Kreisfreie Stadt	0.01	0.000	27.30	253727952.70
DE223	Straubing, Kreisfreie Stadt	0.00	0.000	27.42	254839557.96
DE224	Deggendorf	0.01	0.000	72.41	673110830.48
DE225	Freyung-Grafenau	0.01	0.000	54.34	505158889.90
DE226	Kelheim	0.02	0.000	71.82	667615619.02

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL $_{eq}$*** **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL $_{en}$*** **(10^6 €)**	***AAEC*** **(kWh)**
DE227	Landshut, Landkreis	0.01	0.000	96.17	893950265.57
DE228	Passau, Landkreis	0.03	0.001	114.32	1062678349.04
DE229	Regen	0.01	0.000	57.20	531707958.12
DE22A	Rottal-Inn	0.01	0.000	74.83	695602157.88
DE22B	Straubing-Bogen	0.01	0.000	61.99	576247612.62
DE22C	Dingolfing-Landau	0.01	0.000	59.78	555646988.65
DE231	Amberg, Kreisfreie Stadt	0.00	0.000	28.45	264429871.18
DE232	Regensburg, Kreisfreie Stadt	0.01	0.000	68.42	636047567.50
DE233	Weiden i. d. Opf, Kreisfreie Stadt	0.01	0.000	30.58	284227814.79
DE234	Amberg-Sulzbach	0.01	0.000	69.76	648488827.57
DE235	Cham	0.01	0.000	85.43	794159151.34
DE236	Neumarkt i. d. OPf.	0.01	0.000	80.24	745843921.17
DE237	Neustadt a. d. Waldnaab	0.01	0.000	66.01	613640971.16
DE238	Regensburg, Landkreis	0.02	0.000	115.93	1077643610.11
DE239	Schwandorf	0.01	0.000	97.19	903434215.86
DE23A	Tirschenreuth	0.03	0.000	53.28	495226276.81
DE241	Bamberg, Kreisfreie Stadt	0.01	0.000	43.35	402946999.53
DE242	Bayreuth, Kreisfreie Stadt	0.01	0.000	43.86	407660170.15
DE243	Coburg, Kreisfreie Stadt	0.00	0.000	27.45	255192981.32
DE244	Hof, Kreisfreie Stadt	0.04	0.000	33.09	307571286.82
DE245	Bamberg, Landkreis	0.01	0.000	89.83	835006514.99
DE246	Bayreuth, Landkreis	0.02	0.000	76.46	710699450.87
DE247	Coburg, Landkreis	0.01	0.000	59.06	548981686.86
DE248	Forchheim	0.01	0.000	75.19	698899667.74
DE249	Hof, Landkreis	0.06	0.001	78.86	733080737.07
DE24A	Kronach	0.01	0.000	49.55	460553010.98
DE24B	Kulmbach	0.01	0.000	54.31	504855010.55
DE24C	Lichtenfels	0.00	0.000	44.96	417888463.92
DE24D	Wunsiedel i. Fichtelgebirge	0.11	0.002	60.59	563192530.97
DE251	Ansbach, Kreisfreie Stadt	0.00	0.000	26.46	245981036.88
DE252	Erlangen, Kreisfreie Stadt	0.01	0.000	53.53	497615410.17
DE253	Fürth, Kreisfreie Stadt	0.01	0.000	59.52	553312965.28
DE254	Nürnberg, Kreisfreie Stadt	0.07	0.001	291.33	2708039473.74
DE255	Schwabach, Kreisfreie Stadt	0.01	0.000	24.97	232082599.73
DE256	Ansbach, Landkreis	0.02	0.000	113.16	1051923538.52
DE257	Erlangen-Höchstadt	0.01	0.000	75.95	705973903.07
DE258	Fürth, Landkreis	0.01	0.000	71.06	660519185.06
DE259	Nürnberger Land	0.02	0.000	112.23	1043224069.09
DE25A	Neustadt a. d. Aisch-Bad Windsheim	0.01	0.000	60.09	558591228.84
DE25B	Roth	0.02	0.000	81.29	755633832.29
DE25C	Weißenburg-Gunzenhausen	0.04	0.001	59.08	549176795.76
DE261	Aschaffenburg, Kreisfreie Stadt	0.06	0.001	34.65	322085153.28
DE262	Schweinfurt, Kreisfreie Stadt	0.00	0.000	28.70	266802838.69
DE263	Würzburg, Kreisfreie Stadt	0.01	0.000	61.32	570029512.33
DE264	Aschaffenburg, Landkreis	0.21	0.004	95.38	886630776.15
DE265	Bad Kissingen	0.01	0.000	66.37	616916397.60
DE266	Rhön-Grabfeld	0.01	0.000	53.29	495406198.79
DE267	Haßberge	0.00	0.000	53.32	495658393.10
DE268	Kitzingen	0.01	0.000	50.67	471033463.90
DE269	Miltenberg	0.10	0.002	75.35	700417619.99
DE26A	Main-Spessart	0.02	0.000	78.96	733991223.97
DE26B	Schweinfurt, Landkreis	0.01	0.000	68.85	639980939.58
DE26C	Würzburg, Landkreis	0.01	0.000	91.34	849073202.86
DE271	Augsburg, Kreisfreie Stadt	0.17	0.003	173.05	1608562132.29
DE272	Kaufbeuren, Kreisfreie Stadt	0.02	0.000	27.38	254472213.82
DE273	Kempten (Allgäu), Kreisfreie Stadt	0.04	0.001	37.74	350859501.77
DE274	Memmingen, Kreisfreie Stadt	0.03	0.001	26.25	244033627.31
DE275	Aichach-Friedberg	0.03	0.001	81.27	755431837.67
DE276	Augsburg, Landkreis	0.08	0.002	154.78	1438754799.26
DE277	Dillingen a.d. Donau	0.11	0.003	59.95	557279069.96
DE278	Günzburg	0.06	0.001	78.47	729457641.03
DE279	Neu-Ulm	0.22	0.005	103.18	959108669.51
DE27A	Lindau (Bodensee)	0.18	0.003	50.41	468590214.46
DE27B	Ostallgäu	0.07	0.001	98.49	915549735.70
DE27C	Unterallgäu	0.05	0.001	95.01	883192518.39
DE27D	Donau-Ries	0.21	0.005	82.50	766910376.19

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL*** $_{eq}$ **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL*** $_{en}$ **(10^6 €)**	***AAEC*** **(kWh)**
DE27E	Oberallgäu	0.14	0.002	109.67	1019436743.16
DE300	Berlin	0.00	0.000	1577.03	14659405254.59
DE401	Brandenburg an der Havel, Kreisfreie Stadt	0.00	0.000	46.42	431536121.36
DE402	Cottbus, Kreisfreie Stadt	0.00	0.000	53.67	498881739.40
DE403	Frankfurt (Oder), Kreisfreie Stadt	0.00	0.000	31.33	291226133.97
DE404	Potsdam, Kreisfreie Stadt	0.00	0.000	80.32	746579568.49
DE405	Barnim	0.00	0.000	116.51	1082994099.17
DE406	Dahme-Spreewald	0.00	0.000	105.73	982850537.67
DE407	Elbe-Elster	0.01	0.000	75.89	705397599.73
DE408	Havelland	0.00	0.000	104.27	969254067.58
DE409	Märkisch-Oderland	0.00	0.000	128.15	1191188220.77
DE40A	Oberhavel	0.00	0.000	139.48	1296517560.78
DE40B	Oberspreewald-Lausitz	0.00	0.000	78.57	730352482.74
DE40C	Oder-Spree	0.00	0.000	115.50	1073626845.05
DE40D	Ostprignitz-Ruppin	0.00	0.000	71.47	664355924.66
DE40E	Potsdam-Mittelmark	0.00	0.000	130.38	1211919191.02
DE40F	Prignitz	0.00	0.000	58.63	544967911.45
DE40G	Spree-Neiße	0.00	0.000	79.79	741699134.95
DE40H	Teltow-Fläming	0.00	0.000	106.01	985458380.35
DE40I	Uckermark	0.00	0.000	87.70	815191459.76
DE501	Bremen, Kreisfreie Stadt	0.00	0.000	368.44	3424829742.60
DE502	Bremerhaven, Kreisfreie Stadt	0.00	0.000	65.48	608682646.70
DE600	Hamburg	0.07	0.002	1003.83	9331149894.18
DE711	Darmstadt, Kreisfreie Stadt	2.55	0.072	76.08	707205156.26
DE712	Frankfurt am Main, Kreisfreie Stadt	6.53	0.178	325.88	3029283847.40
DE713	Offenbach am Main, Kreisfreie Stadt	0.92	0.026	54.79	509306869.28
DE714	Wiesbaden, Kreisfreie Stadt	1.07	0.018	161.00	1496596023.13
DE715	Bergstraße	3.58	0.094	145.74	1354692110.72
DE716	Darmstadt-Dieburg	2.81	0.071	158.76	1475753001.22
DE717	Groß-Gerau	3.30	0.087	125.34	1165139512.87
DE718	Hochtaunuskreis	0.72	0.014	140.68	1307708318.64
DE719	Main-Kinzig-Kreis	0.97	0.021	248.91	2313775022.30
DE71A	Main-Taunus-Kreis	1.32	0.030	122.51	1138838827.30
DE71B	Odenwaldkreis	0.17	0.003	58.19	540913310.01
DE71C	Offenbach, Landkreis	2.86	0.074	183.27	1703630999.67
DE71D	Rheingau-Taunus-Kreis	0.63	0.010	121.91	1133234570.95
DE71E	Wetteraukreis	0.54	0.010	183.64	1707007515.32
DE721	Gießen, Landkreis	0.22	0.003	160.20	1489121896.44
DE722	Lahn-Dill-Kreis	0.21	0.003	168.98	1570781272.56
DE723	Limburg-Weilburg	0.37	0.006	109.95	1022026366.67
DE724	Marburg-Biedenkopf	0.07	0.001	157.15	1460799711.84
DE725	Vogelsbergkreis	0.03	0.000	76.55	711568391.61
DE731	Kassel, Kreisfreie Stadt	0.01	0.000	127.11	1181563218.23
DE732	Fulda	0.03	0.000	143.29	1331967319.72
DE733	Hersfeld-Rotenburg	0.01	0.000	85.12	791229546.34
DE734	Kassel, Landkreis	0.01	0.000	160.00	1487307784.64
DE735	Schwalm-Eder-Kreis	0.02	0.000	123.13	1144534658.58
DE736	Waldeck-Frankenberg	0.02	0.000	115.69	1075449635.17
DE737	Werra-Meißner-Kreis	0.00	0.000	75.30	699948769.35
DE803	Rostock, Kreisfreie Stadt	0.00	0.000	103.84	965208839.82
DE804	Schwerin, Kreisfreie Stadt	0.00	0.000	54.43	505923762.14
DE80J	Mecklenburgische Seenplatte	0.00	0.000	183.28	1703714253.22
DE80K	Landkreis Rostock	0.00	0.000	148.54	1380790041.98
DE80L	Vorpommern-Rügen	0.00	0.000	162.74	1512751225.98
DE80M	Nordwestmecklenburg	0.00	0.000	108.41	1007757704.12
DE80N	Vorpommern-Greifswald	0.00	0.000	166.13	1544312840.46
DE80O	Ludwigslust-Parchim	0.00	0.000	147.52	1371299748.93
DE911	Braunschweig, Kreisfreie Stadt	0.00	0.000	150.06	1394856002.38
DE912	Salzgitter, Kreisfreie Stadt	0.00	0.000	65.31	607138102.75
DE913	Wolfsburg, Kreisfreie Stadt	0.00	0.000	74.08	688621173.16
DE914	Gifhorn	0.00	0.000	108.11	1004941665.83
DE916	Goslar	0.00	0.000	105.90	984391451.51
DE917	Helmstedt	0.00	0.000	63.47	590023808.63
DE918	Northeim	0.00	0.000	94.42	877725487.12
DE91A	Peine	0.00	0.000	83.33	774611272.85
DE91B	Wolfenbüttel	0.00	0.000	78.61	730750497.71

NUTS-3		Seismic risk		Energy performance	
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DE91C	Göttingen	0.01	0.000	226.30	2103572340.36
DE922	Diepholz	0.00	0.000	136.81	1271690047.95
DE923	Hameln-Pyrmont	0.00	0.000	101.75	945812181.74
DE925	Hildesheim	0.00	0.000	182.32	1694803442.45
DE926	Holzminden	0.00	0.000	50.50	469390643.61
DE927	Nienburg (Weser)	0.00	0.000	75.20	698991689.21
DE928	Schaumburg	0.00	0.000	96.98	901502174.59
DE929	Region Hannover	0.03	0.001	659.14	6127082117.72
DE931	Celle	0.00	0.000	122.08	1134839534.50
DE932	Cuxhaven	0.00	0.000	132.07	1227659176.53
DE933	Harburg	0.00	0.000	161.07	1497195910.31
DE934	Lüchow-Dannenberg	0.00	0.000	35.64	331259058.28
DE935	Lüneburg, Landkreis	0.00	0.000	114.65	1065692552.04
DE936	Osterholz	0.00	0.000	73.13	679755003.91
DE937	Rotenburg (Wümme)	0.00	0.000	107.43	998641215.38
DE938	Heidekreis	0.00	0.000	94.84	881604938.21
DE939	Stade	0.00	0.000	130.18	1210114646.42
DE93A	Uelzen	0.00	0.000	68.12	633189999.98
DE93B	Verden	0.00	0.000	86.96	808369644.51
DE941	Delmenhorst, Kreisfreie Stadt	0.00	0.000	50.31	467659683.69
DE942	Emden, Kreisfreie Stadt	0.00	0.000	36.62	340368530.84
DE943	Oldenburg (Oldenburg), Kreisfreie Stadt	0.00	0.000	112.54	1046128246.97
DE944	Osnabrück, Kreisfreie Stadt	0.01	0.000	102.70	954608091.35
DE945	Wilhelmshaven, Kreisfreie Stadt	0.00	0.000	55.87	519321523.49
DE946	Ammerland	0.00	0.000	76.97	715452992.03
DE947	Aurich	0.00	0.000	130.02	1208609198.61
DE948	Cloppenburg	0.00	0.000	87.87	816764963.00
DE949	Emsland	0.01	0.000	179.22	1665908399.91
DE94A	Friesland (DE)	0.00	0.000	70.28	653313162.65
DE94B	Grafschaft Bentheim	0.01	0.000	79.80	741816013.29
DE94C	Leer	0.00	0.000	110.97	1031535876.74
DE94D	Oldenburg, Landkreis	0.00	0.000	81.32	755872087.12
DE94E	Osnabrück, Landkreis	0.01	0.000	197.97	1840248196.85
DE94F	Vechta	0.00	0.000	76.34	709668082.95
DE94G	Wesermarsch	0.00	0.000	62.06	576854137.84
DE94H	Wittmund	0.00	0.000	38.77	360362939.27
DEA11	Düsseldorf, Kreisfreie Stadt	3.31	0.073	296.00	2751521486.17
DEA12	Duisburg, Kreisfreie Stadt	1.71	0.031	261.09	2427018598.85
DEA13	Essen, Kreisfreie Stadt	0.52	0.006	326.97	3039358425.60
DEA14	Krefeld, Kreisfreie Stadt	1.05	0.018	126.57	1176524194.76
DEA15	Mönchengladbach, Kreisfreie Stadt	1.80	0.031	150.09	1395126254.59
DEA16	Mülheim an der Ruhr, Kreisfreie Stadt	0.22	0.003	98.69	917357800.20
DEA17	Oberhausen, Kreisfreie Stadt	0.47	0.008	124.94	1161355602.26
DEA18	Remscheid, Kreisfreie Stadt	0.11	0.001	66.47	617837152.23
DEA19	Solingen, Kreisfreie Stadt	0.23	0.003	94.27	876301145.43
DEA1A	Wuppertal, Kreisfreie Stadt	0.35	0.005	198.44	1844599569.39
DEA1B	Kleve	0.86	0.017	178.90	1663009187.28
DEA1C	Mettmann	1.23	0.024	257.12	2390108030.54
DEA1D	Rhein-Kreis Neuss	2.47	0.048	239.48	2226070095.00
DEA1E	Viersen	1.47	0.028	173.10	1609058910.74
DEA1F	Wesel	1.03	0.019	258.36	2401613211.13
DEA22	Bonn, Kreisfreie Stadt	2.65	0.051	167.71	1558997166.86
DEA23	Köln, Kreisfreie Stadt	10.51	0.224	490.75	4561817451.60
DEA24	Leverkusen, Kreisfreie Stadt	0.79	0.016	85.77	797240087.62
DEA26	Düren	3.47	0.073	153.49	1426811087.94
DEA27	Rhein-Erft-Kreis	4.83	0.101	257.09	2389752329.37
DEA28	Euskirchen	1.78	0.033	130.22	1210494653.51
DEA29	Heinsberg	2.67	0.055	144.05	1338990337.14
DEA2A	Oberbergischer Kreis	0.27	0.004	166.56	1548313640.47
DEA2B	Rheinisch-Bergischer Kreis	0.53	0.008	164.03	1524716842.46
DEA2C	Rhein-Sieg-Kreis	3.10	0.056	337.35	3135835179.17
DEA2D	Städteregion Aachen	6.50	0.124	343.33	3191489561.98
DEA31	Bottrop, Kreisfreie Stadt	0.11	0.002	68.65	638117858.81
DEA32	Gelsenkirchen, Kreisfreie Stadt	0.40	0.007	143.83	1337024739.75
DEA33	Münster, Kreisfreie Stadt	0.09	0.002	167.76	1559461117.70
DEA34	Borken	0.24	0.005	205.08	1906350741.45

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL*** $_{eq}$ **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL*** $_{en}$ **(10^6 €)**	***AAEC*** **(kWh)**
DEA35	Coesfeld	0.06	0.001	121.28	1127397873.47
DEA36	Recklinghausen	0.53	0.008	369.25	3432358087.42
DEA37	Steinfurt	0.04	0.001	245.56	2282650925.41
DEA38	Warendorf	0.03	0.001	157.70	1465878190.82
DEA41	Bielefeld, Kreisfreie Stadt	0.03	0.001	197.31	1834074178.94
DEA42	Gütersloh	0.04	0.001	202.73	1884509051.17
DEA43	Herford	0.01	0.000	149.90	1393400543.38
DEA44	Höxter	0.01	0.000	97.66	907792607.16
DEA45	Lippe	0.01	0.000	219.86	2043718450.46
DEA46	Minden-Lübbecke	0.01	0.000	184.42	1714242796.70
DEA47	Paderborn	0.01	0.000	183.50	1705769615.82
DEA51	Bochum, Kreisfreie Stadt	0.59	0.011	211.86	1969342413.52
DEA52	Dortmund, Kreisfreie Stadt	0.47	0.008	332.84	3093948422.00
DEA53	Hagen, Kreisfreie Stadt	0.08	0.001	111.76	1038856932.81
DEA54	Hamm, Kreisfreie Stadt	0.07	0.001	102.26	950609322.33
DEA55	Herne, Kreisfreie Stadt	0.23	0.004	87.29	811438452.60
DEA56	Ennepe-Ruhr-Kreis	0.22	0.003	201.80	1875857551.03
DEA57	Hochsauerlandkreis	0.05	0.001	191.00	1775438728.25
DEA58	Märkischer Kreis	0.21	0.003	280.61	2608412287.10
DEA59	Olpe	0.08	0.001	90.18	838251510.67
DEA5A	Siegen-Wittgenstein	0.17	0.002	194.17	1804953931.43
DEA5B	Soest	0.04	0.001	183.76	1708189319.89
DEA5C	Unna	0.20	0.003	238.54	2217405891.17
DEB11	Koblenz, Kreisfreie Stadt	1.13	0.016	70.13	651914562.59
DEB12	Ahrweiler	0.94	0.014	87.24	810963178.81
DEB13	Altenkirchen (Westerwald)	0.19	0.003	84.31	783674969.93
DEB14	Bad Kreuznach	0.37	0.006	100.70	936033474.58
DEB15	Birkenfeld	0.10	0.001	61.14	568357838.72
DEB17	Mayen-Koblenz	2.39	0.043	143.36	1332619937.60
DEB18	Neuwied	1.73	0.031	113.92	1058949430.47
DEB1A	Rhein-Lahn-Kreis	0.61	0.009	86.08	800204926.86
DEB1B	Westerwaldkreis	0.56	0.009	131.54	1222715252.92
DEB1C	Cochem-Zell	0.14	0.002	47.29	439572373.89
DEB1D	Rhein-Hunsrück-Kreis	0.35	0.005	74.13	689072982.96
DEB21	Trier, Kreisfreie Stadt	0.05	0.001	71.57	665307102.48
DEB22	Bernkastel-Wittlich	0.12	0.002	80.38	747142283.53
DEB23	Eifelkreis Bitburg-Prüm	0.11	0.002	67.06	623359845.84
DEB24	Vulkaneifel	0.15	0.002	47.02	437053807.39
DEB25	Trier-Saarburg	0.06	0.001	93.59	869933748.43
DEB31	Frankenthal (Pfalz), Kreisfreie Stadt	0.84	0.024	21.05	195683388.13
DEB32	Kaiserslautern, Kreisfreie Stadt	0.19	0.002	64.45	599077832.10
DEB33	Landau in der Pfalz, Kreisfreie Stadt	0.46	0.009	25.89	240620771.31
DEB34	Ludwigshafen am Rhein, Kreisfreie Stadt	3.32	0.092	72.40	672971298.32
DEB35	Mainz, Kreisfreie Stadt	0.99	0.019	97.18	903319669.83
DEB36	Neustadt an der Weinstraße, Kreisfreie Stadt	0.44	0.009	29.73	276383986.92
DEB37	Pirmasens, Kreisfreie Stadt	0.08	0.001	29.43	273571531.12
DEB38	Speyer, Kreisfreie Stadt	0.91	0.022	26.40	245408480.94
DEB39	Worms, Kreisfreie Stadt	1.00	0.020	45.88	426524085.06
DEB3A	Zweibrücken, Kreisfreie Stadt	0.03	0.000	22.93	213122003.73
DEB3B	Alzey-Worms	0.59	0.013	72.06	669833953.05
DEB3C	Bad Dürkheim	0.84	0.018	77.31	718644548.45
DEB3D	Donnersbergkreis	0.20	0.004	47.77	444086115.20
DEB3E	Germersheim	1.56	0.041	62.85	584220019.22
DEB3F	Kaiserslautern, Landkreis	0.15	0.002	68.94	640790902.60
DEB3G	Kusel	0.06	0.001	49.32	458433362.73
DEB3H	Südliche Weinstraße	0.59	0.013	61.99	576190323.23
DEB3I	Rhein-Pfalz-Kreis	1.42	0.036	77.11	716753652.03
DEB3J	Mainz-Bingen	0.85	0.016	117.18	1089274952.66
DEB3K	Südwestpfalz	0.13	0.002	62.10	577233734.26
DEC01	Regionalverband Saarbrücken	0.13	0.002	213.55	1985076884.80
DEC02	Merzig-Wadern	0.03	0.001	65.96	613156072.11
DEC03	Neunkirchen	0.08	0.001	91.16	847412317.53
DEC04	Saarlouis	0.06	0.001	123.55	1148427769.42
DEC05	Saarpfalz-Kreis	0.11	0.002	96.52	897192382.86
DEC06	St. Wendel	0.05	0.001	61.03	567330424.05
DED21	Dresden, Kreisfreie Stadt	0.04	0.001	280.11	2603764618.41

