

## Professional Standards Paper

# Introduction to EU Taxonomy

- > The EU Taxonomy provides a systematic framework for assessing sustainable investments, focusing on climate change mitigation and adaptation, while reducing the risk of greenwashing.
- > Aligning with EU Taxonomy is becoming a market standard for investors and investment managers, driven by regulatory demands like SFDR and CSRD.
- > Implementing the EU Taxonomy also presents challenges, such as selecting alternative assessment methods for climate change mitigation in the absence of energy labels or market thresholds, quantifying adaptation measures, and operationalising minimum safeguards.

## Introduction

Building on INREV's [Sustainable Investment Principles paper](#), which clarified how to assess sustainable investments under SFDR and suggested additional indicators to align with current market ambitions, this paper provides an introduction to the EU Taxonomy - a classification system developed by the European Union to identify environmentally sustainable economic activities.

For real estate investors and managers, understanding and aligning with the EU Taxonomy is increasingly important as regulatory demands and investor expectations grow. This classification system is seen as a clearer and more structured framework for assessing sustainable investments, while reducing the risk of greenwashing. Some market participants voluntarily report on Taxonomy-aligned investments to increase environmental credibility.



The EU Taxonomy plays a central role in a number of key regulations impacting the real estate investment sector:

- > Sustainable Finance Disclosure Regulation (SFDR): Investment managers must disclose whether their products align with the Taxonomy, and if they choose to use it, the extent of this alignment to demonstrate environmental sustainability.
- > Corporate Sustainability Reporting Directive (CSRD): From 2025, certain non-listed companies may also need to report on Taxonomy alignment, broadening its applicability.
- > EU Green Bond Regulation: Effective December 2024, this introduces a voluntary Taxonomy-aligned green bond standard, raising sustainability benchmarks for bond issuances.

- > Other regulatory frameworks outside Europe, such as the Singapore-Asia Taxonomy for Sustainable Finance and ASEAN Taxonomy, include references to the EU Taxonomy.

As knowledge and awareness continue to spread, it can become feasible to classify assets as either Taxonomy aligned or not, directly linking their alignment to their sustainability status. This classification is expected to play a greater role in the marketing of sustainable buildings. Investor demand and regulatory pressure are already driving alignment, which can give early adopters of EU Taxonomy a competitive advantage.

However, implementing the EU Taxonomy is not without challenges. Reporting requirements are substantial, particularly alongside other sustainability regulatory obligations. For some, this additional effort may seem too much at this stage. There are also several ambiguities, such

as the absence of benchmarks, demonstrating climate adaptation, and ensuring adherence to minimum safeguards.<sup>1</sup>

This paper focuses on section 7.7 of the EU Taxonomy (Acquisition and ownership of buildings), providing real estate investors and managers with a practical starting point to understand its application to real estate. It outlines key features and characteristics, while identifying areas that need further clarification.

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<sup>1</sup> Please refer to the regularly updated [EU Taxonomy FAQ page](#) for the latest clarifications.

# EU Taxonomy assessment structure

To achieve alignment with the EU Taxonomy, economic activities must be evaluated against three core criteria:

1. Substantial contribution to environmental objectives.
2. Do no significant harm to other environmental objectives.
3. Compliance with minimum safeguards.

This chapter introduces these criteria, with further details in the next chapter.

## 1. Substantial contribution to environmental objectives

In general, an asset should meet the substantial contribution criteria for at least one of the six environmental objectives (Table 1) as defined by the EU Taxonomy. For Section 7.7, contribution criteria for only two of the six objectives are defined:<sup>2</sup>

- (A) Climate change mitigation (CCM) – reducing greenhouse gas emissions and improving energy efficiency.
- (B) Climate change adaptation (CCA) – enhancing the building’s resilience and adaptability to climate risks.

**Table 1 - Environmental objectives as defined by EU Taxonomy**

1	Climate change mitigation
2	Climate change adaptation
3	Sustainable use and protection of water and marine resources
4	Transition to a circular economy
5	Pollution prevention & control
6	Protection and restoration of biodiversity and ecosystems

**Table 2 - Environmental objectives per assessment stage**

Activity	Substantial contribution to environmental objective	Do no significant harm to environmental objective
7.1 Construction of new buildings	1	2 3 4 5 6
	2	1 3 4 5 6
	4	1 2 3 5 6
7.2 Renovation of existing buildings	1	2 3 4 5
	2	1 3 4 5
	4	1 3 4 5
7.7 Ownership and acquisition of buildings	1	2
	2	1

<sup>2</sup> The criteria for making a substantial contribution to these objectives are detailed in the [Technical Screening Criteria \(TSC\)](#), which outline performance thresholds that real estate assets must meet.

