Guide on climate proofing of infrastructure in the EU programming period 2021-2027 for Malta

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Preface

This document presents the National climate proofing guidance for investment preparation in the EU programming period 2021 – 2027 in Malta. It is based on the overarching framework presented in the EC Climate Proofing Technical Guidance[1] and it is complemented by the relevant references to the Maltese context and data sources.

It is intended to provide guidance to project promoters for the purpose of preparing projects in accordance with the climate proofing requirements for the programming period 2021-2027.

These national guidelines were prepared by JASPERS[2] in the framework of the assignment "Support for the development of a national climate proofing guidance for Malta and related dissemination and capacity building activities". The task was carried out by JASPERS in close cooperation with the Planning & Priorities Coordination Division (PPCD) under the Ministry responsible for European Funds.

[1] Commission Notice — Technical guidance on the climate proofing of infrastructure in the period 2021-2027 - Publications Office of the EU (europa.eu)

[2] JASPERS is a joint initiative between the European Investment Bank (EIB) and the European Commission that provides advisory, appraisal and capacity building support for the preparation and implementation of programmes and projects financed by EU Cohesion policy, including Just Transition Fund and the Connecting Europe Facility. For more information please visit : https://jaspers.eib.org/

National climate proofing guidance for investment preparation in the EU programming period 2021 – 2027

1 Introduction

The EU funds in the programming period 2021 – 2027 (Invest EU, Connecting Europe Facility - CEF, European Regional Development Fund – ERDF, Cohesion Fund – CF and Just Transition Fund – JTF) aim, among other objectives, at promoting the transition towards a net zero carbon economy and a resilient Europe.

Climate proofing is defined in the Common Provisions Regulation (1060/2021) as the process to prevent infrastructure from being vulnerable to potential long-term climate impacts, while ensuring that the "energy efficiency first" principle is respected and that the level of greenhouse gas emissions resulting from the project is consistent with the objective of climate neutrality in 2050 (Article 2.42).

The definition shows that climate proofing is a term encompassing the concepts of:

- mitigating the impact of infrastructure on climate change by reducing greenhouse gas (GHG) emissions during the construction and operation of the infrastructure
- adapting an infrastructure to climate change, i.e. addressing the unavoidable consequences of climate change and trying to reduce risks and improve the resilience of infrastructure; and.

The European Commission Technical guidance on climate-proofing of infrastructure projects for the period 2021-2027[3] represents the main document of reference for the present guidance.

This National guidance however does not repeat all the details of the EC Technical guidance on climate-proofing or other relevant reference documents at the EU and national level. It rather summarises them and present their key provisions, established links between them, as well as lists the key documents and resources that should be used during the climate proofing process for infrastructure investment projects.

Additional information on the resources that can be used in the climate proofing is presented in Annex I.

It should be noted that a properly done climate proofing can inform the DNSH assessment for the climate change mitigation and adaptation objectives.

[3] Technical guidance on the climate proofing of infrastructure in the period 2021-2027 (2021/C 373/01), European Commission, 2021

2 European Institutional Framework

Following the adoption of the Paris Agreement, the EU has adopted two cornerstones of its climate policy for the next decades – the European Green Deal presented in December of 2019 and the European Climate Law adopted in June 2021.

The Common Provisions Regulation (EU) 2021/1060 (CPR) is laying down the common provisions for some EU Funds such as the European Regional Development Fund (ERDF), the Cohesion Fund (CF), the Just Transition Fund (JTF), the European Social Fund Plus (ESF+) and the European Maritime, Fisheries and Aquaculture Fund (EMFAF). Recital 10 states that in the context of tackling climate change "the Funds should contribute to mainstreaming climate actions and to the achievement of an overall target of 30 % of the Union budget expenditure supporting climate objectives". Art. 6 of the CPR also clarifies that ERDF and the CF shall contribute with 30 % and 37 % respectively of the Union contribution to expenditure dedicated to the achievement of the climate objectives. Recital 10 also states that "the Funds should support activities that would respect the climate and environmental standards and priorities of the Union and would do no significant harm to environmental objectives within the meaning of Article 17 of the EU Taxonomy Regulation". In this respect it calls for "adequate mechanisms to ensure the climate proofing of supported investment in infrastructure should be an integral part of programming and implementation of the Funds".

Climate resilience is a criterion for assessing the operations to be included in the 2021-2027 NSRF in accordance with Article 73 (2):

"In selecting operations, the managing authority shall:

....

(j) ensure climate proofing of investments in infrastructure with an expected lifetime of at least 5 years."

3 National framework

The following is a non-exhaustive list of relevant national legislation, strategies and reports in relation to the climate proofing exercise:

Legislation

- Resources Authority Act (Chapter 423 of the Laws of Malta)
- Climate Action Act (Chapter 543 of the laws of Malta)
- Environment Protection Act (Chapter 549 of the Laws of Malta)
  - Environmental Impact Assessment Regulation (SL549.46)
  - Strategic Environmental Assessment Regulation (SL549.61)
- Building and Construction Authority Act (Chapter 623 of the Laws of Malta)

Policy Documents, Strategies and reports

- Malta Low Carbon Development Strategy
- Malta's 2030 National Energy and Climate Plan (NECP)
- Long Term Renovation Strategy 2050
- Long Term Waste Management Plan 2021-2030

- National Transport Strategy 2050
- Transport Malta Plan 2025
- National communication of Malta under the United Nations Framework Convention on Climate Change: Latest National Report (2023) and GHG inventory 1990 – 2021 (2023)
- Information on national adaptation actions reported under the Governance Regulation
- Malta's Sustainable Development Vision for 2050
- National Strategy for the Environment 2050
- National Environmental Policies - ERA
- National Agricultural Policy 2018-2028

4 Undertaking climate proofing within infrastructure investment preparation in Malta

Climate proofing was already a requirement for Cohesion's funded major projects in the EU 2014-2020 programming period. This requirement has now been extended to a wider range of EU Funds (including CEF, Invest EU, ERDF, CF and JTF).

Under the CPR for the 2021-2027 programming period, a climate proofing assessment has to be performed for ***all the investments in infrastructure which have an expected lifespan of at least 5 years***.

According to the EC Guidance, infrastructure is a broad concept which includes:

- buildings, from private homes to schools or industrial facilities, which are the most common type of infrastructure and the basis for human settlement;
- nature-based infrastructures such as green roofs, walls, spaces, and drainage systems.
- network infrastructure crucial for the functioning of today's economy and society, notably energy infrastructure (e.g. grids, power stations, pipelines), transport (fixed assets such as roads, railways, ports, airports or inland waterways transport infrastructure), information and communication technologies (e.g. mobile phone networks, data cables, data centres), and water (e.g. water supply pipelines, reservoirs, waste water treatment facilities);
- 'green' infrastructure and mixed forms of 'grey/green infrastructure' as planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, green infrastructure is present in rural and urban settings;
- systems to manage the waste generated by businesses and households (collecting points, sorting and recycling facilities, incinerators and landfills);
- other physical assets in a wider range of policy areas, including communications, emergency services, energy, finance, food, government, health, education and training, research, civil protection, transport, and waste or water;
- other eligible types of infrastructure may also be laid down in the fund-specific legislation, for instance, the InvestEU Regulation includes a comprehensive list of eligible investments under the sustainable infrastructure policy window.

In order to ensure adherence to this Article, the Managing Authority identified this requirement as an eligibility criterion in selecting operations. Consequently, Climate Proofing should be not perceived as an additional bureaucratic procedure but, rather as an assessment which is necessary for project promoters to develop climate neutral and resilient projects.

In order to ensure climate proofed investments, it is essential that this assessment is integrated into the different stages of project cycle management. Not all low-carbon and/or climate adaptation options are always available at all stages of the project cycle – some decisions are better taken at the level of strategy and/or plan, some are more suited for the operational management of specific projects. If climate change considerations are included starting from earlier stages of project preparation, a broader set of potential climate resilient and low-carbon solutions might be considered, including potentially more cost-effective ones.