NUTS-3		Seismic risk		Energy performance	
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DED2C	Bautzen	0.01	0.000	200.75	1866113042.26
DED2D	Görlitz	0.01	0.000	184.22	1712432602.23
DED2E	Meißen	0.03	0.000	155.79	1448137068.20
DED2F	Sächsische Schweiz-Osterzgebirge	0.03	0.000	180.09	1674060733.10
DED41	Chemnitz, Kreisfreie Stadt	0.14	0.002	142.38	1323490740.11
DED42	Erzgebirgskreis	0.25	0.003	277.02	2575017050.23
DED43	Mittelsachsen	0.11	0.002	228.17	2120962311.98
DED44	Vogtlandkreis	0.74	0.010	190.80	1773576560.80
DED45	Zwickau	0.57	0.008	237.31	2205911449.80
DED51	Leipzig, Kreisfreie Stadt	0.40	0.008	257.41	2392763793.86
DED52	Leipzig	0.20	0.003	171.09	1590377349.73
DED53	Nordsachsen	0.05	0.001	128.66	1196009724.92
DEE01	Dessau-Roßlau, Kreisfreie Stadt	0.00	0.000	52.07	483982704.89
DEE02	Halle (Saale), Kreisfreie Stadt	0.02	0.000	119.30	1108933703.75
DEE03	Magdeburg, Kreisfreie Stadt	0.01	0.000	116.02	1078475107.61
DEE04	Altmarkkreis Salzwedel	0.00	0.000	60.67	563947135.00
DEE05	Anhalt-Bitterfeld	0.01	0.000	113.89	1058647420.43
DEE06	Jerichower Land	0.00	0.000	63.77	592747147.83
DEE07	Börde	0.00	0.000	115.72	1075666414.52
DEE08	Burgenlandkreis	0.09	0.001	124.58	1158005783.56
DEE09	Harz	0.00	0.000	161.49	1501108087.79
DEE0A	Mansfeld-Südharz	0.01	0.000	103.35	960686462.84
DEE0B	Saalekreis	0.04	0.001	125.55	1167079929.43
DEE0C	Salzlandkreis	0.00	0.000	137.14	1274749936.22
DEE0D	Stendal	0.00	0.000	81.34	756142183.72
DEE0E	Wittenberg	0.00	0.000	92.28	857828747.95
DEF01	Flensburg, Kreisfreie Stadt	0.00	0.000	59.44	552549686.26
DEF02	Kiel, Kreisfreie Stadt	0.00	0.000	151.43	1407659871.86
DEF03	Lübeck, Kreisfreie Stadt	0.00	0.000	149.19	1386810594.11
DEF04	Neumünster, Kreisfreie Stadt	0.00	0.000	56.06	521078021.66
DEF05	Dithmarschen	0.00	0.000	100.92	938101980.05
DEF06	Herzogtum Lauenburg	0.00	0.000	125.71	1168561243.75
DEF07	Nordfriesland	0.00	0.000	125.09	1162808810.08
DEF08	Ostholstein	0.00	0.000	138.25	1285069114.16
DEF09	Pinneberg	0.01	0.000	198.21	1842442715.30
DEF0A	Plön	0.00	0.000	89.95	836110906.16
DEF0B	Rendsburg-Eckernförde	0.00	0.000	188.32	1750578099.67
DEF0C	Schleswig-Flensburg	0.00	0.000	138.34	1285989274.11
DEF0D	Segeberg	0.01	0.000	173.64	1614090360.05
DEF0E	Steinburg	0.00	0.000	95.05	883544950.54
DEF0F	Stormarn	0.00	0.000	151.92	1412172123.74
DEG01	Erfurt, Kreisfreie Stadt	0.02	0.000	112.98	1050231657.12
DEG02	Gera, Kreisfreie Stadt	0.12	0.002	59.47	552770637.36
DEG03	Jena, Kreisfreie Stadt	0.02	0.000	59.23	550611236.17
DEG04	Suhl, Kreisfreie Stadt	0.01	0.000	25.01	232523710.63
DEG05	Weimar, Kreisfreie Stadt	0.01	0.000	41.57	386455364.50
DEG06	Eichsfeld	0.00	0.000	63.99	594854322.03
DEG07	Nordhausen	0.00	0.000	59.29	551169426.08
DEG09	Unstrut-Hainich-Kreis	0.01	0.000	73.73	685331400.46
DEG0A	Kyffhäuserkreis	0.00	0.000	56.23	522730084.96
DEG0B	Schmalkalden-Meiningen	0.01	0.000	93.13	865683593.39
DEG0C	Gotha	0.01	0.000	95.16	884546401.68
DEG0D	Sömmerda	0.01	0.000	48.00	446151840.13
DEG0E	Hildburghausen	0.01	0.000	46.77	434786049.14
DEG0F	Ilm-Kreis	0.01	0.000	81.44	757017772.37
DEG0G	Weimarer Land	0.01	0.000	58.29	541805763.28
DEG0H	Sonneberg	0.01	0.000	44.11	410035585.34
DEG0I	Saalfeld-Rudolstadt	0.02	0.000	86.22	801489858.32
DEG0J	Saale-Holzland-Kreis	0.02	0.000	56.86	528513672.14
DEG0K	Saale-Orla-Kreis	0.03	0.000	66.32	616487347.29
DEG0L	Greiz	0.15	0.002	78.90	733392624.04
DEG0M	Altenburger Land	0.14	0.002	65.91	612649651.09
DEG0N	Eisenach, Kreisfreie Stadt	0.00	0.000	29.80	276970369.62
DEG0P	Wartburgkreis	0.01	0.000	84.36	784210726.35
DK011	Byen København	0.17	0.008	508.56	4366793626.08
DK012	Københavns omegn	0.13	0.007	362.28	3110723011.76

NUTS-3		Seismic risk		Energy performance	
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DK013	Nordsjælland	0.10	0.005	273.48	2348198194.73
DK014	Bornholm	0.00	0.000	29.17	250478893.94
DK021	Østsjælland	0.05	0.003	159.11	1366180775.21
DK022	Vest- og Sydsjælland	0.09	0.004	352.73	3028693552.75
DK031	Fyn	0.01	0.001	326.67	2804956985.20
DK032	Sydjylland	0.01	0.001	488.82	4197255563.67
DK041	Vestjylland	0.02	0.001	289.85	2488816768.04
DK042	Østjylland	0.04	0.002	565.81	4858333962.56
DK050	Nordjylland	0.05	0.003	394.14	3384254316.33
EE001	Põhja-Eesti	0.02	0.001	172.69	3060280577.05
EE004	Lääne-Eesti	0.01	0.001	47.96	849926776.10
EE008	Lõuna-Eesti	0.02	0.002	117.17	2076436510.72
EE009	Kesk-Eesti	0.01	0.001	47.78	846769046.52
EE00A	Kirde-Eesti	0.01	0.001	60.28	1068253411.76
EL301	Voreios Tomeas Athinon	15.03	1.072	101.88	1070489964.11
EL302	Dytikos Tomeas Athinon	22.96	1.448	82.93	871372126.85
EL303	Kentrikos Tomeas Athinon	44.30	3.051	225.57	2370171525.49
EL304	Notios Tomeas Athinon	31.43	2.134	99.68	1047377792.47
EL305	Anatoliki Attiki	7.78	0.303	126.18	1325867067.97
EL306	Dytiki Attiki	5.33	0.280	38.54	405004096.35
EL307	Peiraias, Nisoi	35.25	1.999	100.69	1057972465.16
EL411	Lesvos, Limnos	7.23	0.341	26.28	276178901.76
EL412	Ikaria, Samos	3.34	0.149	9.71	102061225.38
EL413	Chios	2.67	0.129	11.98	125913948.97
EL421	Kalymnos, Karpathos, Kasos, Kos, Rodos	8.38	0.485	18.61	195569756.06
EL422	Andros, Thira, Kea, Milos, Mykonos, Naxos, Paros, Syros, Tinos	0.92	0.034	18.14	190611185.75
EL431	Irakleio	20.74	1.314	53.02	557129974.09
EL432	Lasithi	4.13	0.216	13.81	145075128.52
EL433	Rethymni	3.74	0.256	13.82	145245344.29
EL434	Chania	9.18	0.565	26.49	278323790.57
EL511	Evros	3.18	0.198	50.00	525332682.66
EL512	Xanthi	0.98	0.072	37.59	394927448.19
EL513	Rodopi	1.42	0.116	41.39	434929981.78
EL514	Drama	1.07	0.079	45.87	482015386.42
EL515	Thasos, Kavala	1.25	0.058	53.10	557924474.55
EL521	Imathia	1.97	0.167	45.52	478254015.16
EL522	Thessaloniki	35.33	2.535	292.19	3070215476.22
EL523	Kilkis	0.89	0.056	27.55	289433843.88
EL524	Pella	2.21	0.177	50.98	535686357.54
EL525	Pieria	2.86	0.175	38.31	402528571.79
EL526	Serres	3.24	0.258	64.83	681213294.19
EL527	Chalkidiki	3.20	0.104	23.69	248891611.87
EL531	Grevena, Kozani	2.67	0.172	72.29	759599263.11
EL532	Kastoria	0.74	0.045	23.27	244516829.65
EL533	Florina	0.80	0.057	23.28	244618799.38
EL541	Arta, Preveza	7.37	0.480	35.09	368689220.86
EL542	Thesprotia	1.52	0.079	11.94	125441919.49
EL543	Ioannina	8.30	0.444	61.83	649676665.17
EL611	Karditsa, Trikala	6.41	0.463	92.54	972332709.43
EL612	Larisa	13.98	1.065	93.60	983532045.52
EL613	Magnisia, Sporades	7.49	0.374	58.45	614185453.91
EL621	Zakynthos	3.26	0.182	9.08	95458840.06
EL622	Kerkyra	6.12	0.403	17.75	186547794.51
EL623	Ithaki, Kefallinia	3.55	0.155	8.94	93988309.05
EL624	Lefkada	2.46	0.092	5.67	59613481.40
EL631	Aitoloakarnania	11.30	0.754	49.99	525317206.28
EL632	Achaia	27.21	2.073	81.69	858307000.40
EL633	Ileia	10.42	0.681	34.01	357357598.29
EL641	Voiotia	3.83	0.235	27.28	286655643.45
EL642	Evvoia	7.17	0.350	52.27	549213461.46
EL643	Evrytania	0.59	0.023	8.82	92671192.24
EL644	Fthiotida	7.72	0.489	53.38	560854433.70
EL645	Fokida	3.29	0.149	14.74	154865285.38
EL651	Argolida, Arkadia	7.99	0.478	55.30	581088913.96
EL652	Korinthia	11.09	0.626	35.38	371760608.08

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL*** $_{eq}$ **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL*** $_{en}$ **(10^6 €)**	***AAEC*** **(kWh)**
EL653	Lakonia, Messinia	18.77	1.101	58.19	611432874.34
ES111	A Coruña	2.12	0.044	260.07	2211587716.14
ES112	Lugo	0.81	0.013	107.17	911384499.87
ES113	Ourense	0.98	0.015	118.97	1011703124.05
ES114	Pontevedra	1.66	0.043	205.18	1744810904.12
ES120	Asturias	0.94	0.022	294.27	2502463034.96
ES130	Cantabria	0.40	0.011	154.21	1311357117.26
ES211	Araba/Álava	0.24	0.007	92.69	788229307.51
ES212	Gipuzkoa	0.44	0.030	97.22	826719818.06
ES213	Bizkaia	0.46	0.021	209.11	1778247295.48
ES220	Navarra	1.72	0.057	163.82	1393127954.58
ES230	La Rioja	0.66	0.022	84.87	721693251.69
ES241	Huesca	0.63	0.013	58.21	494973141.65
ES242	Teruel	0.41	0.005	59.00	501765574.16
ES243	Zaragoza	1.00	0.031	206.93	1759761112.32
ES300	Madrid	0.80	0.044	925.86	7873487737.32
ES411	Ávila	0.05	0.000	62.22	529143057.06
ES412	Burgos	0.61	0.011	159.17	1353595910.17
ES413	León	0.77	0.010	233.26	1983669545.32
ES414	Palencia	0.15	0.002	83.50	710114302.41
ES415	Salamanca	0.21	0.004	102.48	871495203.98
ES416	Segovia	0.05	0.001	65.78	559419014.33
ES417	Soria	0.25	0.003	41.55	353311987.95
ES418	Valladolid	0.14	0.004	173.80	1477956066.98
ES419	Zamora	0.34	0.005	83.64	711245024.40
ES421	Albacete	2.42	0.073	98.81	840312463.80
ES422	Ciudad Real	0.67	0.015	126.62	1076789785.83
ES423	Cuenca	0.39	0.006	78.76	669811271.57
ES424	Guadalajara	0.06	0.001	111.53	948406563.59
ES425	Toledo	0.32	0.007	193.07	1641832741.27
ES431	Badajoz	0.84	0.019	133.37	1134213059.71
ES432	Cáceres	0.71	0.011	101.28	861247624.74
ES511	Barcelona	10.17	0.439	1110.55	9444065084.84
ES512	Girona	1.86	0.045	147.86	1257400203.87
ES513	Lleida	0.42	0.009	134.09	1140338084.89
ES514	Tarragona	1.98	0.075	131.54	1118615349.50
ES521	Alicante/Alacant	24.25	0.872	207.23	1762270254.04
ES522	Castellón/Castelló	8.38	0.348	126.95	1079615751.37
ES523	Valencia/València	9.42	0.297	465.13	3955415620.23
ES531	Eivissa y Formentera	0.07	0.002	16.61	141292206.38
ES532	Mallorca	0.41	0.012	105.22	894811220.74
ES533	Menorca	0.05	0.001	12.00	102034155.55
ES611	Almería	25.38	0.838	130.32	1108228121.88
ES612	Cádiz	13.28	0.574	130.88	1112968463.24
ES613	Córdoba	4.88	0.149	146.82	1248574867.54
ES614	Granada	21.98	0.576	228.20	1940605719.67
ES615	Huelva	4.59	0.138	81.62	694057550.74
ES616	Jaén	5.74	0.120	152.35	1295586937.14
ES617	Málaga	9.21	0.317	229.38	1950644309.58
ES618	Sevilla	10.03	0.358	262.51	2232355935.94
ES620	Murcia	65.58	2.853	220.94	1878858549.75
ES630	Ceuta	0.25	0.020	3.16	26897542.75
ES640	Melilla	0.89	0.066	6.02	51218985.28
FI193	Keski-Suomi	0.00	0.000	195.25	2199578012.68
FI194	Etelä-Pohjanmaa	0.01	0.001	148.66	1674708528.97
FI195	Pohjanmaa	0.01	0.001	120.49	1357366468.78
FI196	Satakunta	0.02	0.001	159.67	1798704536.75
FI197	Pirkanmaa	0.01	0.000	330.38	3721846516.20
FI1B1	Helsinki-Uusimaa	0.02	0.001	876.48	9873865337.46
FI1C1	Varsinais-Suomi	0.02	0.001	287.30	3236586074.11
FI1C2	Kanta-Häme	0.00	0.000	119.92	1350951516.35
FI1C3	Päijät-Häme	0.01	0.000	135.70	1528720617.41
FI1C4	Kymenlaakso	0.00	0.000	125.52	1413989397.80
FI1C5	Etelä-Karjala	0.00	0.000	98.81	1113142112.06
FI1D1	Etelä-Savo	0.01	0.001	123.39	1389993952.28
FI1D2	Pohjois-Savo	0.00	0.000	197.84	2228718919.26

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL*** $_{eq}$ **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL*** $_{en}$ **(10^6 €)**	***AAEC*** **(kWh)**
FI1D3	Pohjois-Karjala	0.00	0.000	136.80	1541104164.99
FI1D5	Keski-Pohjanmaa	0.00	0.000	56.01	631017089.89
FI1D7	Lappi	0.02	0.001	188.58	2124386023.59
FI1D8	Kainuu	0.00	0.000	79.45	895023724.43
FI1D9	Pohjois-Pohjanmaa	0.02	0.000	312.11	3516013086.80
FR101	Paris	0.14	0.002	955.55	9276738196.99
FR102	Seine-et-Marne	0.08	0.002	638.96	6203225501.93
FR103	Yvelines	0.10	0.003	637.47	6188695752.97
FR104	Essonne	0.07	0.002	547.58	5316068419.72
FR105	Hauts-de-Seine	0.13	0.005	599.60	5821090167.31
FR106	Seine-Saint-Denis	0.10	0.004	565.63	5491248576.62
FR107	Val-de-Marne	0.08	0.003	488.02	4737812464.07
FR108	Val-d'Oise	0.10	0.004	512.35	4974055274.51
FRB01	Cher	0.14	0.003	200.86	1950042829.39
FRB02	Eure-et-Loir	0.04	0.001	254.63	2472016404.71
FRB03	Indre	0.21	0.004	147.92	1436058759.52
FRB04	Indre-et-Loire	0.25	0.006	308.96	2999436129.37
FRB05	Loir-et-Cher	0.07	0.001	205.63	1996357534.59
FRB06	Loiret	0.08	0.002	375.46	3645108584.53
FRC11	Côte-d'Or	0.19	0.005	344.68	3346278238.57
FRC12	Nièvre	0.06	0.001	161.51	1568027194.69
FRC13	Saône-et-Loire	0.33	0.008	356.97	3465599021.86
FRC14	Yonne	0.01	0.000	227.65	2210096750.14
FRC21	Doubs	0.67	0.017	373.34	3624476118.63
FRC22	Jura	0.42	0.012	187.63	1821585329.34
FRC23	Haute-Saône	0.22	0.005	165.54	1607071382.10
FRC24	Territoire de Belfort	0.30	0.008	88.94	863494040.23
FRD11	Calvados	0.39	0.009	385.22	3739814857.47
FRD12	Manche	0.44	0.010	298.81	2900967259.67
FRD13	Orne	0.17	0.004	204.24	1982860727.35
FRD21	Eure	0.09	0.002	362.27	3516989555.74
FRD22	Seine-Maritime	0.19	0.005	733.54	7121413885.44
FRE11	Nord	2.06	0.056	1514.36	14701835624.96
FRE12	Pas-de-Calais	0.92	0.032	877.88	8522658175.91
FRE21	Aisne	0.10	0.002	363.86	3532401395.53
FRE22	Oise	0.09	0.002	466.40	4527906815.74
FRE23	Somme	0.13	0.003	371.60	3607620318.97
FRF11	Bas-Rhin	19.78	0.896	611.43	5935876827.16
FRF12	Haut-Rhin	9.11	0.403	426.84	4143910799.19
FRF21	Ardennes	0.10	0.003	203.97	1980168665.52
FRF22	Aube	0.01	0.000	192.20	1865882070.05
FRF23	Marne	0.02	0.000	352.73	3424369612.30
FRF24	Haute-Marne	0.01	0.000	138.77	1347181035.56
FRF31	Meurthe-et-Moselle	0.12	0.003	472.63	4588386239.66
FRF32	Meuse	0.01	0.000	141.98	1378426939.32
FRF33	Moselle	0.30	0.006	653.78	6347079581.55
FRF34	Vosges	0.41	0.008	271.22	2633042245.14
FRG01	Loire-Atlantique	1.86	0.055	569.98	5533469579.09
FRG02	Maine-et-Loire	0.87	0.027	377.12	3661160795.13
FRG03	Mayenne	0.21	0.005	179.73	1744857255.30
FRG04	Sarthe	0.20	0.005	317.56	3082977645.44
FRG05	Vendée	0.79	0.016	297.44	2887577550.79
FRH01	Côtes-d'Armor	0.63	0.016	355.74	3453652625.58
FRH02	Finistère	0.71	0.018	474.48	4606395165.10
FRH03	Ille-et-Vilaine	0.78	0.020	481.66	4676097086.50
FRH04	Morbihan	0.99	0.027	385.60	3743514280.11
FRI11	Dordogne	0.16	0.003	224.81	2182541761.50
FRI12	Gironde	1.31	0.039	554.55	5383718360.09
FRI13	Landes	0.88	0.020	151.38	1469640795.70
FRI14	Lot-et-Garonne	0.20	0.005	154.47	1499609589.77
FRI15	Pyrénées-Atlantiques	4.25	0.123	262.54	2548800166.34
FRI21	Corrèze	0.08	0.001	159.56	1549087977.12
FRI22	Creuse	0.12	0.002	95.73	929332302.33
FRI23	Haute-Vienne	0.14	0.003	225.39	2188181012.18
FRI31	Charente	0.20	0.004	195.82	1901100970.92
FRI32	Charente-Maritime	0.45	0.009	283.91	2756294506.90