## 2. Do no significant harm to other environmental objectives

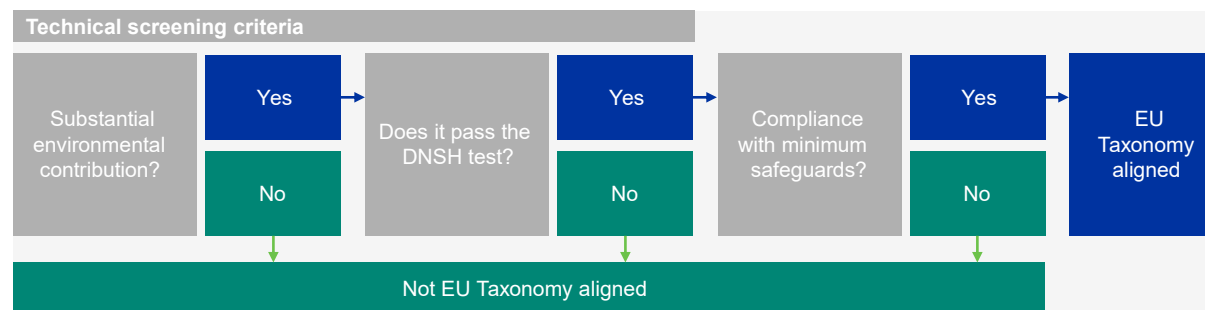
In addition to substantially contributing to environmental objectives, the asset must do no significant harm (DNSH) to specific other environmental objectives. These DNSH requirements for Section 7.7 are also only defined for climate change mitigation and climate change adaptation.<sup>3</sup>

## 3. Compliance with minimum safeguards

Beyond environmental criteria, compliance with minimum safeguards is required. This entails upholding international standards on human and labour rights, anti-corruption practices, taxation, and fair competition.<sup>4</sup>

Compliance with these safeguards at both the corporate and asset level should be ensured, for own activities and activities of business relationships. For a detailed discussion on these requirements, refer to page 9.

Figure 1 - EU Taxonomy assessment structure



<sup>3</sup> While Section 7.7 does not specify requirements for DNSH criteria three to six, these will be relevant for real estate investors engaging in activities such as new construction or major renovations.

<sup>4</sup> Article 18 of the EU Taxonomy Regulation, which also references guidelines such as the Organization for Economic Cooperation and Development (OECD) Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights.



## Assessing EU Taxonomy alignment

Achieving alignment with the EU Taxonomy requires making a substantial contribution to either (A) climate change mitigation or (B) climate change adaptation.

The regulatory requirements for 1) making a substantial contribution and 2) ensuring no significant harm to either objective are detailed below. Further guidance is provided through technical descriptions of key terms and concepts in Appendix I, and decision trees in Appendix II and III.

### Option A: Taxonomy alignment with the climate change mitigation objective

To align an asset with EU Taxonomy requirements for the CCM objective, it must comply with the following criteria:

#### Substantial contribution criteria:

*Assets built before 31/12/2020 (the date of application for a construction permit should be used):*

- > EPC label A, or;
- > The building is within the top 15% of the national or regional building stock as measured by operational Primary Energy Demand (**PED**).



- > Non-residential buildings with **HVAC installations** exceeding 290kW capacity must be efficiently operated through energy performance monitoring and assessment. This should be demonstrated, for example, via an Energy Performance Contract or a Building Management System (**BMS**).

*Assets built after 31/12/2020 (the date of application for a construction permit should be used).<sup>5</sup>*

- > The **PED** of the building must be at least 10% lower than the threshold established for the nearly zero-energy building (**NZEB**) requirements in national measures.
- > If the **building size** is larger than 5000 m<sup>2</sup>, testing for **airtightness** and **thermal integrity** is required upon completion. Any deviations from the performance set during the design stage or defects in the building envelope must be disclosed to investors and clients.
- > If the **building size** is larger than 5000 m<sup>2</sup>, the life-cycle Global Warming Potential (**GWP**) of the building resulting from the construction has been calculated for each stage in the life cycle and is disclosed to investors and clients on demand.
- > Non-residential buildings with **HVAC installations** exceeding 290kW capacity must be efficiently operated through energy performance monitoring and assessment. This should be demonstrated, for example, via an Energy Performance Contract or a Building Management System (**BMS**).

<sup>5</sup> European Commission (n.d.) [Sustainable Finance Taxonomy: Construction of new buildings](#).

**Do no significant harm criteria:**

When pursuing the climate change mitigation track, assets must not cause 'significant harm' to climate change adaptation criteria. To ensure compliance, a climate risk assessment is required. Since the methodology for this assessment aligns with that used for evaluating substantial contributions to EU Taxonomy alignment under the climate change adaptation objective, please refer to page 7 for a detailed explanation.

Following the outcome of the climate risk assessment, relevant adaptation solutions should be defined and implemented within the next five years.<sup>6</sup>

The climate risk assessment should be conducted in accordance with the criteria outlined in Appendix A of the EU Taxonomy.<sup>7</sup>

**Adherence to minimum safeguards**

Assets can only be deemed EU Taxonomy-aligned when their managing entity and business partners meet minimum safeguards across four areas: human rights and labour rights, anti-bribery and anti-corruption, tax compliance, and fair competition. Refer to an extensive elaboration on minimum safeguards on page 9.



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<sup>6</sup> The adaptation solutions implemented do not adversely affect the adaptation efforts or the level of resilience to physical climate risks of other people, of nature, of cultural heritage, of assets and of other economic activities; are consistent with local, sectoral, regional or national adaptation strategies and plans; and consider the use of nature-based solutions or rely on blue or green infrastructure to the extent possible.

<sup>7</sup> A technical explanation of the assessment process can be found in the [EU-level technical guidance on adapting buildings to climate change](#).

## Option B: Taxonomy alignment with the climate change adaptation objective

To achieve alignment with EU Taxonomy requirements for the CCA objective, an asset must comply with the following substantial contribution criteria:

### Substantial contribution criteria:

- > Implementation of adaptation solutions: Both physical and non-physical adaptation solutions must be implemented to mitigate key physical climate risks that are material to the activity.
- > Climate risk assessment: A thorough climate risk assessment should be conducted to identify, assess, and mitigate relevant physical climate risks. This includes the following steps:
  1. Physical risk screening: Identify which physical climate risks may impact the asset's performance over its lifecycle. Data from reliable providers can inform this analysis. The highlighted categories of risks in Table 3 are considered relevant for real estate in Europe,<sup>8</sup> and there might be individual situations where other risks could occur.

