SEA for Malta's National Energy & Climate Plan (NECP)

As per EWA requirements for tender EWA/TD/2/2019

Environmental Report

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1.0 Introduction

AIS Environment has been commissioned by the Energy and Water Agency (EWA) through the public procurement system (EWA/TD/2/2019) to carry out a Strategic Environmental Assessment (SEA) of the NATIONAL ENERGY AND CLIMATE PLAN (NECP). This plan defines Malta's policy direction for energy and climate for a 10-year period between 2021 and 2030.

A draft copy of the NECP has been prepared by the EWA, the Ministry for Energy and Water Management (MEWM) and the Ministry for Environment, Sustainable Development and Climate Change (MESDC) and submitted to the European Commission in December 2018. This document, along with a set of updated policies and measures, constituted the basis for this SEA.

In line with the conditions of the tender, the scope of works are divided into two main stages:

Stage 1: The Scoping Stage

1.1 Kick off meeting
1.2 Inception report
1.3 Initial scoping report for consultation
1.4 Finalised scoping report

Stage 2: The Strategic Environmental Assessment

2.5 Interim SEA report
2.6 Finalised SEA report

This report addresses deliverable 2.5 by providing the interim SEA Report for public consultation.

1.1 SEA objectives

The aim of the environmental report is to summarise the results of the SEA exercise, in preparation for the public consultation which will be undertaken at a later stage. The report provides a general background to the project and describes the policy measures, their impacts and recommendations to reduce the significance of the identified impacts.

The report summarises the overall vision of the NECP, including details on the measures proposed as part of the policy. The methodology used in the SEA process is then outlined, followed by the results of the baseline studies and the impact assessment.

1.2 Report structure

The report is structured in accordance with the guidelines set out in Schedule I of S.L.549.61, as outlined in Table 1.

Table 1: Structure of the report

S.L.549.61 requirement		Section
a	an outline of the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes	1.0 & 2.0
b	the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme	3.0
c	the environmental characteristics of areas likely to be significantly affected	5.0
d	any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC	4.0 & 5.0
e	the environmental protection objectives, established at international, European or national level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation	4.0
f	the likely significant effects on the environment, including on issues such and biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors. These effects should include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects	7.0
g	the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme	8.0
h	an outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties, such as technical deficiencies or lack of know-how, encountered in compiling the required information	6.0
i	a description of the measures envisaged concerning monitoring in accordance with regulation 11	9.0
j	a non-technical summary of the information provided under the above	10.0

2.0 National Energy and Climate Plan (NECP)

2.1 Objectives

The NECP is a strategic planning framework and policy document that describes Malta's role in achieving the EU's Energy Union objectives and targets for 2030. The policy delineates how these targets could be achieved by 2030, with an extended vision to 2040. Malta's current state of affairs in terms of the economy, environment, social development and sustainability are all considered in the NECP. In line with the requirements of the Governance Regulation, the NECP splits the targets and strategies into five dimensions, as described in Section 2.2.

The Plan describes policies and measures (PaMs) that need to be realised in the local context to ensure Malta reaches these targets. The policies and measures are substantiated by analysing the existing situation (With Existing Measures, WEM scenario) in all five dimensions and modelling their projections to 2040 (With Planned Measures, WPM scenario) following implementation of the PaMs, as described in further detail in Section 2.2.

The NECP delineates the following fundamental objectives for the WPM scenario:

- *"Decarbonisation*
  - *-19% GHG emissions reduction target under the Effort Sharing Regulation (ESR);*
  - *Contributing to the EU -40% GHG emission reduction target;*
  - *Fulfilling obligations of the Paris Agreement;*
  - *11.5% share of Renewable energy in gross final energy consumption in 2030;*
  - *14% RES share in the transport sector in line with Renewable Energy Directive;*
- *Energy efficiency*
  - *Energy intensity of 0.07 toe/€$_{2005}$ in 2030;*
  - *Reaching energy savings obligations under Article 7 of the Energy Efficiency Directive;*
- *Energy security*
  - *Continued diversification of energy sources and suppliers;*
  - *Reduction of import dependency through the deployment of indigenous sources of RES, taking into account the specificities of Malta's energy system;*
  - *Periodic contingency planning in the case of supply disruption for electricity, gas and oil sectors;*
  - *Energy Security in the context of the long-term objective of decarbonization of the energy system and increased deployment of RES;*
- *Internal energy market*
  - *Ensure competitive electricity prices for households, commercial and industrial sectors;*
  - *Maintain the level of electricity interconnectivity well above the EU 15% target during the projected period until 2030;*
- *Research & innovation and competitiveness*

- *Development of National Strategy for Research & Innovation in Energy and Water (2021-2030), which would:*
  - *Strengthen and support R&I that addresses national policy priorities and challenges and/or bolsters national competitiveness and growth in a variety of sectors;*
  - *Increase coordination and cooperation between the wide array of stakeholders in fields of energy and water"*

The Plan was drafted in parallel with the adoption and implementation of the legislative foundation for a Governance system to achieve the objectives and targets of the EU's Energy Union. The NECP was tailor-made to the country's national characteristics as an island-state with the largest population per unit area in the EU.

The final NECP was submitted to the European Commission in December 2019, in line with the requirements of the Regulation of the Governance of the Energy Union. Recommendations garnered from this SEA will feed into revisions and updates to the NECP.

2.2 Policies and measures (PaMs)

The NECP studies two primary scenarios, as described hereunder:

1. **"With existing measures" (WEM) scenario** – considered as the baseline (reference) scenario, whereby no additional measures are implemented as proposed in the NECP;
2. **"With proposed measures" (WPM) scenario** – considered as the policy scenario which considers the implementation of the PaMs

AIS Environment was advised that the two scenarios are differed according to what was implemented by the end of 2017, which is considered as the cut-off date for the purpose of establishing the measures to be included in the NECP baseline. The WEM scenario considers those policies that were already implemented by the Government by December 2017, while the WPM considers those which were not yet executed by that date and any measures that are still to be implemented. As agreed with the Energy and Water Agency (EWA), the SEA assesses the environmental impacts which are expected to arise from the proposed WPM scenario, in comparison to the WEM scenario which will be representing the baseline status.

The NECP has been structured as follows:

1. **Overview and process for establishing the plan** – this section describes the current policy situation; consultations and involvement of national and EU entities; and regional cooperation
2. **National objectives and targets** – this section describes the targets of the policy in terms of decarbonisation; GHG emissions and removals; renewable energy; energy efficiency & security; etc.
3. **Policies and measures** – this section describes the proposed PaMs to achieve the aforementioned objectives and targets
4. **Current situation and projections with existing policies and measures** – this section describes the expected future trends in the WEM scenario

5. **Impact assessment of planned policies and measures** – this section describes the expected future trends in the WPM scenario

Five dimensions have been considered for the NECP, each of which have been studied in Sections 2-4 of the NECP, namely:

1. Decarbonisation (including GHG emissions and removals, along with renewable energy generation)
2. Energy efficiency
3. Energy security
4. Internal energy market
5. Research, innovation and competitiveness

The Policies and Measures (PaMs) are listed in Table 2. Such measures have been classified using a coding system representing the authorities who derived them, namely the EWA (E), MESDC (C) and MTIP (T).

Table 2: Proposed PaMs for the WPM scenario in the NECP

Policy and measure		EU Dimension[1]				
		Dec	EE	ES	IEM	R&I
E.2.1	Financial support schemes for Solar PV	✓	✓	✓	✓	
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	✓	✓			
E.2.3	Energy efficiency: electricity tariffs		✓		✓	
E.2.4	Support Scheme for Services and Industry		✓			
E.2.5	Energy Efficient Street Lighting		✓			
E.2.6	Projects in primary water network and wastewater treatment plant		✓			
E.2.7	Biofuels Substitution Obligation (2021-2030)	✓			✓	
E.2.8	Acquisition of renewable energy credits from other Member States	✓				
E.2.9	Gas Security of Supply			✓	✓	
E.2.10	Development of R&I Strategy for Energy and Water	✓				✓
C.2.1	Management of Farm Slurries in the Maltese Islands	✓				
C.2.2	WtE Facility	✓		✓	✓	
C.2.3	Waste Management Plan 2020 - 2030	✓				
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	✓				
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	✓				
T.2.3	Road and infrastructure projects	✓				
T.2.4	Malta - Gozo Tunnel	✓				
T.2.5	Implement Public Transport Quality Corridors (PTQC)	✓				
T.2.6	Improvement of Ferry Landing Places	✓				
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	✓				
T.2.8	Smart Parking System for Valletta	✓				

[1] *Dec = decarbonisation; EE = energy efficiency; ES = energy security; IEM = internal energy market; R&I = research & innovation*

Policy and measure		EU Dimension[1]				
		Dec	EE	ES	IEM	R&I
T.2.9	Fast passenger ferry link between Malta and Gozo	✓				
T.2.10	Free Transport for Youths, Students, and school children	✓	✓			
T.2.11	Increase use of Intelligent Transport Systems in traffic management	✓				
T.2.12	National bicycle sharing scheme	✓				
T.2.13	Last-Mile Delivery for Valletta	✓				
T.2.14	Implementation of a cycling corridor	✓				
T.2.15	Car-Sharing Scheme	✓				
T.2.16	Sustainable Urban Mobility Plan for Valletta	✓				
T.2.17	National Bicycle Strategy and Action Plan	✓				
T.2.18	Introduction of electric buses in Gozo	✓				
T.2.19	Continuation of EV Grants and Electromobility Action Plan	✓		✓	✓	

3.0 Methodology

This report represents deliverable 2.5 of the SEA exercise, as outlined in tender document EWA/TD/2/2019. The scoping phase results and the methodology for this report are delineated in Sections 3.1 and 3.2, respectively.

3.1 Results from Phase 1: Scoping report

3.1.1 Environmental baseline and impact assessment

EWA have provided AIS with a final list of policy and measures (PaMs) spreadsheet containing an overview of the policies and measures and their expected impact on the related Energy Union dimension (such as renewable energy source and energy efficiency). The first step involved reviewing the PaMs spreadsheet provided to AIS. During the reviewing process, the key environmental themes which are relevant to the NECP were identified, as follows:

- Air quality
- Biodiversity
- Climate change
- Cultural heritage
- Energy & water
- Human health
- Landscape
- Transportation and infrastructure
- Waste and resource management

SEAs are generally carried out by assessing the impacts of the PaMs on the environmental themes through indicators (also referred to as objectives). Indicators are quantifiable factors which follow a certain trend, and whose future patterns of change can be predicted. An example of an indicator is the amount of waste by type (ex: C&D waste, mixed municipal waste, etc.) generated in Malta on an annual basis.

The SEA Directive does not specifically require the use of indicators; however, these are identified as the way in which environmental effects can be described, analysed and compared. SEA objectives state what is intended, and the plan's performance against objectives is normally measured by indicators. The SEA objectives are different and separate from the policy objectives, although the two influence each other and may overlap. SEA indicators are measurements of temporal trends, which will be used to ascertain the success of the implementation of the policy against various SEA objectives.

The environmental issues, criteria and indicators associated with each theme were identified in the scoping report, as reproduced in Table 3. The baseline conditions from the reported data sources will be used to account for the relevant themes identified. Subsequently, each PaM will be assessed qualitatively to identify the potential environmental impact on each environmental theme. The interrelationships between the themes, as well as secondary, cumulative, synergistic, short, medium and long-term, permanent and temporary, positive and negative impacts of the policy will also be addressed.