NUTS-3		Seismic risk		Energy performance	
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FRI33	Deux-Sèvres	0.37	0.009	206.37	2003446535.68
FRI34	Vienne	0.37	0.009	236.62	2297126094.27
FRJ11	Aude	0.82	0.015	197.74	1919668451.18
FRJ12	Gard	3.79	0.140	345.63	3355434406.84
FRJ13	Hérault	2.21	0.057	492.49	4781242258.98
FRJ14	Lozère	0.07	0.001	64.71	628202090.82
FRJ15	Pyrénées-Orientales	3.84	0.098	274.65	2666363710.86
FRJ21	Ariège	0.59	0.010	108.02	1048727459.71
FRJ22	Aveyron	0.13	0.002	194.98	1892963832.51
FRJ23	Haute-Garonne	1.85	0.042	518.61	5034831403.91
FRJ24	Gers	0.34	0.008	90.16	875283774.34
FRJ25	Lot	0.05	0.001	97.94	950800208.71
FRJ26	Hautes-Pyrénées	2.71	0.068	144.13	1399289455.79
FRJ27	Tarn	0.19	0.004	197.17	1914173418.91
FRJ28	Tarn-et-Garonne	0.10	0.003	107.73	1045861403.07
FRK11	Allier	0.43	0.011	231.23	2244887206.16
FRK12	Cantal	0.13	0.003	127.18	1234656249.14
FRK13	Haute-Loire	0.22	0.004	181.88	1765701660.70
FRK14	Puy-de-Dôme	0.78	0.019	447.10	4340606190.14
FRK21	Ain	1.56	0.053	324.52	3150516378.06
FRK22	Ardèche	0.77	0.019	184.77	1793826687.91
FRK23	Drôme	4.04	0.156	260.51	2529098558.89
FRK24	Isère	12.40	0.526	725.03	7038750539.39
FRK25	Loire	0.49	0.012	432.16	4195487686.35
FRK26	Rhône	1.71	0.051	763.85	7415641726.41
FRK27	Savoie	2.97	0.081	348.94	3387561913.33
FRK28	Haute-Savoie	5.75	0.203	478.09	4641439277.72
FRL01	Alpes-de-Haute-Provence	1.64	0.043	119.30	1158182483.75
FRL02	Hautes-Alpes	2.79	0.051	126.45	1227634520.44
FRL03	Alpes-Maritimes	7.92	0.202	691.39	6712226500.73
FRL04	Bouches-du-Rhône	7.93	0.324	754.13	7321312524.05
FRL05	Var	1.01	0.018	434.11	4214467464.37
FRL06	Vaucluse	4.35	0.180	220.07	2136479441.23
FRM01	Corse-du-Sud	0.05	0.001	56.10	544593787.06
FRM02	Haute-Corse	0.04	0.001	64.11	622409545.06
HR021	Bjelovarsko-bilogorska županija	0.70	0.092	32.86	574739320.70
HR022	Virovitičko-podravska županija	0.47	0.072	24.17	422859918.59
HR023	Požeško-slavonska županija	0.35	0.046	21.05	368218043.66
HR024	Brodsko-posavska županija	0.74	0.124	42.85	749556745.68
HR025	Osječko-baranjska županija	1.75	0.223	88.25	1543772108.96
HR026	Vukovarsko-srijemska županija	0.96	0.148	48.22	843568695.07
HR027	Karlovačka županija	1.44	0.173	40.61	710390334.09
HR028	Sisačko-moslavačka županija	1.47	0.174	49.27	861856339.87
HR031	Primorsko-goranska županija	2.01	0.211	98.59	1724637365.41
HR032	Ličko-senjska županija	0.33	0.027	19.09	333886689.97
HR033	Zadarska županija	1.94	0.214	36.96	646475429.97
HR034	Šibensko-kninska županija	1.56	0.149	21.55	377003589.69
HR035	Splitsko-dalmatinska županija	5.74	0.668	75.06	1313083198.83
HR036	Istarska županija	0.44	0.041	45.00	787251407.65
HR037	Dubrovačko-neretvanska županija	2.58	0.452	17.55	306943435.76
HR050	Grad Zagreb	24.64	2.363	225.13	3938064789.01
HR061	Međimurska županija	1.00	0.202	32.10	561520772.56
HR062	Varaždinska županija	2.29	0.400	46.16	807480439.35
HR063	Koprivničko-križevačka županija	0.70	0.105	30.51	533673721.45
HR064	Krapinsko-zagorska županija	1.62	0.246	35.14	614627924.73
HR065	Zagrebačka županija	5.15	0.783	83.06	1452923556.53
HU110	Budapest	4.51	0.207	509.22	9852316190.55
HU120	Pest	2.23	0.176	307.27	5944919829.11
HU211	Fejér	1.55	0.104	113.24	2190996830.83
HU212	Komárom-Esztergom	1.66	0.114	85.44	1653035429.44
HU213	Veszprém	0.61	0.037	97.90	1894115535.43
HU221	Győr-Moson-Sopron	0.97	0.058	108.30	2095289104.95
HU222	Vas	0.21	0.012	65.42	1265692893.00
HU223	Zala	0.25	0.014	71.80	1389110472.67
HU231	Baranya	0.40	0.020	92.35	1786780033.78
HU232	Somogy	0.24	0.014	78.89	1526373910.63

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL**$_{eq}$* **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL**$_{en}$* **(10^6 €)**	***AAEC*** **(kWh)**
HU233	Tolna	0.16	0.011	64.80	1253717625.97
HU311	Borsod-Abaúj-Zemplén	0.62	0.042	189.54	3667183703.04
HU312	Heves	0.42	0.029	90.06	1742533880.04
HU313	Nógrád	0.25	0.018	61.45	1189006481.95
HU321	Hajdú-Bihar	1.20	0.091	136.39	2638922339.87
HU322	Jász-Nagykun-Szolnok	0.71	0.054	108.16	2092699000.74
HU323	Szabolcs-Szatmár-Bereg	0.71	0.062	147.79	2859378006.46
HU331	Bács-Kiskun	0.58	0.044	142.74	2761676822.72
HU332	Békés	0.72	0.055	103.47	2001819564.57
HU333	Csongrád	1.18	0.076	102.33	1979937258.05
IE041	Border	0.00	0.000	208.66	1931646840.22
IE042	West	0.00	0.000	219.03	2027687516.84
IE051	Mid-West	0.00	0.000	242.00	2240277221.05
IE052	South-East	0.01	0.000	191.94	1776827037.28
IE053	South-West	0.00	0.000	305.45	2827625471.03
IE061	Dublin	0.03	0.000	651.28	6029146734.79
IE062	Mid-East	0.00	0.000	318.73	2950610965.11
IE063	Midland	0.00	0.000	144.93	1341685633.78
ITC11	Torino	50.69	2.052	1572.05	16460968754.59
ITC12	Vercelli	2.67	0.092	120.83	1265208445.24
ITC13	Biella	1.62	0.048	113.91	1192787267.69
ITC14	Verbano-Cusio-Ossola	0.43	0.011	110.12	1153115539.78
ITC15	Novara	2.73	0.073	211.99	2219795132.97
ITC16	Cuneo	8.25	0.292	316.91	3318358638.30
ITC17	Asti	2.44	0.073	116.61	1221017273.60
ITC18	Alessandria	11.33	0.407	225.17	2357725592.03
ITC20	Valle d’Aosta/Vallée d’Aoste	0.60	0.020	81.46	852965427.62
ITC31	Imperia	3.47	0.141	57.43	601326645.29
ITC32	Savona	2.58	0.089	61.83	647383806.54
ITC33	Genova	5.96	0.178	363.78	3809145282.94
ITC34	La Spezia	5.99	0.221	75.59	791504454.66
ITC41	Varese	4.49	0.113	526.23	5510172391.09
ITC42	Como	3.91	0.114	341.98	3580860749.93
ITC43	Lecco	4.82	0.195	176.52	1848357760.72
ITC44	Sondrio	0.76	0.021	114.18	1195538527.23
ITC46	Bergamo	52.24	2.441	592.54	6204448259.03
ITC47	Brescia	68.17	2.917	793.47	8308380286.28
ITC48	Pavia	17.19	0.654	314.02	3288136362.76
ITC49	Lodi	12.47	0.537	115.82	1212802932.64
ITC4A	Cremona	23.16	0.811	206.70	2164307344.03
ITC4B	Mantova	32.34	1.047	260.83	2731186184.31
ITC4C	Milano	78.77	2.504	1408.54	14748852813.73
ITC4D	Monza e della Brianza	18.99	0.716	408.76	4280077008.19
ITF11	L’Aquila	33.69	1.522	101.07	1058343654.27
ITF12	Teramo	13.66	0.509	92.67	970354011.72
ITF13	Pescara	14.27	0.490	102.62	1074556114.04
ITF14	Chieti	17.33	0.597	114.32	1197038468.49
ITF21	Isernia	8.03	0.330	31.41	328923713.39
ITF22	Campobasso	10.66	0.404	60.98	638476393.09
ITF31	Caserta	34.49	1.444	246.93	2585650757.95
ITF32	Benevento	19.29	0.835	93.77	981840336.33
ITF33	Napoli	138.83	8.161	608.38	6370385927.47
ITF34	Avellino	25.33	1.077	131.80	1380037392.57
ITF35	Salerno	29.63	1.214	252.87	2647818004.60
ITF43	Taranto	7.56	0.266	169.29	1772596583.66
ITF44	Brindisi	2.52	0.074	96.26	1007900646.62
ITF45	Lecce	5.16	0.122	235.60	2466976214.80
ITF46	Foggia	40.95	1.798	142.96	1496910701.07
ITF47	Bari	11.44	0.379	359.29	3762142204.67
ITF48	Barletta-Andria-Trani	11.11	0.498	95.06	995339877.06
ITF51	Potenza	20.02	0.876	114.47	1198567004.98
ITF52	Matera	5.20	0.192	52.74	552285259.71
ITF61	Cosenza	73.76	2.897	182.94	1915523860.45
ITF62	Crotone	13.19	0.574	24.54	256918277.75
ITF63	Catanzaro	42.04	1.734	85.11	891198723.45
ITF64	Vibo Valentia	15.08	0.664	30.68	321290901.75

NUTS-3		Seismic risk		Energy performance	
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ITF65	Reggio di Calabria	65.50	2.931	115.59	1210356474.89
ITG11	Trapani	8.33	0.298	83.12	870305719.97
ITG12	Palermo	32.90	1.281	263.82	2762486971.47
ITG13	Messina	49.62	2.085	140.47	1470892553.32
ITG14	Agrigento	12.21	0.553	72.12	755142643.58
ITG15	Caltanissetta	10.27	0.406	46.95	491569829.64
ITG16	Enna	6.19	0.228	37.81	395887748.67
ITG17	Catania	101.67	4.403	257.62	2697523511.80
ITG18	Ragusa	16.59	0.629	53.82	563546428.40
ITG19	Siracusa	28.32	1.076	84.02	879774764.97
ITG2D	Sassari	0.27	0.009	113.21	1185383051.50
ITG2E	Nuoro	0.09	0.003	58.88	616503495.94
ITG2F	Cagliari	0.29	0.009	97.51	1021052641.19
ITG2G	Oristano	0.07	0.002	47.52	497572617.61
ITG2H	Sud Sardegna	0.13	0.004	102.72	1075552916.38
ITH10	Bolzano-Bozen	2.09	0.083	493.12	5163450961.68
ITH20	Trento	6.51	0.219	311.77	3264503715.78
ITH31	Verona	42.01	1.431	488.82	5118445601.30
ITH32	Vicenza	57.15	2.276	544.34	5699760436.96
ITH33	Belluno	9.31	0.351	138.43	1449547787.38
ITH34	Treviso	68.62	2.606	498.47	5219455077.63
ITH35	Venezia	33.50	0.869	405.29	4243816107.89
ITH36	Padova	47.21	1.531	547.65	5734461303.89
ITH37	Rovigo	12.44	0.356	146.64	1535484062.05
ITH41	Pordenone	24.10	0.852	210.70	2206189530.02
ITH42	Udine	42.85	1.463	386.56	4047669238.27
ITH43	Gorizia	6.58	0.233	71.19	745435996.65
ITH44	Trieste	5.79	0.216	105.14	1100954133.28
ITH51	Piacenza	21.31	0.845	145.82	1526913033.38
ITH52	Parma	49.46	1.822	218.99	2293034909.91
ITH53	Reggio nell'Emilia	62.87	2.398	269.70	2824079363.94
ITH54	Modena	93.65	3.630	343.95	3601508020.06
ITH55	Bologna	115.57	4.341	477.14	4996097943.81
ITH56	Ferrara	48.88	1.862	181.38	1899255785.84
ITH57	Ravenna	54.97	1.930	197.39	2066834666.89
ITH58	Forlì-Cesena	41.55	1.626	186.58	1953696596.87
ITH59	Rimini	24.64	1.121	121.47	1271936755.79
ITI11	Massa-Carrara	6.88	0.271	73.43	768849431.41
ITI12	Lucca	19.89	0.712	164.30	1720423165.37
ITI13	Pistoia	14.06	0.475	137.40	1438684343.65
ITI14	Firenze	56.01	2.056	411.40	4307748593.91
ITI15	Prato	13.36	0.495	95.74	1002508311.70
ITI16	Livorno	3.33	0.116	96.48	1010264255.52
ITI17	Pisa	15.08	0.512	156.79	1641715670.07
ITI18	Arezzo	19.77	0.741	159.36	1668688444.85
ITI19	Siena	8.49	0.283	107.03	1120691995.88
ITI1A	Grosseto	1.88	0.064	57.60	603169444.45
ITI21	Perugia	81.65	3.399	317.03	3319630306.82
ITI22	Terni	11.99	0.406	96.64	1011947560.57
ITI31	Pesaro e Urbino	20.16	0.783	146.61	1535176986.40
ITI32	Ancona	26.07	0.998	177.96	1863420849.80
ITI33	Macerata	17.00	0.613	120.12	1257779267.47
ITI34	Ascoli Piceno	9.00	0.336	69.12	723758492.27
ITI35	Fermo	6.94	0.241	59.14	619303301.68
ITI41	Viterbo	6.41	0.215	109.22	1143592631.18
ITI42	Rieti	9.64	0.372	56.07	587108046.29
ITI43	Roma	201.16	7.006	1258.32	13175898762.19
ITI44	Latina	15.84	0.752	132.34	1385700040.19
ITI45	Frosinone	24.46	0.889	169.15	1771164044.53
LT011	Vilniaus apskritis	0.00	0.000	159.34	2953598591.86
LT021	Alytaus apskritis	0.00	0.000	33.94	629144267.65
LT022	Kauno apskritis	0.00	0.000	133.50	2474671897.64
LT023	Klaipėdos apskritis	0.02	0.002	66.15	1226203336.58
LT024	Marijampolės apskritis	0.00	0.000	36.02	667701726.27
LT025	Panevėžio apskritis	0.01	0.001	57.19	1060171229.11
LT026	Šiaulių apskritis	0.01	0.001	71.06	1317199134.44

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL*** $_{eq}$ **(10**^{6} **€)**	***AALL*** **(no. fatalities)**	***AAEL*** $_{en}$ **(10**^{6} **€)**	***AAEC*** **(kWh)**
LT027	Tauragės apskritis	0.00	0.000	22.74	421504473.82
LT028	Telšių apskritis	0.01	0.001	33.16	614701717.36
LT029	Utenos apskritis	0.00	0.000	37.36	692527308.55
LU000	Luxembourg	0.38	0.007	328.29	4660064467.25
LV003	Kurzeme	0.02	0.003	72.41	1250056530.17
LV005	Latgale	0.02	0.002	92.44	1595833368.45
LV006	Rīga	0.05	0.007	168.36	2906487276.01
LV007	Pierīga	0.03	0.004	83.92	1448654567.61
LV008	Vidzeme	0.01	0.001	65.02	1122385628.66
LV009	Zemgale	0.02	0.003	70.39	1215137592.52
MT001	Malta	0.93	0.043	18.60	153477187.48
MT002	Gozo and Comino/Għawdex u Kemmuna	0.07	0.003	0.96	7931637.77
NL111	Oost-Groningen	0.00	0.000	89.23	868334174.70
NL112	Delfzijl en omgeving	0.00	0.000	29.55	287547113.98
NL113	Overig Groningen	0.01	0.000	207.03	2014804989.06
NL124	Noord-Friesland	0.00	0.000	181.73	1768514719.82
NL125	Zuidwest-Friesland	0.00	0.000	74.09	720980304.50
NL126	Zuidoost-Friesland	0.00	0.000	103.27	1004989899.10
NL131	Noord-Drenthe	0.00	0.000	101.33	986141189.15
NL132	Zuidoost-Drenthe	0.00	0.000	90.79	883589403.02
NL133	Zuidwest-Drenthe	0.00	0.000	68.89	670396504.91
NL211	Noord-Overijssel	0.04	0.001	176.53	1717909485.01
NL212	Zuidwest-Overijssel	0.05	0.001	79.24	771095588.66
NL213	Twente	0.12	0.003	320.08	3114977754.76
NL221	Veluwe	0.31	0.010	312.08	3037106594.26
NL224	Zuidwest-Gelderland	0.73	0.033	115.69	1125819152.76
NL225	Achterhoek	0.39	0.014	206.95	2013997432.31
NL226	Arnhem/Nijmegen	1.00	0.033	361.98	3522695826.28
NL230	Flevoland	0.09	0.003	164.48	1600684765.62
NL310	Utrecht	1.15	0.032	569.74	5544544041.70
NL321	Kop van Noord-Holland	0.01	0.000	183.35	1784294786.31
NL323	IJmond	0.02	0.001	93.30	907964014.80
NL324	Agglomeratie Haarlem	0.05	0.002	114.45	1113813119.16
NL325	Zaanstreek	0.03	0.001	78.80	766877124.41
NL327	Het Gooi en Vechtstreek	0.13	0.004	128.38	1249386266.72
NL328	Alkmaar en omgeving	0.03	0.001	115.26	1121632738.60
NL329	Groot-Amsterdam	0.41	0.008	558.74	5437480130.81
NL332	Agglomeratie 's-Gravenhage	0.26	0.005	337.36	3283121652.58
NL333	Delft en Westland	0.12	0.003	94.67	921280910.38
NL337	Agglomeratie Leiden en Bollenstreek	0.14	0.004	187.18	1821591225.35
NL33A	Zuidoost-Zuid-Holland	0.99	0.038	183.95	1790148847.30
NL33B	Oost-Zuid-Holland	0.27	0.009	146.43	1424990561.56
NL33C	Groot-Rijnmond	1.05	0.023	572.39	5570338562.21
NL341	Zeeuwsch-Vlaanderen	0.25	0.008	53.24	518097690.89
NL342	Overig Zeeland	0.33	0.011	124.81	1214578133.41
NL411	West-Noord-Brabant	1.37	0.045	295.76	2878283815.97
NL412	Midden-Noord-Brabant	1.73	0.073	221.98	2160296808.27
NL413	Noordoost-Noord-Brabant	2.77	0.119	308.82	3005375419.04
NL414	Zuidoost-Noord-Brabant	4.48	0.175	362.04	3523280284.12
NL421	Noord-Limburg	1.31	0.049	133.56	1299752803.41
NL422	Midden-Limburg	1.95	0.077	117.38	1142324054.82
NL423	Zuid-Limburg	5.99	0.201	307.03	2987894503.14
PL213	Miasto Kraków	0.04	0.006	98.65	2078659306.29
PL214	Krakowski	0.05	0.004	145.31	3061831702.42
PL217	Tarnowski	0.03	0.003	83.94	1768765896.87
PL218	Nowosądecki	0.10	0.011	101.98	2148798412.06
PL219	Nowotarski	0.11	0.016	61.30	1291735877.31
PL21A	Oświęcimski	0.05	0.006	93.44	1968876930.84
PL224	Częstochowski	0.01	0.001	98.26	2070392087.64
PL225	Bielski	0.08	0.010	103.21	2174866010.79
PL227	Rybnicki	0.09	0.011	109.90	2315734733.59
PL228	Bytomski	0.02	0.001	101.51	2138974869.32
PL229	Gliwicki	0.04	0.008	83.16	1752249140.96
PL22A	Katowicki	0.04	0.005	122.80	2587552725.17
PL22B	Sosnowiecki	0.04	0.003	180.64	3806260145.49
PL22C	Tyski	0.05	0.007	71.39	1504305836.16