When a development proposal is subject to an EIA, a holistic assessment is undertaken vis-à-vis all environmental concerns which are expected to be relevant to the proposal and potentially significant when considering the nature, scale and location of the project under assessment. The specimen Terms of Reference for the preparation of an Environmental Impact Assessment issued by the Environment & Resources Authority (ERA) includes in Section 4.2 the following regarding climate considerations:

"**Impacts related to Climate Change and Climate Change Adaptation**
The assessment should address the following aspects, as relevant:
1. The contribution of the project to greenhouse gas (GHG) emissions and climate change, including:

> (i) The direct, indirect and off-site GHG emissions and related impacts during all relevant phases of the project, including those arising as a result of the electrical power demand of the project;
> (ii) Any massive GHG emissions that may occur as a consequence of accidents or malfunctions;
> (iii) The impacts of the proposal on carbon sinks (e.g. wooded/afforested areas, agricultural soils, landfills, wetlands, and marine environments);
> (iv) The components of the project that are expected to contribute to renewable energy generation on site or to a reduction in GHG emissions through substitution of current generation facilities, including a quantification and critique of their reliability and actual net contribution to climate change mitigation as well as an identification of the impacts of such components on other aspects of the environment (e.g. landscape, land take, avifauna); and
> (v) The implications of the project and its operations and ancillary demands on National GHG emission targets.

2. The implications of climate change on the proposal, including:

> (i) The aspects/elements of the project that are likely to be affected by changes or variability in climate-related parameters (e.g. temperature, humidity, weather patterns, sea level, etc.);
> (ii) The potential impacts that such changes may have on the proposal, including any possible impacts resulting from changes to multiple parameters; and
> (iii) The adaptability of the project and its components and operations vis-à-vis the relevant climate change parameters and trends."

Complimenting the above EIA assessment, the following sections provide an overview of the climate proofing process whilst identifying practical information within the Maltese context.

4.1 Available national data

Annex I sets out the National sources for climate information and data that can be used in the climate proofing exercise. The climatic data from the latest projections for Malta should be used in the climate resilience proofing exercise and could be complimented with information from other data sources such as studies and data sources providing information on geological/soil characteristics, water resources etc. The beneficiary of the project should ensure that the latest and most relevant data from reliable sources is used in the climate proofing assessment of the project.

4.2 Methodological texts, instructions

The main methodological documents that should be used for the development of the climate proofing assessment and the appraisal of the climate proofing criterion are:

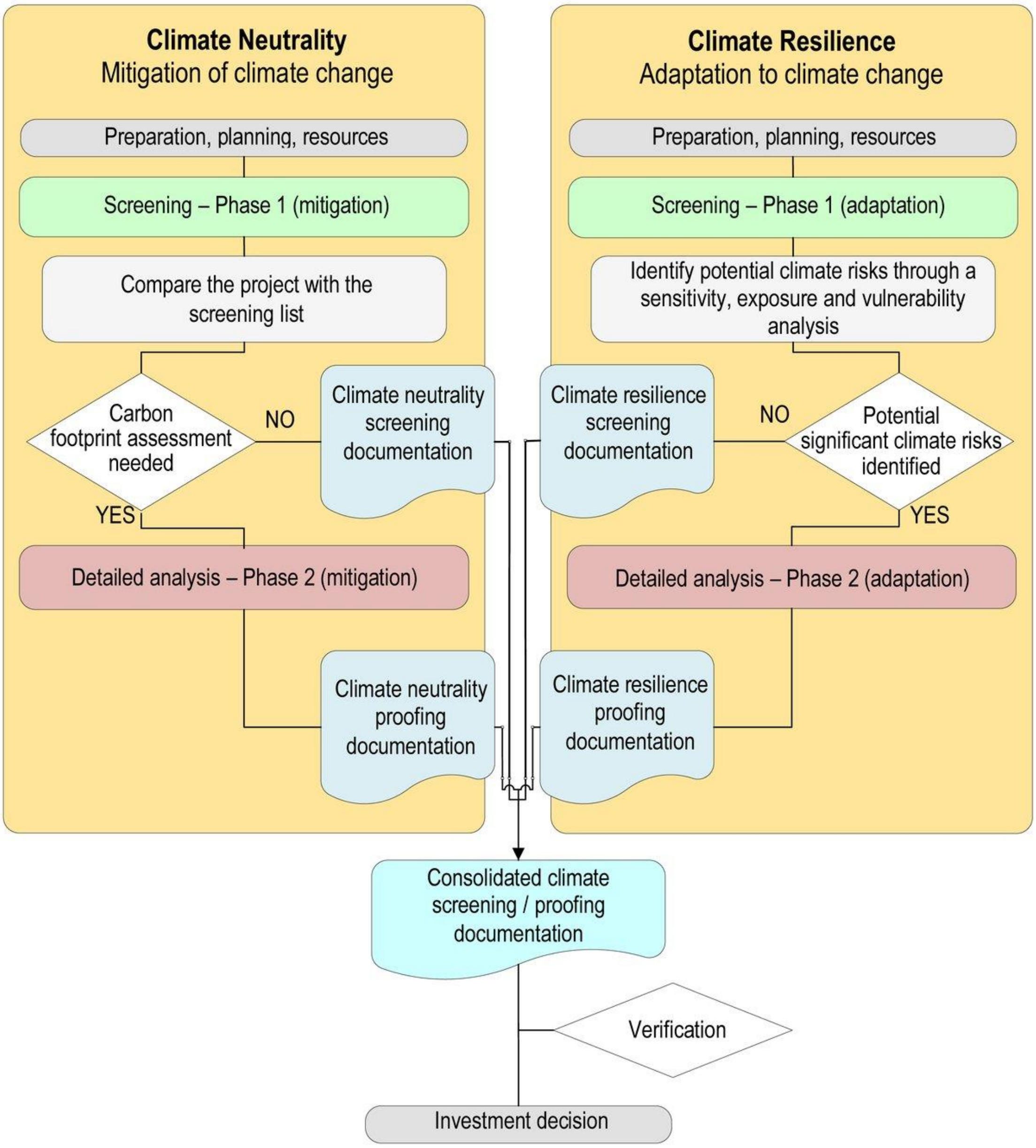
- Communication from the Commission "**Technical guidance on climate proofing of infrastructure in the period 2021-2027**" (2021/C 373/01) (hereafter Technical Guidance) – This is the main guidance document setting out the climate proofing methodology and the one that climate proofing assessment of projects should be aligned with.
- **JASPERS Guidance Note the Basics of Climate Change Adaptation Vulnerability and Risk Assessment** (June 2017) – This document was developed for the 2014-2020 period and was considered during the development of the European Commission Technical Guidance. The methodology proposed is very similar to the one included in the EC Technical Guidance and the document also provides practical information on how to do the climate vulnerability and risk assessment which is relevant for the climate resilience proofing. The JASPERS guidance also includes a comprehensive list of climate hazards that could be used in the climate resilience proofing.
- **EIB Project Carbon Footprint Methodologies**: Methods for the Assessment of Project GHG Emissions and Emission Variations. The latest version of the methodology at the time of the carbon footprint assessment should be used. The link provided is for current version of January 2023.
- **EC Guide to Cost-Benefit Analysis of Investment Projects** – Economic appraisal tool for Cohesion Policy 2014-2020 (2014) which is also applicable in the 2021-2027 programming period.
- **Economic Appraisal Vademecum 2021-2027** - General Principles and Sector Applications (2021) which is complimentary to the EC Guide to CBA of investment projects.

The Technical Guidance contains references to additional relevant documents that are useful for integrating climate proofing in different stages of the project cycle (e.g SEA, EIA). The Technical Guidance complimented by the abovementioned documents sets the analytical methodology for assessing both climate change adaptation and mitigation proofing.

4.3 Key elements of climate proofing

According to the Technical Guidance, climate proofing includes two pillars (see): a climate neutrality proofing that validates the project's compatibility with the objective of climate neutrality by 2050, and the climate resilience proofing that verifies the resilience of the infrastructure to foreseeable climate risks during its lifetime.