Table 3: The relevant environmental themes, criteria and indicators

Theme	SEA objective		Criterion	SEA Indicator	Data source
Air quality	1	Minimise adverse effects and improve air quality	Ensure that the national air quality issues and emission limit values are not breached	Concentrations of atmospheric pollutants and emissions	ERA/NSO
			To improve the quality of air		
Biodiversity	2	Maintain and safeguard protected habitats and species and improve their status	Maintain and safeguard the conservation of designated areas	Status of protected habitats and species of flora and fauna	ERA
			Maintain and safeguard other important habitats which are not officially protected yet	Status of other habitats, including valleys and watercourses	ERA
			Maintain and safeguard environmental factors essential to ecosystems	Status of environmental factors, including coastal water, groundwater, geology and soil	ERA
Climate change	3	Reduce Malta's vulnerability to climate change	Conserve energy and promote renewable sources	Annual mean air temperature	ERA/Malta Airport MetOffice/NSO
				Annual total precipitation	
				Concentrations of greenhouse gases	
Cultural heritage	4	Conserve and protect sites of architectural, archaeological and/or ecological importance from adverse impacts of infrastructural works	Conserve and protect sites of cultural heritage	Number of scheduled sites	PA
Energy and water	5	Reduce Malta's dependence on non-renewable sources of energy	Decrease Malta's dependence on non-renewable energy sources	Energy generation by type	Eurostat/EWA/ NSO
		Reduce energy consumption levels	To incentivise the reduction of energy consumption by end-users	Energy & water consumption levels by type	
		Improve water quality	To improve the quality of primary water		
		Increase Malta's security of supply	Increase Malta's security of supply	Security of supply	

Theme	SEA objective		Criterion	SEA Indicator	Data source
Human health	6	Protect and improve human health	To promote personal health	Number of obesity related deaths	European Environment Agency/NSO/ WHO
			Increase in quality of life through better air quality	Premature deaths attributable to air pollution	
			Reduce occurrence of asthma in the Maltese population	Morbidity due to asthma	National Health Interview Survey
Landscape	7	Protect and improve the quality, integrity and distinctiveness of the landscape	Protection of the landscape	Status of landform and topography, landscape, the natural beauty and scenic amenity of the landscape	ERA
Transportation and related infrastructure	8	Minimise environmental impacts from non-sustainable means of transportation and improve Malta's status	Reduce the number of vehicles running on non-renewable fuel sources	Number of vehicles by type[2]	EWA/NSO/TM
				Number of bicycles and e-bicycles	
			To increase public transport usage	Number of public transport commuters	
		Provide and increase use of alternative means of travel	To promote cycling as a sustainable mode of transport	Length of cycle lanes	
			To improve accessibility and better access without the use of cars	Number of public transport commuters	
Waste and resource management	9	Increase sustainable management of waste, waste preventions and minimisation practices	Promote prevention, re-use, recycling, recovery (energy)	Waste generation by type	MESDC/ Wasteserv
		Improve the management of agricultural waste	Improve the manure and slurry management		
		Increase re-use, recycling and recovery wastes	Reduce landfilling	Waste separation and recycling	

[2] *Data on distance covered is not publicly available.*

3.1.2 Stakeholder involvement

The SEA Focal Point, composed of a Chairperson and two other members, is the Competent Authority for the STRATEGIC ENVIRONMENTAL ASSESSMENT REGULATIONS 2010. In addition, the designated authorities which are frequently being consulted due to their particular environmental responsibilities, may be affected by the environmental effects of implementing plans as per SEA REGULATIONS (S.L. 549.61):

- Environment and Resources Authority (ERA)
- Regulator for Energy and Water Services (REWS)
- Directorate for Agriculture
- Directorate for Fisheries
- Ministry for Health

The leading Ministry in the development of the NECP is the Ministry for Energy and Water Management, as the legal basis of the Governance Proposal falls within the remit of the Directorate-General for Energy. In addition, several other Ministries were considered as important contributors to the drafting of the Plan and have been tasked with providing input to sections falling under their remit:

- The Office of the Prime Minister
- Ministry for the Environment, Sustainable Development and Climate Change
- Minister for Transport, Infrastructure and Capital Projects
- Ministry for the Economy, Investment and Small Business
- Ministry for Finance
- Ministry for European Affairs and Equality
- Ministry for Education and Employment
- Ministry for Justice, Culture and Local Government
- Parliamentary Secretary for Financial Services, Digital Economy and Innovation

Collectively, these Ministries established an Inter-Ministerial Steering Committee (IMSC) through cabinet Decision CAB/90/XIII/17 with the objective to deliver Malta's first NECP. The IMSC was set up in order to ensure that all national stakeholder contribute effectively towards the National Plan, since the development of the Plan requires coordination and contributions from several entities. The Impact Assessment being carried out by EWA and the entities on the IMSC is an independent exercise to the SEA.

The drafting stage of Malta's first NECP was subjected to early consultations involving stakeholders, which took place between April and October 2018. A public consultation period was held after submission of the draft NECP between March and April 2019. Entities considered as key stakeholders to the Plan were as follows:

- Building Industry Consultative Council (BICC)
- Malta Developers Association (MDA)
- Malta Business Bureau (MBB)
- Institute for Climate Change and Sustainable Development (University of Malta)
- Institute for Sustainable Energy (University of Malta)
- Malta College for Art and Science

- Malta Hotels & Restaurants Association
- The Commission for Environment of CURIA (Il-Kummissjoni Ambjent tal-Knisja)
- Malta Chamber of Commerce
- Enemalta Plc
- Enemed Ltd
- Liquigas Malta Ltd
- Easygas Ltd
- Electrogas Ltd
- Water Services Corporation (WSC)

During the scoping stage of the SEA, AIS undertook a stakeholder engagement strategy with stakeholders identified in Section 3.1.2, prior to the finalisation of the scoping report (Deliverable 1.4). The objectives of the stakeholder engagement strategy were guided by the following strategic objectives, so as to:

1. Support the right level of public consultation with regards to the scope of the project, the communication events should create awareness of:
    a. Malta's 2030 NECP, the draft of which is already public
    b. the SEA process which is currently underway;
2. Focus on the efforts to involve and consult with the largest number of stakeholders and public groups possible to thoroughly assess the Plan and provide the most comprehensive SEA as possible;
3. Generate interest and debate within the Maltese community;
4. Discuss the proposed assessment methodologies and indicators;
5. Highlight the EWA's commitment as regards to the above points; and
6. Reinforce and illustrate the positive points achieved for/by EWA resulting from communication events.

3.2 Phase 2: Strategic Environmental Assessment

3.2.1 Interim SEA report

The Environmental Report has been written in accordance with the guidelines set out in Schedule I of S.L.549.61, as outlined in Section 1.2. Table 4 outlines the stages involved in the compilation of the Environmental Report.

Table 4: Environmental report content

Stage		Description
1	Environmental baselines	Relevant baseline conditions and trends
2	Policies	Links to other relevant environmental policies, plans and programmes, particularly in relation to the SEA Regulations
3	Potential environmental issues	Environmental issues potentially arising from the policy criteria, including establishment of reasonable alternatives
4	Impact assessment	Impact assessment exercise during all the phases of policy measures implementation, including: » Construction/installation, operation and decommissioning of any infrastructure

Stage		Description
		» Cumulative impacts from implementation of multiple measures The assessment will evaluate whether the policy-level measures are expected to be effective in pre-empting significant impacts
		Alternative scenarios to be assessed separately
		Designation of mitigation measures for the adverse impacts and determining the residual impacts
5	Assessment of alternatives	The various alternatives will be assessed to determine the preferred alternative (including reasons for rejection of others)
6	Recommendations	A description of the recommendations made throughout the SEA process to improve criteria and measures
7	Monitoring proposals	A description of the monitoring requirements to assess the impacts and implications of the policy during the implementation stage

Stage 1 of the Environmental Report involved a thorough literature review of any existing and available information relevant to this study within the AoS. The following sources of information/data were identified at scoping stage:

- The Strategic Plan for the Environment and Development (SPED, 2015)
- The National Environmental Policy;
- The National Biodiversity Strategy and Action Plan;
- The Flora, Fauna and Natural Habitats Protection Regulations and related regulations
- Natura 2000 Management Plans and Conservation Orders issued by ERA;
- The Waste Management Plan;
- The Water Catchment Management Plan;
- The Bathing Water Quality Regulations;
- The Air Quality Plan for the Maltese Islands;
- The Limitation of Emissions of Certain Atmospheric Pollutants Regulations, in view of the specific emission ceilings for Malta; and
- The environmental policies of the Strategic Plan for the Environment and Development.

A number of alternatives for the NECP measures were identified and justified in agreement with the EWA and other Ministries whose PaMs fall within their remit, i.e. the Ministry of the Environment, Sustainable Development and Climate Change (MESDC) and the Ministry of Transport, Infrastructure & Capital Projects (MTIP). A thorough assessment of the alternatives shall be carried out, comparing each of the alternative options and the zero option (do-nothing scenario). The significance of the environmental impacts was assessed in line with the guidelines provided in Section 2 of Schedule II of S.L.549.61:

(a) the probability, duration, frequency and reversibility of the effects,
(b) the cumulative nature of the effects,
(c) the transboundary nature of the effects,
(d) the risks to human health or the environment (e.g. due to accidents),

(e) the magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected),

(f) the value and vulnerability of the area likely to be affected due to:

i. special natural characteristics or cultural heritage,

ii. exceeded environmental quality standards or limit values,

iii. intensive land-use,

(g) the effects on areas or landscapes which have a recognised national, Community or international protection status.

Impacts on the themes highlighted in Table 3 were assessed as part of the SEA process and presented in this draft Environmental Report. For each environmental theme, the impact assessment is presented in tabular format (Section 7.1). These matrices summarise the strategy alternatives being considered, the significance of the impacts and the timeframe of the impacts for each alternative. The potential cumulative effect of other policies and projects were also taken into account, including the Environmental Impact Assessment on the Malta-Italy gas pipeline link and the SEA & Appropriate Assessment (AA) which are currently underway for the Solar Farms Policy.

3.2.2 Stakeholder involvement

At Stage 2 of the SEA process, after the interim environmental report has been drafted, stakeholder consultation will be undertaken in order to enable provision of feedback on the draft environmental report.

At the time of writing, public gatherings of groups larger than 4 is prohibited due to the current COVID-19 health crisis. Consequently, the stakeholder and public consultation period must be remote. Following guidance from the SEA Focal Point, the Responsible Authority (i.e. EWA) has proposed that the document is issued for public consultation online on EWA website with notification of its publication and consultation timeframe in the Government Gazette. The report will also be submitted via email to the full list of entities outlined in Section 3.1.2.

3.2.3 Final SEA report

Following discussions with the stakeholders, the environmental report will be updated to include relevant comments and suggestions from the public.

4.0 Relevant environmental policies

4.1 Background on national energy generation

Between 2015 and 2017, Malta's electricity generation system underwent numerous major changes, as outlined below:

- The Marsa Power Plant was shut down, the older steam turbines in the Delimara Power Plant were phased out;
- The diesel engines at the Delimara Power Plant were converted to run on natural gas and diesel in dual-fuel and single-fuel engine arrangements, instead of heavy fuel oil;
- A private 215MW combined cycle gas turbine (CCGT) plant was commissioned to complement the existing capacity of the Maltese Islands, which includes a new LNG delivery, floating storage, re-gasification and natural gas supply facility at the Delimara peninsula; and
- A connection between Malta's electricity grid and the European grid via a 200MW HVAC subsea cable was constructed.

Since the above measures were implemented before the cut-off date, these are not included in the PaMs within the WPM scenario. These have nevertheless been included here to provide context for the SEA.