NUTS-3		Seismic risk		Energy performance	
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PL411	Pilski	0.01	0.001	76.62	1614555225.71
PL414	Koniński	0.00	0.000	116.53	2455467039.27
PL415	Miasto Poznań	0.00	0.000	76.11	1603802707.02
PL416	Kaliski	0.00	0.000	114.38	2410170483.36
PL417	Leszczyński	0.00	0.000	95.50	2012224183.94
PL418	Poznański	0.01	0.001	178.56	3762491682.74
PL424	Miasto Szczecin	0.00	0.000	66.02	1391220490.31
PL426	Koszaliński	0.01	0.001	88.78	1870788854.45
PL427	Szczecinecko-pyrzycki	0.01	0.002	85.05	1792044099.97
PL428	Szczeciński	0.01	0.001	86.94	1832028496.55
PL431	Gorzowski	0.00	0.000	79.75	1680380205.45
PL432	Zielonogórski	0.00	0.000	124.00	2612829670.38
PL514	Miasto Wrocław	0.02	0.002	109.58	2308971164.72
PL515	Jeleniogórski	0.02	0.002	116.30	2450590200.67
PL516	Legnicko-głogowski	0.00	0.000	79.50	1675143917.62
PL517	Wałbrzyski	0.05	0.005	142.98	3012726368.34
PL518	Wrocławski	0.01	0.002	76.24	1606447126.68
PL523	Nyski	0.04	0.007	69.29	1459969362.04
PL524	Opolski	0.04	0.005	130.93	2758907712.01
PL613	Bydgosko-toruński	0.01	0.002	153.76	3239924006.32
PL616	Grudziądzki	0.00	0.000	61.43	1294313164.35
PL617	Inowrocławski	0.01	0.001	65.81	1386735026.39
PL618	Świecki	0.00	0.001	52.29	1101802053.93
PL619	Włocławski	0.01	0.001	63.29	1333530055.74
PL621	Elbląski	0.00	0.000	110.58	2330170261.02
PL622	Olsztyński	0.01	0.001	136.11	2868109520.56
PL623	Ełcki	0.00	0.000	55.56	1170643720.68
PL633	Trójmiejski	0.01	0.001	132.72	2796575860.37
PL634	Gdański	0.01	0.001	81.58	1719094709.81
PL636	Słupski	0.01	0.000	73.15	1541459388.43
PL637	Chojnicki	0.00	0.000	43.52	916996835.07
PL638	Starogardzki	0.00	0.000	79.49	1674997192.39
PL711	Miasto Łódź	0.00	0.001	105.21	2216836731.48
PL712	Łódzki	0.01	0.001	106.81	2250587973.87
PL713	Piotrkowski	0.01	0.001	113.13	2383791443.94
PL714	Sieradzki	0.00	0.001	81.98	1727458440.90
PL715	Skierniewicki	0.01	0.001	70.16	1478398004.34
PL721	Kielecki	0.01	0.001	171.13	3605967115.44
PL722	Sandomiersko-jędrzejowski	0.01	0.001	97.25	2049157689.02
PL811	Bialski	0.00	0.000	65.26	1375187098.07
PL812	Chełmsko-zamojski	0.01	0.001	119.70	2522250560.76
PL814	Lubelski	0.01	0.002	126.60	2667632040.55
PL815	Puławski	0.01	0.001	91.72	1932594385.92
PL821	Krośnieński	0.05	0.004	94.67	1994867374.06
PL822	Przemyski	0.01	0.001	77.76	1638530734.78
PL823	Rzeszowski	0.01	0.001	122.12	2573173776.86
PL824	Tarnobrzeski	0.01	0.001	89.15	1878583329.52
PL841	Białostocki	0.01	0.000	116.43	2453411724.34
PL842	Łomżyński	0.00	0.000	81.37	1714536355.20
PL843	Suwalski	0.00	0.000	62.13	1309136034.19
PL911	Miasto Warszawa	0.02	0.005	262.39	5528966003.35
PL912	Warszawski wschodni	0.00	0.001	91.55	1929099754.83
PL913	Warszawski zachodni	0.01	0.001	88.87	1872625144.90
PL921	Radomski	0.01	0.002	140.98	2970558591.27
PL922	Ciechanowski	0.00	0.000	61.83	1302828521.81
PL923	Płocki	0.01	0.001	71.46	1505708934.90
PL924	Ostrołęcki	0.00	0.000	72.68	1531572437.39
PL925	Siedlecki	0.00	0.001	89.15	1878591010.81
PL926	Żyrardowski	0.00	0.001	36.13	761379197.06
PT111	Alto Minho	0.31	0.016	31.31	244999128.47
PT112	Cávado	0.38	0.022	41.55	325087503.97
PT119	Ave	0.37	0.022	54.84	429102016.61
PT11A	Área Metropolitana do Porto	3.99	0.248	194.20	1519529116.54
PT11B	Alto Tâmega	0.33	0.019	22.79	178304584.82
PT11C	Tâmega e Sousa	0.59	0.040	50.69	396618462.14
PT11D	Douro	0.65	0.040	32.52	254481166.97

NUTS-3		Seismic risk		Energy performance	
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PT11E	Terras de Trás-os-Montes	0.28	0.014	22.56	176515606.07
PT150	Algarve	10.41	0.385	32.46	253972310.93
PT16B	Oeste	2.73	0.149	28.66	224208064.13
PT16D	Região de Aveiro	1.42	0.089	40.26	314972360.97
PT16E	Região de Coimbra	2.14	0.124	49.06	383824600.36
PT16F	Região de Leiria	1.34	0.080	29.49	230773682.63
PT16G	Viseu Dão Lafões	0.92	0.052	37.32	291972955.95
PT16H	Beira Baixa	0.25	0.011	12.65	99016065.90
PT16I	Médio Tejo	1.93	0.109	24.85	194462292.02
PT16J	Beiras e Serra da Estrela	0.70	0.033	37.65	294570956.56
PT170	Área Metropolitana de Lisboa	32.94	2.192	192.99	1509988783.21
PT181	Alentejo Litoral	0.90	0.042	9.13	71433065.00
PT184	Baixo Alentejo	0.54	0.032	14.78	115611761.21
PT185	Lezíria do Tejo	3.73	0.263	21.08	164942611.69
PT186	Alto Alentejo	0.36	0.018	16.10	125987332.01
PT187	Alentejo Central	0.64	0.039	21.22	166023864.29
RO111	Bihor	0.21	0.039	123.31	1591191963.61
RO112	Bistrița-Năsăud	0.19	0.024	77.98	1006212430.55
RO113	Cluj	0.59	0.107	151.04	1948934866.34
RO114	Maramureş	0.09	0.015	129.14	1666410064.34
RO115	Satu Mare	0.32	0.054	82.13	1059744092.68
RO116	Sălaj	0.05	0.010	55.94	721888348.99
RO121	Alba	0.45	0.057	91.56	1181489061.65
RO122	Braşov	17.19	4.422	122.71	1583337525.10
RO123	Covasna	5.27	1.170	56.56	729797513.69
RO124	Harghita	2.80	0.543	97.67	1260264480.55
RO125	Mureş	1.92	0.288	144.20	1860641783.44
RO126	Sibiu	2.10	0.398	94.96	1225340592.62
RO211	Bacău	14.46	3.520	142.79	1842554398.60
RO212	Botoşani	0.65	0.139	98.55	1271603979.28
RO213	Iaşi	3.66	0.789	161.92	2089362271.81
RO214	Neamț	5.27	1.032	128.51	1658218367.77
RO215	Suceava	0.93	0.149	218.31	2816992971.97
RO216	Vaslui	3.14	0.903	88.76	1145300661.52
RO221	Brăila	6.60	1.686	54.30	700697797.16
RO222	Buzău	20.11	3.981	108.71	1402776301.98
RO223	Constanța	4.52	0.746	98.90	1276142449.20
RO224	Galați	10.38	3.133	88.53	1142317902.73
RO225	Tulcea	1.55	0.283	40.35	520694685.05
RO226	Vrancea	14.19	2.626	86.59	1117260399.99
RO311	Argeş	8.65	1.712	148.18	1911987941.70
RO312	Călăraşi	4.16	0.875	57.31	739505484.10
RO313	Dâmbovița	8.58	1.670	115.32	1488046787.44
RO314	Giurgiu	3.46	0.660	57.25	738758362.82
RO315	Ialomița	5.93	1.313	52.93	682987612.36
RO316	Prahova	25.32	5.448	182.26	2351862673.30
RO317	Teleorman	2.31	0.542	81.49	1051571481.22
RO321	Bucureşti	107.11	37.137	283.84	3662554652.27
RO322	Ilfov	13.27	1.648	94.28	1216603439.76
RO411	Dolj	2.06	0.336	123.83	1597810067.90
RO412	Gorj	0.56	0.088	75.60	975501037.97
RO413	Mehedinți	0.11	0.015	54.70	705772489.06
RO414	Olt	2.95	0.518	89.20	1150989336.76
RO415	Vâlcea	1.67	0.291	96.87	1249944322.40
RO421	Arad	0.34	0.100	83.18	1073275337.42
RO422	Caraş-Severin	0.13	0.028	54.93	708797185.84
RO423	Hunedoara	0.36	0.075	83.24	1074049127.45
RO424	Timiş	1.73	0.401	123.62	1595155136.07
SE110	Stockholms län	0.13	0.004	1204.51	9571843097.77
SE121	Uppsala län	0.04	0.002	220.30	1750655023.92
SE122	Södermanlands län	0.02	0.001	168.56	1339508297.04
SE123	Östergötlands län	0.02	0.001	278.29	2211473411.81
SE124	Örebro län	0.04	0.001	201.61	1602120124.58
SE125	Västmanlands län	0.02	0.001	180.24	1432324387.36
SE211	Jönköpings län	0.02	0.001	235.65	1872618628.06
SE212	Kronobergs län	0.01	0.000	118.39	940767636.76

NUTS-3		Seismic risk		Energy performance	
Code	**Name**	***AAEL*** $_{eq}$ **(10^6 €)**	***AALL*** **(no. fatalities)**	***AAEL*** $_{en}$ **(10^6 €)**	***AAEC*** **(kWh)**
SE213	Kalmar län	0.02	0.001	134.76	1070856450.30
SE214	Gotlands län	0.00	0.000	28.50	226504112.08
SE221	Blekinge län	0.01	0.000	82.64	656750233.24
SE224	Skåne län	0.15	0.006	678.29	5390173139.58
SE231	Hallands län	0.02	0.001	161.22	1281141121.47
SE232	Västra Götalands län	0.14	0.004	996.59	7919585095.56
SE311	Värmlands län	0.03	0.001	207.08	1645625760.17
SE312	Dalarnas län	0.03	0.001	225.64	1793126298.87
SE313	Gävleborgs län	0.06	0.002	228.82	1818326918.76
SE321	Västernorrlands län	0.04	0.001	215.58	1713153370.76
SE322	Jämtlands län	0.00	0.000	106.60	847121892.86
SE331	Västerbottens län	0.06	0.002	254.91	2025712647.42
SE332	Norrbottens län	0.04	0.001	291.45	2316046013.78
SI031	Pomurska	0.48	0.048	55.58	687966253.21
SI032	Podravska	1.70	0.148	122.32	1514135970.46
SI033	Koroška	0.43	0.058	29.38	363625263.03
SI034	Savinjska	2.80	0.370	97.94	1212315397.28
SI035	Zasavska	0.46	0.042	19.13	236794586.36
SI036	Posavska	1.40	0.124	31.55	390586239.40
SI037	Jugovzhodna Slovenija	1.72	0.159	59.32	734231546.55
SI038	Primorsko-notranjska	0.37	0.041	21.18	262178365.41
SI041	Osrednjeslovenska	9.17	0.946	146.26	1810411192.96
SI042	Gorenjska	2.20	0.263	79.59	985231198.28
SI043	Goriška	1.20	0.131	48.41	599284974.42
SI044	Obalno-kraška	0.47	0.039	27.81	344280723.17
SK010	Bratislavský kraj	3.08	0.175	189.97	2461367002.43
SK021	Trnavský kraj	1.13	0.086	116.83	1513797475.70
SK022	Trenčiansky kraj	0.42	0.035	87.81	1137674788.90
SK023	Nitriansky kraj	1.04	0.133	64.45	835123018.39
SK031	Žilinský kraj	0.75	0.035	241.44	3128292389.17
SK032	Banskobystrický kraj	0.56	0.022	225.36	2919987350.86
SK041	Prešovský kraj	0.50	0.028	216.47	2804729791.85
SK042	Košický kraj	0.56	0.032	186.71	2419115014.05

([1]) NUTS 2021 classification.
([2]) Source: GADM seismic risk data obtained from ESRM20 (Crowley et al., 2021a, available from EFEHR); JRC mapping to NUTS.

Table B. 2. Residential buildings: top 100 priority regions based on $I_{eq,2}$.

No	NUTS-3		$\overline{AAEL}_{eq/bldg}$	$\overline{AAELR}_{eq}$	$\overline{AALLR}$	$I_{eq,1}$	$I_{eq,2}$
	Code	**Name**					
1	RO321	Bucureşti	0.861	1.000	1.000	1.000	0.954
2	ITH55	Bologna	1.000	0.407	0.244	0.325	0.550
3	ITH54	Modena	0.854	0.472	0.290	0.381	0.539
4	RO222	Buzău	0.137	0.829	0.501	0.665	0.489
5	ITH53	Reggio nell'Emilia	0.686	0.432	0.254	0.343	0.457
6	ITH57	Ravenna	0.636	0.455	0.275	0.365	0.455
7	ITH56	Ferrara	0.600	0.444	0.289	0.366	0.444
8	RO226	Vrancea	0.127	0.763	0.438	0.600	0.443
9	ITI21	Perugia	0.580	0.441	0.284	0.363	0.435
10	RO122	Braşov	0.185	0.656	0.457	0.556	0.432
11	EL632	Achaia	0.313	0.557	0.379	0.468	0.417
12	ITH52	Parma	0.624	0.379	0.234	0.307	0.413
13	ITF65	Reggio di Calabria	0.437	0.460	0.291	0.376	0.396
14	ITH58	Forlì-Cesena	0.570	0.380	0.229	0.304	0.393
15	ITF63	Catanzaro	0.453	0.448	0.263	0.356	0.388
16	RO316	Prahova	0.122	0.616	0.405	0.510	0.381
17	ITF11	L'Aquila	0.375	0.435	0.281	0.358	0.364
18	ITG17	Catania	0.484	0.366	0.223	0.294	0.358
19	EL304	Notios Tomeas Athinon	0.542	0.281	0.228	0.255	0.350
20	ITF61	Cosenza	0.398	0.384	0.222	0.303	0.335
21	CY000	Kýpros	0.351	0.368	0.259	0.313	0.326
22	EL621	Zakynthos	0.188	0.515	0.253	0.384	0.319
23	RO123	Covasna	0.096	0.533	0.316	0.424	0.315
24	RO224	Galați	0.089	0.517	0.331	0.424	0.313
25	EL624	Lefkada	0.189	0.504	0.220	0.362	0.304
26	RO221	Brăila	0.087	0.525	0.298	0.411	0.303
27	ITH59	Rimini	0.420	0.288	0.192	0.240	0.300
28	ITF64	Vibo Valentia	0.296	0.382	0.223	0.302	0.300
29	EL633	Ileia	0.171	0.481	0.242	0.361	0.298
30	EL431	Irakleio	0.224	0.423	0.244	0.333	0.297
31	RO211	Bacău	0.085	0.481	0.324	0.403	0.297
32	EL653	Lakonia, Messinia	0.168	0.459	0.250	0.355	0.292
33	EL652	Korinthia	0.179	0.441	0.245	0.343	0.288
34	ITF33	Napoli	0.493	0.215	0.146	0.181	0.285
35	EL303	Kentrikos Tomeas Athinon	0.508	0.177	0.168	0.172	0.284
36	EL645	Fokida	0.156	0.483	0.209	0.346	0.283
37	RO322	Ilfov	0.118	0.487	0.240	0.363	0.282
38	ITF46	Foggia	0.397	0.280	0.157	0.218	0.278
39	EL307	Peiraias, Nisoi	0.311	0.299	0.216	0.258	0.275
40	ITF21	Isernia	0.287	0.329	0.205	0.267	0.274
41	EL623	Ithaki, Kefallinia	0.158	0.438	0.225	0.331	0.274
42	RO315	Ialomița	0.072	0.477	0.271	0.374	0.273
43	EL541	Arta, Preveza	0.155	0.423	0.217	0.320	0.265
44	ITH34	Treviso	0.365	0.264	0.163	0.214	0.264
45	ITI43	Roma	0.536	0.155	0.097	0.126	0.263
46	ITG13	Messina	0.301	0.299	0.176	0.238	0.259
47	ITI14	Firenze	0.448	0.211	0.116	0.163	0.258
48	ITF62	Crotone	0.287	0.303	0.184	0.244	0.258
49	ITC4B	Mantova	0.358	0.263	0.141	0.202	0.254
50	ITH51	Piacenza	0.337	0.256	0.163	0.209	0.252
51	EL411	Lesvos, Limnos	0.142	0.427	0.186	0.306	0.251
52	EL622	Kerkyra	0.136	0.386	0.219	0.303	0.247
53	EL434	Chania	0.171	0.363	0.204	0.284	0.246
54	EL302	Dytikos Tomeas Athinon	0.283	0.287	0.168	0.228	0.246
55	EL412	Ikaria, Samos	0.137	0.398	0.197	0.297	0.244
56	EL631	Aitoloakarnania	0.153	0.375	0.203	0.289	0.243
57	EL612	Larisa	0.192	0.304	0.212	0.258	0.236
58	ITI15	Prato	0.395	0.202	0.110	0.156	0.236

No	NUTS-3		$\overline{AAEL}_{eq/bldg}$	$\overline{AAELR}_{eq}$	$\overline{AALLR}$	$I_{eq,1}$	$I_{eq,2}$
	Code	**Name**					
59	ITC49	Lodi	0.364	0.212	0.132	0.172	0.236
60	ITH41	Pordenone	0.296	0.260	0.151	0.205	0.235
61	ITH42	Udine	0.297	0.257	0.150	0.203	0.235
62	ITC4A	Cremona	0.343	0.232	0.125	0.178	0.233
63	ITG19	Siracusa	0.283	0.262	0.147	0.205	0.231
64	ITH32	Vicenza	0.318	0.225	0.146	0.186	0.230
65	ITF32	Benevento	0.253	0.259	0.160	0.210	0.224
66	ITC47	Brescia	0.320	0.204	0.129	0.167	0.218
67	ITI32	Ancona	0.332	0.199	0.115	0.157	0.216
68	EL433	Rethymni	0.126	0.346	0.169	0.258	0.214
69	EL644	Fthiotida	0.135	0.312	0.175	0.244	0.208
70	ITC46	Bergamo	0.313	0.185	0.123	0.154	0.207
71	EL543	Ioannina	0.155	0.306	0.150	0.228	0.204
72	ITI18	Arezzo	0.276	0.209	0.118	0.164	0.201
73	EL432	Lasithi	0.118	0.315	0.163	0.239	0.199
74	ITI31	Pesaro e Urbino	0.275	0.202	0.118	0.160	0.198
75	BG325	Silistra	0.086	0.355	0.152	0.254	0.198
76	ITF34	Avellino	0.226	0.229	0.137	0.183	0.197
77	BG411	Sofia (stolitsa)	0.171	0.244	0.150	0.197	0.188
78	ITI33	Macerata	0.263	0.194	0.105	0.149	0.187
79	RO313	Dâmbovița	0.054	0.324	0.183	0.253	0.187
80	EL413	Chios	0.112	0.306	0.139	0.223	0.186
81	ITI42	Rieti	0.193	0.232	0.130	0.181	0.185
82	ITF51	Potenza	0.197	0.221	0.127	0.174	0.182
83	EL651	Argolida, Arkadia	0.107	0.283	0.148	0.215	0.179
84	BG323	Ruse	0.093	0.301	0.140	0.220	0.178
85	ITI22	Terni	0.254	0.183	0.097	0.140	0.178
86	EL421	Kalymnos, Karpathos, Kasos, Kos, Rodos	0.128	0.258	0.144	0.201	0.177
87	EL522	Thessaloniki	0.219	0.179	0.129	0.154	0.176
88	ITH36	Padova	0.258	0.169	0.092	0.130	0.173
89	RO312	Călărași	0.043	0.306	0.162	0.234	0.170
90	ITH31	Verona	0.262	0.161	0.088	0.124	0.170
91	ITF13	Pescara	0.255	0.165	0.085	0.125	0.169
92	ITC4C	Milano	0.369	0.085	0.045	0.065	0.166
93	ITI34	Ascoli Piceno	0.254	0.154	0.087	0.121	0.165
94	ITI13	Pistoia	0.226	0.172	0.090	0.131	0.163
95	HR050	Grad Zagreb	0.099	0.213	0.171	0.192	0.161
96	ITG18	Ragusa	0.173	0.196	0.112	0.154	0.160
97	AT130	Wien	0.324	0.062	0.093	0.077	0.160
98	ITH43	Gorizia	0.224	0.163	0.092	0.127	0.159
99	RO311	Argeş	0.051	0.265	0.159	0.212	0.158
100	HR037	Dubrovačko-neretvanska županija	0.060	0.203	0.211	0.207	0.158

Table B. 3. Commercial buildings: top 100 priority regions based on $I_{eq,2}$.