Figure 1 Climate proofing and its two pillars: 'climate neutrality proofing' and 'climate resilience proofing'



Source: European Commission (2021)

The assessment of both climate neutrality and climate resilience, in accordance with the Technical Guidance, is carried out in two phases:

- Screening (phase 1) that involves a relatively simple determination whether the proposed infrastructure may cause significant emissions of greenhouse gasses (so-called climate neutrality screening) and whether it could potentially be vulnerable to present and future climatic conditions (so-called the climate resilience screening); and

- Detailed analysis (phase 2) which is conducted only when the screening indicates that the project requires more detailed scrutiny on each of the two assessments.

The time, cost and effort put into climate proofing should be proportionate to the expected benefits. This is reflected, for instance, in the way the climate proofing process is divided into two phases, with screening in phase 1 and a detailed analysis only carried out in phase 2 where warranted. Planning and integration into the project development cycle should help avoiding duplication of work, for instance between climate proofing and environmental assessments, reduce cost and the administrative burden.

The costs for the implementation of the necessary mitigation and adaptation measures can be included in the project costs.

A general description of the methodology included in the Technical Guidance is provided below.

5 Climate neutrality proofing

Mitigating climate change involves decarbonisation, energy efficiency, energy savings, and deploying renewable forms of energy. It involves taking action to reduce GHG emissions or increase GHG sequestration and is guided by EU policy on emission reduction targets for 2030 and 2050.

This is translated into the climate neutrality proofing exercise as described in the Technical Guidance and that is presented in Figure 2. The following text summarises the key provisions related to climate neutrality assessment.

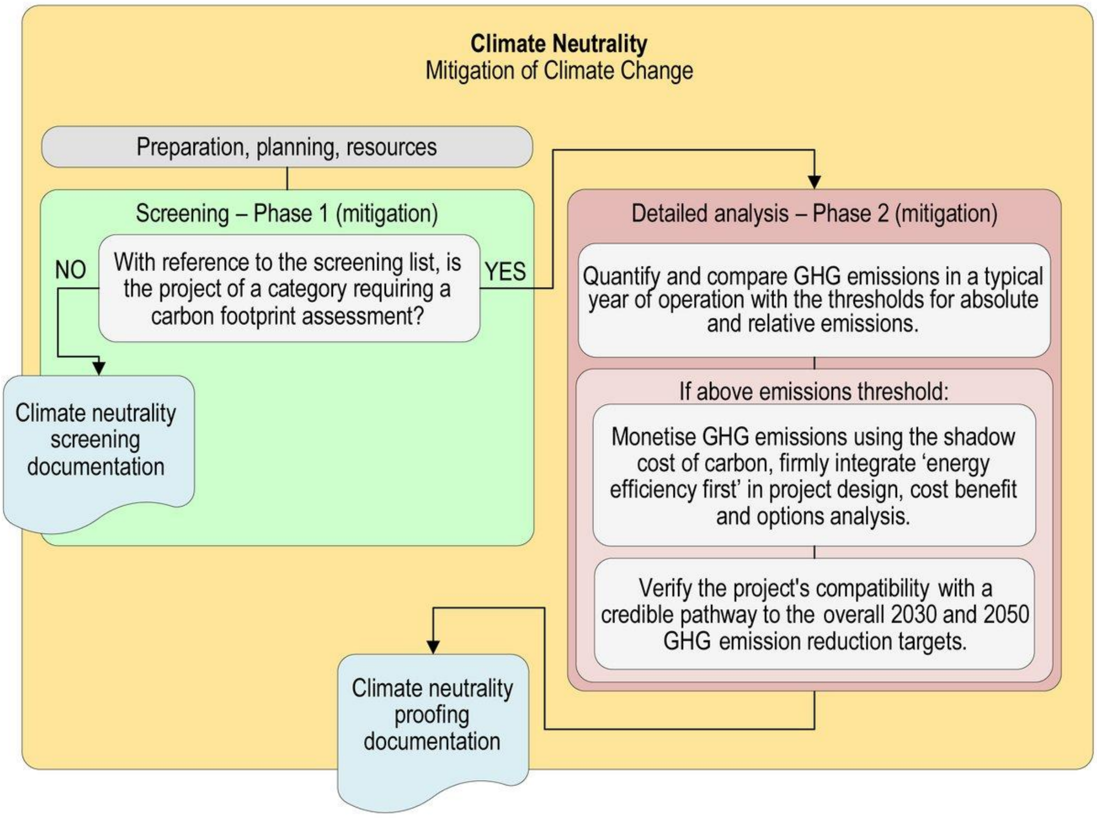
The EC Guidance recommends that the climate neutrality proofing that involves calculation of the greenhouse gas (GHG) emissions and their monetisation should be conducted for individual investments that may cause significant GHG emissions.

The principle of 'energy efficiency first'[4] emphasises the need to prioritise alternative cost-efficient energy efficiency measures when making investment decisions, in particular cost-effective end-use energy savings.

Quantifying and monetising GHG emissions can support investment decisions. In addition, a substantial share of the infrastructure projects that will be supported in the period 2021-2027 will have a lifespan that extends beyond 2050. Therefore, an expert analysis is needed to verify whether the project is compatible with, for instance, operation, maintenance and final decommissioning in the overall context of net zero GHG emissions and climate neutrality.

[4] Commission recommendation on Energy Efficiency First: from principles to practice — Guidelines and examples for its implementation in decision-making in the energy sector and beyond

Figure 2 Overview of the climate mitigation related process for climate proofing (hereafter referred to as climate neutrality proofing)



Source: European Commission (2021)

5.1 Phase 1 – Climate neutrality screening

The European Commission Technical Guidance recommends using the EIB carbon footprint methodology and assess all projects that may cause significant emission greater than 20,000 tonnes CO_2e/year (absolute or relative).

ABSOLUTE GHG EMISSIONS: Project's emissions estimated for an average year of operation.

RELATIVE GHG EMISSIONS: The difference (delta) between the absolute project emissions and the baseline scenario emissions (for an average year of operation).

According to the Guidance, a simple screening step is required for all infrastructure project in order to determine if a detailed analysis is needed.

Table *1* shows indicative categories of operations for which the assessment is limited to screening (Phase 1) and the second section shows indicative categories of operations requiring not only screening (Phase 1) but also detailed analysis (Phase 2).

In case of uncertainty as to whether the project's absolute and/or relative emissions could exceed 20,000 tonnes CO_2e/year (positive or negative), a preliminary carbon footprint calculation should be performed. If a type of infrastructure is not explicitly mentioned in Table 1 then the beneficiary should do a preliminary carbon footprint calculation to check if the GHG emissions (absolute and relative) are above or below 20,000 tonnes CO_2e/year.

It must be highlighted that in some cases, depending on the scale of the project, even infrastructure projects that are in the first group might require a detailed analysis if they exceed the threshold of GHG emissions. It is responsibility of the beneficiary to determine if the GHG emissions threshold is exceeded and thus a detailed analysis would be required.

Table 1 Climate neutrality screening list

Screening	**Categories of infrastructure projects**
In general, depending on the scale of the project, a carbon footprint assessment WILL NOT be required in these project categories. As regards the climate proofing process to mitigate climate change, the process ends with phase 1 (screening).	Telecommunications services
	Drinking water supply networks
	Rainwater and wastewater collection networks
	Small-scale industrial wastewater treatment and municipal wastewater treatment
	Property developments[5]
	Mechanical/biological waste treatment plants
	Research and development activities (R&D)
	Pharmaceuticals and biotechnology
As a general rule, an assessment of the carbon footprint WILL[6] be required for these project categories. As regards the climate proofing process for climate change mitigation, the process for the categories of specific project types will include phase 1 (screening) and phase 2 with detailed analysis.	Municipal solid waste landfills
	Municipal waste incineration plants
	Large wastewater treatment plants
	Manufacturing industry
	Chemicals and refining
	Mining and basic metals
	Pulp and paper
	Rolling stock, ship, transport fleet purchases
	Road and rail infrastructure[7], urban transport
	Ports and logistic platforms
	Power transmission lines
	Renewable energy

[5] Including among other safe and secure parking and external border checks.
[6] Any infrastructure that is not eligible for funding should be excluded.
[7] Measures addressing road safety and reduction of rail freight noise may be exempted.