4.2 National energy & climate change policies

4.2.1 Malta's Energy Policy

Malta's NATIONAL ENERGY POLICY (published in 2012) stipulates policy areas which largely fall under the five dimensions defined by the Energy Union, as listed hereunder:

1. Decarbonisation
2. Energy efficiency
3. Energy security
4. Internal energy market
5. Research, innovation and competitiveness

The above dimensions have been adopted by the NECP to classify the PaMs, in line with the Regulation of the Governance of the Energy Union.

The guidelines and policy areas of the Energy Policy remain valid until 2030, although some of the measures have been implemented, superseded or rendered irrelevant. In fact, the specific way forward to achieve the policy objectives are aligned to the goals of the specific administration which is in power at the time.

4.2.2 Malta's National Renewable Energy Action Plan

Malta's NATIONAL RENEWABLE ENERGY ACTION PLAN (NREAP) for 2015-2020 forms part of Malta's obligations for the RES DIRECTIVE 2009/28/EC. This action plan outlines how Malta will achieve its national 2020 target of 10% renewable energy share in gross final energy consumption as stipulated in the Directive.

Solar radiation is identified by the Action Plan as Malta's likely primary source of renewable energy, and in fact, solar energy contributed 95.5% of the share of renewable electricity production in Malta.[3]

4.2.3 Low Carbon Development Strategy

The government is currently developing a LOW CARBON DEVELOPMENT STRATEGY (LCDS) to address a series of EU obligations that constitute ambitious targets to minimise climate change that oblige the country to adapt to uncertain and inevitable physical and economic consequences. The purpose of this policy is to gradually reshape the country into a Low Carbon Economy.

One of the main pillars that will be tackled in this policy is the energy sector, as this industry has the highest potential for delayering a reduction in emissions. In fact, it is considered possible that the sector could contribute towards the elimination of CO_2 emissions by 2050. The government's vision on the LCDS is to seek investments which embrace a low carbon footprint and technologies with a higher efficiency in terms of space utilisation/peak power especially in solar energy harvesting.

4.2.4 The National Strategy for Policy and Abatement Measures relating to the reduction of Greenhouse Gas Emissions (2009)

In 1994, Malta ratified the United Nations Framework Convention on Climate Change (UNFCCC) as a non-Annex I party. Before the ratification, Malta did not have any obligations under the Kyoto Protocol to limit or decrease its greenhouse gas (GHGs) emissions, not even under the EU 'burden-sharing agreement'.

However, this has changed after the accession in the European Union and Malta had to submit this strategy according to Article 3(2) of Decision 280/2004/EC. This required the introduction of policies and measures which, directly or indirectly, lead to limitations or reductions of emissions of GHGs, such as the proposals mentioned in the new NWMP.

4.2.5 The National Climate Change Adaptation Strategy (2012)

This Strategy seeks to address various sectors which are vulnerable to climate change impacts, and recommends a number of adaptation action plans which should be taken into consideration. At present, Malta does not have a legal framework which relates particularly to climate change adaptation.

However, there are other existing regulations and studies which tackle such an issue indirectly by adopting implementation measures over the next 10 to 50 years, for instance; Environmental Impact Assessments (EIA), water policy, terrestrial and marine ecosystems, infrastructure (including energy, transport, telecommunications, buildings, and waste) and health.

[3] *NSO (2019). Renewable energy from Photovoltaic Panels (PVs): 2018. News Release. https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_02/Regional_and_Geospatial_Statistics/Documents/2019/News2019_097.pdf.*

4.2.6 Solar Farm Policy

In order to fulfil the requirements of EU Directive 2009/28/EC for the RES DIRECTIVE, Malta developed a SOLAR FARM POLICY which was published in October 2017. Such a policy is key in helping Malta achieve its EU target of reaching an overall 10% share of energy from renewable sources by 2020, in accordance with the PROMOTION OF ENERGY FROM RENEWABLE SOURCES REGULATIONS (S.L. 545.11).

The objectives of the SOLAR FARM POLICY are "*to establish a policy framework which shall define a solar farm, provide guidance for the location of new solar farms with a priority, but not exclusively, for large scale roof tops, for land already committed to industrial development and for quarries; and to identify potential impacts to be addressed.*"

An SEA and AA for the SOLAR FARM POLICY are currently being prepared by AIS Environment in relation to those quarries whose development into a solar farm may potentially impact vicinal Natura 2000 sites.

4.3 Environmental policies

Relevant environmental policies that have been consulted as part of this SEA are listed below:

European Directives

- MARINE STRATEGY FRAMEWORK DIRECTIVE 2008/56/EC (MSFD)
- WATER FRAMEWORK DIRECTIVE 2000/60/EC (WFD)
- HABITATS DIRECTIVE 92/43/EEC
- BIRDS DIRECTIVE 2009/147/EC

National Policies, Documents & Regulations

- STATE OF THE ENVIRONMENT REPORT (2018)
- THE NATIONAL ENVIRONMENTAL POLICY (2012)
- THE NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (2012)
- FLORA, FAUNA AND NATURAL HABITATS PROTECTION REGULATIONS (S.L. 549.44)
- THE WASTE MANAGEMENT PLAN (2014)
- THE WATER CATCHMENT MANAGEMENT PLANS (2011 & 2016)
- THE BATHING WATER QUALITY REGULATIONS (2009)
- THE AIR QUALITY PLAN FOR THE MALTESE ISLANDS (2010)
- THE LIMITATION OF EMISSIONS OF CERTAIN ATMOSPHERIC POLLUTANTS REGULATIONS (2018)

5.0 Environmental baseline

The collection of baseline information is fundamental to the SEA process. It provides the basis for identifying key issues and trends in the Maltese Islands and for predicting and monitoring the effects of the NECP.

The criteria for assessment and indicators were discussed and selected during the scoping activity which included the participation of the EWA (Section 3.1), whilst referring to the comments received by those who have shown an interest in the call for feedback. During the scoping activity, the environmental concerns related to each topic were discussed and the extent to which these shall be considered as issues was delineated.

The choice of environmental indicators was based on their appropriateness in describing the environmental baseline conditions, in measuring any predicted effects and their usefulness in comparing alternatives and monitoring of the implementation of the NECP. Table 3 shows how the Environmental Report has drawn together the environmental themes and existing baseline data. Paragraph C of Schedule 1 of the SEA Regulations states that the environmental characteristics of areas likely to be significantly affected shall be provided in the Environment Report. Consequently, the environmental characteristics of the Maltese Islands will be described in accordance with the parameters listed in Table 3.

The environmental baseline data evaluated in Sections 5.1 to 5.9 is mainly sourced from documents prepared by the Environment & Resources Authority (ERA) and the National Statistics Office (NSO). This Environment Report document tracks the progress of the different environmental themes presented in Table 3.

5.1 Air quality

Air quality is a top-priority environmental concern for Malta, which is lately being given increasing importance even on the national political agenda. This concern arises because of the direct link of air quality to the quality of public human health and ecosystems – terrestrial, freshwater and marine. In compliance with EU Air Quality Directives, Malta is required to avoid, prevent and reduce the impact of harmful air emissions on human health and the environment by abiding with set thresholds. In response to these Directives, the ERA has been implementing the AIR QUALITY PLAN FOR THE MALTESE ISLANDS (2010) that sets out the basic framework for the measurement of air quality in Malta over the coming years and the specific reduction of PM_{10} and NO_2 concentrations which have shown annual exceedances since 2004 and 2006, respectively. This plan outlines measures to be implemented in order to reduce and, if possible, prevent further exceedances.

The European Environmental Agency (EEA) published the AIR QUALITY IN EUROPE – 2019 REPORT,[4] which states that Malta managed to meet all air quality targets, except for PM_{10} in 2017. The annual data shows that the island has managed to keep emissions of $PM_{2.5}$, O_3, benzene, NO_2 and SO_2 below the level required by the EEA. The 2017 data shows a general improvement in the concentrations of these atmospheric pollutants from previous years,

[4] *https://www.eea.europa.eu/publications/air-quality-in-europe-2019.*

with the lowest concentrations of PM_{10} and $PM_{2.5}$ being lowest in 2017 in the 2013-2017 period.

The ERA continuously measures the concentration of a number of pollutants, the results of which are then compared to the emission limit values (ELVs) established by EU legislation. These measurements are taken using specialised equipment operated by trained staff, to operate the four real-time monitoring stations and a passive diffusion tube network covering most of the Maltese Islands. The monitoring stations are as follows:

- Traffic site in Msida
- Urban background in Żejtun
- Urban site in Attard
- Rural background in Għarb, Gozo

These monitoring stations provide hourly real-time data for the concentrations of a number of pollutants, as outlined in Table 5.

Table 5: Pollutants monitored real-time by ERA, and their EU/WHO limits

Pollutant	EU Ambient Air Quality Directives			WHO guidelines		Malta monitoring station			
	Avrg period	LV (µg/m³)	Exceedances/year	Avrg period	AQG (µg/m³)	Gharb	Attard	Msida	Zejtun
Particulate matter (PM_{10})	1 day	50	35 days	1 day	50	Yes	No	Yes	Yes
	1 year	40	N/A	1 year	20				
Particulate matter ($PM_{2.5}$)	1 year	25	N/A	1 day	25	Yes	Yes	Yes	Yes
				1 year	10				
Carbon monoxide	Max 1 day 8-hour mean	10	N/A	1 hour	30,000	Yes	No	Yes	No
				Max 1 day 8-hour mean	10,000				
Nitrogen dioxide	1 hour	200	18 hours	1 hour	200	Yes	Yes	Yes	Yes
	1 year	40	N/A	1 year	40				
Ozone	1 hour	180	N/A	Max 1 day 8-hour mean	100	Yes	Yes	Yes	Yes
	Max 1 day 8-hour mean	120	25 days						
Sulphur dioxide	1 hour	350	24 hours	10 minutes	500	Yes	No	Yes	Yes
	1 day	125	3 days	1 day	20				
Benzene	1 year	5	N/A	1 year	1.7 (ref limit)	Yes	No	Yes	No
Nitric oxide	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	Yes
Ethylbenzene	N/A	N/A	N/A	N/A	N/A	No	No	Yes	No
Metaxylene	N/A	N/A	N/A	N/A	N/A	No	No	Yes	No
Orthaxylene	N/A	N/A	N/A	N/A	N/A	No	No	Yes	No
Toluene	N/A	N/A	N/A	N/A	N/A	No	No	Yes	No
Mercury	N/A	N/A	N/A	N/A	N/A	No	No	No	Yes
Air pressure	N/A	N/A	N/A	N/A	N/A	No	Yes	Yes	Yes
Relative air pressure	N/A	N/A	N/A	N/A	N/A	Yes	No	No	No
Humidity	N/A	N/A	N/A	N/A	N/A	Yes	Yes	No	No
Temperature	N/A	N/A	N/A	N/A	N/A	Yes	Yes	No	Yes
Wind direction	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	Yes
Wind speed	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	Yes

The fixed station network is complemented by a passive diffusion tube network (Figure 1), which consists of approximately 98 NO_2 and 90 VOC passive diffusion tubes located around Malta and Gozo. These are exposed for a period of four weeks (total of 13 exposure periods annually).

