



# **Climate change adaptation of major infrastructure projects**

Country report for Malta

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**Note for the readers of the printed version:** the present country report links to a large number of resources via hyperlinks, which by nature are only active in the electronic version. In order to find the identified resources, an online search will usually deliver the right result; but otherwise it is also possible to make use of Annex II of the main report where all the identified resources and their hyperlinks are presented.

**Disclaimer:** The identified resources are non-exhaustive and present a snapshot of the readily available and accessible material during 2017. This information was collected through finite web-based desk research, and through questionnaires and interviews aimed at the relevant national competent authorities (ESIF managing authorities, research institutes, ministry officials, etc.). Further resources might be available but not accessible due to privacy restrictions, or a lack of mandate to share related material. Following the publication of the present report, more resources will continue to reach the public domain, including through Climate-ADAPT and the identified national websites.

## 1. INTRODUCTION

The [EU Strategy on Adaptation to Climate Change](#) of 2013 includes actions to enhance the resilience of infrastructure and mainstream climate adaptation into the European regional and cohesion policy. The [Common Provisions Regulation](#) (CPR) of 2013 states under article 8 that climate change mitigation and adaptation, and risk prevention shall be taken into consideration for investments made with the support of the European Structural and Investment Funds (ESI Funds). The regulation integrates climate change adaptation considerations into the preparation and approval of major projects<sup>1</sup> or other projects funded by the ESI Funds through the requirement to conduct climate change vulnerability and risk assessments. In coordination with the ESI Funds, and complimentary to them, the LIFE fund in addition assists in the realisation of the climate change adaptation objectives. Climate change analyses (such as vulnerability and risk assessments) are also sporadically found to be undertaken for infrastructure projects that are financed outside the framework of EU funds.

This report for Malta focuses on the adaptation to climate change of infrastructure projects supporting the requirement to undertake climate change vulnerability and risk assessments by presenting:

- **Legal, policy and institutional framework:** A schematic outline of national and regional policy and legal framework, and organisational structure to deal with adaptation;
- **Resources:** Offering the most important resources supporting the realisation of climate change vulnerability and risk assessments for infrastructure projects. The available resources for data, methodologies, tools, guidance, design standards, system framework and institutional capacity are contextualised and listed in this section.
- **Sector overview:** Identifying the approach, main strengths and weaknesses for each of these sectors: Transport, Broadband, Urban development, Energy, Water and Waste;
- **Case studies:** Current practice in adaptation and resilience of infrastructure projects.

### ***Country Overview***

The current [National Adaptation Strategy](#) (NAS) was adopted in 2012 under the authority of the Ministry for Resources and Rural Affairs, and it builds upon the [National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gas Emissions](#) of 2009, in terms of governance and policy infrastructure. The Maltese [Ministry for Sustainable Development, Environment and Climate Change](#) (MSDEC) in Santa Venera is responsible for maintaining resources related to climate change, waste management, the environment, rural development and agriculture, amongst others. Key stakeholders within the Maltese policy and institutional framework include the Environment and Resources Authority (ERA), Malta Resources Authority (MRA) and University of Malta. A National [climate change committee](#) established within the [MRA](#) is responsible for all climate change adaptation-related activities.

Malta provides the necessary resources for climate adaptation. Data on climate change adaptation are collected by various organisations and authorities such as the Environment and Resources Authority (ERA), Malta Resources Authority (MRA) and Met

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<sup>1</sup> major project: an operation comprising a series of works, activities or services intended in itself to accomplish an indivisible task of a precise economic or technical nature which has clearly identified goals and for which the total eligible cost exceeds EUR 50 000 000 and in the case of operations contributing to the thematic objective under point (7) of the first paragraph of Article 9 of Regulation 1303/2013 where the total eligible cost exceeds EUR 75 000 000

Office. The [Ministry for Sustainable Development, Environment and Climate Change](#) (MESDCC) also provides general analytical information of climate impacts and vulnerabilities, whilst the [Water Services Corporation](#) holds geospatial data with application to the water and wastewater sectors. In terms of the available methodologies, infrastructure projects using EU Structural and Investment Funds adopt a [Cost-Benefit Analysis \(CBA\)](#) approach, and make use of the [Guide to Cost-Benefit Analysis of Investment Projects](#). The methodology does possess limitations however, in that it provides no formal guidance on financial, economic or social impacts, and is not specific to climate change adaptation. Regarding tools, the [Water Services Corporation](#) uses GIS (Geospatial Information Systems)-based applications, which are of high value in modelling the effects of floods and designing measures to prevent them. The [CLIMSAVE project](#) developed an [Impact Assessment Platform tool](#), which allows stakeholders to assess climate change impacts and vulnerabilities for a range of sectors, including agriculture, forests, biodiversity, coasts, water resources and urban development. Malta makes use of guidance derived from the European level, such as the DG CLIMA Publications: [Climate Change and Major Projects](#) and the non-paper [Guidelines for Project Managers - Making vulnerable investments climate resilient](#); and the JASPERS Guidance: [The Basics of Climate Change Adaptation Vulnerability and Risk Assessment](#).