No	NUTS-3		$\overline{AAEL}_{eq/bldg}$	$\overline{AAELR}_{eq}$	$\overline{AALLR}$	$I_{eq,1}$	$I_{eq,2}$
	Code	Name					
1	RO222	Buzău	0.368	1.000	1.000	1.000	0.789
2	ITH56	Ferrara	1.000	0.519	0.760	0.639	0.760
3	ITF65	Reggio di Calabria	0.998	0.517	0.750	0.633	0.755
4	ITH57	Ravenna	0.991	0.511	0.708	0.609	0.737
5	ITF11	L'Aquila	0.941	0.497	0.754	0.625	0.731
6	ITF63	Catanzaro	0.948	0.493	0.645	0.569	0.695
7	ITI21	Perugia	0.919	0.475	0.692	0.583	0.695
8	RO123	Covasna	0.343	0.856	0.863	0.860	0.688
9	RO316	Prahova	0.330	0.860	0.863	0.862	0.684
10	ITH54	Modena	0.885	0.471	0.671	0.571	0.676
11	ITG17	Catania	0.913	0.475	0.631	0.553	0.673
12	RO322	Ilfov	0.314	0.841	0.832	0.837	0.662
13	RO226	Vrancea	0.305	0.842	0.830	0.836	0.659
14	RO321	Bucureşti	0.305	0.807	0.807	0.807	0.639
15	RO221	Brăila	0.291	0.806	0.778	0.792	0.625
16	RO313	Dâmboviţa	0.306	0.776	0.771	0.773	0.618
17	ITF64	Vibo Valentia	0.838	0.419	0.574	0.496	0.610
18	EL623	Ithaki, Kefallinia	0.714	0.534	0.566	0.550	0.605
19	ITH52	Parma	0.782	0.420	0.583	0.501	0.595
20	ITH53	Reggio nell'Emilia	0.764	0.401	0.545	0.473	0.570
21	ITH55	Bologna	0.730	0.401	0.556	0.479	0.562
22	ITH58	Forlì-Cesena	0.743	0.380	0.518	0.449	0.547
23	ITF61	Cosenza	0.734	0.382	0.507	0.444	0.541
24	ITF21	Isernia	0.703	0.362	0.523	0.443	0.529
25	EL624	Lefkada	0.617	0.469	0.497	0.483	0.528
26	EL621	Zakynthos	0.541	0.512	0.513	0.513	0.522
27	RO315	Ialomiţa	0.229	0.650	0.625	0.637	0.501
28	ITH59	Rimini	0.645	0.325	0.482	0.403	0.484
29	RO211	Bacău	0.225	0.607	0.597	0.602	0.476
30	ITI42	Rieti	0.630	0.330	0.455	0.393	0.472
31	RO122	Braşov	0.246	0.591	0.565	0.578	0.467
32	ITF32	Benevento	0.619	0.323	0.453	0.388	0.465
33	EL632	Achaia	0.355	0.520	0.519	0.520	0.465
34	EL633	Ileia	0.363	0.516	0.503	0.510	0.461
35	RO224	Galaţi	0.214	0.586	0.564	0.575	0.455
36	HR037	Dubrovačko-neretvanska županija	0.526	0.238	0.594	0.416	0.453
37	ITF46	Foggia	0.626	0.321	0.410	0.365	0.452
38	ITH34	Treviso	0.589	0.312	0.441	0.376	0.447
39	EL541	Arta, Preveza	0.405	0.485	0.432	0.458	0.440
40	ITH41	Pordenone	0.583	0.305	0.409	0.357	0.432
41	ITF62	Crotone	0.575	0.298	0.390	0.344	0.421
42	ITG19	Siracusa	0.580	0.299	0.359	0.329	0.413
43	ITG13	Messina	0.566	0.291	0.375	0.333	0.411
44	EL652	Korinthia	0.327	0.438	0.445	0.441	0.403
45	RO312	Călăraşi	0.186	0.521	0.496	0.509	0.401
46	ITH42	Udine	0.542	0.282	0.377	0.329	0.400
47	ITC4B	Mantova	0.540	0.282	0.368	0.325	0.397
48	ITH51	Piacenza	0.515	0.269	0.373	0.321	0.386
49	ITF51	Potenza	0.494	0.254	0.338	0.296	0.362
50	ITF34	Avellino	0.488	0.254	0.343	0.299	0.362
51	ITH32	Vicenza	0.477	0.252	0.353	0.302	0.361
52	CY000	Kýpros	0.527	0.296	0.255	0.275	0.359
53	EL653	Lakonia, Messinia	0.298	0.354	0.416	0.385	0.356
54	EL434	Chania	0.368	0.345	0.353	0.349	0.355
55	ITC47	Brescia	0.467	0.244	0.345	0.295	0.352
56	ITC49	Lodi	0.450	0.246	0.354	0.300	0.350
57	ITC4A	Cremona	0.472	0.251	0.324	0.287	0.349
58	EL412	Ikaria, Samos	0.333	0.336	0.375	0.356	0.348

No	NUTS-3		$\overline{AAEL}_{eq/bldg}$	$\overline{AAELR}_{eq}$	$\overline{AALLR}$	$I_{eq,1}$	$I_{eq,2}$
	Code	Name					
59	ITG18	Ragusa	0.488	0.247	0.307	0.277	0.347
60	HR050	Grad Zagreb	0.282	0.257	0.491	0.374	0.343
61	EL622	Kerkyra	0.310	0.327	0.393	0.360	0.343
62	EL645	Fokida	0.282	0.347	0.388	0.368	0.339
63	BG325	Silistra	0.380	0.360	0.277	0.319	0.339
64	EL433	Rethymni	0.349	0.327	0.318	0.323	0.332
65	RO314	Giurgiu	0.149	0.435	0.409	0.422	0.331
66	ITI22	Terni	0.442	0.229	0.292	0.261	0.321
67	ITI31	Pesaro e Urbino	0.431	0.225	0.303	0.264	0.320
68	ITF33	Napoli	0.395	0.208	0.321	0.264	0.308
69	ITI45	Frosinone	0.415	0.213	0.284	0.248	0.304
70	ITI14	Firenze	0.406	0.218	0.285	0.252	0.303
71	ITC46	Bergamo	0.387	0.207	0.309	0.258	0.301
72	BG411	Sofia (stolitsa)	0.339	0.265	0.292	0.278	0.299
73	RO311	Argeş	0.141	0.382	0.359	0.371	0.294
74	EL411	Lesvos, Limnos	0.265	0.308	0.310	0.309	0.294
75	ITI32	Ancona	0.392	0.207	0.277	0.242	0.292
76	EL431	Irakleio	0.243	0.290	0.339	0.314	0.291
77	ITI15	Prato	0.400	0.209	0.261	0.235	0.290
78	HR065	Zagrebačka županija	0.238	0.217	0.398	0.307	0.284
79	ITI18	Arezzo	0.384	0.199	0.269	0.234	0.284
80	EL631	Aitoloakarnania	0.196	0.314	0.340	0.327	0.283
81	EL432	Lasithi	0.250	0.290	0.301	0.295	0.280
82	EL421	Kalymnos, Karpathos, Kasos, Kos, Rodos	0.289	0.273	0.272	0.272	0.278
83	HR062	Varaždinska županija	0.250	0.197	0.385	0.291	0.277
84	ITF13	Pescara	0.378	0.196	0.235	0.216	0.270
85	ITH36	Padova	0.358	0.191	0.252	0.222	0.267
86	BG323	Ruse	0.309	0.276	0.209	0.242	0.265
87	ITI12	Lucca	0.359	0.186	0.249	0.217	0.265
88	ITF22	Campobasso	0.365	0.188	0.236	0.212	0.263
89	ES620	Murcia	0.346	0.206	0.231	0.218	0.261
90	BG421	Plovdiv	0.271	0.245	0.264	0.255	0.260
91	ITI33	Macerata	0.351	0.180	0.227	0.204	0.253
92	ITH43	Gorizia	0.348	0.182	0.227	0.205	0.252
93	EL644	Fthiotida	0.189	0.269	0.293	0.281	0.250
94	RO214	Neamț	0.126	0.324	0.293	0.309	0.248
95	ITH37	Rovigo	0.342	0.176	0.210	0.193	0.243
96	ITF31	Caserta	0.336	0.174	0.218	0.196	0.242
97	BG324	Razgrad	0.270	0.245	0.182	0.213	0.232
98	ITI17	Pisa	0.312	0.167	0.214	0.190	0.231
99	ITF12	Teramo	0.316	0.161	0.203	0.182	0.227
100	ITI44	Latina	0.308	0.159	0.211	0.185	0.226

Table B. 4. Residential buildings: top 100 priority regions based on I_{en}.

No	NUTS-3		$\overline{AAEC}_{bldg/HDD}$	$\overline{AAEL}_{en/bldg}$	$\overline{AAELR}_{en}$	I_{en}
	Code	**Name**				
1	FR101	Paris	1.000	1.000	0.089	0.696
2	ITC4C	Milano	0.679	0.587	0.168	0.478
3	ITH10	Bolzano-Bozen	0.275	0.533	0.518	0.442
4	FR105	Hauts-de-Seine	0.536	0.564	0.139	0.413
5	ITC11	Torino	0.379	0.481	0.293	0.384
6	RO215	Suceava	0.057	0.095	1.000	0.384
7	ITC4D	Monza e della Brianza	0.417	0.372	0.205	0.331
8	ITH55	Bologna	0.412	0.363	0.188	0.321
9	SE332	Norrbottens län	0.101	0.456	0.389	0.316
10	ITC33	Genova	0.403	0.357	0.163	0.308
11	FRL03	Alpes-Maritimes	0.345	0.419	0.153	0.306
12	FR106	Seine-Saint-Denis	0.360	0.390	0.161	0.304
13	RO212	Botoşani	0.043	0.060	0.802	0.302
14	FI1D7	Lappi	0.123	0.370	0.411	0.301
15	DE803	Rostock, Kreisfreie Stadt	0.300	0.452	0.141	0.298
16	FR107	Val-de-Marne	0.372	0.377	0.143	0.297
17	RO124	Harghita	0.052	0.091	0.749	0.297
18	RO216	Vaslui	0.038	0.052	0.801	0.297
19	DE300	Berlin	0.310	0.456	0.121	0.295
20	ITC47	Brescia	0.280	0.326	0.276	0.294
21	ITI43	Roma	0.487	0.292	0.100	0.293
22	ITC49	Lodi	0.346	0.295	0.224	0.289
23	DED21	Dresden, Kreisfreie Stadt	0.287	0.450	0.129	0.288
24	SI033	Koroška	0.141	0.173	0.548	0.287
25	ITH44	Trieste	0.365	0.308	0.184	0.286
26	DE271	Augsburg, Kreisfreie Stadt	0.245	0.417	0.177	0.280
27	ITC41	Varese	0.292	0.294	0.251	0.279
28	DE212	München, Kreisfreie Stadt	0.293	0.424	0.118	0.278
29	SE331	Västerbottens län	0.096	0.398	0.336	0.277
30	ITI14	Firenze	0.371	0.287	0.172	0.277
31	ITC46	Bergamo	0.279	0.311	0.240	0.277
32	FI1D8	Kainuu	0.125	0.330	0.368	0.274
33	RO123	Covasna	0.050	0.081	0.691	0.274
34	ITC4A	Cremona	0.308	0.266	0.237	0.270
35	AT130	Wien	0.357	0.373	0.080	0.270
36	FRC24	Territoire de Belfort	0.235	0.322	0.241	0.266
37	ITH36	Padova	0.312	0.259	0.224	0.265
38	CZ041	Karlovarský kraj	0.150	0.193	0.453	0.265
39	SI042	Gorenjska	0.136	0.166	0.491	0.264
40	DED41	Chemnitz, Kreisfreie Stadt	0.245	0.405	0.142	0.264
41	SI038	Primorsko-notranjska	0.117	0.136	0.539	0.264
42	EL303	Kentrikos Tomeas Athinon	0.476	0.223	0.091	0.263
43	FRK26	Rhône	0.304	0.341	0.144	0.263
44	DE712	Frankfurt am Main, Kreisfreie Stadt	0.282	0.384	0.123	0.263
45	FRC21	Doubs	0.207	0.309	0.270	0.262
46	DED51	Leipzig, Kreisfreie Stadt	0.270	0.395	0.117	0.261
47	ITC4B	Mantova	0.289	0.250	0.243	0.261
48	FI1D9	Pohjois-Pohjanmaa	0.120	0.314	0.346	0.260
49	SI034	Savinjska	0.126	0.145	0.507	0.260
50	DEA11	Düsseldorf, Kreisfreie Stadt	0.284	0.375	0.118	0.259
51	ITH31	Verona	0.300	0.265	0.212	0.259
52	DEF02	Kiel, Kreisfreie Stadt	0.235	0.373	0.167	0.259
53	ITC42	Como	0.249	0.273	0.252	0.258
54	AT333	Osttirol	0.134	0.289	0.347	0.257
55	RO112	Bistriţa-Năsăud	0.051	0.076	0.641	0.256
56	DE254	Nürnberg, Kreisfreie Stadt	0.238	0.372	0.158	0.256
57	RO317	Teleorman	0.036	0.043	0.689	0.256
58	DE731	Kassel, Kreisfreie Stadt	0.233	0.365	0.164	0.254

No	NUTS-3		$\overline{AAEC}_{bldg/HDD}$	$\overline{AAEL}_{en/bldg}$	$\overline{AAELR}_{en}$	$\boldsymbol{I}_{en}$
	Code	**Name**				
59	DE714	Wiesbaden, Kreisfreie Stadt	0.238	0.368	0.156	0.254
60	ITH54	Modena	0.293	0.273	0.195	0.254
61	DEG03	Jena, Kreisfreie Stadt	0.237	0.369	0.155	0.253
62	RO114	Maramureş	0.054	0.076	0.630	0.253
63	RO214	Neamț	0.045	0.069	0.645	0.253
64	DE404	Potsdam, Kreisfreie Stadt	0.250	0.367	0.142	0.253
65	ITH32	Vicenza	0.248	0.262	0.246	0.252
66	DE804	Schwerin, Kreisfreie Stadt	0.241	0.375	0.139	0.252
67	DEE02	Halle (Saale), Kreisfreie Stadt	0.253	0.375	0.127	0.252
68	DE600	Hamburg	0.238	0.371	0.144	0.251
69	DE713	Offenbach am Main, Kreisfreie Stadt	0.263	0.361	0.127	0.251
70	RO122	Braşov	0.081	0.108	0.562	0.250
71	AT334	Tiroler Oberland	0.122	0.285	0.343	0.250
72	DEG01	Erfurt, Kreisfreie Stadt	0.232	0.361	0.155	0.249
73	FI1D5	Keski-Pohjanmaa	0.123	0.297	0.328	0.249
74	DE273	Kempten (Allgäu), Kreisfreie Stadt	0.181	0.325	0.241	0.249
75	FI1D3	Pohjois-Karjala	0.122	0.296	0.327	0.248
76	SE321	Västernorrlands län	0.096	0.353	0.295	0.248
77	RO116	Sălaj	0.047	0.058	0.637	0.247
78	ITH53	Reggio nell'Emilia	0.277	0.255	0.210	0.247
79	FI1D2	Pohjois-Savo	0.123	0.292	0.322	0.246
80	CZ071	Olomoucký kraj	0.145	0.176	0.416	0.246
81	DEG02	Gera, Kreisfreie Stadt	0.228	0.366	0.142	0.245
82	CZ080	Moravskoslezský kraj	0.148	0.178	0.410	0.245
83	FRF31	Meurthe-et-Moselle	0.208	0.280	0.247	0.245
84	DE111	Stuttgart, Stadtkreis	0.270	0.357	0.108	0.245
85	BE336	Bezirk Verviers — Deutschsprachige Gemeinschaft	0.131	0.189	0.413	0.244
86	RO125	Mureş	0.058	0.080	0.595	0.244
87	FRF33	Moselle	0.203	0.279	0.251	0.244
88	ITC43	Lecco	0.239	0.266	0.228	0.244
89	FR103	Yvelines	0.248	0.291	0.192	0.244
90	DEG05	Weimar, Kreisfreie Stadt	0.223	0.350	0.158	0.243
91	SI031	Pomurska	0.121	0.128	0.478	0.242
92	SI043	Goriška	0.118	0.131	0.477	0.242
93	DEG0N	Eisenach, Kreisfreie Stadt	0.217	0.352	0.156	0.242
94	RO321	Bucureşti	0.220	0.195	0.309	0.242
95	DEA32	Gelsenkirchen, Kreisfreie Stadt	0.254	0.346	0.124	0.241
96	CZ063	Kraj Vysočina	0.135	0.171	0.417	0.241
97	DE131	Freiburg im Breisgau, Stadtkreis	0.257	0.343	0.122	0.241
98	BE100	Arr. de Bruxelles-Capitale/Arr. Brussel-Hoofdstad	0.268	0.289	0.164	0.240
99	FR108	Val-d'Oise	0.242	0.284	0.195	0.240
100	ITC15	Novara	0.248	0.243	0.229	0.240

Table B. 5. Residential buildings: top 100 priority regions based on $I_{eq\text{-}en}$.