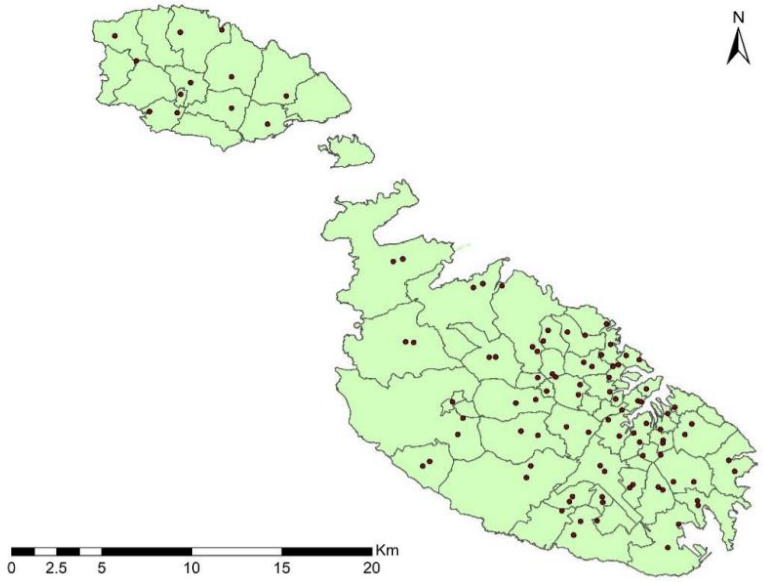

Figure 1: Passive diffusion tube network in Malta[5]

5.1.1 Pollution sources

Malta's STATE OF THE ENVIRONMENT REPORT (SoER) published in 2018[5] identifies numerous sources for the aforementioned air pollutants, as listed in Table 6. Active construction sites are also considered to be a primary source of particulate matter in the Maltese Islands.

Table 6: Pollutants and their primary sources[5]

Pollutant	**Source(s)**
Particulate matter (PM_{10} and $PM_{2.5}$)	Fuel combustion in power generation Fuel combustion in road transport Incineration Tyre and brake wear Road wear
Ozone (O_3)	A secondary pollutant that results from reactions involving precursor gases such as volatile organic compounds and nitrogen oxides
Nitrogen Oxides (NO and NO_2)	Combustion sources (results in NO mostly, with subsequent oxidation to NO_2)
Sulphur Dioxide (SO_2)	Combustion of fuels containing high levels of sulphur (e.g. Heavy Fuel Oil in thermal power plants)
Benzo[a-]pyrene (BaP)	Incomplete combustion of fuels and rubber-tyre wear
Carbon monoxide (CO)	Incomplete combustion of fuels in road transport
Benzene	Incomplete combustion of fuel in road transport

[5] *ERA (2018). State of the Environment Report 2018. https://era.org.mt/en/Pages/State-of-the-Environment-Report-2018-Summary-and-Chapters.aspx.*

Pollutant	Source(s)
	Handling and distribution of petrol
Arsenic	Metal smelters Coal combustion
Cadmium	Non-ferrous metal production Iron and steel production Cement production Waste incineration Stationary combustion of fossil fuel
Nickel	Combustion of fuel oil and coal in stationary plants Combustion of fuel in ships Waste incineration Steel manufacture Electroplating
Lead	Combustion of fossil fuel Waste incineration Production of non-ferrous metals Production of iron and steel Production of cement
Mercury	Combustion of coal

5.1.2 Particulate matter

Particulate matter (PM) consists of very small suspended solid or liquid particles, which have both short- and long-term effects on human health. Such particles originate mainly from fuel combustion in transport and power generation, quarrying and construction dust, mechanically-generated dust, tyre and brake abrasion, and aerosols of transboundary origin. In addition, dust from natural sources such as atmospheric sea salt and wind-blown dust are also considered as PM.

In 2017, Malta's real time monitoring stations recorded high levels of PM_{10}, as can be visualised in Figure 2. An average of 15.9 µg/m^3, 38.1 µg/m^3 and 26.2 µg/m^3 of PM_{10} was observed for the Għarb, Msida and Żejtun stations in 2017, respectively. The daily limit value established by the EU is of 50µg/m^3, which should not be exceeded more than 35 times during one calendar year. In Għarb, a total of 3 exceedances were noted from the 359-day time period in 2017, which are suspected to be caused by influxes of Saharan dust (black arrows in Figure 2). In Msida, 57 days exceeded the EU threshold from the 351 days which were measured, and 12 exceedances were observed at the Żejtun station from the 345-day time period.

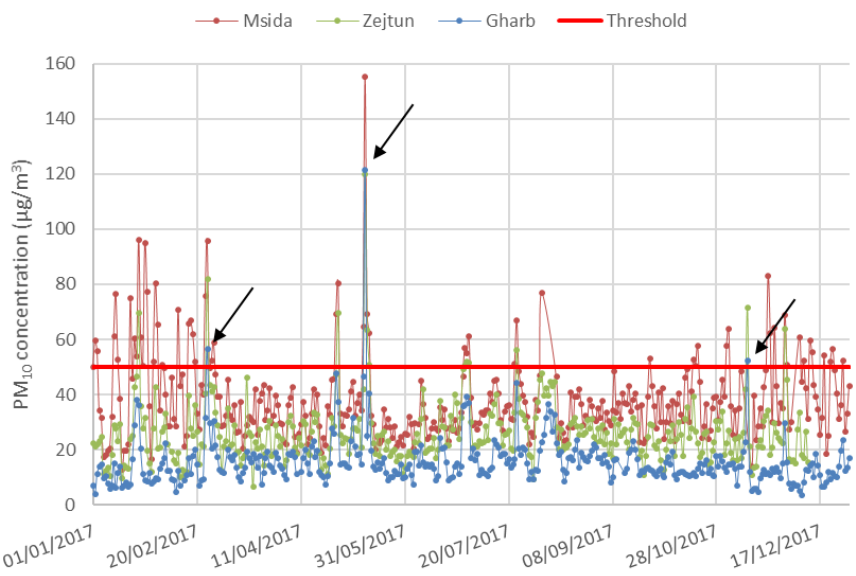

Figure 2: Daily PM_{10} concentrations for 2017

The annual average concentration of PM_{10} in 2017 was below the 40µg/l limit stipulated by EU legislation in all stations (vide Figure 3). It should be emphasised that the PM_{10} concentrations at the Msida station during 2013-2017 are close to the ELV, and in fact exceeded the limit in 2016. The 2017 status was an improvement from the 2016 concentrations at all stations, and were in fact the lowest levels observed in 2013-2017.

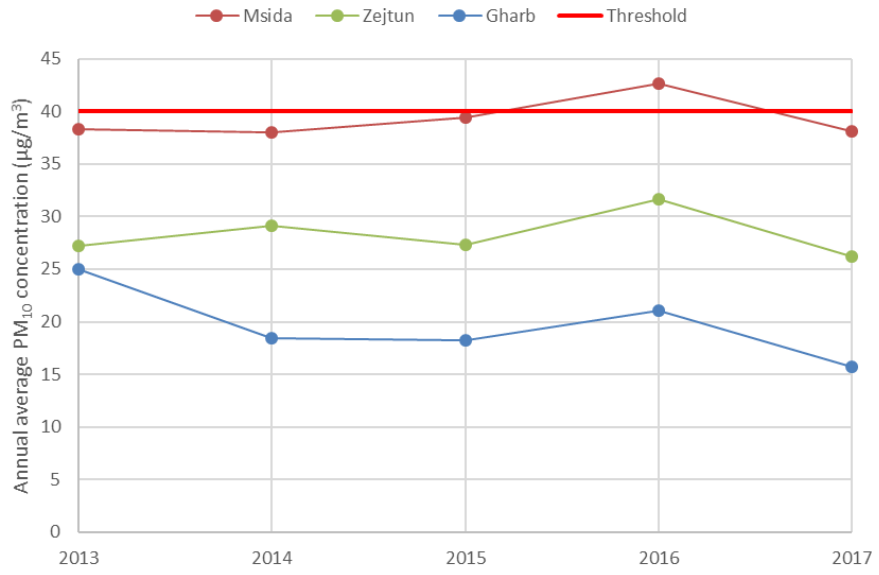

Figure 3: Annual average PM_{10} concentrations for 2013-2017

$PM_{2.5}$ are considered harmful because of their ability to penetrate deeper into the lungs when compared to PM_{10}. An average of 8.4µg/m^3, 12.4µg/m^3, 13.9µg/m^3 and 10.6µg/m^3 of $PM_{2.5}$ was observed for the Għarb, Attard, Msida and Żejtun stations respectively in 2017 (Figure 4). The EU annual average ELV for $PM_{2.5}$ is 25µg/m^3, which should have been attained by all Member States by 2015. In Għarb, Gozo, a total of 2 exceedances were noted from the 356-day time period, which are suspected to represent Saharan dust episodes (black arrows

in Figure 2). A total of 10 exceedances were observed in Attard from the 356 days measured in 2017. In Msida, 17 days exceeded the EU threshold from the 365 days which were measured, and 4 exceedances were observed at the Żejtun station from the 363-day time period.

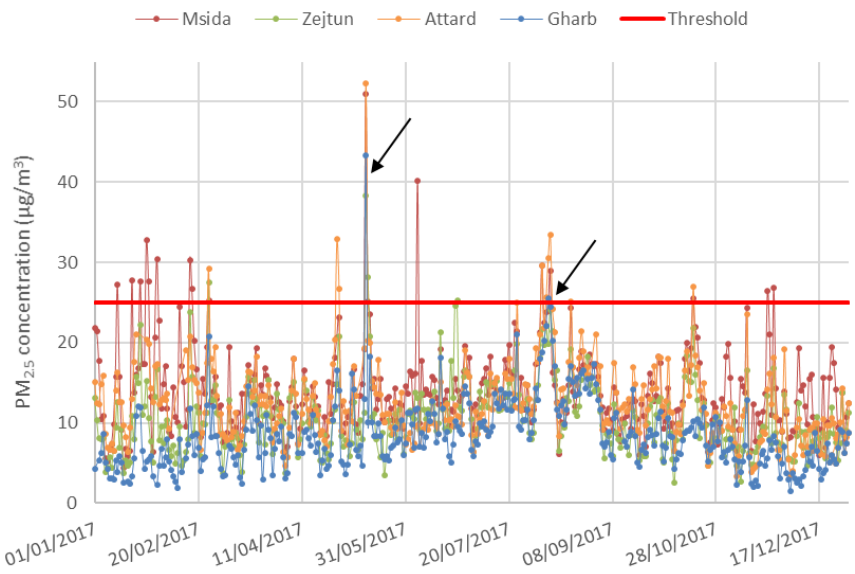

Figure 4: Daily $PM_{2.5}$ concentrations for 2017

The annual average concentration of $PM_{2.5}$ in 2017 was below the 25µg/l limit stipulated by EU legislation in all stations (vide Figure 5). The 2017 concentrations were the lowest observed between 2013 and 2017 at all stations, except for Attard. The Attard station, which began measuring $PM_{2.5}$ in 2016, showed an increase in concentration in the following year.