Screening	Categories of infrastructure projects
	Fuel production, processing, storage and transport
	Cement and lime production
	Glass production
	Heat and power generating plants
	District heating networks
	Natural gas liquefaction and re-gasification facilities
	Gas transmission infrastructure
	Any other category or scale of infrastructure for which the absolute and/or relative emissions could exceed 20 000 tonnes CO 2 e/year (positive or negative)

5.2 Phase 2 – Climate neutrality detailed analysis

The detailed analysis of which infrastructure projects fall within this scope shall include quantification and monetisation of GHG emissions (and reductions) and their consistency with the climate change mitigation targets for 2030 and 2050.

The assessment typically involves the following main steps:

- Setting up boundaries of the GHG emissions assessment
- Determining baseline situation and the project/project alternative(s)[8] to be considered in the assessment
- Estimating the GHG emissions for the baseline and the project /project alternative(s) according to the EIB carbon footprint methodology
- Estimating the carbon externalities using shadow carbon prices and including them in the CBA or alternative Economic Appraisal method used
- Verifying compatibility with a credible GHG pathway based on the EU's 2030 and 2050 emissions targets

While it is understood that each project is unique, the following principles should be used during the assessment steps:

Setting up boundaries of the GHG emissions assessment and estimating the GHG emissions

The project boundary defines what is to be included in the calculation of the absolute and relative emissions. The EC Guidance suggests that the GHG emissions assessment should quantify both absolute and relative GHG emissions for a typical year of the project operation.

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[8] Project alternative(s) are understood as project option(s) considered in the relevant project preparation stage (if relevant).

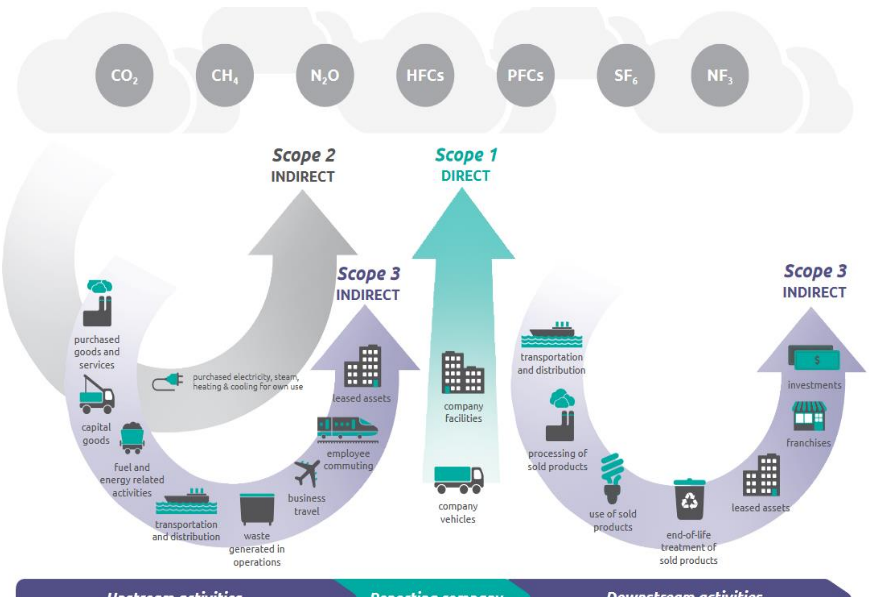
Absolute and relative emissions are defined as:

- Absolute emissions are those generated in an average year of operation.
- Baseline emissions are the emissions that would be generated from the expected alternative scenario that would have occurred in the absence of the project, estimated for an average year of operation.
- Relative emissions are the difference between absolute emissions and baseline scenario emissions.

The GHG emissions assessment may cover the following scopes of GHG emissions:

- **Scope 1** (Direct) GHG emissions: Direct GHG emissions physically occur from sources that are operated by the project. For example, emissions produced by the combustion of fossil fuels, by industrial processes and by fugitive emissions, such as refrigerants or methane leakage.
- **Scope 2** (Indirect) GHG emissions: Scope 2 accounts for indirect GHG emissions associated with energy consumption (electricity, heating, cooling and steam) consumed but not produced by the project. These are included because the project has direct control over energy consumption, for example by improving it with energy efficiency measures or switching to consume electricity from renewable sources.
- **Scope 3** (Indirect) GHG emissions: Scope 3 emissions are all other indirect emissions that can be considered a consequence of the activities of the project (e.g. emissions from the production or extraction of raw material or feedstock and vehicle emissions from the use of road infrastructure, including emissions from the electricity consumption of trains and electric vehicles).

Figure 3 Overview of GHG Protocol scopes and emissions across the value chain



Source: [GHG Protocol Figure 1.1 of "Scope 3 Standard"]

Determining the baseline situation and the project alternative(s) to be considered in the assessment

The baseline for the carbon footprint methodology is often referred to as the "likely alternative" to the proposed developments, and the baseline for the calculation of the relative

GHG emissions or emission reductions that will be achieved through the project. The baseline situation should outline the situation without the project and should ideally consider not only the absence of the project but also the likely changes in the baseline conditions in the absence of the proposed project over its lifetime – e.g., the expected future transport flows without the project.

The different project alternative(s) that are defined of the project options analysis should be assessed in respect of GHG emissions (and related externalities) as part of the options comparison.

This assessment might also be part of criteria for comparing options at different stages of the project preparation together with other relevant criteria/objectives.

Estimating the GHG emissions for project alternative(s) and counterfactuals

The calculation of the carbon footprint should be done in accordance with a reliable carbon footprint methodology. The EC Guidance recommends conducting the GHG emission calculations with the help of the Carbon Footprint Methodologies of the European Investment Bank. The EIB methodology mainly includes Scope 1 and 2 emissions in the carbon footprint. However, for certain sectors in which the scope 3 emissions associated with the projects are significant and can be estimated (e.g., transportation or biofuel production and bioenergy projects), scope 3 emissions may be included as well in the carbon footprint.

Estimating the carbon externalities using shadow carbon prices and using them in the CBA

If relative and/or absolute emissions exceed the limit of 20.000 tonnes CO_2 per year, in order to facilitate the proper reflection of the carbon externalities of proposed projects, a monetisation of the GHG emissions needs to be done in the form of financial/economic analysis.

The following table provides information about the type of financial studies required in Malta for the 2021-2027 Programming Period:

Table 2 Type of economic appraisal required in the 2021-2027 Programming Period[9]

<table>
<tr><th>Project Cost</th><th>Revenue Generating?</th><th>Study required</th></tr>
<tr><td rowspan="2">€0 - €1,000,000</td><td>No</td><td>None</td></tr>
<tr><td>Yes</td><td>Financial Assessment</td></tr>
<tr><td rowspan="2">€1,000,001 - €5,000,000</td><td>No</td><td rowspan="2">Financial Feasibility Study</td></tr>
<tr><td>Yes</td></tr>
<tr><td rowspan="2">More than €5,000,001</td><td>No</td><td rowspan="2">Full Cost Benefit Analysis</td></tr>
<tr><td>Yes</td></tr>
</table>

[9] Together with the applicable financial study, applicants are to compile and submit the checklists for project appraisal to be completed by the Project Promoter and Consultant. Templates of checklists to be submitted can be accessed from the following link: https://fondi.eu/important_documentat/erdf-cf-templates/

Further guidance on the methodologies for economic appraisal of investments can be found in the EC Guide to Cost-Benefit Analysis of Investment Projects – Economic appraisal tool for Cohesion Policy 2014-2020 and the Economic Appraisal Vademecum 2021-2027. The Commission Guidance on climate proofing suggests using the shadow cost of carbon published by EIB to estimate the value of net carbon savings or emissions in a cost-benefit analyses representing society's point of view. As indicated in the table below, the shadow costs of carbon are expected to increase over-time and they may become factor for the economic appraisal of proposed projects.