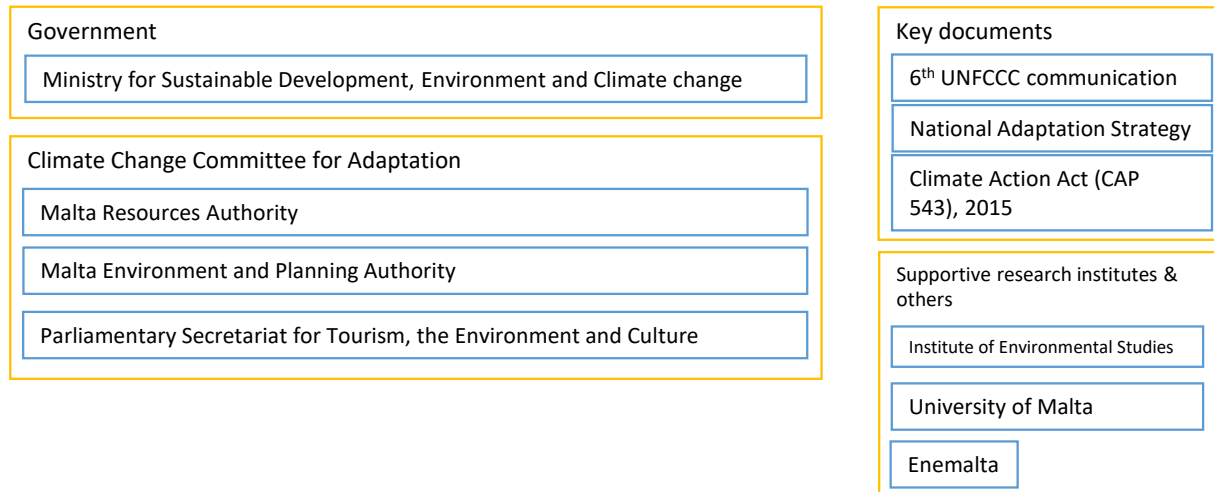
Limited resources were identified relating to climate adaptation in infrastructure sectors, other than the water sector. As a result of the 2012 [National Climate Change Adaptation Strategy](#), there were approximately 27 water-related measures with established targets set for implementation. As of today, few targets have been fully or partially met e.g. the water recovery from sewage target. Projects, although usually implemented, meet roadblocks, such as the pricing of groundwater, which caused delays and slowed adaptation. The [Preliminary Flood Risk Assessment](#) by the MRA (Malt Resource Authority) states that the [National Flood Relief Project](#) sought reduction in the vulnerability of climate change through the development of infrastructure that is capable of withstanding the uncertainties associated with future flood events, and through the adoption of a holistic catchment based approach to surface runoff management. The National methods of adapting to water-related climate hazards involve water conservation, water recovery, water recycling and treatment of sewage effluent. In the Urban development sector, the [Planning Authority](#) asks for a number of climate change related assessments in the early phases of a project that the architect / engineer would have to carry out. Locally there are guidelines for buildings, but many professionals use industry-wide guidelines, for example [ISO 14001](#) and [ISO 50001](#). Roads and urban infrastructure are built according to design standards written in law. There are guidelines published by the [Building Regulation Office](#), which outlines how the buildings should be constructed.

One case study has been identified in Malta, the [NAQQAS U FFRANKA](#) educational campaign focusing information sessions on water and energy conservation, renewable energy and waste management.

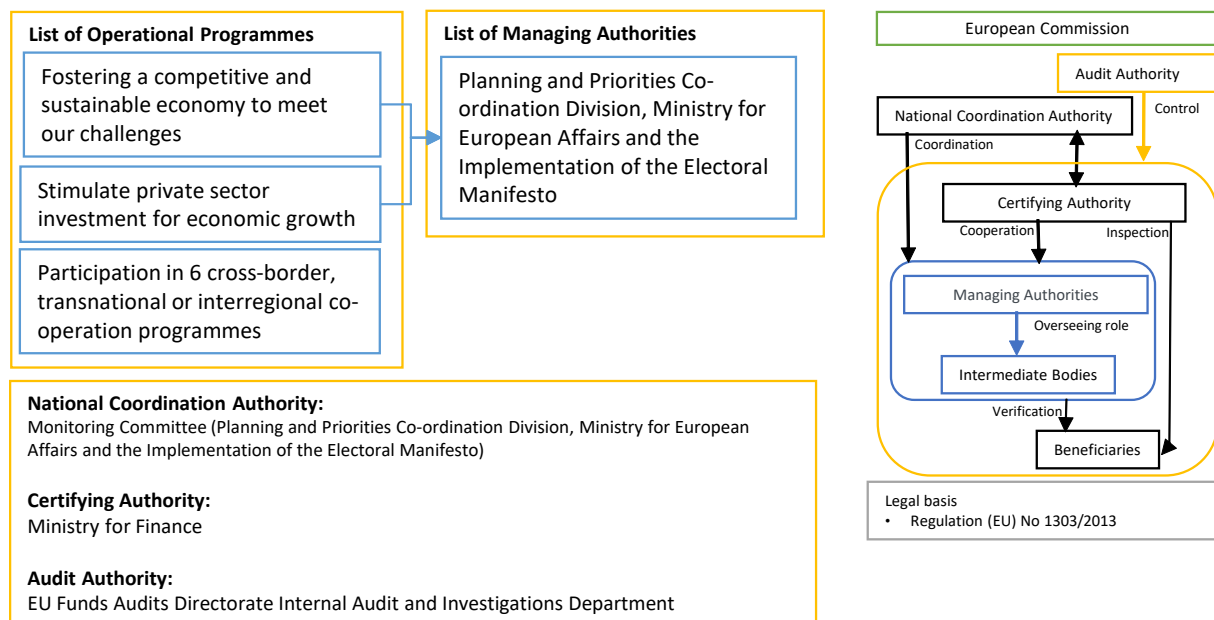
## **2. LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK**