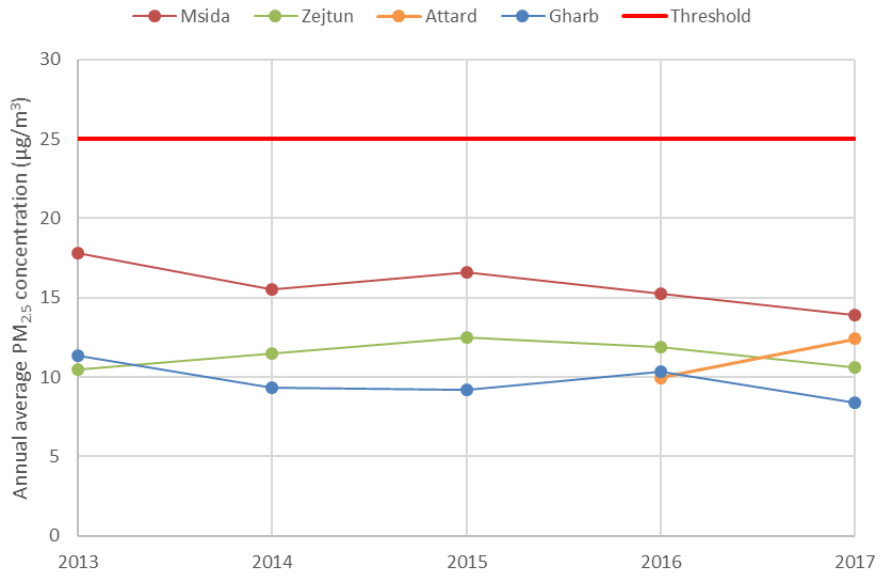

Figure 5: Annual average $PM_{2.5}$ concentrations for 2013-2017

Despite the daily $PM_{2.5}$ exceedances in 2017, the average exposure indicator (AEI) of the Maltese population to small particulate matter is considered as minimal and within the AEI

limit of 20µg/m^3, as shown in Figure 6. The 2017 AEI concentration showed a reduction of approximately 9% when compared to the 2011 value, which is just shy of the 10% reduction target to be achieved by 2020.

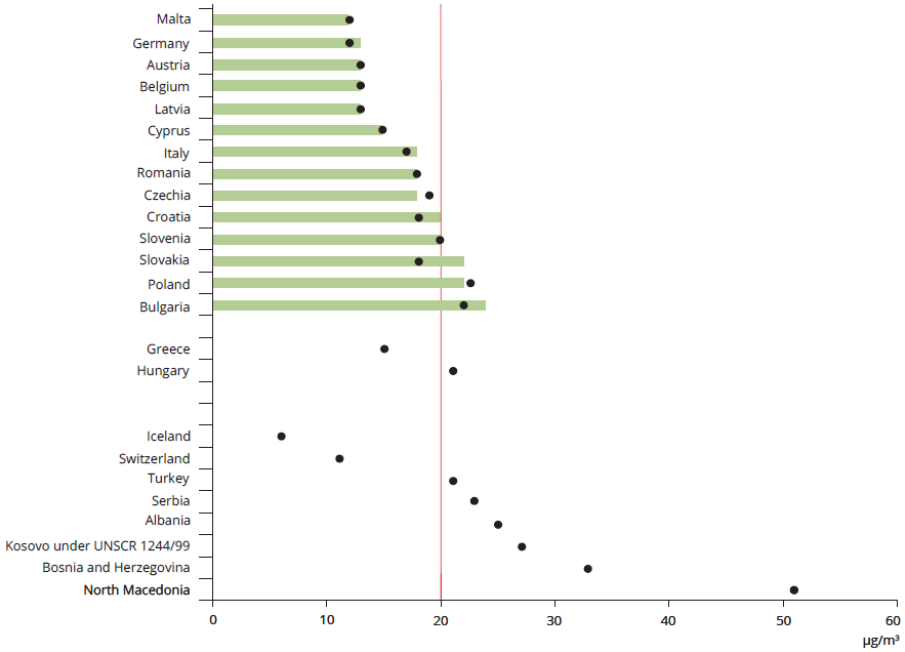

Figure 6: Average exposure indicator ($PM_{2.5}$) in 2017[6,7]

5.1.3 Ozone

Air quality standards also include concentrations of ozone, a pollutant which is formed in the troposphere by the reaction of nitrogen oxides and volatile organic compounds (VOCs) produced by vehicles with internal combustion engines. Ozone is also produced by the reaction of emissions from power stations in the presence of sunlight. It is a harmful pollutant in low atmospheric levels since it causes respiratory and cardiovascular health issues, and damages plant health. Three limit values are established by the EU and WHO for ozone, which require real time monitoring, as follows:

- 180µg/m^3 hourly threshold for human health protection, which should never be exceeded;
- 120µg/m^3 8-hourly running average limit value for human health protection, not to be exceeded more than 25 times per year; and
- 100µg/m^3 8-hourly running average limit value for human health protection.

The hourly average concentrations for ozone in 2017 were 98.1µg/m^3, 81.5µg/m^3, 55.6µg/m^3 and 75.1µg/m^3 in Għarb, Attard, Msida and Żejtun, respectively(Figure 7). The hourly threshold was exceeded twice in Għarb on 8th August 2017. Conversely, the 8-hourly limit was exceeded 91 times in Għarb, 24 times in Attard, twice in Msida and 7 times in

[6] Bars show the average exposure indicator (AEI) calculated in 2017 (averages 2015-2017); dots show all urban and suburban background PM2.5 concentrations (for stations with at least 75 % of data coverage) presented as 3-year (2015-2017) averages.

[7] EEA (2019). Air quality in Europe – 2019 report. DOI: 10.2800/822355.

Żejtun (Figure 8). The data indicates that the highest concentrations and exceedances occur in the areas with lowest traffic, i.e. rural areas.

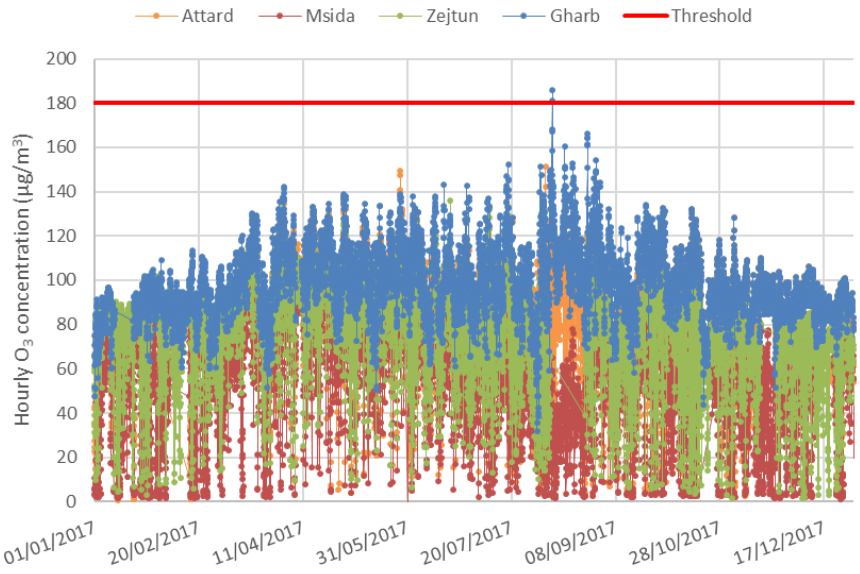

Figure 7: Hourly O_3 concentrations for 2017

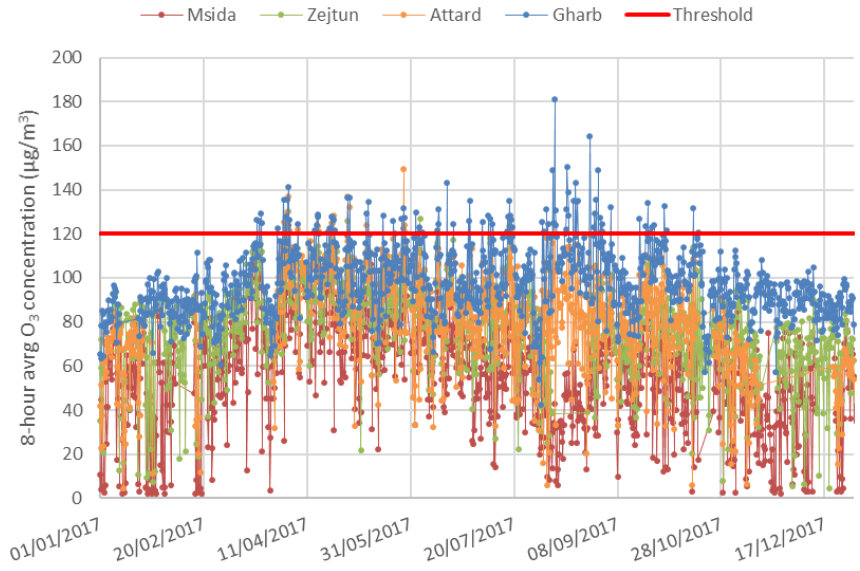

Figure 8: 8-hourly average O_3 concentrations for 2017

5.1.4 Benzenes and VOCs

Apart from being responsible for the formation of ozone at low atmospheric levels, benzene and other VOCs also cause respiratory irritations and other genetic and nervous disorders, depending on various factors such as exposure duration. These pollutants are emitted from incomplete and inefficient combustion, or evaporate directly into the atmosphere from their liquid counterparts. ERA monitors benzene, toluene, ethylbenzene and xylenes (BTEX).

Average annual concentrations of benzene declined by 16.8% between 2013 and 2017 at the Għarb station and by 53.4% at the Msida station. None of the concentration levels of

benzene exceeded the EU limit value of 5µg/m^3. The decline in benzene and other VOCs level is likely due to lower benzene and concentrations in imported gasoline. The WHO does not stipulate a threshold value, but instead advises a reference limit of 1.7µg/m^3, which was also not exceeded by Malta in 2014-2017 in Għarb and 2015-2017 in Msida.

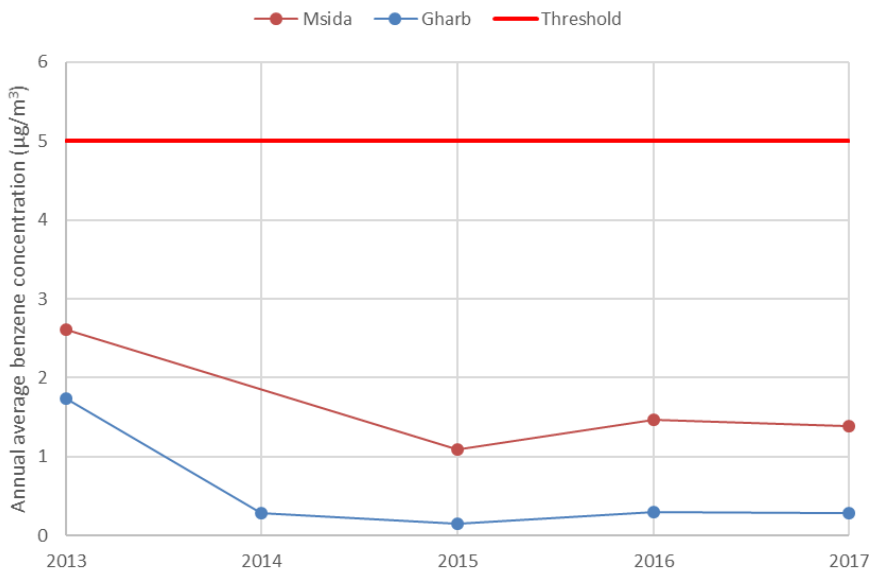

Figure 9: Annual benzene concentration for 2013-2017

5.1.5 Nitrogen dioxide

Nitrogen dioxide is another air quality parameter of importance according to EU legislation. NO_2 is emitted during fuel combustion such as industrial facilities and road transport. Nitrogen dioxide forms acids upon contact with water, and can convert to nitrates or other harmful compounds when reacting with atmospheric chemicals. NO_2 forms part of a group of nitrogen oxides (NO_x) which also includes nitrogen monoxide (NO). The latter makes up the majority of NO_x emissions. NO_x ultimately contributes to the formation of ozone and PM.