Table 3 Shadow cost of carbon for GHG emissions and reductions in €/tCO2e, 2016-prices

Year	2020	2025	2030	2035	2040	2045	2050
€/tCO2e	80	165	250	390	525	660	800

Source: EIB Group Climate Bank Roadmap 2021-2025

Verifying compatibility with a credible GHG pathway based on the EU's 2030 and 2050 emissions targets

The final step in the carbon neutrality proofing is the verification of the project's compatibility with a credible GHG pathway based on the EU's 2030 and 2050 emissions targets and with the goals of the Paris Agreement, the European Climate Law could be based on long-term strategy, the Maltese National Energy and Climate Plans (NECPs) covering ten-year periods starting from 2021 to 2030 (and its subsequent updates once available) and other relevant official documents.

Based on the analyses outlined above, the EU-funded projects should demonstrate that the GHG emissions will be reduced in a way that is consistent with the overall Union objectives for 2030 and 2050, and with any other relevant targets for the sector to which the project belongs.

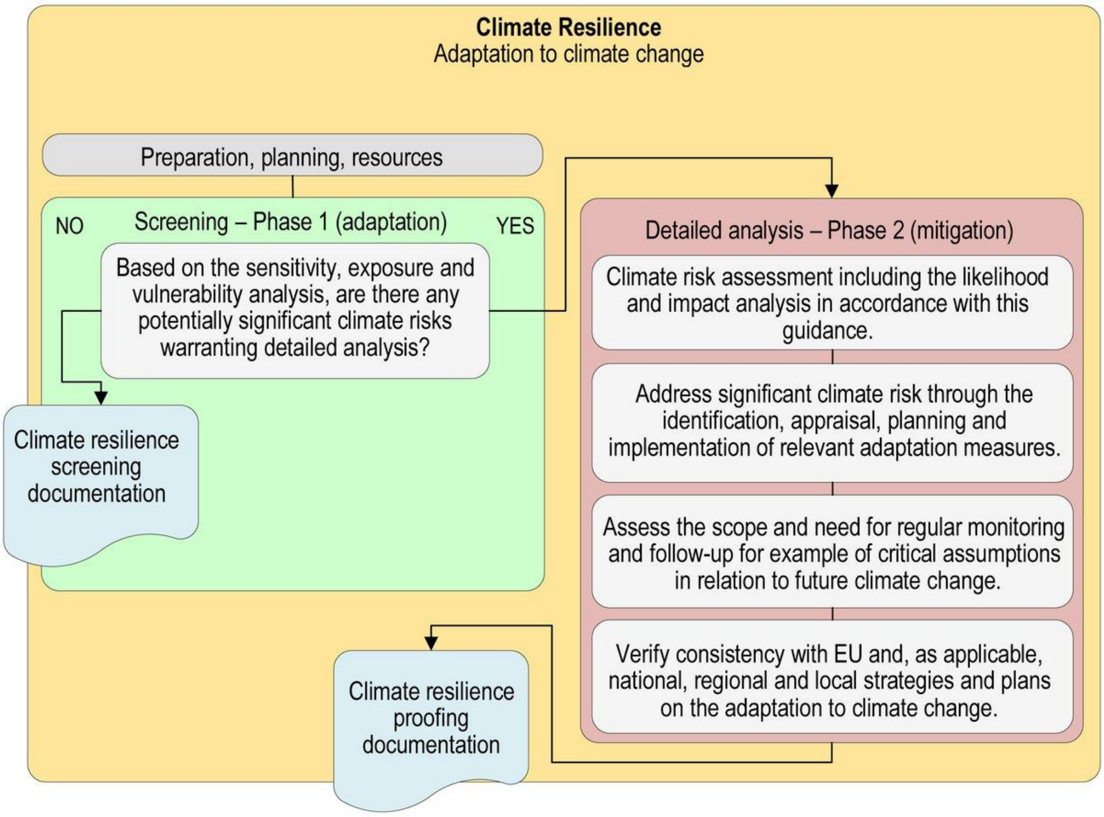
For some sectors (e.g. transport) the project-level decisions are often constrained by choices made at the higher-level strategies and plans (being at local/regional or national level), and thus it is highly recommended to conduct proper climate neutrality proofing for those (sectoral) strategies and plans. It means assessing GHG reductions resulting from those sectoral strategies (e.g. transport strategies) and their alignment vis-à-vis the relevant sector targets when available and/or with the overall pathway to neutrality. Therefore, for these sectors the assessment at strategy level (where the project is identified) can effectively generate information to support the compatibility of specific projects[10].

[10] For some projects (e.g. road infrastructure), the positive conclusions of the assessment of compatibility with EU GHG emissions reduction targets might only be possible when it is effectively demonstrated at the level of the strategy the project is part of.

6 Adaptation to climate change

The climate resilience process is illustrated in Figure 4 and the following text summarises key provisions.

Figure 4 Overview of the climate adaptation-related process for climate proofing (hereafter referred to as climate resilience proofing)



Source: European Commission (2021)

Climate resilience proofing aims to ensure an adequate level of resilience of the infrastructure to the impacts of climate change over its lifetime. These impacts include extreme events such as more intense floods, cloudbursts, droughts, heatwaves, wildfires, storms and landslides, as well as chronic events such as projected sea-level rise and changes in average precipitation, soil moisture, air humidity, etc.

The climate vulnerability and risk assessment helps to identify the significant climate risks for the project. It is the basis for identifying, appraising and implementing targeted adaptation measures which will help reduce the residual risk to an acceptable level.

It must be highlighted that the climate resilience assessment (particularly the exposure analysis and risk analysis) should cover the entire lifespan of the project.

At the same time, it should be ensured that the project is aligned with the EU the national adaptation strategies and plans.

6.1 Basic concepts

❖ Climate hazards

Climate change refers to a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.

Hazard is the potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.

The sensitivity and exposure analysis will determine the exact climate hazards that are relevant for a specific project at a given location in Malta and should be determined by the project beneficiary during the climate proofing assessment.

A non-exhaustive list of climate-related hazards that can be used in the climate proofing exercise is set out[11] in Delegated Regulation (EU) 2021/2139 and Appendix A and are presented in *Table 4*.

Table 4 List of climate hazards according to the EU Taxonomy Climate Delegated Act

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

[11] supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives

	Water-related	Temperature-related	Wind-related	Solid mass-related
	Flood (coastal, fluvial, pluvial, ground water)			
	Glacial lake outburst			

Source: European Commission (2021b)

Climate risks are classified into 4 categories in accordance with Regulation 2021/2139 Appendix A of the EU Taxonomy report, in particular:

- Temperature related hazards (thermal stress, forest fire, etc.)
- Wind hazards (storms, etc.)
- Risks related to water (sea level, drought, flooding, etc.)
- Risks related to soil (Coastal Corrosion, landslide, etc.)

An alternative list of climate hazards is presented in JASPERS working paper "The Basics of Climate Change Adaptation, Vulnerability and Risk Assessment" (see

Table 5).