Table 3 – EU Taxonomy with highlighted ‘priority hazards’.

	Temperature-related	Wind-related	Water-related	Solid mass-related
Chronic	Changing temperature (air, freshwater, marine water)	Changing wind patterns	Changing precipitation patterns and types (rain, hail, snow/ice)	Coastal erosion
	Heat stress		Precipitation or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	
Acute			Water stress	
	<b>Heat wave</b>	Cyclone, hurricane, typhoon	<b>Drought</b>	Avalanche
	Cold wave/frost	<b>Storm (including blizzards, dust and sandstorms)</b>	<b>Heavy precipitation (rain, hail, snow/ice)</b>	Landslide
	Wildfire	Tornado	<b>Flood (coastal, fluvial, pluvial, ground water)</b>	<b>Subsidence</b>
			Glacial lake outburst	

<sup>8</sup> European Commission: Directorate-General for Climate Action. (2023). [EU-level technical guidance on adapting buildings to climate change – Best practice guidance](#), Publications Office of the European Union.

2. Climate risk and vulnerability assessment: Evaluate the materiality of these risks.

- Expected building lifespan less than 10 years: Conduct an assessment by at least using climate projections at the smallest appropriate scale;
- Expected building lifespan 10 years or more: Use the highest available resolution climate projections, aligned with the asset’s lifespan and including long-term projections (10 to 30 years) across IPCC scenarios<sup>9</sup> for major investments.

3. Adaptation solutions:<sup>10</sup> Assess feasible adaptation measures and implement these to reduce the identified risks. These adaptation solutions should meet regulatory standards, ensuring they:

- Do not adversely impact adaptation or resilience efforts for people, nature, cultural heritage, assets, or economic activities.
- Prioritise nature-based approaches and consider blue or green infrastructure (for more information, refer to [INREV’s publication on the impact of real estate on nature](#)).

- Align with relevant local, sectoral, regional, or national adaptation strategies.
- Are monitored against pre-defined indicators, with remedial measures taken if targets are not achieved.
- Comply with DNSH criteria, especially if involving activities covered by the TSC.

**Do no significant harm criteria:**

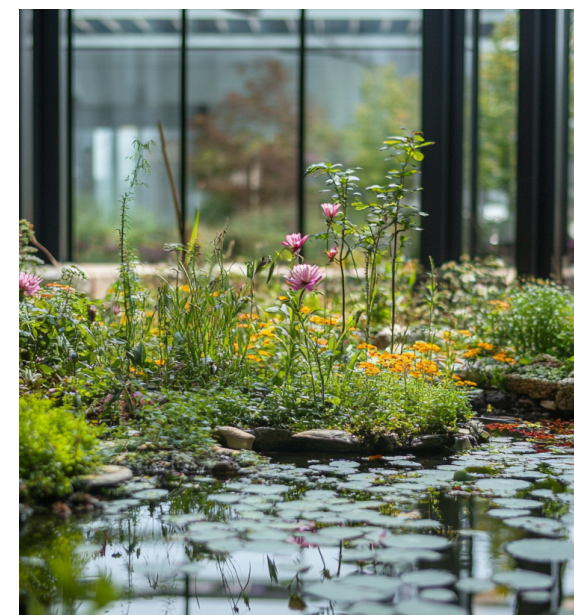
When following the climate change adaptation track, assets should not ‘significantly harm’ climate change mitigation criteria. To demonstrate this, the following requirements should be met:

- > The building must not be dedicated to the extraction, storage, transport, or manufacture of fossil fuels (for clarification, refer to [INREV’s Sustainable Investment Principles paper](#))
- > For buildings **built** before 31 December 2020, the building must meet at least an EPC C. Alternatively, the building should fall within the top 30% of the national or regional building stock in terms of operational **PED**. Adequate evidence is required to demonstrate this, while distinguishing between residential and non-residential buildings.

- > For buildings **built** after 31 December 2020, the **PED** reflecting the building’s energy performance must not exceed the threshold established for **NZEB’s** under national regulations. The performance should be certified with an “as-built” EPC.

**Adherence to minimum safeguards**

Similar to the assessment outlined for the climate change mitigation pathway.



<sup>9</sup> Intergovernmental Panel on Climate Change (IPCC) scenarios include Representative Concentration Pathways RCP2.6, RCP4.5, RCP6.0, and RCP8.5.

<sup>10</sup> Examples of adaptation solutions can be found in Appendix IV.



## Adherence to minimum safeguards

Compliance with minimum safeguards<sup>11</sup> is evaluated in four key areas:

1. Human rights and labour rights
2. Anti-bribery and anti-corruption
3. Tax compliance
4. Fair competition

A comprehensive compliance assessment involves a two-fold test for each area, including both 'positive' screening (ie checking for preventative measures) and 'negative' screening (ie identifying any controversies).<sup>12</sup>

### Key considerations for human rights, labour rights, and anti-bribery & corruption

For compliance with human rights, labour rights, and anti-bribery and anti-corruption, the following factors should be considered:

- > Scope: Non-compliance can arise from both own activities or own activities of business relationships.<sup>13</sup> In the context of acquisition and ownership of buildings, business relationships could be with property managers or tenants, making the six steps outlined on the next page relevant for them as well.
- > Materiality: For real estate entities with extensive value chains, the UN Guiding Principles on Business and Human Rights (UNGP)<sup>14</sup> recognise that conducting due diligence across all entities may be impractical, so the most significant risks should be identified instead.
- > Level of influence/control: Efforts should focus on addressing impacts within the entity's control and applying proportional influence when dealing with tenants and indirect partners.
- > Remediation: Actions should target impacts caused or contributed to by the fund, a with support provided for remediation efforts when impacts are linked but not directly caused by the fund.
- > Process integration: Human rights considerations should be incorporated into broader ESG assessments.
- > Ongoing monitoring: Compliance should be assessed prior to investment and reviewed periodically thereafter.