The current National Adaptation Strategy (NAS) was adopted in 2012, under the authority of the Ministry for Resources and Rural Affairs. The Maltese [Ministry for Sustainable Development, Environment and Climate Change](#) (MSDEC) in Santa Venera is in charge of adaptation policy-making in accordance with the Climate Action Act, 2015. The ministry is solely responsible for the coordination of Climate Change Policies development and implementation. Malta's [NAS](#) builds upon the [National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gas Emissions](#) of 2009, in terms of governance and policy infrastructure. As well as identifying recommendations within various climate change affected sectors, the [NAS](#) addresses the financial impacts and any sustainability issues. Key stakeholders of the institutional framework include:

- [Environment and Resources Authority \(ERA\)](#): The ERA takes the leading role in advising Government on environmental policy-making at the national level, as well as in the context of international environmental negotiations;
- [Malta Resources Authority \(MRA\)](#): The Malta Resources Authority is a public body set up in 2000 through the Malta Resources Act, responsible to regulate water, energy and mineral resources, to promote energy efficiency and renewable, and with responsibilities in oil exploration and climate change.; and
- [University of Malta](#): The University of Malta is the highest teaching institution in Malta. It is a publicly funded university where various climate change adaptation data and information is collected, as well as research projects designed.



ERDF is absorbed through two Operational Programmes managed by the Ministry for European Affairs and the Implementation of the Electoral Manifesto.





### 3. RESOURCES

This country report has reviewed the currently available resources in Malta for adapting to the impacts of climate change across six key infrastructure sectors. Adaptation to climate change is integrated in the legal basis<sup>2</sup> for ESIF-funded projects, through the processes of vulnerability and risk assessments which are, broadly:

1. Vulnerability – evaluating the sensitivity and exposure of infrastructure to climate change
2. Risk – estimating the likelihood and impact of relevant climate hazards
3. Adaptation - consideration of adaptation options and integration into the project planning

The legal requirements for major projects also foresee climate change mitigation. This study however is focused on climate change adaptation and does not cover mitigation aspects.

Information on the requirements for climate change adaptation is available in the 2016 publication [Climate Change and Major Projects](#), and details on the methodology of climate resilience analysis is provided in the 2017 JASPERS publication [The Basics of Climate Change Adaptation, Vulnerability and Risk Assessment](#). Further resources are being identified in the present publication and its references. Effective vulnerability and risk assessments for the adaptation of major projects to climate change require the resources explained in the following table:

Resources	Explanation
<b>Data Availability</b>	The availability, accessibility and applicability of data on climate projections and impacts, on past and historic events, on geophysical parameters, on long-term scenarios, on economic, environmental and social impacts, etc.
<b>Methodologies</b>	The existence of quantitative or qualitative methodologies (a system of processes, a set of principles and rules) for integrating climate change adaptation in the development of infrastructure projects.
<b>Tools</b>	The availability of tools for planning, evaluation, impact estimation (i.e. software, maps, computer simulations, long term climate forecasts etc.) to assist with the adaptation of infrastructure to climate impacts
<b>Guidance</b>	The provision of guidance on how to use methodologies (i.e. for conducting climate change vulnerability and risk assessments) or develop the required infrastructure project documentation relating to climate adaptation.
<b>Design Standards</b>	The availability of published engineering design standards (i.e. by BSI, DIN, ISO) for infrastructure projects that include sections or appropriate provisions to ensure resilience to climate change impacts
<b>System</b>	The institutional and legal framework that the formal authorities work with to deliver their primary responsibilities for climate adaptation, infrastructure, and management of European Structural and Investment Funds
<b>Institutional capacity</b>	The human and technical capacity of institutions to carry out their functions. It depends on being adequately resourced, on having the appropriate expertise, and on collaborating effectively and enforcing