Table 5 List of climate hazards according to the JASPERS working paper "The Basics of Climate Change Adaptation, Vulnerability and Risk Assessment"

Climate Hazard	Description
Average air temperature increase	Increases in average temperatures over time
Extreme temperature occurrences (including heat waves)	Changes in the frequency and intensity of periods of high temperatures, including heat waves (periods of extremely high maximum and minimum temperatures)
Average rainfall change	Trends over time of either more or less precipitation (rain, snow, hail, etc.)
Extreme rainfall events	Changes in the frequency and intensity of periods of intense precipitation
Water availability	The relative abundance or lack of water
Water temperature	Changes in the temperature of surface and ground water
Flooding (coastal and fluvial)	Flooding from the sea or from rivers
Seawater temperature	Changes in the average sea surface water temperature
Relative sea level rise	Caused by a combination of increased sea temperatures (expanding the volume of water) and melting ice sheets and glaciers
Storm surges	An abnormal rise of seawater generated by a storm, over and above the predicted astronomical tides

Climate Hazard	Description
Saline intrusion	Movement of salt water into freshwater aquifers, which can lead to contamination of drinking water sources and other consequences
Ocean salinity	Changes in the concentrations of salt in seawater
Ocean pH	Acidification of the oceans
Coastal erosion	The wearing away of land and the removal of beach or dune sediments by wave action, tidal currents, wave currents, drainage or high winds
Soil erosion	The process of removal and transport of soil and rock by weathering, mass wasting, and the action of streams, glaciers, waves, winds and underground water
Ground instability/ landslides/ avalanche	Ground instability: movement of the ground; Landslide: A mass of material that has slipped downhill by gravity, often assisted by water when the material is saturated; Avalanche: a rapid flow of snow down a sloping surface
Soil salinity	Changes in the salt content in the soil
Average wind speed	Changes in average wind speeds over time
Maximum wind speed	Increases in the maximum force of gusts of wind
Storms (tracks & intensity)	Changes in the location of storms, their frequency and intensity
Humidity	Changes in the amount of water vapour in the atmosphere
Droughts	Prolonged periods of abnormally low rainfall, leading to shortages of water
Dust Storms	A storm of strong winds and dust-filled air
Wild fire	Unwanted, unplanned and damaging fires such as forest fires and fires of shrub and grasslands
Air quality	Increased concentrations of pollutants locally, including incidents such as smog
Urban heat island effect	Cities or metropolitan areas which are significantly warmer than the surrounding rural area, caused by higher absorption of solar energy by materials in the urban area, such as asphalt
Growing season length	Changes in the seasons during which certain flora species grow, either longer or shorter
Solar radiation	The energy emitted by the sun from a nuclear fusion reaction that creates electromagnetic energy
Cold spells	Prolonged periods of extremely cold temperatures
Freeze-thaw damage	Repeated freezing and thawing may cause stress damage to structure such as concrete
Melting permafrost	Melting of previously permanently frozen soil

Source: JASPERS (2017)

Table *6* presents the climate hazards observed in Malta while Table *7* presents the qualitative trends that are expected in the future due to climate change.

Table 6 List of climate hazards observed in Malta according to Climate ADAPT portal[12]

Hazard type	Acute/Chronic	Observed climate hazards
Water	Acute	Drought
		Flood
		Heavy precipitation
	Chronic	Ocean acidification
		Precipitation hydrological variability
		Saline intrusion
		Seal level rise
		Water scarcity
Solid mass	Acute	
	Chronic	Coastal erosion
		Soil erosion
		Sol degradation
Temperature	Acute	Heat wave
	Chronic	Changing temperature
Wind	Acute	Storm
	Chronic	Changing wind patterns

Table 7 Qualitative trends for the climate hazards observed in Malta[13]

Hazard type	Acute/Chronic	Future climate hazards	Qualitative trend
Water	Acute	Drought	significantly increasing
		Flood	significantly increasing
		Heavy precipitation	significantly increasing
	Chronic	Ocean acidification	significantly increasing
		Precipitation hydrological variability	significantly increasing
		Saline intrusion	significantly increasing
		Seal level rise	significantly increasing
		Water scarcity	significantly increasing
Solid mass	Acute		
	Chronic	Coastal erosion	significantly increasing
		Soil erosion	significantly increasing
		Sol degradation	evolution uncertain or unknown
Temperature	Acute	Cold wave frost	evolution uncertain or unknown
		Heat wave	significantly increasing

[12] https://climate-adapt.eea.europa.eu/en/countries-regions/countries/malta
[13] https://climate-adapt.eea.europa.eu/en/countries-regions/countries/malta

Hazard type	Acute/Chronic	Future climate hazards	Qualitative trend
	Chronic	Changing temperature	significantly increasing
		Temperature variability	significantly increasing
Wind	Acute	Cyclone	evolution uncertain or unknown
		Storm	significantly increasing
		Tornado	evolution uncertain or unknown
	Chronic	Changing wind patterns	evolution uncertain or unknown

❖ Climate scenarios for the evolution of greenhouse gas concentration

The identification of present and future climate variables and hazards should ideally take into account the differences between historic meteorological data and relevant climate forecasts. The differences between historic and expected future climate variables should ideally reflect both mean and extreme values.

REPRESENTATIVE CONCENTRATION PATHWAYS (RCPs)

Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases (GHGs) and aerosols and chemically active gases, as well as land use/land cover. RCPs were used to develop climate projections in CMIP5

RCP-based scenarios are referred to as RCPy, where 'y' refers to the level of radiative forcing (in watts per square meter, or W m-2) resulting from the scenario in the year 2100.

These simulations are performed for three (out of the four) representative concentration pathways (RCPs) which have been proposed by the Intergovernmental Panel on Climate Change. These scenarios are as follows:

- **RCP2.6** is the pathway where radiative forcing peaks at approximately 3 W /m2 before 2100. The increase of global mean surface temperature by the end of the 21st century relative to 1986-2005 is likely to be up to 1.7oC.
- **RCP4.5** is an intermediate stabilisation pathway in which radiative forcing is stabilised at approximately 4.5 W m-2 after 2100. The increase of global mean surface temperature by the end of the 21st century relative to 1986-2005 is likely to be up to 2.6oC.
- **RCP8.5** is a high pathway for which radiative forcing reaches greater than 8.5 W /m^2 by 2100 and continues to rise for some amount of time. The increase of global mean surface temperature by the end of the 21st century relative to 1986-2005 is likely to be up to 5.8°C.

Relevant information on climate forecasts for Malta can be found in Copernicus Climate Change Service.

The EC Guidance recommends using the RCP 8.5 or RCP 6.0 for the initial screening under the climate proofing assessment. For the detailed analysis, RCP 4.5 scenario is recommended for projects with a lifespan until 2060 and the ones that are flexible enough to increase the level of climate resilience during their lifetime as and when needed (for instance, where it is feasible to increase gradually the height of flood defence systems as part of water resource management). For projects with longer life span as well as those that cannot be upgraded during their lifetime (for instance bridges or new railway lines) it is recommended to consider the expected changes in the climatic variables based on the RCP 8.5 scenario.

In the future RCPs might be replaced by the Shared socio-economic pathways (SSPs) from the VI IPCC Report but currently the RCPs should be used for the climate proofing exercise.

❖ Sensitivity and exposure

The climate hazards for which an infrastructure needs to be shielded are defined based on:

- those hazards that the infrastructure is sensitive to based on the type of the infrastructure (sensitivity), irrelevant of the location; and
- those hazards that are present in the location of the infrastructure (exposure), irrespective of the project type.

Sensitivity: The degree to which a system is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g. a change in crop yield in response to a change in the mean, range or variability of temperature) or indirect (e.g. damages caused by an increase in the frequency of coastal flooding due to sea-level rise).

Exposure: The presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected.

6.2 Screening

In order to examine whether the proposed infrastructure is resilient to potential climate change, or whether adaptation measures are required, an assessment of the **vulnerability** of the infrastructure resulting should be carried out combining:

- the **sensitivity** of the infrastructure to climate risks; and
- the **exposure** of the infrastructure area to these risks, i.e. if these climate hazards are expected to occur at the location of the infrastructure in the immediate and distant future based on the climate projections.

A full list of climate hazards as those presented in Table 4 or

Table 5 needs to be considered in order to allow for an adequate identification of project's vulnerabilities.

The main aim of this screening step is identifying in a solid and clear manner the main climate hazards of the project, to determine those that would eventually require a more detailed risk analysis.

Infrastructure sensitivity analysis

The sensitivity analysis is based on knowledge of all the elements according to which the infrastructure will be built and operated. All project components and interdependencies should be included in the assessments.