No	NUTS-3		$\overline{AAELR_{eq}}$	$\overline{AAELR_{en}}$	$I_{eq\text{-}en}$
	Code	Name			
1	RO222	Buzău	0.829	0.537	0.683
2	RO226	Vrancea	0.763	0.559	0.661
3	RO321	Bucureşti	1.000	0.309	0.655
4	RO123	Covasna	0.533	0.691	0.612
5	RO122	Braşov	0.656	0.562	0.609
6	RO316	Prahova	0.616	0.531	0.574
7	RO211	Bacău	0.481	0.571	0.526
8	RO224	Galați	0.517	0.528	0.523
9	RO221	Brăila	0.525	0.517	0.521
10	RO215	Suceava	0.035	1.000	0.517
11	RO216	Vaslui	0.233	0.801	0.517
12	RO315	Ialomița	0.477	0.509	0.493
13	RO124	Harghita	0.177	0.749	0.463
14	RO322	Ilfov	0.487	0.410	0.448
15	RO214	Neamț	0.219	0.645	0.432
16	RO317	Teleorman	0.162	0.689	0.425
17	RO212	Botoşani	0.043	0.802	0.423
18	RO313	Dâmbovița	0.324	0.522	0.423
19	RO312	Călăraşi	0.306	0.504	0.405
20	RO311	Argeş	0.265	0.544	0.405
21	EL632	Achaia	0.557	0.188	0.372
22	RO314	Giurgiu	0.248	0.489	0.368
23	EL645	Fokida	0.483	0.249	0.366
24	RO213	Iaşi	0.109	0.581	0.345
25	EL621	Zakynthos	0.515	0.158	0.336
26	ITH54	Modena	0.472	0.195	0.334
27	RO125	Mureş	0.066	0.595	0.330
28	EL633	Ileia	0.481	0.175	0.328
29	RO112	Bistrița-Năsăud	0.013	0.641	0.327
30	EL541	Arta, Preveza	0.423	0.230	0.327
31	RO126	Sibiu	0.101	0.548	0.324
32	RO225	Tulcea	0.157	0.489	0.323
33	RO116	Sălaj	0.005	0.637	0.321
34	ITH53	Reggio nell'Emilia	0.432	0.210	0.321
35	ITH57	Ravenna	0.455	0.183	0.319
36	RO421	Arad	0.021	0.615	0.318
37	ITI21	Perugia	0.441	0.193	0.317
38	RO114	Maramureş	0.004	0.630	0.317
39	RO414	Olt	0.137	0.493	0.315
40	SI034	Savinjska	0.121	0.507	0.314
41	EL624	Lefkada	0.504	0.124	0.314
42	ITH56	Ferrara	0.444	0.184	0.314
43	SI038	Primorsko-notranjska	0.078	0.539	0.309
44	RO415	Vâlcea	0.078	0.539	0.309
45	EL653	Lakonia, Messinia	0.459	0.157	0.308
46	SI033	Koroška	0.067	0.548	0.307
47	RO422	Caraş-Severin	0.011	0.594	0.303
48	SI042	Gorenjska	0.113	0.491	0.302
49	EL411	Lesvos, Limnos	0.427	0.173	0.300
50	EL652	Korinthia	0.441	0.155	0.298
51	ITH55	Bologna	0.407	0.188	0.298
52	RO121	Alba	0.023	0.567	0.295
53	ITF11	L'Aquila	0.435	0.142	0.288
54	SI043	Goriška	0.099	0.477	0.288
55	SI037	Jugovzhodna Slovenija	0.112	0.463	0.288
56	SI036	Posavska	0.156	0.417	0.287
57	ITH58	Forlì-Cesena	0.380	0.192	0.286
58	EL543	Ioannina	0.306	0.263	0.285

No	NUTS-3		$\overline{AAELR}_{eq}$	$\overline{AAELR}_{en}$	$I_{eq\text{-}en}$
	Code	**Name**			
59	BG325	Silistra	0.355	0.214	0.285
60	ITH52	Parma	0.379	0.188	0.284
61	EL533	Florina	0.127	0.439	0.283
62	HR061	Međimurska županija	0.118	0.448	0.283
63	EL631	Aitoloakarnania	0.375	0.186	0.280
64	EL644	Fthiotida	0.312	0.248	0.280
65	EL623	Ithaki, Kefallinia	0.438	0.117	0.277
66	RO423	Hunedoara	0.019	0.524	0.272
67	ITF63	Catanzaro	0.448	0.092	0.270
68	ITF65	Reggio di Calabria	0.460	0.080	0.270
69	EL431	Irakleio	0.423	0.114	0.269
70	EL612	Larisa	0.304	0.233	0.269
71	ITH10	Bolzano-Bozen	0.018	0.518	0.268
72	RO113	Cluj	0.017	0.516	0.266
73	RO412	Gorj	0.031	0.501	0.266
74	EL532	Kastoria	0.112	0.418	0.265
75	ITH42	Udine	0.257	0.268	0.262
76	ITH41	Pordenone	0.260	0.262	0.261
77	EL412	Ikaria, Samos	0.398	0.123	0.260
78	HR062	Varaždinska županija	0.152	0.362	0.257
79	SI031	Pomurska	0.035	0.478	0.256
80	ITC4B	Mantova	0.263	0.243	0.253
81	EL651	Argolida, Arkadia	0.283	0.223	0.253
82	EL622	Kerkyra	0.386	0.119	0.253
83	RO411	Dolj	0.062	0.443	0.252
84	EL524	Pella	0.135	0.367	0.251
85	RO115	Satu Mare	0.016	0.483	0.250
86	EL611	Karditsa, Trikala	0.185	0.313	0.249
87	HR065	Zagrebačka županija	0.171	0.324	0.248
88	RO424	Timiş	0.052	0.443	0.248
89	HR064	Krapinsko-zagorska županija	0.137	0.351	0.244
90	RO111	Bihor	0.007	0.481	0.244
91	SI032	Podravska	0.051	0.436	0.244
92	EL433	Rethymni	0.346	0.138	0.242
93	ITH34	Treviso	0.264	0.218	0.241
94	ITF61	Cosenza	0.384	0.098	0.241
95	SI035	Zasavska	0.081	0.401	0.241
96	ITC47	Brescia	0.204	0.276	0.240
97	SI041	Osrednjeslovenska	0.166	0.310	0.238
98	BG323	Ruse	0.301	0.173	0.237
99	EL434	Chania	0.363	0.110	0.237
100	RO413	Mehedinți	0.008	0.463	0.236

Table B. 6. Residential buildings: top 100 priority regions based on $I_{eq\text{-}en\text{-}SVI,1}$.

No	NUTS-3		$\overline{AAELR}_{eq}$	$\overline{AAELR}_{en}$	$\overline{SVI}$	$I_{eq\text{-}en\text{-}SVI,1}$
	Code	**Name**				
1	RO222	Buzău	0.829	0.537	0.924	0.763
2	RO226	Vrancea	0.763	0.559	0.924	0.749
3	RO316	Prahova	0.616	0.531	0.837	0.661
4	RO224	Galați	0.517	0.528	0.924	0.656
5	RO221	Brăila	0.525	0.517	0.924	0.656
6	RO123	Covasna	0.533	0.691	0.727	0.650
7	RO122	Braşov	0.656	0.562	0.727	0.648
8	RO211	Bacău	0.481	0.571	0.862	0.638
9	RO215	Suceava	0.035	1.000	0.862	0.632
10	RO216	Vaslui	0.233	0.801	0.862	0.632
11	RO315	Ialomița	0.477	0.509	0.837	0.608
12	RO214	Neamț	0.219	0.645	0.862	0.575
13	RO212	Botoşani	0.043	0.802	0.862	0.569
14	RO317	Teleorman	0.162	0.689	0.837	0.563
15	RO313	Dâmbovița	0.324	0.522	0.837	0.561
16	RO321	Bucureşti	1.000	0.309	0.370	0.560
17	RO124	Harghita	0.177	0.749	0.727	0.551
18	RO312	Călăraşi	0.306	0.504	0.837	0.549
19	RO311	Argeş	0.265	0.544	0.837	0.549
20	RO314	Giurgiu	0.248	0.489	0.837	0.525
21	RO225	Tulcea	0.157	0.489	0.924	0.523
22	RO213	Iaşi	0.109	0.581	0.862	0.517
23	RO414	Olt	0.137	0.493	0.807	0.479
24	RO415	Vâlcea	0.078	0.539	0.807	0.475
25	EL632	Achaia	0.557	0.188	0.675	0.473
26	RO125	Mureş	0.066	0.595	0.727	0.463
27	RO126	Sibiu	0.101	0.548	0.727	0.458
28	RO223	Constanța	0.123	0.316	0.924	0.454
29	ITF63	Catanzaro	0.448	0.092	0.818	0.453
30	ITF65	Reggio di Calabria	0.460	0.080	0.818	0.453
31	EL645	Fokida	0.483	0.249	0.619	0.451
32	RO412	Gorj	0.031	0.501	0.807	0.446
33	EL633	Ileia	0.481	0.175	0.675	0.444
34	BG325	Silistra	0.355	0.214	0.758	0.442
35	RO121	Alba	0.023	0.567	0.727	0.439
36	RO411	Dolj	0.062	0.443	0.807	0.437
37	ITF61	Cosenza	0.384	0.098	0.818	0.433
38	EL621	Zakynthos	0.515	0.158	0.624	0.432
39	RO421	Arad	0.021	0.615	0.660	0.432
40	ITG17	Catania	0.366	0.095	0.834	0.431
41	RO112	Bistrița-Năsăud	0.013	0.641	0.632	0.429
42	RO413	Mehedinți	0.008	0.463	0.807	0.426
43	ITF64	Vibo Valentia	0.382	0.076	0.818	0.425
44	RO116	Sălaj	0.005	0.637	0.632	0.425
45	RO322	Ilfov	0.487	0.410	0.370	0.422
46	RO114	Maramureş	0.004	0.630	0.632	0.422
47	RO422	Caraş-Severin	0.011	0.594	0.660	0.422
48	EL411	Lesvos, Limnos	0.427	0.173	0.662	0.420
49	BG314	Pleven	0.083	0.174	1.000	0.419
50	EL624	Lefkada	0.504	0.124	0.624	0.417
51	EL631	Aitoloakarnania	0.375	0.186	0.675	0.412
52	BG323	Ruse	0.301	0.173	0.758	0.411
53	EL533	Florina	0.127	0.439	0.657	0.408
54	EL541	Arta, Preveza	0.423	0.230	0.566	0.407
55	ITG13	Messina	0.299	0.085	0.834	0.406
56	EL653	Lakonia, Messinia	0.459	0.157	0.601	0.405
57	BG312	Montana	0.034	0.179	1.000	0.404
58	BG324	Razgrad	0.262	0.193	0.758	0.404

No	NUTS-3		$\overline{AAELR}_{eq}$	$\overline{AAELR}_{en}$	$\overline{SVI}$	$I_{eq\text{-}en\text{-}SVI,1}$
	Code	**Name**				
59	BG313	Vratsa	0.031	0.174	1.000	0.402
60	RO423	Hunedoara	0.019	0.524	0.660	0.401
61	BG311	Vidin	0.017	0.181	1.000	0.399
62	EL652	Korinthia	0.441	0.155	0.601	0.399
63	ITF32	Benevento	0.259	0.136	0.799	0.398
64	EL532	Kastoria	0.112	0.418	0.657	0.396
65	EL412	Ikaria, Samos	0.398	0.123	0.662	0.394
66	EL644	Fthiotida	0.312	0.248	0.619	0.393
67	EL623	Ithaki, Kefallinia	0.438	0.117	0.624	0.393
68	BG315	Lovech	0.021	0.156	1.000	0.392
69	ITF46	Foggia	0.280	0.101	0.796	0.392
70	ITG19	Siracusa	0.262	0.076	0.834	0.391
71	ITF62	Crotone	0.303	0.050	0.818	0.390
72	ITF11	L'Aquila	0.435	0.142	0.589	0.389
73	RO113	Cluj	0.017	0.516	0.632	0.388
74	ITF34	Avellino	0.229	0.128	0.799	0.385
75	RO424	Timiş	0.052	0.443	0.660	0.385
76	BG421	Plovdiv	0.184	0.164	0.805	0.385
77	EL612	Larisa	0.304	0.233	0.611	0.383
78	ITF21	Isernia	0.329	0.140	0.679	0.383
79	BG423	Pazardzhik	0.133	0.207	0.805	0.382
80	EL543	Ioannina	0.306	0.263	0.566	0.379
81	RO115	Satu Mare	0.016	0.483	0.632	0.377
82	EL622	Kerkyra	0.386	0.119	0.624	0.376
83	BG344	Stara Zagora	0.120	0.155	0.853	0.376
84	EL513	Rodopi	0.103	0.355	0.667	0.375
85	EL514	Drama	0.075	0.381	0.667	0.374
86	RO111	Bihor	0.007	0.481	0.632	0.373
87	EL413	Chios	0.306	0.151	0.662	0.373
88	ITF33	Napoli	0.215	0.097	0.799	0.371
89	EL611	Karditsa, Trikala	0.185	0.313	0.611	0.370
90	EL531	Grevena, Kozani	0.108	0.344	0.657	0.369
91	EL651	Argolida, Arkadia	0.283	0.223	0.601	0.369
92	HR061	Međimurska županija	0.118	0.448	0.537	0.367
93	BG424	Smolyan	0.054	0.239	0.805	0.366
94	BG332	Dobrich	0.162	0.164	0.770	0.365
95	HU313	Nógrád	0.010	0.285	0.794	0.363
96	ITG18	Ragusa	0.196	0.058	0.834	0.363
97	EL524	Pella	0.135	0.367	0.585	0.362
98	EL431	Irakleio	0.423	0.114	0.549	0.362
99	ITF31	Caserta	0.161	0.123	0.799	0.361
100	BG342	Sliven	0.086	0.142	0.853	0.360

Table B. 7. Residential buildings: top 100 priority regions based on $I_{eq\text{-}en\text{-}SVI,2}$.

No	NUTS-3		$\overline{I}_{eq,1}$	$\overline{AAELR_{en}}$	$\overline{SVI}$	$I_{eq\text{-}en\text{-}SVI,2}$
	Code	Name				
1	RO222	Buzău	0.665	0.54	0.924	0.709
2	RO226	Vrancea	0.600	0.56	0.924	0.694
3	RO215	Suceava	0.024	1.00	0.862	0.629
4	RO316	Prahova	0.510	0.53	0.837	0.626
5	RO224	Galați	0.424	0.53	0.924	0.625
6	RO221	Brăila	0.411	0.52	0.924	0.618
7	RO122	Brașov	0.556	0.56	0.727	0.615
8	RO216	Vaslui	0.181	0.80	0.862	0.615
9	RO123	Covasna	0.424	0.69	0.727	0.614
10	RO211	Bacău	0.403	0.57	0.862	0.612
11	RO315	Ialomița	0.374	0.51	0.837	0.573
12	RO212	Botoşani	0.031	0.80	0.862	0.565
13	RO321	București	1.000	0.31	0.370	0.560
14	RO214	Neamț	0.172	0.65	0.862	0.560
15	RO317	Teleorman	0.121	0.69	0.837	0.549
16	RO124	Harghita	0.138	0.75	0.727	0.538
17	RO313	Dâmbovița	0.253	0.52	0.837	0.537
18	RO311	Argeş	0.212	0.54	0.837	0.531
19	RO312	Călăraşi	0.234	0.50	0.837	0.525
20	RO225	Tulcea	0.116	0.49	0.924	0.510
21	RO213	Iași	0.083	0.58	0.862	0.509
22	RO314	Giurgiu	0.190	0.49	0.837	0.506
23	RO415	Vâlcea	0.061	0.54	0.807	0.469
24	RO414	Olt	0.102	0.49	0.807	0.467
25	RO125	Mureş	0.048	0.60	0.727	0.457
26	RO126	Sibiu	0.079	0.55	0.727	0.451
27	RO223	Constanța	0.093	0.32	0.924	0.444
28	EL632	Achaia	0.468	0.19	0.675	0.444
29	RO412	Gorj	0.023	0.50	0.807	0.443
30	RO121	Alba	0.016	0.57	0.727	0.437
31	RO411	Dolj	0.045	0.44	0.807	0.432
32	RO421	Arad	0.017	0.61	0.660	0.431
33	RO112	Bistrița-Năsăud	0.009	0.64	0.632	0.427
34	RO413	Mehedinți	0.006	0.46	0.807	0.425
35	ITF65	Reggio di Calabria	0.376	0.08	0.818	0.425
36	RO116	Sălaj	0.004	0.64	0.632	0.424
37	ITF63	Catanzaro	0.356	0.09	0.818	0.422
38	RO114	Maramureş	0.003	0.63	0.632	0.422
39	RO422	Caraş-Severin	0.008	0.59	0.660	0.421
40	BG314	Pleven	0.058	0.17	1.000	0.411
41	BG325	Silistra	0.254	0.21	0.758	0.408
42	ITG17	Catania	0.294	0.09	0.834	0.408
43	ITF61	Cosenza	0.303	0.10	0.818	0.406
44	EL645	Fokida	0.346	0.25	0.619	0.405
45	EL633	Ileia	0.361	0.17	0.675	0.404
46	BG312	Montana	0.024	0.18	1.000	0.401
47	RO423	Hunedoara	0.015	0.52	0.660	0.399
48	ITF64	Vibo Valentia	0.302	0.08	0.818	0.399
49	BG313	Vratsa	0.021	0.17	1.000	0.398
50	BG311	Vidin	0.011	0.18	1.000	0.397
51	EL533	Florina	0.095	0.44	0.657	0.397
52	BG315	Lovech	0.014	0.16	1.000	0.390
53	EL621	Zakynthos	0.384	0.16	0.624	0.389
54	RO113	Cluj	0.013	0.52	0.632	0.387
55	ITG13	Messina	0.238	0.08	0.834	0.385
56	EL532	Kastoria	0.082	0.42	0.657	0.385
57	BG323	Ruse	0.220	0.17	0.758	0.384
58	EL631	Aitoloakarnania	0.289	0.19	0.675	0.383

No	NUTS-3		$\bar{I}_{eq,1}$	$\overline{AAELR}_{en}$	$\overline{SVI}$	$I_{eq\text{-}en\text{-}SVI,2}$
	Code	**Name**				
59	RO424	Timiş	0.043	0.44	0.660	0.382
60	ITF32	Benevento	0.210	0.14	0.799	0.382
61	RO322	Ilfov	0.363	0.41	0.370	0.381
62	EL411	Lesvos, Limnos	0.306	0.17	0.662	0.380
63	BG324	Razgrad	0.184	0.19	0.758	0.378
64	BG421	Plovdiv	0.162	0.16	0.805	0.377
65	RO115	Satu Mare	0.012	0.48	0.632	0.376
66	BG423	Pazardzhik	0.107	0.21	0.805	0.373
67	RO111	Bihor	0.005	0.48	0.632	0.373
68	EL541	Arta, Preveza	0.320	0.23	0.566	0.372
69	ITG19	Siracusa	0.205	0.08	0.834	0.372
70	ITF46	Foggia	0.218	0.10	0.796	0.372
71	EL653	Lakonia, Messinia	0.355	0.16	0.601	0.371
72	ITF62	Crotone	0.244	0.05	0.818	0.370
73	EL644	Fthiotida	0.244	0.25	0.619	0.370
74	ITF34	Avellino	0.183	0.13	0.799	0.370
75	EL624	Lefkada	0.362	0.12	0.624	0.370
76	EL514	Drama	0.060	0.38	0.667	0.369
77	BG344	Stara Zagora	0.098	0.16	0.853	0.369
78	EL513	Rodopi	0.081	0.36	0.667	0.368
79	EL612	Larisa	0.258	0.23	0.611	0.367
80	EL652	Korinthia	0.343	0.15	0.601	0.366
81	HR061	Međimurska županija	0.110	0.45	0.537	0.365
82	ITF11	L'Aquila	0.358	0.14	0.589	0.363
83	HU313	Nógrád	0.007	0.29	0.794	0.362
84	ITF21	Isernia	0.267	0.14	0.679	0.362
85	EL412	Ikaria, Samos	0.297	0.12	0.662	0.361
86	BG424	Smolyan	0.037	0.24	0.805	0.361
87	EL531	Grevena, Kozani	0.081	0.34	0.657	0.360
88	ITF33	Napoli	0.181	0.10	0.799	0.359
89	HU312	Heves	0.008	0.27	0.794	0.358
90	EL623	Ithaki, Kefallinia	0.331	0.12	0.624	0.357
91	EL611	Karditsa, Trikala	0.146	0.31	0.611	0.357
92	BG342	Sliven	0.065	0.14	0.853	0.353
93	EL543	Ioannina	0.228	0.26	0.566	0.352
94	EL524	Pella	0.103	0.37	0.585	0.352
95	HU311	Borsod-Abaúj-Zemplén	0.005	0.25	0.794	0.351
96	BG332	Dobrich	0.117	0.16	0.770	0.350
97	ITF31	Caserta	0.124	0.12	0.799	0.349
98	ITG18	Ragusa	0.154	0.06	0.834	0.349
99	EL622	Kerkyra	0.303	0.12	0.624	0.349
100	BG422	Haskovo	0.109	0.13	0.805	0.347

Table B. 8. Residential buildings: top 100 priority regions based on $I_{eq\text{-}en\text{-}SVI,3}$.