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<sup>2</sup> Regulation (EU) No 1303/2013, Commission Delegated Regulation (EU) No 480/2014, Commission Implementing Regulation (EU) No 1011/2014, No 215/2014, 2015/207; and the Directives 2001/42/EC, 2011/92/EU and 2014/52/EU

### **3.1. Data Availability**

Quantitative data are essential to understand the relevant risks and the requirements for any corresponding climate change adaptation in key sectors. The following databases are available in the country:

- The [Ministry for Sustainable Development, Environment and Climate Change](#) (MESDCC) provides general analytical information of climate impacts and vulnerabilities;
- The [National Communication to the UNFCCC](#) details vulnerabilities and risks of climate change, whilst analyzing the social value of assets at risk from climate change;
- Forecasts on weather and climate conditions in Malta are conducted by the [Meteorological Services Office](#) of the Malta International Airport. The office holds detailed weather data (rainfall, storms, floods, sea/water/air temperature, etc.) from various localities in Malta and Gozo, and provides weather warning and hazards services;
- The [Water Services Corporation](#) holds geospatial data with application to the water and wastewater sectors.

The [National Statistics Office \(NSO\)](#) is the state authority coordinating official statistics in the country and provides a database of national statistics as well as links to external European databases. The exact content of the NSO's database was not examined in the context of the present study. The University of Malta carries out academic research and climate observation. The Climate Research Group (CRG) within the University of Malta, Department of Geosciences, has now installed a numerical weather prediction model called WRF which makes forecasts over the Maltese Islands, and two regional climate models (RCM) called PRECIS and RegCM4 on the super computer cluster, ALBERT, available at the University of Malta.

Information relevant for climate adaptation is currently recorded within the respective Ministries and educational institutions. There is no central web portal or repository for climate change adaptation related data or infrastructure projects within Malta.

Updates for a wide range of national adaptation actions, can be found in the [National adaptation actions deliveries database on EIONET](#), and on the [Climate-ADAPT](#) website.

### **3.2. Methodologies**

Methodologies for integrating climate change adaptation into the development of infrastructure projects rely on the basic rules of risk assessment. Infrastructure projects using EU Structural and Investment Funds adopt a [Cost-Benefit Analysis \(CBA\)](#) approach as the methodological framework for Maltese climate change adaptation projects.

There are also indicators of socio-economic impacts in the [Guide to Cost-Benefit Analysis of Investment Projects](#), which are broadly used in structural projects. The methodology does possess limitations however, in that it provides no formal guidance on financial, economic or social impacts, and is not specific to climate change adaptation.

A commonly used approach is the [life cycle assessment](#) (LCA). This method is used whenever a new building is constructed or a new infrastructural system is planned and also acts as an operational guide to the ISO standards. An [environmental impact](#)

[assessment](#) (EIA) may also be carried out. Some European funds ask specifically for an EIA, for example the social impacts on a transport-related project. The choice of method also depends on the specific indicators being assessed.

### **3.3. Tools**

Tools are highly valuable for facilitating climate adaptation studies and planning for infrastructure. They can be public or private, numerical or descriptive, and be provided in many mediums, such as software, text documents, maps, and so on. Some tools are generic (such in risk assessments) whilst others are specific to a certain set of circumstances. The following tools are available:

- The [Water Services Corporation](#) uses GIS (Geospatial Information Systems)-based applications, which are of high value in modelling the effects of floods and designing measures to prevent them; and
- The [CLIMSAVE project](#) developed an [Impact Assessment Platform tool](#), which allows stakeholders to assess climate change impacts and vulnerabilities for a range of sectors, including agriculture, forests, biodiversity, coasts, water resources and urban development.

EIONET provides [Flood Maps](#) which are publically available, mapping areas of potential significant flood risk. EIONET also contains Flood Risk Management Plans.

For a continual update of available tools, the reader is referred to the European Climate Adaptation Platform [Climate-ADAPT](#), which has a dedicated tools section.

### **3.4. Guidance**

Malta makes use of knowledge and guidance derived from the European level, such as the DG CLIMA Publications: [Climate Change and Major Projects](#) and the non-paper [Guidelines for Project Managers - Making vulnerable investments climate resilient](#); while it uses JASPERS Guidance and the soon to be finalized document: Basics of Climate Change Adaptation Vulnerability and Risk Assessment. More information can be adapted to the local level through the publication of the report by the European Financing Institutions Working Group on Adaptation to Climate Change [Integrating Climate Change Information and Adaptation in Project Development](#).

### **3.5. Design Standards**

Design standards are critically important for all infrastructure projects to ensure stability and optimal functioning under the strain of natural phenomena. For civil works (including bridges, buildings, masts and towers for the mobile access networks), EN standards are available to address natural forces such as wind and snowfall, e.g. EN1991-1-4 (Eurocode 1) and EN1993 (Eurocode 3) for structures in steel. However, these standards might be outdated and not account for the impacts of climate change.