The hourly nitrogen dioxide concentrations remained below the 200µg/m^3 EU limit at all stations in 2017, as shown in Figure 10. The annual average level of nitrogen dioxide concentrations in 2013-2017 for all stations was also below the 40µg/m^3 EU and WHO limit value, as shown in Figure 11. The NO_2 concentration changes were relatively constant in 2013-2017, despite a dip in concentration in 2014 at the Msida station. It should nevertheless be noted that the NO_2 levels in 2017 at the Msida station are only 6.2% lower than the EU/WHO limit, meaning marginal increases in concentrations can bring about exceedances.

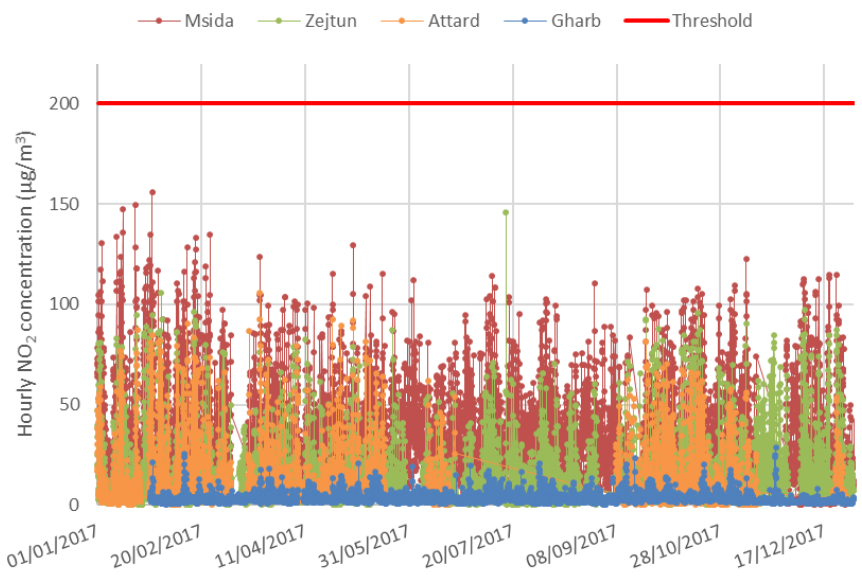

Figure 10: Hourly NO_2 concentrations for 2017

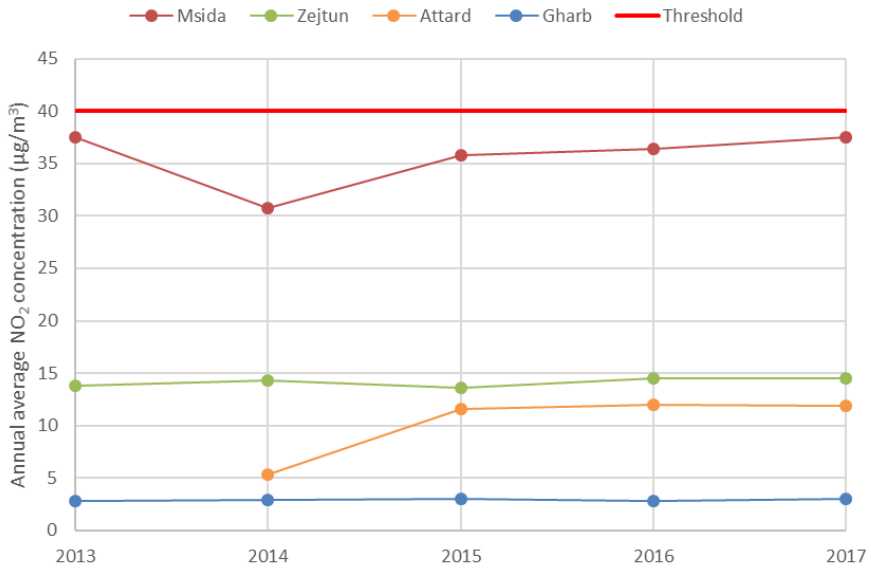

Figure 11: Annual average NO_2 concentrations for 2013-2017

The extensive passive diffusion tube network around the Maltese Islands allows for mapping of the distribution of NO_2 concentrations in the local context, as visualised in Figure 12.

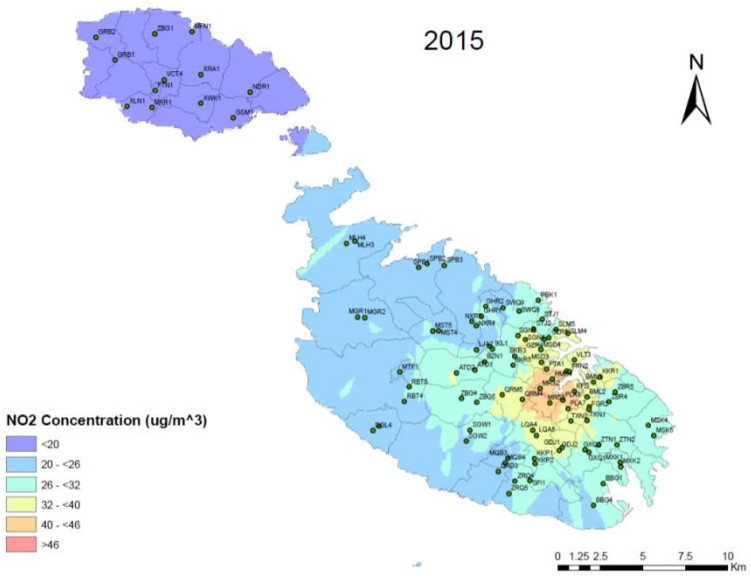

Figure 12: NO_2 concentration map in 2015[5]

5.1.6 Sulphur dioxide

Sulphur dioxide adversely affects the human respiratory system and lung function. It damages aquatic ecosystems, soils, vegetation and limestone buildings. Sulphur dioxide originates from burning of sulphur-containing fuels, including biofuels, in power stations and transport (amongst others). In addition, international shipping is considered a source of sulphur dioxide pollution and is a matter of increasing concern. Although natural sources of sulphur also exist (most notably active volcanoes), no such sources exist in Malta. Sulfate also combines with other atmospheric compounds to become particulate matter and is therefore an important source of ultra-fine particles such $PM_{2.5}$.

In 2017, the national hourly concentration of sulphur dioxide (SO_2) was well below the EU limit of 350µg/m^3 (Figure 13). In fact, the annual average concentrations at Għarb, Msida and Zejtun equated to 0.41%, 0.33% and 0.39% of the ELV, respectively. The 2017 daily average concentration was also below the 125µg/m^3 ELV (Figure 14).

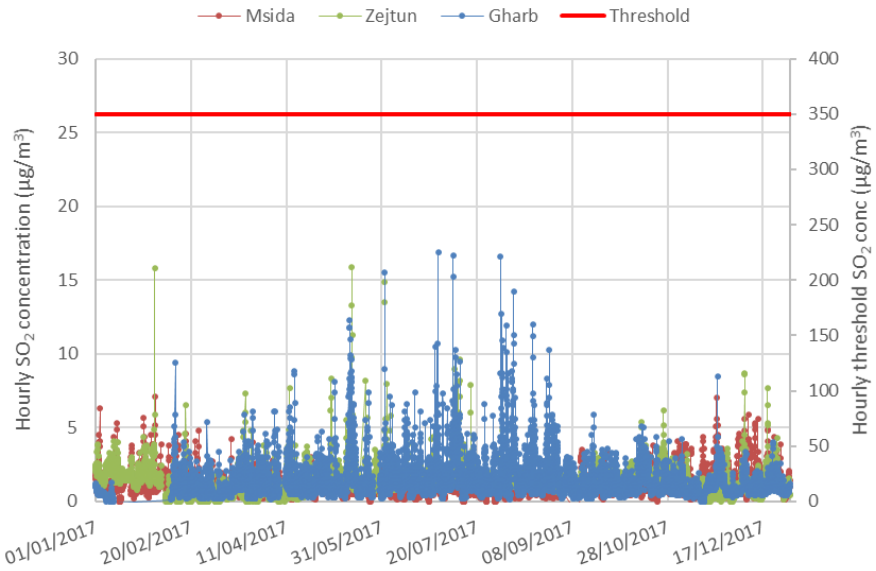

Figure 13: Hourly SO_2 concentrations for 2017

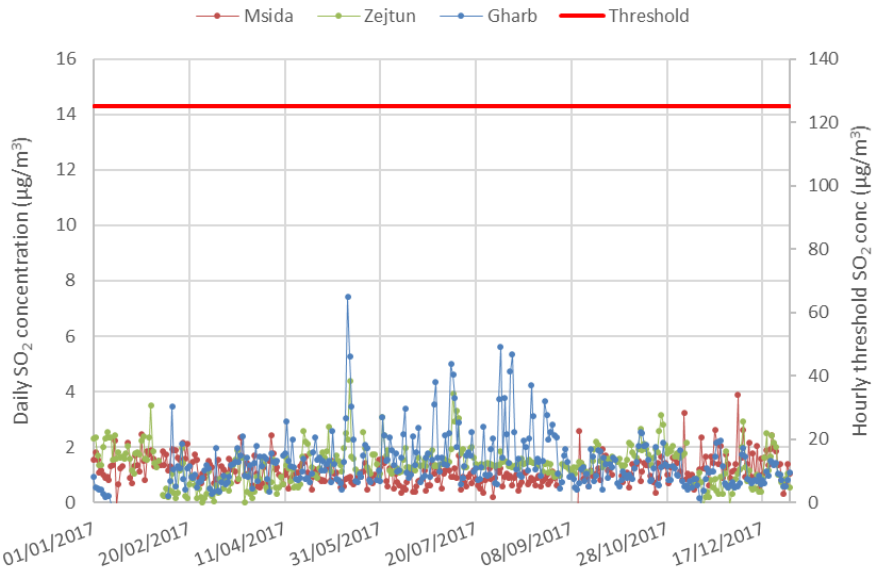

Figure 14: Daily SO_2 concentrations for 2017

5.1.7 Emission ceilings

The SoER identifies the emission ceilings and compares them to the 2015 emissions, as delineated in Table 7. It is clear that Malta has already reached the 2020 and 2030 targets for NMVOC and $PM_{2.5}$, and must continue to maintain such levels by 2030. The 2020 target for NO_x and NH_3 has been achieved, and further work must be done to reach the 2030 targets. Nevertheless, Malta must ensure that proper measures are implemented and enforced to maintain and improve existing scenarios for these pollutants by 2030. Conversely, the SO_2 concentration in 2015 exceeded the 2020 limit, indicating that Malta may not reach this target. Nevertheless, as discussed in Section 5.1.6, the ambient concentrations of SO_2 were well below the target levels. Further measures are necessary to remove the national emissions.

Table 7: National emissions and their emission ceilings[5]

	Pollutant				
	NO_x	NMVOC	SO_2	$PM_{2.5}$	NH_3
2015 emissions (tonnes)	2850	2060	3300	239	1460
2020 emission ceilings (tonnes)	5394	2541	2530	975	1536
2030 emission ceilings (tonnes)	2008	2862	552	355	1300

5.2 Biodiversity

Biodiversity comprises all living native organisms and the diverse habitats in which they reside, and is also considered to be the natural heritage of that area/country. The quintessential aspect of nature is captured by biological diversity, since it encompasses an assortment of species and habitats at different taxonomic levels of biological organisation in terrestrial and aquatic systems, namely:

- Genetic diversity
- Species diversity
- Habitat diversity
- Ecosystem diversity

The more diverse and complex a biological system is, be it terrestrial, freshwater or marine, the healthier it tends to be and the more resistant it is to external pressures. Communities of living organisms also interact with non-living components of their environment to form a unified and effective system. The health of the physical environment is just as important as its living counterpart since the two are closely interlinked.