No	NUTS-3		$\bar{I}_{eq,2}$	$\bar{I}_{en}$	$\overline{SVI}$	$I_{eq\text{-}en\text{-}SVI,3}$
	Code	**Name**				
1	RO222	Buzău	0.513	0.297	0.924	0.578
2	RO321	Bucureşti	1.000	0.340	0.370	0.570
3	RO226	Vrancea	0.464	0.309	0.924	0.566
4	RO224	Galați	0.328	0.295	0.924	0.516
5	RO316	Prahova	0.399	0.305	0.837	0.514
6	RO122	Braşov	0.453	0.353	0.727	0.511
7	RO221	Brăila	0.318	0.288	0.924	0.510
8	RO211	Bacău	0.311	0.318	0.862	0.497
9	RO123	Covasna	0.330	0.387	0.727	0.481
10	RO215	Suceava	0.019	0.547	0.862	0.476
11	ITF33	Napoli	0.299	0.329	0.799	0.476
12	RO216	Vaslui	0.135	0.420	0.862	0.473
13	RO315	Ialomița	0.286	0.277	0.837	0.467
14	ITG17	Catania	0.375	0.179	0.834	0.463
15	ITF63	Catanzaro	0.407	0.132	0.818	0.452
16	RO214	Neamț	0.133	0.357	0.862	0.451
17	ITF65	Reggio di Calabria	0.415	0.117	0.818	0.450
18	RO313	Dâmbovița	0.196	0.289	0.837	0.441
19	ITH55	Bologna	0.577	0.456	0.281	0.438
20	RO212	Botoşani	0.024	0.428	0.862	0.438
21	RO311	Argeş	0.166	0.310	0.837	0.437
22	ITF61	Cosenza	0.351	0.134	0.818	0.434
23	RO317	Teleorman	0.091	0.361	0.837	0.430
24	RO312	Călăraşi	0.179	0.271	0.837	0.429
25	EL632	Achaia	0.437	0.169	0.675	0.427
26	RO225	Tulcea	0.089	0.266	0.924	0.426
27	ITF46	Foggia	0.291	0.191	0.796	0.426
28	RO213	Iaşi	0.066	0.333	0.862	0.420
29	RO124	Harghita	0.108	0.421	0.727	0.418
30	RO314	Giurgiu	0.146	0.264	0.837	0.415
31	ITG13	Messina	0.271	0.127	0.834	0.411
32	ITF64	Vibo Valentia	0.315	0.094	0.818	0.409
33	ITF32	Benevento	0.235	0.180	0.799	0.405
34	ITC4C	Milano	0.174	0.683	0.355	0.404
35	ITG19	Siracusa	0.242	0.132	0.834	0.403
36	ITH54	Modena	0.565	0.358	0.281	0.401
37	RO223	Constanța	0.077	0.199	0.924	0.400
38	ITF48	Barletta-Andria-Trani	0.147	0.245	0.796	0.396
39	ITF31	Caserta	0.158	0.217	0.799	0.392
40	ITF34	Avellino	0.207	0.167	0.799	0.391
41	ITF62	Crotone	0.271	0.074	0.818	0.388
42	RO414	Olt	0.079	0.269	0.807	0.385
43	RO415	Vâlcea	0.047	0.298	0.807	0.384
44	BG314	Pleven	0.049	0.102	1.000	0.384
45	ITI21	Perugia	0.456	0.280	0.409	0.382
46	EL303	Kentrikos Tomeas Athinon	0.298	0.372	0.465	0.378
47	BG312	Montana	0.020	0.102	1.000	0.374
48	EL633	Ileia	0.312	0.134	0.675	0.374
49	ITI43	Roma	0.276	0.415	0.428	0.373
50	ITF11	L'Aquila	0.382	0.146	0.589	0.372
51	ITF21	Isernia	0.287	0.150	0.679	0.372
52	BG313	Vratsa	0.017	0.098	1.000	0.372
53	RO126	Sibiu	0.063	0.325	0.727	0.372
54	ITF35	Salerno	0.115	0.200	0.799	0.372
55	ITF47	Bari	0.043	0.275	0.796	0.371
56	ITH53	Reggio nell'Emilia	0.480	0.349	0.281	0.370
57	RO125	Mureş	0.038	0.344	0.727	0.370
58	BG311	Vidin	0.009	0.097	1.000	0.369

No	NUTS-3		$\bar{I}_{eq,2}$	$\bar{I}_{en}$	$\overline{SVI}$	$I_{eq\text{-}en\text{-}SVI,3}$
	Code	Name				
59	ITG12	Palermo	0.105	0.164	0.834	0.368
60	RO412	Gorj	0.018	0.275	0.807	0.366
61	BG315	Lovech	0.012	0.087	1.000	0.366
62	RO411	Dolj	0.036	0.248	0.807	0.363
63	EL304	Notios Tomeas Athinon	0.367	0.256	0.465	0.363
64	BG325	Silistra	0.207	0.122	0.758	0.362
65	EL621	Zakynthos	0.334	0.128	0.624	0.362
66	ITG18	Ragusa	0.168	0.084	0.834	0.362
67	EL645	Fokida	0.296	0.165	0.619	0.360
68	EL631	Aitoloakarnania	0.255	0.149	0.675	0.360
69	EL612	Larisa	0.247	0.214	0.611	0.357
70	RO413	Mehedinți	0.004	0.252	0.807	0.354
71	RO121	Alba	0.013	0.323	0.727	0.354
72	ITG15	Caltanissetta	0.129	0.095	0.834	0.353
73	EL533	Florina	0.085	0.313	0.657	0.351
74	ITF43	Taranto	0.049	0.209	0.796	0.351
75	FR101	Paris	0.001	1.000	0.052	0.351
76	BG323	Ruse	0.187	0.107	0.758	0.350
77	EL411	Lesvos, Limnos	0.264	0.124	0.662	0.350
78	ITG16	Enna	0.113	0.101	0.834	0.350
79	ITC11	Torino	0.107	0.547	0.392	0.349
80	BG421	Plovdiv	0.134	0.103	0.805	0.347
81	ITH57	Ravenna	0.478	0.283	0.281	0.347
82	EL532	Kastoria	0.075	0.309	0.657	0.347
83	ITI14	Firenze	0.271	0.391	0.377	0.346
84	ITF51	Potenza	0.190	0.155	0.693	0.346
85	EL624	Lefkada	0.319	0.094	0.624	0.346
86	HU313	Nógrád	0.007	0.231	0.794	0.344
87	ITH52	Parma	0.433	0.317	0.281	0.344
88	EL653	Lakonia, Messinia	0.307	0.121	0.601	0.343
89	EL644	Fthiotida	0.218	0.190	0.619	0.342
90	BG423	Pazardzhik	0.090	0.130	0.805	0.342
91	HU312	Heves	0.007	0.222	0.794	0.341
92	ITH56	Ferrara	0.466	0.276	0.281	0.341
93	BG344	Stara Zagora	0.080	0.090	0.853	0.341
94	HU311	Borsod-Abaúj-Zemplén	0.005	0.223	0.794	0.341
95	BG324	Razgrad	0.151	0.111	0.758	0.340
96	EL514	Drama	0.055	0.296	0.667	0.339
97	EL652	Korinthia	0.302	0.114	0.601	0.339
98	EL541	Arta, Preveza	0.278	0.171	0.566	0.338
99	ITF13	Pescara	0.177	0.248	0.589	0.338
100	EL412	Ikaria, Samos	0.256	0.095	0.662	0.337

Table B. 9. Residential buildings: top 100 priority regions based on $I^*_{eq\text{-}en}$.

No	NUTS-3		$\overline{AAELR}_{eq}$	$\overline{AAELR}_{en}$	$I^*_{eq\text{-}en}$
	Code	**Name**			
1	RO222	Buzău	0.829	0.537	0.683
2	RO226	Vrancea	0.763	0.559	0.661
3	RO321	Bucureşti	1.000	0.309	0.655
4	RO123	Covasna	0.533	0.691	0.612
5	RO122	Braşov	0.656	0.562	0.609
6	RO316	Prahova	0.616	0.531	0.574
7	RO211	Bacău	0.481	0.571	0.526
8	RO224	Galați	0.517	0.528	0.523
9	RO221	Brăila	0.525	0.517	0.521
10	RO216	Vaslui	0.233	0.801	0.517
11	RO315	Ialomița	0.477	0.509	0.493
12	RO124	Harghita	0.177	0.749	0.463
13	RO322	Ilfov	0.487	0.410	0.448
14	RO214	Neamț	0.219	0.645	0.432
15	RO317	Teleorman	0.162	0.689	0.425
16	RO313	Dâmbovița	0.324	0.522	0.423
17	RO312	Călăraşi	0.306	0.504	0.405
18	RO311	Argeş	0.265	0.544	0.405
19	EL632	Achaia	0.557	0.188	0.372
20	RO314	Giurgiu	0.248	0.489	0.368
21	EL645	Fokida	0.483	0.249	0.366
22	RO213	Iaşi	0.109	0.581	0.345
23	EL621	Zakynthos	0.515	0.158	0.336
24	ITH54	Modena	0.472	0.195	0.334
25	EL633	Ileia	0.481	0.175	0.328
26	EL541	Arta, Preveza	0.423	0.230	0.327
27	RO126	Sibiu	0.101	0.548	0.324
28	RO225	Tulcea	0.157	0.489	0.323
29	ITH53	Reggio nell'Emilia	0.432	0.210	0.321
30	ITH57	Ravenna	0.455	0.183	0.319
31	ITI21	Perugia	0.441	0.193	0.317
32	RO414	Olt	0.137	0.493	0.315
33	SI034	Savinjska	0.121	0.507	0.314
34	EL624	Lefkada	0.504	0.124	0.314
35	ITH56	Ferrara	0.444	0.184	0.314
36	SI038	Primorsko-notranjska	0.078	0.539	0.309
37	RO415	Vâlcea	0.078	0.539	0.309
38	EL653	Lakonia, Messinia	0.459	0.157	0.308
39	SI042	Gorenjska	0.113	0.491	0.302
40	EL411	Lesvos, Limnos	0.427	0.173	0.300
41	EL652	Korinthia	0.441	0.155	0.298
42	ITH55	Bologna	0.407	0.188	0.298
43	ITF11	L'Aquila	0.435	0.142	0.288
44	SI043	Goriška	0.099	0.477	0.288
45	SI037	Jugovzhodna Slovenija	0.112	0.463	0.288
46	SI036	Posavska	0.156	0.417	0.287
47	ITH58	Forlì-Cesena	0.380	0.192	0.286
48	EL543	Ioannina	0.306	0.263	0.285
49	BG325	Silistra	0.355	0.214	0.285
50	ITH52	Parma	0.379	0.188	0.284
51	EL533	Florina	0.127	0.439	0.283
52	HR061	Međimurska županija	0.118	0.448	0.283
53	EL631	Aitoloakarnania	0.375	0.186	0.280
54	EL644	Fthiotida	0.312	0.248	0.280
55	EL623	Ithaki, Kefallinia	0.438	0.117	0.277
56	ITF63	Catanzaro	0.448	0.092	0.270
57	ITF65	Reggio di Calabria	0.460	0.080	0.270
58	EL431	Irakleio	0.423	0.114	0.269

No	NUTS-3		$\overline{AAELR}_{eq}$	$\overline{AAELR}_{en}$	$I^*_{eq\text{-}en}$
	Code	**Name**			
59	EL612	Larisa	0.304	0.233	0.269
60	EL532	Kastoria	0.112	0.418	0.265
61	ITH42	Udine	0.257	0.268	0.262
62	ITH41	Pordenone	0.260	0.262	0.261
63	EL412	Ikaria, Samos	0.398	0.123	0.260
64	HR062	Varaždinska županija	0.152	0.362	0.257
65	ITC4B	Mantova	0.263	0.243	0.253
66	EL651	Argolida, Arkadia	0.283	0.223	0.253
67	EL622	Kerkyra	0.386	0.119	0.253
68	EL524	Pella	0.135	0.367	0.251
69	EL611	Karditsa, Trikala	0.185	0.313	0.249
70	HR065	Zagrebačka županija	0.171	0.324	0.248
71	HR064	Krapinsko-zagorska županija	0.137	0.351	0.244
72	EL433	Rethymni	0.346	0.138	0.242
73	ITH34	Treviso	0.264	0.218	0.241
74	ITF61	Cosenza	0.384	0.098	0.241
75	SI035	Zasavska	0.081	0.401	0.241
76	ITC47	Brescia	0.204	0.276	0.240
77	SI041	Osrednjeslovenska	0.166	0.310	0.238
78	BG323	Ruse	0.301	0.173	0.237
79	EL434	Chania	0.363	0.110	0.237
80	ITH32	Vicenza	0.225	0.246	0.236
81	ITF21	Isernia	0.329	0.140	0.234
82	ITC4A	Cremona	0.232	0.237	0.234
83	ITG17	Catania	0.366	0.095	0.230
84	EL513	Rodopi	0.103	0.355	0.229
85	ITF64	Vibo Valentia	0.382	0.076	0.229
86	EL413	Chios	0.306	0.151	0.228
87	EL542	Thesprotia	0.241	0.216	0.228
88	EL514	Drama	0.075	0.381	0.228
89	BG324	Razgrad	0.262	0.193	0.228
90	ITH51	Piacenza	0.256	0.198	0.227
91	EL531	Grevena, Kozani	0.108	0.344	0.226
92	ITH59	Rimini	0.288	0.156	0.222
93	EL643	Evrytania	0.162	0.282	0.222
94	EL526	Serres	0.132	0.308	0.220
95	RO223	Constanța	0.123	0.316	0.219
96	ITC49	Lodi	0.212	0.224	0.218
97	HR050	Grad Zagreb	0.213	0.222	0.218
98	CY000	Kýpros	0.368	0.060	0.214
99	ITH33	Belluno	0.157	0.269	0.213
100	EL432	Lasithi	0.315	0.111	0.213

Table B. 10. Residential buildings: top 100 priority regions based on $I^*_{eq\text{-}en\text{-}SVI,1}$.

No	NUTS-3 Code	Name	$\overline{AAELR_{eq}}$	$\overline{AAELR_{en}}$	$\overline{SVI}$	$I^*_{eq\text{-}en\text{-}SVI,1}$
1	RO222	Buzău	0.829	0.537	0.924	0.763
2	RO226	Vrancea	0.763	0.559	0.924	0.749
3	RO316	Prahova	0.616	0.531	0.837	0.661
4	RO224	Galați	0.517	0.528	0.924	0.656
5	RO221	Brăila	0.525	0.517	0.924	0.656
6	RO123	Covasna	0.533	0.691	0.727	0.650
7	RO122	Brașov	0.656	0.562	0.727	0.648
8	RO211	Bacău	0.481	0.571	0.862	0.638
9	RO216	Vaslui	0.233	0.801	0.862	0.632
10	RO315	Ialomița	0.477	0.509	0.837	0.608
11	RO214	Neamț	0.219	0.645	0.862	0.575
12	RO317	Teleorman	0.162	0.689	0.837	0.563
13	RO313	Dâmbovița	0.324	0.522	0.837	0.561
14	RO321	București	1.000	0.309	0.370	0.560
15	RO124	Harghita	0.177	0.749	0.727	0.551
16	RO312	Călărași	0.306	0.504	0.837	0.549
17	RO311	Argeș	0.265	0.544	0.837	0.549
18	RO314	Giurgiu	0.248	0.489	0.837	0.525
19	RO225	Tulcea	0.157	0.489	0.924	0.523
20	RO213	Iași	0.109	0.581	0.862	0.517
21	RO414	Olt	0.137	0.493	0.807	0.479
22	RO415	Vâlcea	0.078	0.539	0.807	0.475
23	EL632	Achaia	0.557	0.188	0.675	0.473
24	RO126	Sibiu	0.101	0.548	0.727	0.458
25	RO223	Constanța	0.123	0.316	0.924	0.454
26	ITF63	Catanzaro	0.448	0.092	0.818	0.453
27	ITF65	Reggio di Calabria	0.460	0.080	0.818	0.453
28	EL645	Fokida	0.483	0.249	0.619	0.451
29	EL633	Ileia	0.481	0.175	0.675	0.444
30	BG325	Silistra	0.355	0.214	0.758	0.442
31	ITF61	Cosenza	0.384	0.098	0.818	0.433
32	EL621	Zakynthos	0.515	0.158	0.624	0.432
33	ITG17	Catania	0.366	0.095	0.834	0.431
34	ITF64	Vibo Valentia	0.382	0.076	0.818	0.425
35	RO322	Ilfov	0.487	0.410	0.370	0.422
36	EL411	Lesvos, Limnos	0.427	0.173	0.662	0.420
37	BG314	Pleven	0.083	0.174	1.000	0.419
38	EL624	Lefkada	0.504	0.124	0.624	0.417
39	EL631	Aitoloakarnania	0.375	0.186	0.675	0.412
40	BG323	Ruse	0.301	0.173	0.758	0.411
41	EL533	Florina	0.127	0.439	0.657	0.408
42	EL541	Arta, Preveza	0.423	0.230	0.566	0.407
43	ITG13	Messina	0.299	0.085	0.834	0.406
44	EL653	Lakonia, Messinia	0.459	0.157	0.601	0.405
45	BG324	Razgrad	0.262	0.193	0.758	0.404
46	EL652	Korinthia	0.441	0.155	0.601	0.399
47	ITF32	Benevento	0.259	0.136	0.799	0.398
48	EL532	Kastoria	0.112	0.418	0.657	0.396
49	EL412	Ikaria, Samos	0.398	0.123	0.662	0.394
50	EL644	Fthiotida	0.312	0.248	0.619	0.393
51	EL623	Ithaki, Kefallinia	0.438	0.117	0.624	0.393
52	ITF46	Foggia	0.280	0.101	0.796	0.392
53	ITG19	Siracusa	0.262	0.076	0.834	0.391
54	ITF62	Crotone	0.303	0.050	0.818	0.390
55	ITF11	L'Aquila	0.435	0.142	0.589	0.389
56	ITF34	Avellino	0.229	0.128	0.799	0.385
57	BG421	Plovdiv	0.184	0.164	0.805	0.385
58	EL612	Larisa	0.304	0.233	0.611	0.383

No	NUTS-3		$\overline{AAELR}_{eq}$	$\overline{AAELR}_{en}$	$\overline{SVI}$	**I*** $_{eq\text{-}en\text{-}SVI,1}$
	Code	**Name**				
59	ITF21	Isernia	0.329	0.140	0.679	0.383
60	BG423	Pazardzhik	0.133	0.207	0.805	0.382
61	EL543	Ioannina	0.306	0.263	0.566	0.379
62	EL622	Kerkyra	0.386	0.119	0.624	0.376
63	BG344	Stara Zagora	0.120	0.155	0.853	0.376
64	EL513	Rodopi	0.103	0.355	0.667	0.375
65	EL514	Drama	0.075	0.381	0.667	0.374
66	EL413	Chios	0.306	0.151	0.662	0.373
67	ITF33	Napoli	0.215	0.097	0.799	0.371
68	EL611	Karditsa, Trikala	0.185	0.313	0.611	0.370
69	EL531	Grevena, Kozani	0.108	0.344	0.657	0.369
70	EL651	Argolida, Arkadia	0.283	0.223	0.601	0.369
71	HR061	Međimurska županija	0.118	0.448	0.537	0.367
72	BG332	Dobrich	0.162	0.164	0.770	0.365
73	ITG18	Ragusa	0.196	0.058	0.834	0.363
74	EL524	Pella	0.135	0.367	0.585	0.362
75	EL431	Irakleio	0.423	0.114	0.549	0.362
76	ITF31	Caserta	0.161	0.123	0.799	0.361
77	BG342	Sliven	0.086	0.142	0.853	0.360
78	BG422	Haskovo	0.136	0.126	0.805	0.356
79	EL511	Evros	0.142	0.259	0.667	0.356
80	ITG16	Enna	0.143	0.088	0.834	0.355
81	EL643	Evrytania	0.162	0.282	0.619	0.354
82	BG333	Shumen	0.103	0.183	0.770	0.352
83	HR062	Varaždinska županija	0.152	0.362	0.537	0.350
84	ITF51	Potenza	0.221	0.137	0.693	0.350
85	ITG15	Caltanissetta	0.148	0.063	0.834	0.348
86	ITI21	Perugia	0.441	0.193	0.409	0.348
87	BG334	Targovishte	0.095	0.169	0.770	0.345
88	EL641	Voiotia	0.231	0.184	0.619	0.345
89	EL433	Rethymni	0.346	0.138	0.549	0.344
90	HR065	Zagrebačka županija	0.171	0.324	0.537	0.344
91	ITF48	Barletta-Andria-Trani	0.123	0.110	0.796	0.343
92	EL526	Serres	0.132	0.308	0.585	0.342
93	HR064	Krapinsko-zagorska županija	0.137	0.351	0.537	0.342
94	EL542	Thesprotia	0.241	0.216	0.566	0.341
95	EL434	Chania	0.363	0.110	0.549	0.341
96	ITG12	Palermo	0.100	0.080	0.834	0.338
97	ITF35	Salerno	0.113	0.099	0.799	0.337
98	EL521	Imathia	0.115	0.309	0.585	0.336
99	BG321	Veliko Tarnovo	0.085	0.161	0.758	0.335
100	EL523	Kilkis	0.089	0.323	0.585	0.332

Table B. 11. Residential buildings: top 100 priority regions based on $I^*_{eq\text{-}en\text{-}SVI,2}$.