The Malta Competition and Consumer Affairs Authority ([MCCAA](#)) is the national standards authority for Malta. The MCCAA is collaborating with the [European Standardization Organizations](#) in the context of the EU Regulation No 1025/2012 on European standardisation. The European Committee for Standardisation (CEN) and Electrotechnical Standardisation (CENELEC) established the [Adaptation to Climate Change Coordination Group \(ACC-CG\)](#) to coordinate standardisation work in the field of adaptation to climate change in support of the implementation of the EU Strategy on Adaptation to Climate

Change. More information is available in the section on *Available resources at the EU level* in the Final Report of the present study (European Commission, 2018).

### **3.6. System**

The institutional system for adapting to climate change requires a legal framework (laws and implementing regulations) and strategies and policies (with implementing action plans). The system is usually conflated with disaster management (and its various components, preparedness, reduction etc.) and more generally with resilience.

#### ***Institutional and legal framework***

In May 2012, the Ministry for Resources and Rural Affairs, MRRA, published the [National Climate Change Adaptation Strategy \(NAS\)](#). It sought to address recommendations in various sectors which are vulnerable to climate change: water, agriculture, health and tourism. The strategy also addresses the financial impacts as well as any sustainability issues. The [NAS](#) adopts a holistic approach to Climate Change Adaptation in Malta, identifying climate change impacts with particular reference to health and socio-economic policy, water and flooding as well as biodiversity, agriculture and fisheries. The Strategy also provides a recommendation of emergency plans and the circumstances under which they should be formed in high-probability, high-consequence risk areas.

Malta has also adopted the [Climate Action Act, 2015 \(CAP 543\)](#), which dictates the process to conduct periodic reviews and updates of the [National Adaptation Strategy](#) at least every four years.

The following sector documents address adaptation:

- the 2nd Water Catchment Management Plan for the Maltese Islands (2016)
- the Malta National Biodiversity Strategy and Action Plan 2012-2020
- the National Energy Efficiency Action Plan
- the Malta's National Transport Master Plan 2025, adopted in 2016
- the National Agricultural Policy for the Maltese Islands 2016-2025

Malta has finalized the transposition of the new EIA Directive with L.N. 412 of 2017: Environment Protection Act (Cap. 549).

The Strategic Environmental Assessment Directive is also transposed in the national legislation with the Legal Notice 497 of 2010.

#### ***Responsible authorities***

The Ministry for Sustainable Development, Environment and Climate Change ([MESDCC](#)) is the leading ministry with regard to climate change policy, but the implementation of measures becomes the responsibility of the leading ministry within each sector: Ministry for Health and Energy (MEH), Ministry for Transport and Infrastructure (MTI), Ministry for Health and Energy (MEH), Transport Malta (TM), the Agricultural Department (AD), the Rural Development Department (RDD), the Malta Resources Authority (MRA), and the Malta Environment and Planning Authority (MEPA).

The key organisations and institutions involved are the [Building Regulation Office](#), [Environment & Resource Authority](#) and the [Malta Resources Authority](#). The [Malta Resources Authority](#) is responsible for developing the national communication of climate change. The last National Communication was concluded in 2013/14, with the second round underway in collaboration with the [Department of Physics within the University of Malta](#).

A National [climate change committee](#) established within the [Malta Resources Authority](#) and is responsible for all climate change adaptation-related activities. Its members include employees of [Enemalta](#), [MEPA](#), the [University of Malta](#), and experts from the [German Environment Ministry](#). The committee focuses on: financial risks and impacts, on identifying the requisite legal framework, on sustainability; and on key sectors (water, agriculture; human health, tourism and education)

### ***Management of the ESI Funds***

The management of the two national Operational Programmes (Fostering A Competitive And Sustainable Economy To Meet Our Challenges; and Stimulate Private Sector Investment for Economic Growth) are managed by the Planning and Priorities Co-ordination Division at the Ministry for European Affairs and the Implementation of the Electoral Manifesto. Malta is also participating in six cross-border, transnational or interregional co-operation programmes. In ensuring the functioning of the ESIF system, the National Coordination Authority is the Monitoring Committee (Planning and Priorities Co-ordination Division, Ministry for European Affairs and the Implementation of the Electoral Manifesto), the Certifying Authority is the Ministry for Finance, and the Audit Authority is the EU Funds Audits Directorate Internal Audit and Investigations Department.

### ***3.7. Institutional Capacity***

The institutional challenge for climate change adaptation is that climate policy is a cross-cutting issue, and requires co-operation across a large number of institutions. To be effective in delivering climate change adaptation a minimum level of capacity is needed on leadership, technical and human resources, effective collaboration, and financial support.

#### ***Technical and human resources***

The [Climate Change Committee](#) is a key reference point in co-ordinating the national activities on climate adaptation capacity. This has led to a huge burden in terms of administration, with the need to import technical equipment and professionals for specific studies. For example, [Sustech Consulting](#) states regarding Malta's state of affairs within hydro-related climate change adaptation activities, that there are "*only a handful of hydrologists nationally; not enough to cater for the climate change challenges the sector is facing*". Sustech justifies this through the lack of national university courses in which hydrologists can take up, therefore limiting ability to expand the pool of human resources.