Biodiversity also produces an endless list of goods and life-supporting services to human beings, termed as "ecosystem services". Such services are divided into four categories:

1. **Supporting services**: such as primary production, nutrient cycling, soil formation, pollination, etc.
2. **Provisioning services**: such as provision of food, raw materials, genetic resources, water, etc.
3. **Regulating services**: such as climate regulation, predation (to regulate prey/pest populations), waste decomposition, water/air purification, etc.
4. **Cultural services**: such as historical, recreational, spiritual, cultural, etc.

5.2.1 Protected sites

Due to the importance of certain habitats and species, national and international regulatory bodies designate such habitats and species as protected areas. These sites are studied in detail to establish their role and importance, along with specific measures to preserve and improve their environmental and ecological health (i.e. biodiversity). According to the 2018 SoER issued by the ERA, Malta's protected sites cover a total area of 90.1km^2 (28.5% of the islands' land area), which includes 41km^2 of land protected by the EU Natura 2000 network.[5] Additionally, 4,138km^2 of Maltese terrestrial waters (35.5%) are considered to be protected areas. A total of 263 protected sites are currently established in Maltese legislation, comprising of 244 terrestrial sites and 19 marine sites. From the total, three terrestrial and

two marine sites were added to the list in 2019. The trends of national designations given to protected sites are shown in Table 8.

Table 8: International & national designations as of 2013 & 2019

Designation		Number of sites (2013)[8]	Number of sites (2019)[9]	% change
Natura 2000	Special Area of Conservation – National	8	8	0.0
	Special Area of Conservation – International	28	37	+32.1
	Special Protection Area	13	21	+61.5
National legislation	Area of Ecological Importance	20	24	+20.0
	Site of Scientific Importance	8	10	+25.0
	Area of Ecological Importance & Site of Scientific Importance	38	42	+10.5
	Nature Reserves	3	3	0.0
	Tree protection area	29	60	+106.9
	Historical Trees having an Antiquarian importance	6	6	0.0
	Bird Sanctuary	26	26	0.0
	Protected Beaches	11	11	0.0

5.2.1.1 International designations

Sites protected by international legislation in Malta can be designated in one or more categories, as described in Table 9.

Table 9: International designation, legislation and Maltese sites

Designation	Legislation	Malta sites
Wetlands of International Importance (Ramsar sites)	CONVENTION ON WETLANDS OF INTERNATIONAL IMPORTANCE (or UN Ramsar Convention)	L-Għadira and Is-Simar
Special Protection Areas	CONVENTION FOR THE PROTECTION OF THE MARINE ENVIRONMENT AND THE COASTAL REGION OF THE MEDITERRANEAN (UN Barcelona Convention)	L-Għadira, Il-Gżejjer ta' San Pawl (St Paul's Islands), Filfla & surrounding islets, and Ħaġret il-Ġeneral (Fungus Rock)
Natura 2000 sites (Special Areas of Conservation and Special Protection Areas)	EC HABITATS DIRECTIVE (92/43/EEC) and EC BIRDS DIRECTIVE (2009/147/EC)	37 terrestrial sites and 18 marine sites

[8] *MEPA (2012). The Environment Report Indicators 2010-2011. https://era.org.mt/en/Documents/TERI%202010_2011.pdf*

[9] *https://era.org.mt/en/Pages/Database-on-Designated-Areas-in-National-Law.aspx*

Designation	Legislation	Malta sites
Areas of Special Conservation Interest (Emerald Network of Protected Areas)	CoE Bern Convention	Same as those of the Natura 2000 network

The EU Natura 2000 Network is a system of protected sites across the EU, designated under the Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC), which merit special conservation measures since they support habitats and species of community interest. This network is one of the tools used by the EU to assist with halting the loss of biodiversity. A number of ecologically important in Malta have been designated as part of the EU Natura 2000 network.

The habitats of international importance are listed in Annex I of the Habitats Directive for natural habitat types of community interest whose conservation requires the designation of Special Areas of Conservation (SAC). This list has been transposed into local legislation in Schedule I of the Flora, Fauna and Natural Habitats Protection Regulations (S.L. 549.44). In 2011, 13.3% and 5.2% of land area was designated as an SAC and SPA, respectively, as shown in Figure 15. As of 2020, 13.3% and 5.8% of Malta's land area is designated as SACs and SPAs, respectively. As of 2015, 35% of Maltese territorial waters formed part of the EU's Natura 2000 network (Figure 16),[5] which has increased even further through more recent additions, as shown in Figure 17.

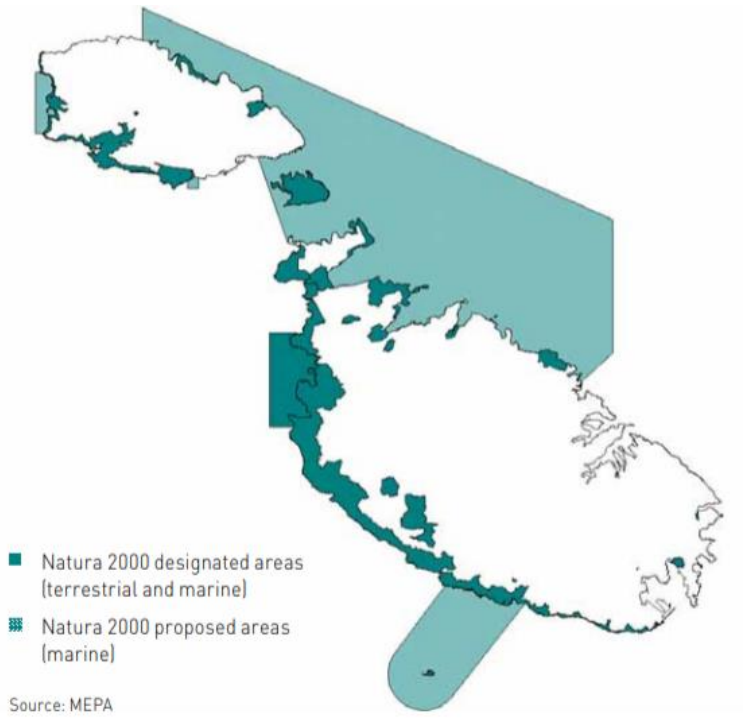

Figure 15: Maltese Natura 2000 Network in 2011[8]

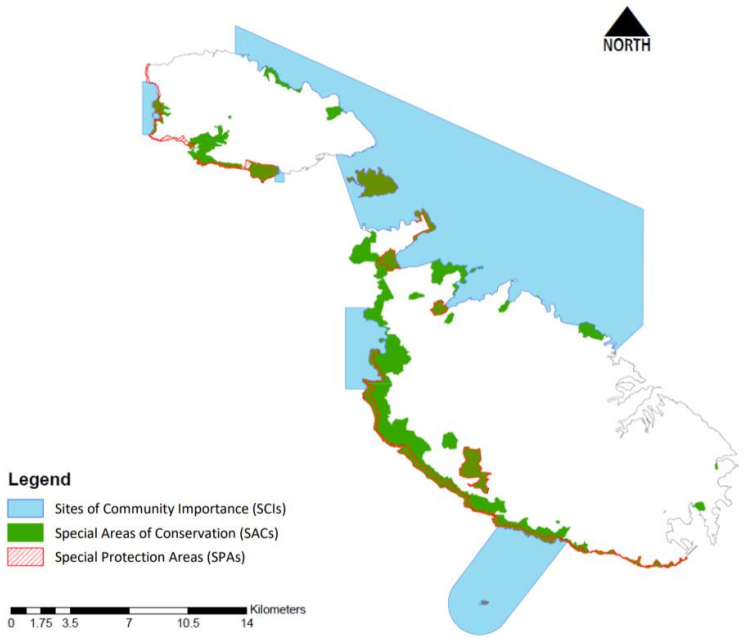

Figure 16: Maltese Natura 2000 Network in 2015[5]

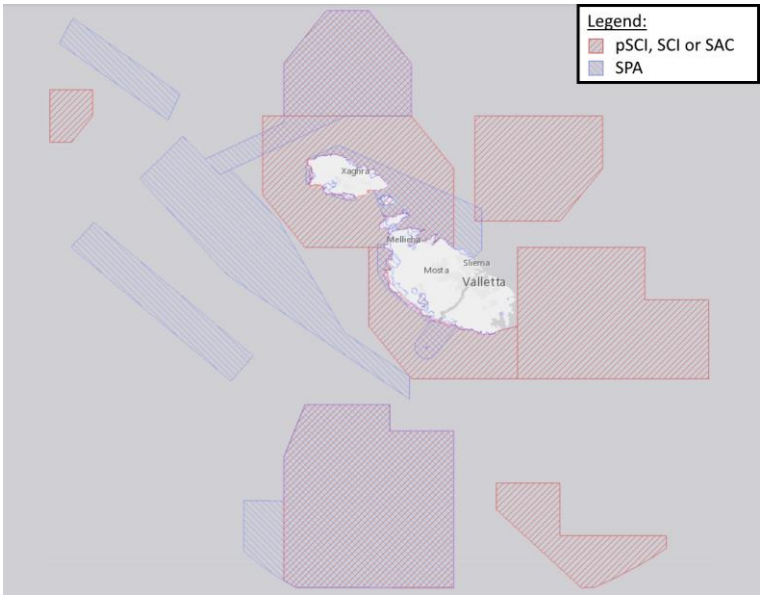

Figure 17: Maltese Natura 2000 Network in 2018[10,11]

Certain plant and animal species and habitat types are protected by law and thus any development proposals need to take into account the potential effects on protected species and habitats. Moreover, parts of the countryside where special statutory designations apply, development control decisions need to take full account of the features or qualities which justify the designation of the area. These are achieved through requests for ecological

[10] *Blue hatching denotes sites designated in line with the HABITATS DIRECTIVE; red hatching denotes sites designated in line with the BIRDS DIRECTIVE.*

[11] *http://natura2000.eea.europa.eu/.*

assessments (ex: depending on the statutory designation, a site-specific AA could be requested) during the planning phase.

5.2.1.2 National designations

The sites designated under the Natura 2000 Network (pSCIs, SCIs, SACs & SPAs) are also enlisted in local legislation, since such protection needs to be transposed into local legislation to take effect. Additionally, some sites which are not designated for international importance are designated solely according to national legislation, namely:

- Areas of Ecological Importance (AEIs)
- Sites of Scientific Importance (SSIs)
- Nature Reserves
- Tree protection areas
- Historical Trees having an Antiquarian importance
- Bird Sanctuaries
- Protected Beaches

Between 2011 and 2020, the number of AEIs increased from 20 to 24, while the number of SSIs increased from 8 to 10. In 2011, the boundaries for 30 tree protection areas were published, covering 5.35km^2, with the aim of enhancing protection of Malta's important terrestrial ecosystems. Between 2011 and the time of writing, the number of tree protection sites has increased to 60.

Malta has designated 3 nature reserves which afford protection to islets, as well as 26 bird sanctuaries. Since 2007, all beaches and swimming areas in close proximity to urban areas or major roads, including 11 specifically named beaches, were afforded legal protection from hunting. No new nature reserves, bird sanctuaries and protected beaches have been designated since 2011.

5.2.2 Protected species

Among the diverse assortment of species that inhabit the Maltese islands, some are considered to be endemic to the islands, i.e. they are only found in our country due to long-term isolation and evolution. Some species inhabit an even smaller area, such as *Helichrysum melitense* which only inhabits the western cliffs of Gozo. Other species observed in the Maltese Islands may occur only in the Mediterranean region, or parts thereof, rather than being specific to Malta; such species are considered as endemic to their specific area of occupation.