For example, the following sub-elements could be identified in an infrastructure project:

- Technical/construction part
- Elements necessary for the operation of the infrastructure
- Products/services produced by the infrastructure
- Connectivity of infrastructure with the wider region

Taking into account the wide range of types and complexity of infrastructure, the identification of the climate hazards to which an infrastructure is sensitive lies primarily with scientists who have carried out the relevant technical studies. The full list of hazards should be used in order to define the ones that are relevant to the specific type of infrastructure.

The assessment of sensitivity may be relatively straightforward (identifying whether the infrastructure is sensitive or not to a climate hazard) or more detailed (for example by setting sensitivity thresholds identifying hazards with high, medium, low or no sensitivity to each climate hazard considered). For larger projects it is recommended to use sensitivity thresholds in order to identify the relevant climate hazards.

Note that ***sensitivity does not take into account the location of the construction***. It is purely based on the project's specific factors, irrespective of the location, e.g. what the project is and how it works.

Infrastructure exposure analysis

The purpose of the **exposure analysis** is to identify the relevant climate risks for the intended location of the project, regardless of the type of project for both the immediate and the distant future.

RISK ASSESSMENT

Indicative risk table: *(example)*

Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
	Overall impact of the essential climate variables and hazards (example)				
Rare					
Unlikely		Drought			
Moderate		Heat	Flood		
Likely					
Almost certain					

Legend:

Risk level
Low
Medium
High
Extreme

The output of the risk analysis may be summarised in a table combining likelihood and impact of the essential climate variables and hazards. Detailed explanations are required to qualify and substantiate the assessment conclusions. The risk levels should be explained and justified.

In terms of climate data and projections, information is available in the sources quoted in Annex 1. Copernicus Climate Change Service in particular includes climate projections for all EU countries, including Malta.

As for the sensitivity, the Technical Guidance says that the scoring system (qualitative or numerical) should be carefully defined and explained, and the given scores should be justified. This for example can happen by setting thresholds.

Vulnerability

The vulnerability assessment combines exposure and sensitivity analysis to determine which climate hazards are related to the infrastructure in question, in terms of its type and location. It forms the basis for the decision to continue to the detailed analysis.

Vulnerability = Sensitivity score x Exposure score

For the analysis of sensitivity and exposure, a three-level rating scale (low, medium, high) can be established, showing the level of vulnerability for each climate risk (low, medium, high).

If the vulnerability assessment concludes that the project is not vulnerable to any climate hazards and that conclusion has been duly justified, there may be no need to undertake further risk assessment and the consideration of climate change adaptation shall be completed.

However, if medium or high levels of vulnerability arise for some climate hazards, a risk analysis will have to be carried out for each of them.

Two examples of vulnerability analysis table are provided below.

Table 8 Example of vulnerability analysis table according to the Technical Guidance

VULNERABILITY ANALYSIS

Indicative vulnerability table: *(example)*		Exposure (current + future climate) High	Medium	Low
Sensitivity (highest across the four themes)	High	Flood		
	Medium		Heat	
	Low			Drought

Legend: Vulnerability level
High
Medium
Low

The vulnerability analysis may be summarised in a table for the given specific project type at the selected location. It combines the sensitivity and the exposure analysis. The most relevant climate variables and hazards are those with a high or medium vulnerability level, which are then taken forward to the steps below. The vulnerability levels should be carefully defined and explained, and the given scores justified.

Table 9 Example of vulnerability analysis table with numerical scoring

		Exposure score			
		0	1	2	3
Sensitivity score	0	0	0	0	0
	1	0	1	2	3
	2	0	2	4	6
	3	0	3	6	9

High vulnerability (score ≥6)

- Project is vulnerable to this climate hazard.
- Take forward to detailed assessment (phase 2).

Medium vulnerability (score 3<6)

- Project may be vulnerable to this climate hazard.
- Take forward to detailed assessment (phase 2).

Low (or zero) vulnerability (score ≤2)

- Project is not vulnerable to this climate hazard.
- Do not progress to detailed assessment.

6.3 Detailed analysis

Risk analysis,

The detailed analysis in the climate resilience proofing should focus on climate hazards that warrant attention because of their potentially significantly impacts on the proposed project (i.e. those hazards that have been assessed with medium or high vulnerability in the screening phase). The ***assessment should be proportionate to the scale of the activity and its expected lifespan*** and should consider plausible climate projections across the existing range of future scenarios over the expected lifetime of the infrastructure.

The risk analysis is the combination of the likelihood of the occurrence of each climate risk identified at the stage of vulnerability and the effect/intensity of this climate risk.

There are various approaches for describing the **likelihood** of a hazard to occur. It is important in the beginning of the assessment to set out what sort of scale will be used to assess probability and clearly explain what it means in terms of likelihood of a hazard to occur. The scale that will be chosen should be relevant to the specificities of the project and the same scale should be used throughout the assessment. The EC Guidance suggests that the likelihood of any particular risk event may be described in qualitative or quantitative terms In all cases, the scale needs to be explained and each category needs to have a description about what that means (for example what is understood by “likely”).

When it comes to the assessment of **impacts** of the potential hazard events, the EC Guidance emphasises the need to consider not only its direct consequences but also any potential knock-on effects. The assessment may need to cover the adaptive capacity of the system in which the project operates. According to the EC Guidance, adaptive capacity is the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Impacts should be assessed on a scale of impact per hazard. This is also referred to as severity or magnitude. Again, it is important that the methodology sets out the scale for assessing severity and that this is explained clearly in relation to the project. Each category needs to have a description about what that means for the project (for example: what “Catastrophic” means).

The consequences may generally relate to physical assets and operations, health and safety, environmental impacts, social impacts (including impacts on vulnerable populations), financial implications, etc.

Indicatively, a rating scale for probability of occurrence and impact may be established with a five-level analysis as presented in the table below. This is only an example and for each project it needs to be explained clearly what each level of the scale means and it needs to be relevant to the specificities of the project.

Table 10 Example of scales for assessing likelihood and impact of climate hazards

Likelihood analysis		**Analysis of impacts**	
Scale	Meaning	Scale	Meaning
Rarely	5% chance of occurring	Negligible	Minimal impact that can be mitigated through normal activity.
Unlikely	20% chance of occurring	Very low	An event which effects the normal project operation, resulting in localised impacts of a temporary nature.
Moderate	50% chance of occurring	Moderate	A serious event requiring additional actions to manage, resulting in moderate impacts.
Likely	80% chance of occurring	Serious	A critical event requiring extraordinary action, resulting in significant, widespread or long-term impacts.
Almost certain	95% chance of occurring	Extremely severe	Disaster with the potential to lead to shut down or collapse of the asset / network, causing significant harm and widespread long-term impacts.

Having assessed the probability (likelihood) and severity of each hazard occurring, the significance level of each potential risk can be determined through a combination of the two factors. The level of risk (e.g. low, medium, high, extreme) is then determined for each rating in the above scales.

Thus, the result of the risk analysis can be summarised in a risk matrix which presents together the probability and impact of key climate variables and hazards. This shows all the climate indicators that have been examined and identified where the combination of likelihood and impact calls for action (i.e. adaptation measure).

Table *11* presents one example of how such a risk matrix may look and that would need to be tailored to the project/sector as per above.

Table 11 Example of risk assessment matrix

RISK ASSESSMENT

Indicative risk table: *(example)*	Overall impact of the essential climate variables and hazards (example)				
Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Rare					
Unlikely		Drought			
Moderate		Heat	Flood		
Likely					
Almost certain					

Legend:
Risk level
Low
Medium
High
Extreme

If the risk assessment concludes that there are no significant risks to the project from climate change, and that conclusion has been duly justified, there may be no need to undertake further assessment or additional adaptation measures.

Adaptation measures

If the risk assessment concludes that there are significant risks to the project, relevant adaptation measures that reduce identified risks to an acceptable level need to be considered. For each significant risk identified, targeted adaptation measures should be considered, assessed, and where found justified, integrated into the proposed interventions. Such measures can include:

- Structural measures – a physical change to the design of the project or its location.
- Non-structural measures – also known as soft measures, these include operational and maintenance measures plus relevant monitoring. They are more about how the infrastructure is managed in the long-term.
- Risk management – assessing whether the risks can be accepted and managed.