The need for investment in research into climate change adaptation is identified by the [National Research and Innovation Strategy 2020](#). In this regard, the University of Malta has the intention of setting up the Centre of Excellence in Climate Change Research with the Government expressing its intention to support this initiative by possibly including it in the upcoming Smart Specialisation Strategy. The setting up of the [University Platform for Climate Change](#) and the establishment of the [Institute for Climate Change and Sustainable Development](#) serve to better coordinate research activities within the different faculties, institutes and centres of the University

#### ***Effective collaboration***

Implementation of the National Climate Change Adaptation Strategy is possible through inter-ministerial cooperation. In this regard, implementation of climate specific actions on adaptation is undertaken by the relevant Ministries or departments depending on the different sectors in which action is being taken. Relevant Ministries and departments responsible for specific implementation include, inter alia, Ministry for Sustainable

Development Environment and Climate Change (MSDEC), Ministry for Health and Energy (MEH), Ministry for Transport and Infrastructure (MTI), Ministry for Health and Energy (MEH), Transport Malta (TM), the Agricultural Department (AD), the Rural Development Department (RDD), the Malta Resources Authority (MRA), and the Malta Environment and Planning Authority (MEPA).

### **Financial resources**

The [ESI Funds are enabling the development of major projects](#) in the 2014 – 2020 programming period. Concerning major projects, by early 2018, there have been no funds allocated for major projects in Malta for the 2014-2020 programming period according to the datasets of the European Commission. However, the [dataset will be updated regularly](#) to reflect changes in the programme lists and major project notifications.

According to the [ESIF-viewer](#), Malta is planning investments of 698 Million EUR. 105 Million EUR approved for Network Infrastructures in Transport and Energy (Thematic Objective 7); 200 Million EUR in Environment Protection & Resource Efficiency (Thematic Objective 6); and 31 Million EUR for Information and Communication Technologies (Thematic Objective 2). The shares within these Thematic Objectives that may relate to climate adaptation are unknown.

The [EEA and Norway Grants](#) have allocated 4.5 Million EUR for the period 2009 – 2014, and 8 Million EUR for the period 2014 – 2021. Specifically, the Norwegian Coastal Administration has allocated 0.5 Million EUR for the Climate Change Adaptation programme in the 2009 – 2014 period.

## **4. SECTOR OVERVIEW**

### **4.1. Introduction**

Since 2014, the requirements for major projects to obtain ESIF funding<sup>3</sup> demand that project applications integrate climate change considerations<sup>4</sup>, such as a vulnerability and risk analysis and adaptation option appraisal. At EU-level, material is available to assist in fulfilling these requirements. Key websites and documents are:

- The [Climate-ADAPT](#) website containing many links to data and a [map viewer](#)
- EUROPEAN COMMISSION Directorate-General for Regional and Urban policy: The [Guide to Cost-benefit analysis of Investment projects](#) (also referred to as the 'CBA guide')
- EUROPEAN COMMISSION DIRECTORATE-GENERAL CLIMATE ACTION: [Non-paper of Guidelines for Project Managers: Making vulnerable investments climate resilient](#)
- JASPERS Guidance note: [The Basics of Climate Change Adaptation, Vulnerability and Risk Assessment](#)
- JASPERS Guidance note: [An overview of the most important sources for integrating climate change in \(major\) projects](#)

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<sup>3</sup> [http://ec.europa.eu/regional\\_policy/archive/projects/major\\_projects/index\\_en.cfm](http://ec.europa.eu/regional_policy/archive/projects/major_projects/index_en.cfm)

<sup>4</sup> For a compilation of the climate change requirements for major projects in 2014-2020, see: <http://www.jaspersnetwork.org/plugins/servlet/documentRepository/displayDocumentDetails?documentId=401>



Additional relevant material can be found in the Final Report of the present study (European Commission, 2018) in the section *Available resources at the EU level* and in *Annex I*.<sup>5</sup>

## **4.2. Transport**

Investments in the transport sector are very diverse, covering roads (including bridges and tunnels), inland waterways, rail, ports / airports, and public transport infrastructure. Any disruption caused in this sector can affect many other sectors (economic and societal) directly. Potential threats are sea-level rise and extreme weather events, such as extended heat waves, flooding, heavy rainfall or storm, and landslides amongst others. Extreme weather events are a potential threat to both infrastructure and operation of the transport system.

### **Road infrastructure**

During the present study, no known sector resources that include climate adaptation were identified, or suggested by the interviewed national authorities. The climate adaptation strategy focuses more on water and agriculture. Potentially available information and relevant resources would reach a wider audience and contribute further to the climate adaptation of infrastructure projects if, in the future, the adequate provisions are applied that encourage publication, dissemination and ease of accessibility.

See section 4.1 for general documents that can help in taking climate considerations into account.

### **Railway infrastructure**

There is no railway transportation in Malta.