<sup>11</sup> Under Article 18 of the EU Taxonomy Regulation, an economic activity can only be considered environmentally sustainable if it complies with minimum safeguards.

<sup>12</sup> This assessment should be guided by international standards such as the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights (UNGPs), which emphasise responsible business conduct and the establishment of thorough due diligence processes to prevent social risks. For further details, see the [Report on Minimum Safeguards](#) (European Commission, 2022, p. 4)

<sup>13</sup> The UNGPs define 'business relationships' to include relationships with business partners, entities in the undertaking's value chain and any other entity directly linked to the undertaking's business operations, products or services.

<sup>14</sup> United Nations. (2011). [Guiding principles on business and human rights: Implementing the United Nations "Protect, Respect and Remedy" framework](#). Office of the High Commissioner for Human Rights.

### Assessment of human rights and labour rights

- I. Real estate funds should establish robust due diligence procedures aligned with six steps outlined by the UNGPs. These steps include:
  1. Adopting and embedding a commitment to human rights due diligence in policies and procedures.
  2. Identifying and assessing actual and potential adverse impacts.
  3. Implementing measures to prevent or mitigate identified impacts.
  4. Regularly tracking the implementation of these measures and their results.
  5. Communicating this approach to investors and affected stakeholders to avoid adverse impacts.
  6. Providing or facilitating remediation where necessary.
- II. Indicators of non-compliance: Include absence of human rights due diligence, liability findings for breaches, non-cooperation with National Contact Points, or unaddressed credible allegations (eg in the Business and Human Rights Resource Centre database).<sup>15</sup>

### Assessment of anti-bribery and anti-corruption

- I. Ensure that the entity has effective internal controls, ethics programs, and measures to prevent and detect bribery.
- II. Confirm that neither the entity nor its senior management, including subsidiaries, has final convictions for bribery or corruption. If such convictions exist, compliance is only met once enhanced processes reduce the likelihood of recurrence.



### Scope of tax compliance and fair competition assessments

The scope for assessing tax compliance and fair competition is generally confined to the entity's own activities. Below are a few steps that should be considered.

#### Assessment of tax compliance

- I. Confirm that the entity prioritises tax governance with adequate risk management, in line with OECD guidelines.
- II. Confirm that the entity has no convictions for tax fraud or evasion. Any such convictions should be followed by demonstrated improvements to prevent future breaches.

#### Assessment of fair competition

- I. Verify that the entity promotes compliance awareness of competition laws among employees and trains senior management.
- II. Any final breaches of competition laws must be addressed through improved processes to restore compliance.

<sup>15</sup> European Commission. (2022). [Report on minimum safeguards \(pp. 34–35\)](#). EU Platform on Sustainable Finance.



## EU Taxonomy reporting

Products undertaking EU Taxonomy assessments (as part of SFDR and CSRD reporting) should disclose their asset level aggregated percentage of alignment by AUM<sup>16</sup> as well as the proportion of turnover, capital expenditures (CapEx), and operating expenditures (OpEx) linked to Taxonomy-aligned sustainable economic activities.<sup>17</sup>

## Further considerations

Despite its detailed evaluation criteria, there are several sections in the EU Taxonomy which require further clarification to facilitate practical implementation. These include:

Climate change mitigation requirements:

- 1) Establishing thresholds for alternative assessment methodologies where EPCs or PED data are unavailable. This may differ per country due to different stages of maturity of the topic.
- 2) Addressing gaps in benchmarks to ensure that assets can be accurately assessed.

Climate change adaptation requirements:

- 1) Researching or developing robust methodologies for quantifying adaptation measures and assessing their effectiveness.
- 2) Clarifying the criteria for determining when a building is sufficiently adaptive to meet the Taxonomy's criteria.

Minimum safeguards:

- 1) Examining how compliance with minimum safeguards can be operationalised in practice.
- 2) Clarifying the necessary policies and processes to assess the materiality of risks across the value chain.

<sup>16</sup> AUM refers to market value of assets.

<sup>17</sup> Reporting entities can use the [EU Taxonomy Calculator](#), to compute the proportion of OpEx, CapEx and turnover linked to taxonomy aligned activities.

## Conclusion and next steps

The EU Taxonomy provides a framework to align real estate investments with sustainability goals, promoting environmental and social responsibility in the sector. This paper introduces the EU Taxonomy's principles, outlining the requirements for substantial contributions, adherence to DNSH principles, and compliance with minimum safeguards.

As the regulatory landscape evolves, practical application challenges remain. Issues such as alternative assessment methods for climate change mitigation, quantifying adaptation measures, and operationalising minimum safeguards require further clarification.

These topics will be addressed in future INREV papers, developed in collaboration with the INREV ESG Committee and expert members, to ensure practical implementation for the real estate industry.