The potential use of nature-based solutions or rely on blue or green infrastructure to the extent possible should also be considered.

It may also be appropriate for project promoters to consider flexible/adaptive measures such as monitoring the situation and only implementing physical measures when the situation reaches a critical threshold. This option may be particularly useful when climate predictions show high levels of uncertainty. This approach is appropriate as long as the thresholds or trigger points are clearly set out and the future proposed measures can be proven to address the risks sufficiently. Monitoring should be integrated in the infrastructure management processes.

Assessing the adaptation options can be quantitative or qualitative, depending on the availability of information and other factors. In some circumstances, such as relatively low-value infrastructure with limited climate risks, it may be sufficient with a rapid expert assessment. In other circumstances, in particular for options with significant socioeconomic impact, it will be important to use more comprehensive information and assessment.

The next step is to integrate the appraised adaptation options into the project, at the right development stage, including investment and finance planning, monitoring and response planning, defining roles and responsibilities, organisational arrangements, training, engineering design and to ensure that the options comply with the applicable law.

The consideration of the adaptation measures aims to achieve the acceptable level of residual climate risks with due regard to all legal, technical or other requirements. When doing so, the determination of "acceptable level" is dependent on the expert team undertaking the assessment and the risk that the project promoter is prepared to accept. For example, there may be elements of the project which are considered to be non-essential infrastructure where the costs of adaptation measures outweigh the benefits of avoiding the risks and the best option could be to allow the non-essential infrastructure to fail under certain circumstances. This is a form of risk management and part of adaptation measures assessment considerations.

Monitoring

Since the risk assessment is a continual process, it is important to determine any critical assumptions and establish monitoring and follow-up arrangements in order to ensure that the adaptation measures are performing as envisaged and and implementing additional adaptation measures as and when needed. This is particularly important for projects relying on adaptive management.

6.4 Consistency with adaptation strategies and plans

Final step in the climate resilience proofing process is to ensure that the project is aligned with the relevant EU and, as applicable, national strategies and plans on the adaptation to climate change, including Malta's climate change adaptation strategy as well as other documentation mentioned in section 3 as may be applicable depending on the context of the project.

7 Climate proofing report

Indicatively, the documentation report should include:

Introduction:

Describe the infrastructure project, indicate its location (map as in EIA or other relevant project documentation) and outline how it addresses climate change considerations.

Climate-proofing process:

<u>1 Adaptation to climate change (climate resilience):</u>

1.a Screening

- Describe the screening and its outcome, including adequate details of the sensitivity, exposure and vulnerability analysis:
    - Describe the data sources and climate projections that were used for the assessment;
    - Describe the project components included in the analysis (i.e. processes, inputs, outputs, interdependencies);
    - List the climate hazards taken into account for sensitivity analysis (e.g. EU Taxonomy list of hazards or JASPERS list of hazards) and the scale used in the assessment;
    - Present the sensitivity analysis;
    - Present the exposure analysis for current and future climate with the scale used in the assessment;
    - Present the vulnerability analysis and summarise the climate hazards that will require detailed analysis;

1.b Detailed analysis

- For each climate hazard identified in the previous stage present a risk analysis including the probability and impact analysis;
- In case where risk analysis identifies climatic hazards please provide information on how these hazards have been taken into account in technical studies and if they adequately address the identified risks to an acceptable level;
- In case where there are climate hazards which have not been taken into account in the technical studies or if they are not adequately addressed there, provide adaptation measures which will ensure the resilience of the project against the identified climate risks;
- Describe the identification, appraisal, planning and implementation of the adaptation measures;
- Describe any regular monitoring plan and follow-up adaptation measure plan that are envisaged for the project;
- Describe the project’s consistency with the EU and National Adaptation Plans and Strategies;

<u>B. Mitigation of climate change (climate neutrality):</u>

B.1 Screening

- Describe the screening and its outcome;

B.2 Detailed analysis

- Describe the GHG emissions and compare with the thresholds for absolute and relative emissions;
- If absolute and/or relative emissions are above 20.000 t/year then monetize emissions by using shadow price;
- In case a CBA is prepared for the project, describe the economic analysis and the use of the shadow cost of carbon as well as the options analysis and the integration of the principle of ‘energy efficiency first’;
- Describe the project’s consistency with relevant EU and National Energy and Climate Plans, the EU target for emission reductions by 2030 and climate neutrality by 2050. Include a quantitative assessment of contribution of the project to the decarbonisation objectives set at national/regional/local and European Union level, as well as in the National Energy and Climate Plan for those projects that have a measurable contribution;
- For projects with an intended lifespan beyond 2050, describe the compatibility with operation, maintenance, and eventual decommissioning under circumstances of net zero GHG emissions and climate neutrality;

Annex I – Key references and data sources

UNFCCC/IPPC

- **IPCC Data Distribution Centre(DDC)** - https://www.ipcc-data.org
- **IPCC 6th Assessment Report -** https://www.ipcc.ch/assessment-report/ar6/
- **IPCC Special report on Global warming of 1.5deg Celsius** - https://www.ipcc.ch/sr15/download/
- **IPCC special report on climate change and land** - https://www.ipcc.ch/srccl/ IPPC Sixty Assessment Report – Regional Fact Sheet for Europe - https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf
- IPPC Mediterranean Region Supplementary Material - https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_CCP4_SM.pdf
- **Malta National Communication NC 8** - https://unfccc.int/documents/629690

EU Institutions and Agencies

- **Overview of disaster risks the European Union may face-** https://op.europa.eu/en/publication-detail/-/publication/89fcf0fc-edb9-11eb-a71c-01aa75ed71a1
- **European Climate Adaptation Platform (Climate-ADAPT) -** https://climate-adapt.eea.europa.eu/
- **European Commission Joint Research Centre –** https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/joint-research-centre_en
- **Climate Change adaptation of major infrastructure projects (provides access to country repots -** https://ec.europa.eu/regional_policy/en/information/publications/studies/2018/climate-change-adaptation-of-major-infrastructure-projects
- **Disaster Risk Management Knowledge Centre (DRMKC)** - https://drmkc.jrc.ec.europa.eu/
- **European Environment Agency (EEA)** - https://www.eea.europa.eu/en

Copernicus Climate Change Service

- **Climate Data Storage** - https://cds.climate.copernicus.eu/#!/home
- **Climate Change Services web page** - https://climate.copernicus.eu/

- **Atmosphere Monitoring Service** - https://atmosphere.copernicus.eu/
- **Marine Environment Monitoring Station** - https://marine.copernicus.eu/
- **Land Monitoring Service** - https://land.copernicus.eu/en
- **Security Services -** https://www.copernicus.eu/en/copernicus-services/security
- **Emergency Management Service -** https://emergency.copernicus.eu/
- **Climate change adaptation of major infrastructure projects –** https://ec.europa.eu/regional_policy/en/information/publications/studies/2018/climate-change-adaptation-of-major-infrastructure-projects

World Bank Climate Change Knowledge Portal

- **Climatology -** https://climateknowledgeportal.worldbank.org/country/malta/climate-data-historical

Energy and Water Agency

- **Flood Risk Assessment** - https://www.energywateragency.gov.mt/wp-content/uploads/2020/09/Preliminary-Flood-Risk-Assessment-for-the-Malta-River-Basin-District-2019.pdf
- **Flood hazard Maps – EWA -** https://energywateragency.gov.mt/wp-content/uploads/2022/09/FHM-and FRM_11_12_2020_Final_Draft.pdf

Malta Resources Authority

- **Adaptation to Climate Change** - https://mra.mt/climate-change/adaptation-to-climate-change/
- **Integrated River Basin Management** - https://energywateragency.gov.mt/integrated-river-basin-management/

Other

- **Climate Change Impact on the Built Environment in Coastal Regions** - http://beacon-researchproject.org/wp-content/uploads/2022/03/O1-MaltaCountry-report.pdf