### **Airport infrastructure**

Malta International Airport is the only international airport. In the current study, no specific strategy on making the airport climate resilient was retrieved from desk study or interviews. But more general materials are available which apply to all types of projects, including airport infrastructure. See section 4.1 for more information.

## **4.3. Broadband**

The International Telecommunication Union has issued the recommendation L.1502 "[Adapting information and communication technology infrastructure to the effects of climate change](#)" for the purpose of identifying climate threats and their impact. L.1502 supports Resilience by design in identified risky areas, and proposes changes to equipment installation standards to ensure protection from more frequent extreme weather phenomena and their impacts. The European broadband sector standardisation bodies have not prepared vulnerability assessment and risk management framework for dealing with climate change in broadband projects.

During the present study, no known sector resources that include climate adaptation were identified, or suggested by the interviewed national authorities. Nevertheless, it is a general best practice for operators to use flood mapping information from environmental

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<sup>5</sup> European Commission (2018) Climate change adaptation of major infrastructure projects. A stock-taking of available resources to assist the development of climate resilient infrastructure. Final report.

agencies to safeguard new planned data centres from flooding. For civil works (e.g. masts and towers for the mobile access networks), EN standards are available to address wind and snowfall, e.g. EN1991-1-4 (Eurocode 1) and EN1993 (Eurocode 3) for structures in steel. But these standards don't take climate change into account. CEN-CENELEC is currently working on adapting a number of EN standards to climate change. See Final Report of the present study (European Commission, 2018) for more information in the section on *Available resources at the EU level*.<sup>6</sup>

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

#### **4.4. Urban Development**

Investments in the urban development sector include site developments (industrial and other), urban planning, local infrastructure, building projects (such as hospitals, schools), and much more diverse projects. Cities have a unique position to analyse and respond to local impacts and vulnerabilities, such as heat island effects, which depend on the specific layout of a city, its green spaces, and numerous other factors. Cities can actively support the uptake of climate change adaptation in infrastructure projects through, for instance pilot projects, and can initiate dedicated infrastructure projects to improve their resilience to climate change.

During the present study, no known sector resources that include climate adaptation were identified, or suggested by the interviewed national authorities. Potentially available information and relevant resources would reach a wider audience and contribute further to the climate adaptation of infrastructure projects if, in the future, the adequate provisions are applied that encourage publication, dissemination and ease of accessibility.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

#### **4.5. Energy**

Project investments in the energy sector are related to power generation infrastructure, energy distribution networks and energy storage (e.g. through hydropower). Potential impacts of climate change on energy infrastructure may include increased damage to power generation plants or problems with energy provision, leading to black-outs or other disruptions. Disruptions in the energy sector can have large impacts on different sectors due to the increasing dependency on (electric) power provision for all kind of operational systems such as water supply (pumping installations, etc.) , the food system (transport, cooling, etc.), transport, (electrified vehicles, dynamic traffic information, etc.).

During the present study, no known sector resources that include climate adaptation were identified, or suggested by the interviewed national authorities. Potentially available information and relevant resources would reach a wider audience and contribute further to the climate adaptation of infrastructure projects if, in the future, the adequate provisions are applied that encourage publication, dissemination and ease of accessibility.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

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<sup>6</sup> European Commission (2018) Climate change adaptation of major infrastructure projects. A stock-taking of available resources to assist the development of climate resilient infrastructure. Final report.



#### **4.6. Water**

Investments in the water sector are linked to efficient water supply (including reduction of leakage), waste-water treatment and water reuse as well as the implementation of [River Basin Management Plans \(RBMP\)](#) to ensure integrated water management at the river basin scale. Important threats are linked to water quantity (droughts and floods) as well as quality (water pollution). Climate change can have an impact on both water quantity and quality. Following the EU Floods Directive 2007/60/EC, Member States are obligated to perform flood risk assessment and to elaborate flood hazard and risk maps and flood risk management plans. Flood risk maps include the history of floods and climate scenarios. Member States also need to take climate change into consideration when developing RBMP. A [Guidance document on adaptation to climate change in water management](#) is available to ensure that the RBMP are climate-proofed. [Evaluations of the RBMP and FRMP](#) are also available on the EC website.

The [Preliminary Flood Risk Assessment](#) by the MRA (Malt Resource Authority) states that the [National Flood Relief Project](#) sought reduction in the vulnerability of climate change through the development of infrastructure that is capable of withstanding the uncertainties associated with future flood events, and through the adoption of a holistic catchment based approach to surface runoff management. Moreover the [National Climate Change Adaptation Strategy](#) has put forward a number of recommendations to limit the effect of climate change on the occurrence of flood events such as the introduction of a one-off flood fine for properties not having cisterns and therefore contributing to uncontrolled street surface runoff.

As a result of the 2012 [National Climate Change Adaptation Strategy](#), there were approximately 27 water-related measures with established targets set for implementation. As of today, few targets have been fully or partially met e.g. the water recovery from sewage target. Projects, although usually implemented, meet roadblocks, such as the pricing of groundwater, which caused delays and slowed adaptation.