Aligning with the EU Taxonomy offers real estate managers and investors a more structured pathway to meet the growing demand for ESG-aligned portfolios.

While its application may present challenges and be subject to potential changes, it provides an opportunity to drive measurable progress toward sustainability and responsible investment practices.





## Appendix I. Elaboration on requested information for Taxonomy alignment

Below is a summary of information compiled from the EU Taxonomy sections and FAQs, relevant to the real estate industry.

**Year built:** To determine when a property was 'built', the date of application for a construction permit should be used. Distinction is made between construction permit applications from before and after 31/12/2020.<sup>18</sup>

### PED:

1. **The PED figure** is based on the operational primary energy demand of the building. To further specify, "the Primary Energy Demand is *'the calculated amount of energy needed to meet the energy demand associated with the typical uses of a building expressed by a numeric indicator of total primary energy*

*use in kWh/m<sup>2</sup> per year and based on the relevant national calculation methodology and as displayed on the EPC.'*

The EPBD defines in Article 2(5) primary energy as *'energy from renewable and non-renewable sources which has not undergone any conversion or transformation process'*. It also explains in Annex I that *'the energy performance of a building shall be determined on the basis of calculated or actual energy use and shall reflect typical energy use for space heating, space cooling, domestic hot water, ventilation, built-in lighting and other technical building systems'*.<sup>19</sup>

2. **National benchmarks:** Most EU countries have created national PED benchmarks. For countries or regions without PED benchmarks, and buildings that don't have an EPC label, 'In the absence of a relevant EPC, a technical study can be done to estimate the relevant threshold for the top 15% of the national (or regional) building stock for that category of building'. There may be

information available from national databases or studies produced by certain organisations (eg World Green Building Council).

Whenever there is such a study publicly available, it can be used. When there is no study available, it has to be conducted. It can be expected that eg interested market actors or associations/institutes/public authorities could be willing to conduct or commission such studies and make them public, so that other entities (in particular smaller ones) could use them afterwards.<sup>20</sup>

**HVAC output:** Non-residential buildings built before 31/12/2020 with HVAC systems with an output of over 290 kW, should be efficiently operated through energy performance monitoring and assessment. This can be demonstrated, for example, through the presence of an Energy Performance Contract or a building automation and control system in accordance with Article 14 (4) and Article 15 (4), of Directive 2010/31/EU.

**Building size** is based on Gross Floor Area (GFA).

<sup>18</sup> European Union (2023) Answer to question 143: [Commission Notice on the Implementation of the EU Taxonomy Regulation \(CELEX: 52023XC00267\)](#).

<sup>19</sup> European Union (2023) Answer to question 153: [Commission Notice on the Implementation of the EU Taxonomy Regulation \(CELEX: 52023XC00267\)](#).

<sup>20</sup> European Union (2023) Answer to question 149: [Commission Notice on the Implementation of the EU Taxonomy Regulation \(CELEX: 52023XC00267\)](#).

**NZEB:** NZEB requirements are nationally determined following implementation of Directive 2010/31/EU. Some countries outside the EU also set NZEB thresholds. When NZEB thresholds are not clearly defined in the national legislation, equivalents can be used, eg equivalents or thresholds from an EU country with a similar climate, when possible.<sup>21</sup>

**Thermal integrity testing:** Upon completion, new buildings (built after 31/12/2020) should undergo testing for air-tightness and thermal integrity<sup>22</sup> and any deviation in the levels of performance set at the design stage or defects in the building envelope are disclosed to investors and clients. For residential buildings, the testing is made for a representative set of dwelling/apartment types.

**Construction quality control process:** Robust and traceable quality control processes are an acceptable alternative to thermal integrity testing.

**Global warming potential testing:** For new buildings (built after 31/12/2020) that are larger than 5000 m<sup>2</sup>, the GWP should be calculated for each lifecycle stage, and should be disclosed by demand. For residential buildings, the calculation and disclosure are made for a representative set of dwelling/apartment types. The GWP is communicated as a numeric indicator for each life cycle stage expressed as kgCO<sub>2</sub>e/m<sup>2</sup> (of useful internal floor area) averaged for one year of a reference study period of 50 years.<sup>23</sup>