No	NUTS-3		$\bar{I}_{eq,1}$	$\overline{AAELR_{en}}$	$\overline{SVI}$	$I^*_{eq\text{-}en\text{-}SVI,2}$
	Code	Name				
1	RO222	Buzău	0.665	0.537	0.924	0.709
2	RO226	Vrancea	0.600	0.559	0.924	0.694
3	RO316	Prahova	0.510	0.531	0.837	0.626
4	RO224	Galați	0.424	0.528	0.924	0.625
5	RO221	Brăila	0.411	0.517	0.924	0.618
6	RO122	Braşov	0.556	0.562	0.727	0.615
7	RO216	Vaslui	0.181	0.801	0.862	0.615
8	RO123	Covasna	0.424	0.691	0.727	0.614
9	RO211	Bacău	0.403	0.571	0.862	0.612
10	RO315	Ialomița	0.374	0.509	0.837	0.573
11	RO321	Bucureşti	1.000	0.309	0.370	0.560
12	RO214	Neamț	0.172	0.645	0.862	0.560
13	RO317	Teleorman	0.121	0.689	0.837	0.549
14	RO124	Harghita	0.138	0.749	0.727	0.538
15	RO313	Dâmbovița	0.253	0.522	0.837	0.537
16	RO311	Argeş	0.212	0.544	0.837	0.531
17	RO312	Călăraşi	0.234	0.504	0.837	0.525
18	RO225	Tulcea	0.116	0.489	0.924	0.510
19	RO213	Iaşi	0.083	0.581	0.862	0.509
20	RO314	Giurgiu	0.190	0.489	0.837	0.506
21	RO415	Vâlcea	0.061	0.539	0.807	0.469
22	RO414	Olt	0.102	0.493	0.807	0.467
23	RO126	Sibiu	0.079	0.548	0.727	0.451
24	RO223	Constanța	0.093	0.316	0.924	0.444
25	EL632	Achaia	0.468	0.188	0.675	0.444
26	ITF65	Reggio di Calabria	0.376	0.080	0.818	0.425
27	ITF63	Catanzaro	0.356	0.092	0.818	0.422
28	BG314	Pleven	0.058	0.174	1.000	0.411
29	BG325	Silistra	0.254	0.214	0.758	0.408
30	ITG17	Catania	0.294	0.095	0.834	0.408
31	ITF61	Cosenza	0.303	0.098	0.818	0.406
32	EL645	Fokida	0.346	0.249	0.619	0.405
33	EL633	Ileia	0.361	0.175	0.675	0.404
34	ITF64	Vibo Valentia	0.302	0.076	0.818	0.399
35	EL533	Florina	0.095	0.439	0.657	0.397
36	EL621	Zakynthos	0.384	0.158	0.624	0.389
37	ITG13	Messina	0.238	0.085	0.834	0.385
38	EL532	Kastoria	0.082	0.418	0.657	0.385
39	BG323	Ruse	0.220	0.173	0.758	0.384
40	EL631	Aitoloakarnania	0.289	0.186	0.675	0.383
41	ITF32	Benevento	0.210	0.136	0.799	0.382
42	RO322	Ilfov	0.363	0.410	0.370	0.381
43	EL411	Lesvos, Limnos	0.306	0.173	0.662	0.380
44	BG324	Razgrad	0.184	0.193	0.758	0.378
45	BG421	Plovdiv	0.162	0.164	0.805	0.377
46	BG423	Pazardzhik	0.107	0.207	0.805	0.373
47	EL541	Arta, Preveza	0.320	0.230	0.566	0.372
48	ITG19	Siracusa	0.205	0.076	0.834	0.372
49	ITF46	Foggia	0.218	0.101	0.796	0.372
50	EL653	Lakonia, Messinia	0.355	0.157	0.601	0.371
51	ITF62	Crotone	0.244	0.050	0.818	0.370
52	EL644	Fthiotida	0.244	0.248	0.619	0.370
53	ITF34	Avellino	0.183	0.128	0.799	0.370
54	EL624	Lefkada	0.362	0.124	0.624	0.370
55	EL514	Drama	0.060	0.381	0.667	0.369
56	BG344	Stara Zagora	0.098	0.155	0.853	0.369
57	EL513	Rodopi	0.081	0.355	0.667	0.368
58	EL612	Larisa	0.258	0.233	0.611	0.367

No	NUTS-3		$\overline{I}_{eq,1}$	$\overline{AAELR}_{en}$	$\overline{SVI}$	$I^*_{eq-en-SVI,2}$
	Code	**Name**				
59	EL652	Korinthia	0.343	0.155	0.601	0.366
60	HR061	Međimurska županija	0.110	0.448	0.537	0.365
61	ITF11	L'Aquila	0.358	0.142	0.589	0.363
62	ITF21	Isernia	0.267	0.140	0.679	0.362
63	EL412	Ikaria, Samos	0.297	0.123	0.662	0.361
64	EL531	Grevena, Kozani	0.081	0.344	0.657	0.360
65	ITF33	Napoli	0.181	0.097	0.799	0.359
66	EL623	Ithaki, Kefallinia	0.331	0.117	0.624	0.357
67	EL611	Karditsa, Trikala	0.146	0.313	0.611	0.357
68	BG342	Sliven	0.065	0.142	0.853	0.353
69	EL543	Ioannina	0.228	0.263	0.566	0.352
70	EL524	Pella	0.103	0.367	0.585	0.352
71	BG332	Dobrich	0.117	0.164	0.770	0.350
72	ITF31	Caserta	0.124	0.123	0.799	0.349
73	ITG18	Ragusa	0.154	0.058	0.834	0.349
74	EL622	Kerkyra	0.303	0.119	0.624	0.349
75	BG422	Haskovo	0.109	0.126	0.805	0.347
76	HR062	Varaždinska županija	0.141	0.362	0.537	0.347
77	EL651	Argolida, Arkadia	0.215	0.223	0.601	0.346
78	EL413	Chios	0.223	0.151	0.662	0.345
79	EL511	Evros	0.109	0.259	0.667	0.345
80	ITG16	Enna	0.108	0.088	0.834	0.343
81	BG333	Shumen	0.070	0.183	0.770	0.341
82	HR065	Zagrebačka županija	0.155	0.324	0.537	0.339
83	EL643	Evrytania	0.114	0.282	0.619	0.338
84	ITG15	Caltanissetta	0.114	0.063	0.834	0.337
85	HR064	Krapinsko-zagorska županija	0.124	0.351	0.537	0.337
86	BG334	Targovishte	0.065	0.169	0.770	0.335
87	ITF51	Potenza	0.174	0.137	0.693	0.334
88	ITF48	Barletta-Andria-Trani	0.096	0.110	0.796	0.334
89	EL526	Serres	0.107	0.308	0.585	0.334
90	EL431	Irakleio	0.333	0.114	0.549	0.332
91	ITG12	Palermo	0.078	0.080	0.834	0.331
92	ITF35	Salerno	0.087	0.099	0.799	0.328
93	EL521	Imathia	0.091	0.309	0.585	0.328
94	BG321	Veliko Tarnovo	0.058	0.161	0.758	0.326
95	ITG14	Agrigento	0.086	0.056	0.834	0.325
96	EL641	Voiotia	0.172	0.184	0.619	0.325
97	EL523	Kilkis	0.064	0.323	0.585	0.324
98	ITI21	Perugia	0.363	0.193	0.409	0.322
99	EL542	Thesprotia	0.172	0.216	0.566	0.318
100	HR027	Karlovačka županija	0.088	0.327	0.537	0.317

Table B. 12. Residential buildings: top 100 priority regions based on $I^*_{eq\text{-}en\text{-}SVI,3}$.

No	NUTS-3		$\bar{I}_{eq,2}$	$\bar{I}_{en}$	$\overline{SVI}$	$I^*_{eq\text{-}en\text{-}SVI,3}$
	Code	Name				
1	RO222	Buzău	0.513	0.297	0.924	0.578
2	RO321	Bucureşti	1.000	0.340	0.370	0.570
3	RO226	Vrancea	0.464	0.309	0.924	0.566
4	RO224	Galați	0.328	0.295	0.924	0.516
5	RO316	Prahova	0.399	0.305	0.837	0.514
6	RO122	Braşov	0.453	0.353	0.727	0.511
7	RO221	Brăila	0.318	0.288	0.924	0.510
8	RO211	Bacău	0.311	0.318	0.862	0.497
9	RO123	Covasna	0.330	0.387	0.727	0.481
10	ITF33	Napoli	0.299	0.329	0.799	0.476
11	RO216	Vaslui	0.135	0.420	0.862	0.473
12	RO315	Ialomița	0.286	0.277	0.837	0.467
13	ITG17	Catania	0.375	0.179	0.834	0.463
14	ITF63	Catanzaro	0.407	0.132	0.818	0.452
15	RO214	Neamț	0.133	0.357	0.862	0.451
16	ITF65	Reggio di Calabria	0.415	0.117	0.818	0.450
17	RO313	Dâmbovița	0.196	0.289	0.837	0.441
18	ITH55	Bologna	0.577	0.456	0.281	0.438
19	RO311	Argeş	0.166	0.310	0.837	0.437
20	ITF61	Cosenza	0.351	0.134	0.818	0.434
21	RO317	Teleorman	0.091	0.361	0.837	0.430
22	RO312	Călăraşi	0.179	0.271	0.837	0.429
23	EL632	Achaia	0.437	0.169	0.675	0.427
24	RO225	Tulcea	0.089	0.266	0.924	0.426
25	ITF46	Foggia	0.291	0.191	0.796	0.426
26	RO213	Iaşi	0.066	0.333	0.862	0.420
27	RO124	Harghita	0.108	0.421	0.727	0.418
28	RO314	Giurgiu	0.146	0.264	0.837	0.415
29	ITG13	Messina	0.271	0.127	0.834	0.411
30	ITF64	Vibo Valentia	0.315	0.094	0.818	0.409
31	ITF32	Benevento	0.235	0.180	0.799	0.405
32	ITC4C	Milano	0.174	0.683	0.355	0.404
33	ITG19	Siracusa	0.242	0.132	0.834	0.403
34	ITH54	Modena	0.565	0.358	0.281	0.401
35	RO223	Constanța	0.077	0.199	0.924	0.400
36	ITF48	Barletta-Andria-Trani	0.147	0.245	0.796	0.396
37	ITF31	Caserta	0.158	0.217	0.799	0.392
38	ITF34	Avellino	0.207	0.167	0.799	0.391
39	ITF62	Crotone	0.271	0.074	0.818	0.388
40	RO414	Olt	0.079	0.269	0.807	0.385
41	ITI21	Perugia	0.456	0.280	0.409	0.382
42	EL303	Kentrikos Tomeas Athinon	0.298	0.372	0.465	0.378
43	EL633	Ileia	0.312	0.134	0.675	0.374
44	ITI43	Roma	0.276	0.415	0.428	0.373
45	ITF11	L'Aquila	0.382	0.146	0.589	0.372
46	ITF21	Isernia	0.287	0.150	0.679	0.372
47	RO126	Sibiu	0.063	0.325	0.727	0.372
48	ITF35	Salerno	0.115	0.200	0.799	0.372
49	ITH53	Reggio nell'Emilia	0.480	0.349	0.281	0.370
50	ITG12	Palermo	0.105	0.164	0.834	0.368
51	EL304	Notios Tomeas Athinon	0.367	0.256	0.465	0.363
52	BG325	Silistra	0.207	0.122	0.758	0.362
53	EL621	Zakynthos	0.334	0.128	0.624	0.362
54	ITG18	Ragusa	0.168	0.084	0.834	0.362
55	EL645	Fokida	0.296	0.165	0.619	0.360
56	EL631	Aitoloakarnania	0.255	0.149	0.675	0.360
57	EL612	Larisa	0.247	0.214	0.611	0.357
58	ITG15	Caltanissetta	0.129	0.095	0.834	0.353

No	NUTS-3		$\overline{I}_{eq,2}$	$\overline{I}_{en}$	$\overline{SVI}$	$I^*_{eq\text{-}en\text{-}SVI,3}$
	Code	Name				
59	EL533	Florina	0.085	0.313	0.657	0.351
60	BG323	Ruse	0.187	0.107	0.758	0.350
61	EL411	Lesvos, Limnos	0.264	0.124	0.662	0.350
62	ITG16	Enna	0.113	0.101	0.834	0.350
63	ITC11	Torino	0.107	0.547	0.392	0.349
64	BG421	Plovdiv	0.134	0.103	0.805	0.347
65	ITH57	Ravenna	0.478	0.283	0.281	0.347
66	EL532	Kastoria	0.075	0.309	0.657	0.347
67	ITI14	Firenze	0.271	0.391	0.377	0.346
68	ITF51	Potenza	0.190	0.155	0.693	0.346
69	EL624	Lefkada	0.319	0.094	0.624	0.346
70	ITH52	Parma	0.433	0.317	0.281	0.344
71	EL653	Lakonia, Messinia	0.307	0.121	0.601	0.343
72	EL644	Fthiotida	0.218	0.190	0.619	0.342
73	BG423	Pazardzhik	0.090	0.130	0.805	0.342
74	ITH56	Ferrara	0.466	0.276	0.281	0.341
75	BG344	Stara Zagora	0.080	0.090	0.853	0.341
76	BG324	Razgrad	0.151	0.111	0.758	0.340
77	EL652	Korinthia	0.302	0.114	0.601	0.339
78	EL541	Arta, Preveza	0.278	0.171	0.566	0.338
79	ITF13	Pescara	0.177	0.248	0.589	0.338
80	EL412	Ikaria, Samos	0.256	0.095	0.662	0.337
81	ITC49	Lodi	0.247	0.408	0.355	0.337
82	EL522	Thessaloniki	0.184	0.241	0.585	0.337
83	ITG14	Agrigento	0.093	0.081	0.834	0.336
84	EL513	Rodopi	0.072	0.267	0.667	0.335
85	ITH58	Forlì-Cesena	0.412	0.310	0.281	0.334
86	EL623	Ithaki, Kefallinia	0.287	0.090	0.624	0.334
87	ITC47	Brescia	0.229	0.416	0.355	0.333
88	ITC4B	Mantova	0.266	0.368	0.355	0.330
89	EL543	Ioannina	0.214	0.208	0.566	0.329
90	ITH34	Treviso	0.277	0.338	0.373	0.329
91	EL531	Grevena, Kozani	0.073	0.254	0.657	0.328
92	ITC4A	Cremona	0.245	0.382	0.355	0.327
93	EL431	Irakleio	0.312	0.119	0.549	0.327
94	EL511	Evros	0.101	0.211	0.667	0.326
95	ITF52	Matera	0.101	0.184	0.693	0.326
96	BG422	Haskovo	0.092	0.078	0.805	0.325
97	EL622	Kerkyra	0.259	0.090	0.624	0.324
98	EL413	Chios	0.195	0.115	0.662	0.324
99	ITF22	Campobasso	0.157	0.135	0.679	0.324
100	ITH32	Vicenza	0.241	0.356	0.373	0.323

List of abbreviations and definitions

A	Floor area
AAEC	Average Annual Energy Consumption
AAEL(*R*)	Average Annual Economic Loss (Ratio)
AAL	Average Annual Loss
AALL(*R*)	Average Annual Loss of Life (Ratio)
admin	Administrative division
AASEC	Average Annual Specific Energy Consumption
AASED	Average Annual Specific Energy Demand
ANN	Artificial Neural Network
ASED	Annual Specific Energy Demand
ASM	Cross border harmonised area sources model
bcl	Building class without considering ‘construction date’ attribute
bcl_date	Building class considering ‘construction date’ attribute
BEM	Building Energy Modelling
bldg	Building
BPIE	Buildings Performance Institute Europe
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
com	Commercial building
CR	Reinforced concrete
D	Displacement
DNO	Non-ductile system
DS	Damage state
DUH	High ductility system
DUL	Low ductility system
DUM	Medium ductility system
dw	Dwelling
E[…]	Expected value (mean)
EDP	Engineering Demand Parameter
EDSF	European Database of Seismogenic Faults

EFEHR	European Facilities for Earthquake Hazard and Risk
ELR	Ratio of total repair cost to total replacement cost
empl	Employee
en	Energy
EPICA	European PreInstrumental earthquake CAtalogue
ENTRANZE	Policies to ENforce the TRAnsition to Nearly Zero-Energy Buildings in the EU-27
eq	Earthquake
EPBD	Energy Performance of Buildings Directive
EPISCOPE	Energy Performance Indicator tracking Schemes for the Continuous Optimisation of refurbishment Processes in European housing stocks
ESHM13	European Seismic Hazard Model 2013
ESHM20	European Seismic Hazard Model 2020
ESRM20	European Seismic Risk Model 2020
EU	European Union
EU	Earth, unreinforced (material class)
EU-SILC	EU Statistics on Income and Living Conditions
FS+SSM	Hybrid smoothed seismicity and active fault sources model
g	Acceleration of gravity
GADM	Global Database of Administrative Areas
GDP	Gross Domestic Product
GED4GEM	Development of a Global Exposure Database for the Global Earthquake Model
GEM	Global Earthquake Model foundation
GHG	Greenhouse gas emissions
H	Exact number of storeys
HBET	Range of storeys
HDD	Heating Degree Day
HDI	Human Development Index
heat	Heated area/dwellings
HICP	Harmonised Index of Consumer Prices
I	Single/multi-sectoral index
I_{en}	Single-sector integrated indicator considering normalised average annual economic loss ratio due to space heating energy consumption, average annual economic loss (due to energy consumption) per building, average annual energy consumption per building and *HDD*
$I_{eq,1}$	Single-sector integrated indicator considering normalised average annual economic loss ratio due to seismic repair and average annual loss of life ratio
$I_{eq,2}$	Single-sector integrated indicator considering normalised average annual economic loss ratio due to seismic repair, average annual economic loss due to seismic repair per building, and average annual loss of life ratio
$I^{(*)}_{eq\text{-}en}$	Multi-sectoral integrated indicator considering normalised average annual economic loss ratios due to seismic repair and space heating energy consumption (*: indicator promoting regions of high seismic risk)

$I^{(*)}_{eq-en-SVI,1}$	Multi-sectoral integrated indicator considering normalised average annual economic loss ratios due to seismic repair and space heating energy consumption, and socioeconomic vulnerability (*: indicator promoting regions of high seismic risk)
$I^{(*)}_{eq-en-SVI,2}$	Multi-sectoral integrated indicator considering normalised average annual economic loss ratios due to seismic repair and energy consumption, average annual loss of life ratio, and socioeconomic vulnerability (*: indicator promoting regions of high seismic risk)
$I^{(*)}_{eq-en-SVI,3}$	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 (*: indicator promoting regions of high seismic risk)
IM	Intensity Measure
INGV	National Institute of Geophysics and Volcanology (Istituto Nazionale di Geofisica e Vulcanologia)
INSPIRE	Development of Systemic Packages for Deep Energy Renovation of Residential and Tertiary Buildings including Envelope and Systems
k	Lateral force coefficient
K	Kelvin
K_d	Dynamic coefficient
K_o	Importance coefficient
K_p	Structural coefficient
K_s	Seismic coefficient
L	Uncertain loss (l: a specific value of L)
LD	Less-Developed regions
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
LLRS	Lateral Load Resisting System
LPB	Post and beam
m	Metre
MCF	Confined masonry
MD	More-Developed regions
MFD	Magnitude–Frequency Distributions
MMI	Modified Mercali intensity scale
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
M_w	Earthquake moment magnitude
NERA	Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation
NGA West	Next Generation Attenuation relationships for Western North-America
NUTS	Nomenclature of Territorial Units for Statistics
occ	Occupied buildings/dwellings
P	Population
P	Probability
PAGER	Prompt Assessment of Global Earthquakes for Response
PGA	Peak Ground Acceleration
PPS	Purchasing Power Standard
PSHA	Probabilistic Seismic Hazard Assessment
rep	Replacement (referring to cost)
res	Residential building
S	Steel
S_a	Spectral acceleration
SDG	Sustainable Development Goal
SDOF	Single-degree-of-freedom system
sec	Seconds
SERA	Seismology and Earthquake engineering Research infrastructure Alliance for Europe
SHARE	Seismic Hazard Harmonization in Europe
SHEEC	SHARE European Earthquake Catalogue
SOS	Soft storey irregularity
SPI	Social Progress Index
SPT	Set-Point Temperature
SRC	Concrete, composite with steel section
st	Storey
SVI	Socioeconomic Vulnerability Index
SWD	Commission Staff Working Document
TABULA	Typology Approach for BUiLding stock energy Assessment
TR	Transition regions
T	Structural period of vibration
T_R	Statistical return period
TR	Transition regions
U	Thermal transmittance value
UN	United Nations
UNDP	United Nations Development Programme
UNK	Unknown (material)

U_r	Roof thermal transmittance value
USGS	United States Geological Survey
U_t	Target thermal transmittance value
U_w	Wall thermal transmittance value
W	Watt
W	Wood
β	Logarithmic standard deviation
θ	Median
λ	Annual rate/frequency of exceedance of loss
σ	Standard deviation of linear regression

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