The National methods of adapting to water-related climate hazards involve water conservation, water recovery, water recycling and treatment of sewage effluent. Within hotels, a process has been developed whereby the hotel recycles [75% of the water used](#), which means that sewage is collected, treated, and used for the flushing of toilets and for landscaping, with surplus water from the sewage treatment plants further treated and taken to a potable water level. Also, most large hotels situated on the coast use their own water from the sea, therefore reducing stress on the aquifers for supply. The larger goal is to improve the natural cycle of water scarcity around the country.

The Environment and Planning Authority, in the context of the EU Water Framework Directive, issued a report in 2010 on [integrating climate change considerations in the Water Catchment Management Plan for the Maltese Islands](#), where it identifies potential climate change impacts on water resources. In order to ensure climate change strategy compliance, the plan's measures were subjected to a climate change check. Such a check was performed to identify those measures best suited to strengthen Malta's capacity in adapting to climate change and in identifying those that are less effective directly in this regard.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

## 4.7. Waste

Project investments in the waste sector are related to separate collection infrastructure, re-use and recycling infrastructure, energy recovery facilities and closure of landfills. Potential impacts of climate change on waste infrastructure may include increased rates of waste decomposition, odour and dust due to increased temperatures, flooding of landfills and waste treatment facilities, and reduced water availability for wet processes in waste treatment facilities. Also the impact on transport infrastructure should be considered, as transport is a critical component of waste management (collection, transport to and from waste treatment facilities). The impact on transportation is discussed in the section on transport above.

Solid waste management was, for a long time, simply a matter of disposal in unmanaged landfills. In more recent years, unmanaged landfill sites are closing, with a shift towards waste disposal in managed landfills coupled with greater emphasis on reducing, reusing, recycling and waste treatment at the forefront of solid waste management policy. This has seen a substantial reduction in quantities of municipal solid waste and inert construction and demolition waste being deposited in public landfills.

Under the 2014-2020 programming period, the Operational Programmes envisages the development of a Waste to Energy Treatment Facility, in line with the national objectives linked to the implementation of the Waste Framework Directive 2008/98/EC on which the National Waste Management Plan 2014-2020 is based. This plant will need to be compliant with the [Directive 2010/75/EU on industrial emissions](#) (IED), just like other large waste treatment plants. The IED requires as a general principle that necessary measures should be taken to prevent accidents which may have environmental consequences, and to limit those consequences. This requires that a structured management plan should be available that includes and mitigates hazards such as extreme weather conditions (e.g. flooding, very high winds). In the [BAT reference document \(BREF\) on Waste Treatments Industries](#), some information is provided on the impact of certain climatic conditions (e.g. the impact of higher temperature on biofilter performance, aerobic decomposition, etc.). Although climate change is not specifically addressed.

[Directive 1999/31/EC on the landfill of waste](#) requires that landfills are situated and designed in such a way that safeguard against pollution of the soil, groundwater or surface water. This requirement is translated into [national design standards](#) for the construction of landfills, which include the consideration of temperature, precipitation extremes and flooding where relevant.

See section 4.1 for more information on other documents that can help in taking climate considerations into account.

## 5. CASE STUDIES

### 5.1. Case studies of climate adaptation projects

#### ECO GOZO: 'NAQQAS U FFRANKA'

Project description	The aim of this <a href="#">campaign</a> was to design and deliver information sessions on water and energy conservation, renewable energy and waste management in every household in Gozo.
Photograph	N/A
Budget	N/A

Climate Change Vulnerability and Risks	The main objectives of this initiative was to increase awareness and disseminate eco-friendly information with the aim of improving the quality of life and levels of sustainability on the island. The methodology consisted of training courses, examination of the trainers, the island-wide house-call programme, the approach used during the visits themselves and the results compiled through a specific questionnaire.
Climate change adaptation measures	<a href="#">Analysis</a> of questionnaire responses revealed that a favourable disposition towards renewable energy (RE) technologies, energy-saving and water-conservation measures already existed amongst Gozitan households. While the results help to consolidate the information compiled, they also enable the refinement of the training and dissemination methodologies utilised.
Good practice	These actions served to couple an educational campaign focusing on sustainability and environment-related issues with a data-gathering exercise in an island community. The results show a favourable opinion on water-conservation measures such as recycling of grey water and the use of rainwater catchment in dwellings' existing water cisterns, at the time of the home visits.
Further information	<a href="http://www.ecogozo.com/index.php?option=com_content&amp;view=article&amp;id=289%3AAnaqqas-u-ffranka-the-eco-gozo-home-consultancy-visits-are-a-success-story&amp;catid=1%3Anews&amp;lang=mt">http://www.ecogozo.com/index.php?option=com_content&amp;view=article&amp;id=289%3AAnaqqas-u-ffranka-the-eco-gozo-home-consultancy-visits-are-a-success-story&amp;catid=1%3Anews&amp;lang=mt</a>

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