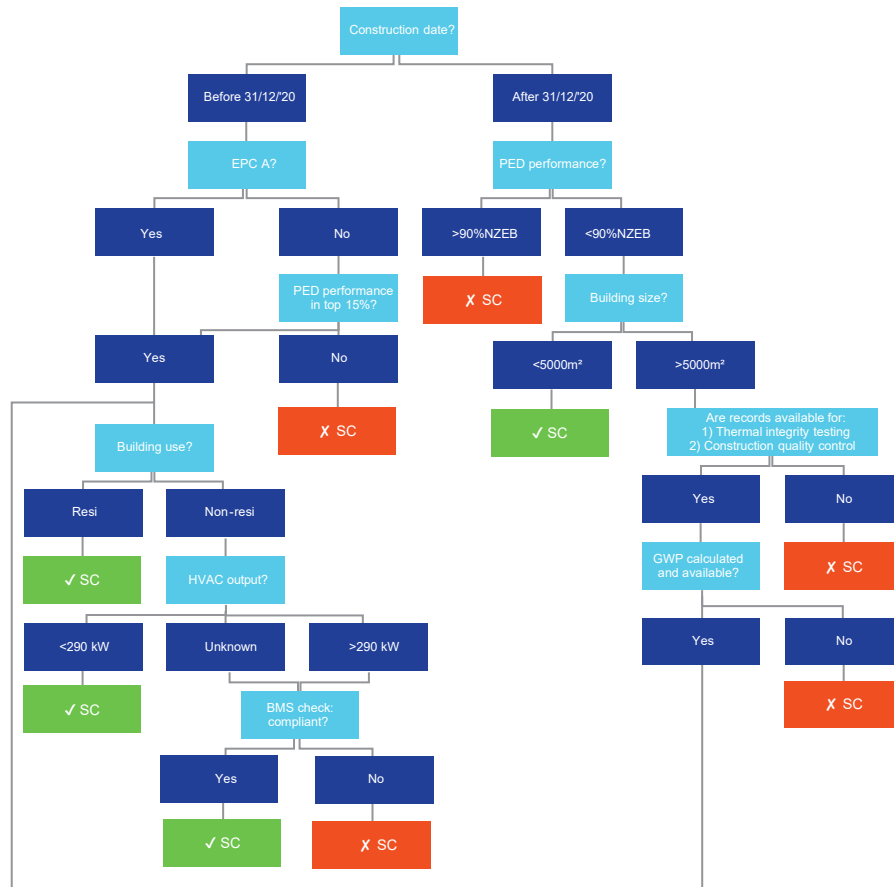
<sup>21</sup> European Union (2023) Answer to question 146: [Commission Notice on the Implementation of the EU Taxonomy Regulation \(CELEX: 52023XC00267\)](#).

<sup>22</sup> European Union (2021) [Delegated Regulation - 2021/2139](#). Requirements for testing (see footnote 284).

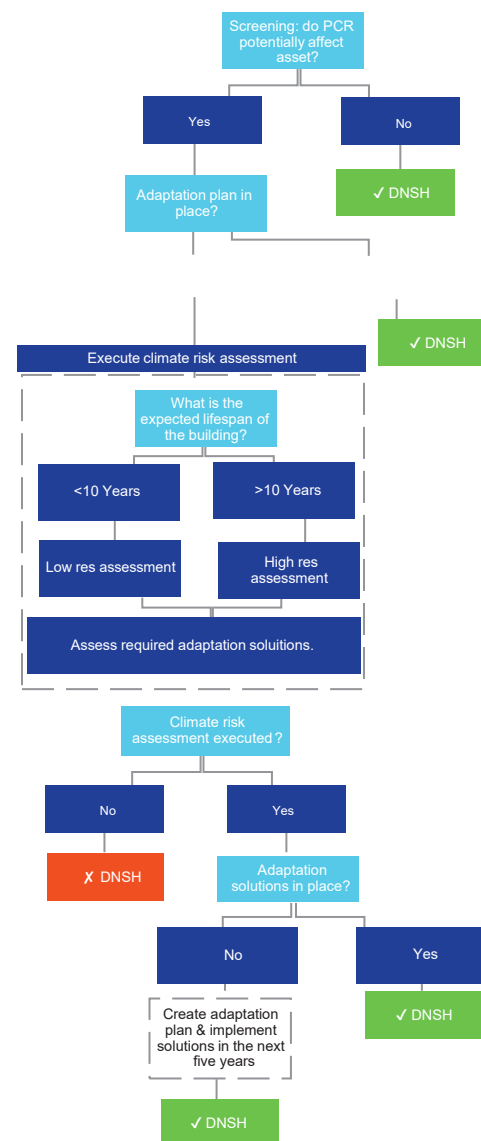
<sup>23</sup> European Union (2021) [Delegated Regulation - 2021/2139](#). Requirements for testing (see footnote 286).

# Appendix II. CCM decision tree

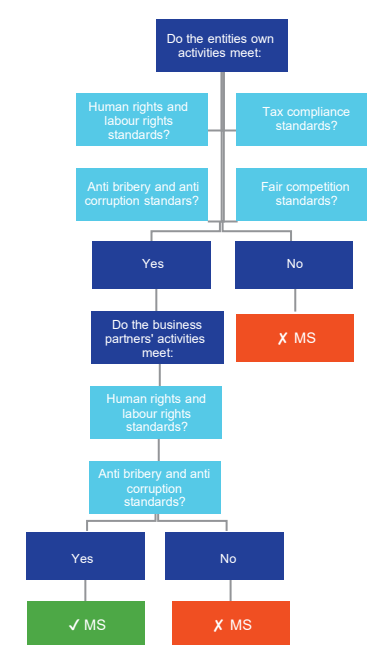
## 1. Significant contribution



## 2. Do no significant harm

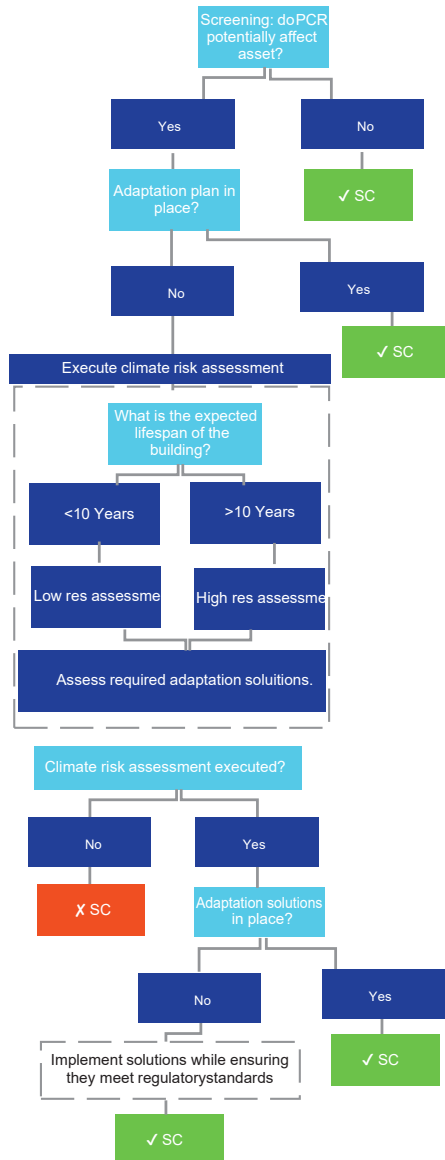


## 3. Minimum safeguards

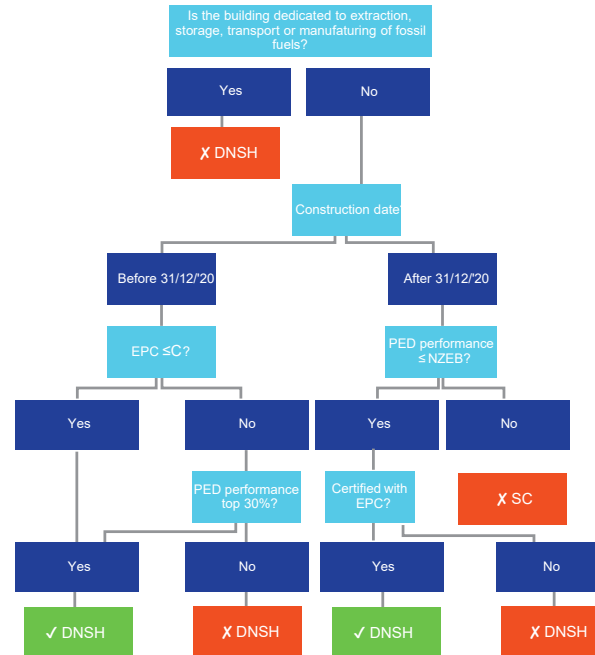


# Appendix III. CCA decision tree

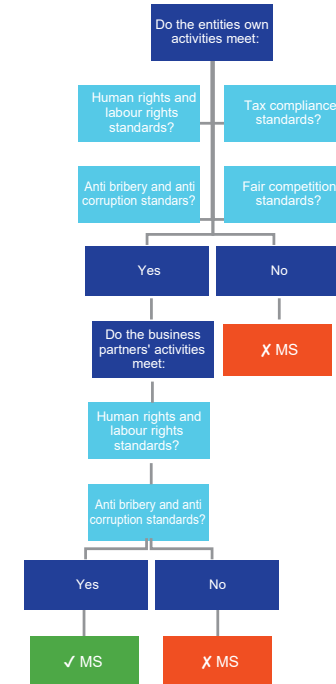
## 1. Significant contribution



## 2. Do no significant harm



## 3. Minimum safeguards





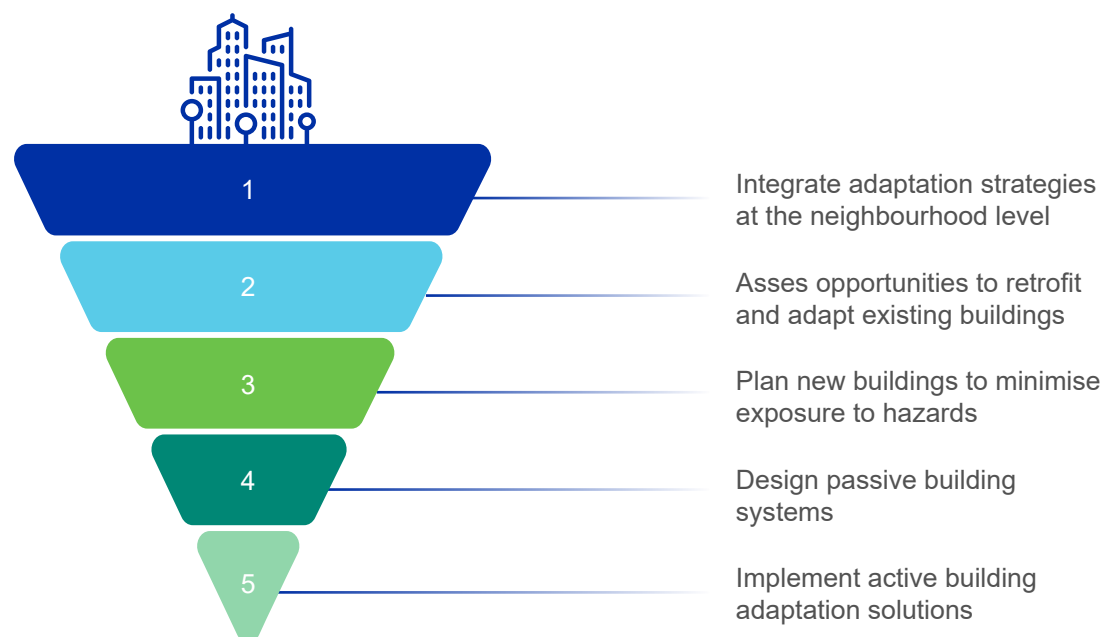
## Appendix IV. Adaptation solutions

Effective adaptation solutions for each priority hazard are outlined on the next page, focusing on measures within the control of real estate investment managers. Where building owners cannot implement these solutions directly, they are encouraged to collaborate with partners and advocate for their adoption.

These solutions address hazards categorised as 'acute' under the EU Taxonomy and are detailed in the *EU-Level Technical Guidance on Adapting Buildings to Climate Change*, published by the European Commission.

It is worth noting that not all solutions have the same impact, and official guidance highlights that a single measure is unlikely to be sufficient, nor will every solution apply to all buildings.

Figure 5 – Building adaptation hierarchy





**Table 1 – Priority climate-related hazards and best practice building adaptation solutions<sup>24</sup>**

Hazards	Examples of adaptation solutions
 <p><b>Heat wave</b></p>	<p>Retrofit:</p> <ul style="list-style-type: none"> <li>• Exterior shading for windows</li> <li>• Green roof and facades</li> <li>• Light-coloured and reflective materials</li> <li>• Insulation of walls, windows and roofs</li> <li>• Active cooling and ventilation</li> <li>• Geocooling and heat pumps<sup>25</sup></li> </ul> <p>Surroundings:</p> <ul style="list-style-type: none"> <li>• High vegetation on sun-exposed sides of the building to provide shading (exterior)</li> </ul> <p>New construction:</p> <ul style="list-style-type: none"> <li>• Natural ventilation</li> <li>• Movement joints</li> <li>• Orientation of main facades away from direct sunlight</li> </ul>
 <p><b>Storm</b> (blizzards/dust/sandstorms)</p>	<p>Retrofit:</p> <ul style="list-style-type: none"> <li>• Sealant joint in windows to prevent moisture</li> <li>• Reinforcement and protection of openings, storm shutters</li> <li>• Storm hooks to secure openings</li> <li>• Strong connections between exterior building elements (roof-walls, walls-foundations, foundations-ground)</li> <li>• Lowest liveable floor elevated above ground level</li> <li>• Short overhangs and protrusions</li> <li>• Installation of backup generators</li> </ul> <p>Surroundings:</p> <ul style="list-style-type: none"> <li>• Plant dense vegetation in rows</li> </ul> <p>New construction:</p> <ul style="list-style-type: none"> <li>• Favour aerodynamic shapes</li> <li>• Undertake performance-based wind design</li> <li>• Hip-roof (with slopes of 30°)</li> </ul>

<sup>24</sup> Adapted from [EU-level technical guidance on adapting buildings to climate change – Best practice guidance](#) (2023).

<sup>25</sup> Geocooling refers to a method of using the earth's stable underground temperature to cool a building.

Hazards	Examples of adaptation solutions
 <p><b>Heavy precipitation</b> (rain/hail/snow/ice)</p>	<p>Retrofit:</p> <ul style="list-style-type: none"> <li>• Green facades</li> <li>• Water-repellent materials</li> <li>• 4mm thick tempered glass panes</li> <li>• Hail proof blinds and shutters</li> <li>• Effective sealant</li> <li>• Warm roof</li> <li>• Anti-return valves for toilets and sinks/sewage pumps</li> </ul> <p>Surroundings:</p> <ul style="list-style-type: none"> <li>• Sustainable urban drainage systems (SuDS)<sup>26</sup></li> <li>• Rainwater tanks</li> <li>• Permeable or pervious soils</li> <li>• Drainage network dimensioned to future runoff projections</li> </ul> <p>New construction:</p> <ul style="list-style-type: none"> <li>• Inverted or pitched roofs</li> </ul> <p>Maintenance:</p> <ul style="list-style-type: none"> <li>• Regular inspection and cleaning of the roof drain, gutters and downspouts</li> </ul>
 <p><b>Flood</b> (coastal, fluvial, pluvial, groundwater)</p>	<p>Retrofit:</p> <ul style="list-style-type: none"> <li>• Wet floodproofing (vents, internal drainage system, etc.)</li> <li>• Water resistant materials (plaster-based coating or water-repellent mortar)</li> <li>• Permanent flood barrier (automatic barriers, flood walls, retractable barriers)</li> <li>• Temporary flood barriers (flood shields, sand bags, deployable and inflatable barriers)</li> <li>• Water-resistant insulation (expanded polystyrene – EPS – and extruded polystyrene – XPS)</li> <li>• Mechanical systems and utilities above flood level</li> </ul> <p>Surroundings:</p> <ul style="list-style-type: none"> <li>• Buffer zones and drainage system around the building</li> <li>• Tree planting</li> </ul> <p>New construction:</p> <ul style="list-style-type: none"> <li>• Elevated structure</li> <li>• Preliminary soil study</li> </ul>

<sup>26</sup> SuDS are designed to manage surface water runoff in urban areas in a way that mimics natural drainage processes. They include features such as permeable pavements, swales and retention basins that allow rainwater to infiltrate into the ground, reducing the risk of flooding and improving water quality by filtering pollutants before they reach watercourses.

## Hazards

## Examples of adaptation solutions



Drought

## Retrofit:

- Water-efficient fixtures and fittings
- Recycling grey water
- Rainwater harvesting
- Air-handling unit, condensate capture and reuse

## Surroundings:

- Onsite water source such as onsite water storage or wells
- Designating water stressed areas



Subsidence

## Retrofit:

- Underpinning
- Structural strengthening (horizontal and vertical reinforcements)

## Surroundings:

- Impermeable peripheral pavement around the building
- Peripheral drainage system

## New construction:

- Deep or semi-deep foundations
- Homogenous foundations (avoid partial basements)
- Movement joints

## New construction:

- Greenspace management regimes