Endemic species, while being of significance to Malta's biodiversity and natural heritage, are inherently vulnerable to pressures/threats since they require specific environmental conditions to survive, which are characteristically rare.

Similar to protected sites, some species are protected by both international and national legislation, while others are only protected for their national importance, as shown in Table 10.

Table 10: Protected species in Malta and their legislative frameworks

Description	HABITATS DIRECTIVE	S.L. 549.44
Animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation	Annex II	Schedule II
Animal and plant species of national interest whose conservation requires the designation of Special Areas of Conservation	N/A	Schedule III
Animal and plant species of community interest in need of strict protection	Annex IV	Schedule V
Animal and plant species of national interest in need of strict protection	N/A	Schedule VI
Animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures	Annex V	Schedule VII
Animal and plant species of national interest whose taking in the wild and exploitation may be subject to management measures	N/A	Schedule VIII

5.2.3 Conservation status

The 2018 SoER compared the overall conservation status of protected species in Malta over two assessment periods, namely 2001-2006 (published in 2007) and 2007-2012 (published in 2013), as shown in Figure 18.

The 2018 SoER stated that the improvement in habitat conservation status between the two assessment periods are mostly attributable to reduction in knowledge gaps, rather than an actual improvement in status. Only 3% of the changes are considered as authentic status changes, as discussed in the following subsections.

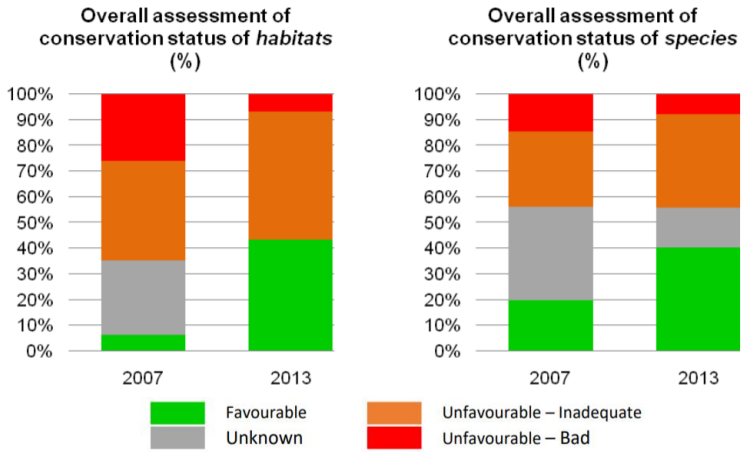

Figure 18: Conservation status of Maltese habitats and species[5]

5.2.3.1 Habitats conservation status

31 habitats of community importance were assessed in 2007, and 30 in the 2013 exercise. Some important conclusions were drawn in the 2018 SoER regarding the conservation status of the species and habitats (Figure 19), namely an increase in the number of terrestrial sites considered to be in favourable conservation status from 6% in 2007 to 43% in 2013, which

equates to an increase in favourable habitats from 1 to 9. There was an additional 15% reduction in habitats in bad/inadequate status (from 20 to 17 sites).

In the marine environment, a significant increase in knowledge is observed; in 2007, only one habitat was found in good status, while the statuses of the remaining sites were all considered as unknown. In 2013, all statuses were with all protected marine sites having a favourable status, with none remaining unknown.

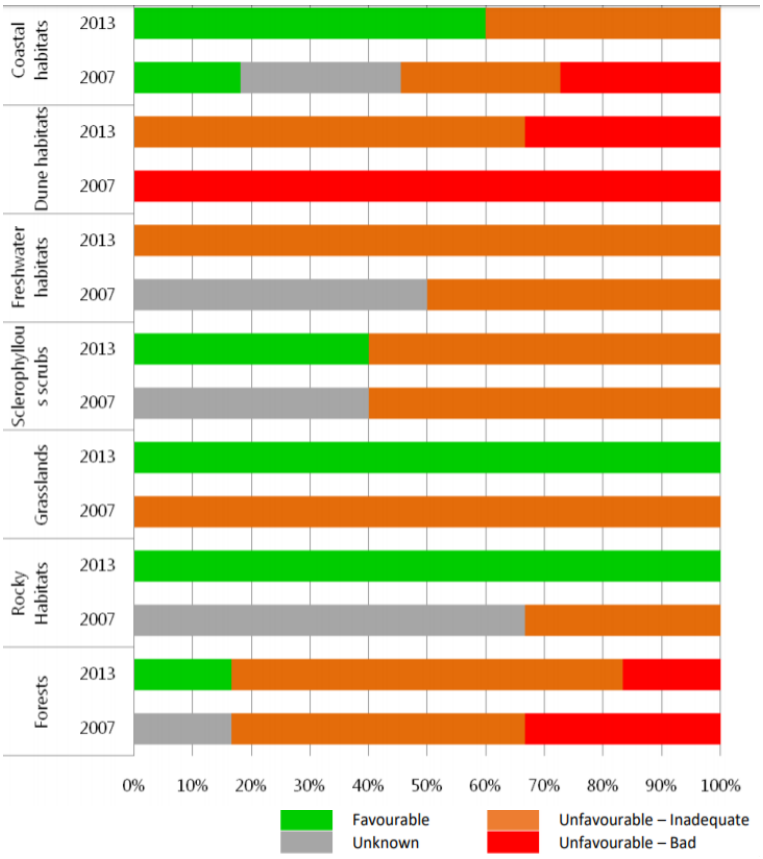

Figure 19: Habitat conservation status grouped by type[5]

5.2.3.2 Species conservation status

55 species of community importance were assessed in 2007, and 52 in 2013. Some important conclusions were drawn in the 2018 SoER regarding the conservation status of the species and habitats (Figure 20), namely the increase in species in favourable conservation status from 20% in 2007 to 40% in 2013.

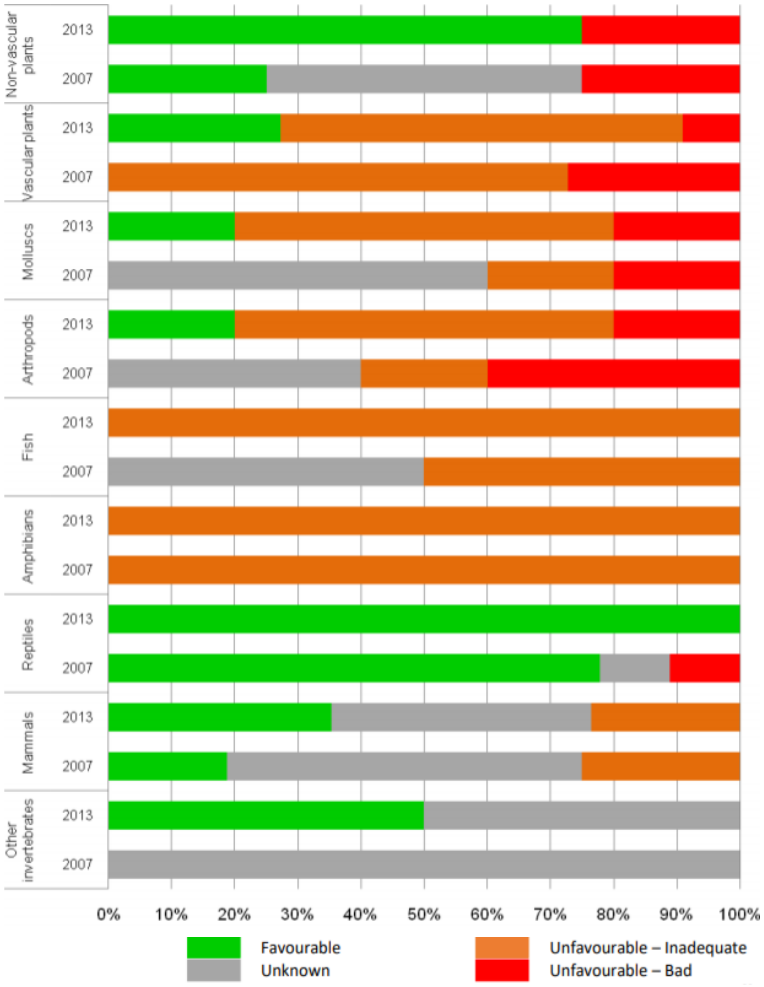

Figure 20: Species conservation status grouped by taxonomy[5]

35% of the protected species showed a change in conservation status between the two assessment periods; however, this change is mostly attributable to an increase in knowledge or change in thresholds. Only 4% of these changes are considered as genuine, such as the improvement of the status of *Brachytrupes megacephalus* (subterranean cricket) and *Psudoseriscius cameroni* (endemic tenebrionid beetle). 15% of the protected species are still considered as unknown, the majority of which are marine. While the percentage of species in unfavourable status has remained the same in the two periods (44%), there has been a decrease in sites in bad status from 15% in 2007 to 8% in 2013; the remaining 7% are now considered to be in unfavourable inadequate status. Stringent measures are required for these to attain favourable status, while further surveys are needed to assess those with unknown status.

5.2.3.3 Pressures & threats to conservation status

Pressures and threats to Malta's biodiversity and their frequency of occurrence are highlighted in the SoER report, as presented in Figure 21 and Figure 22.

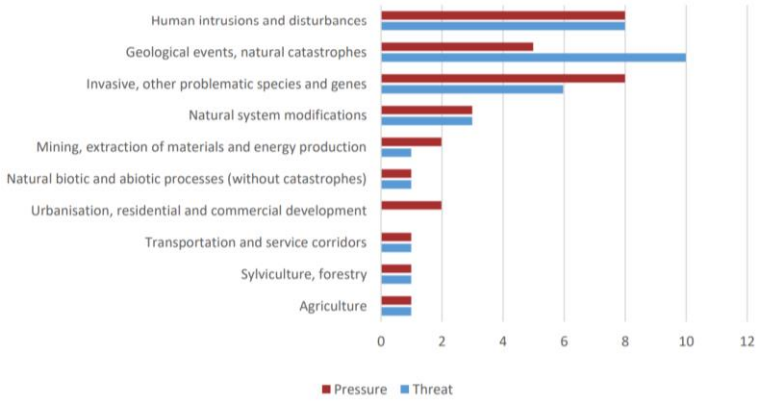

Figure 21: Frequency of pressures and threats to Malta's habitats[5]

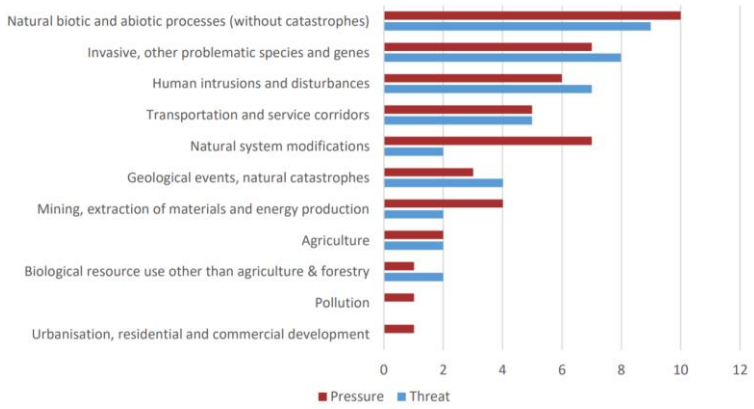

Figure 22: Frequency of pressures and threats to Malta's species[5]

Invasive alien species (IAS) represent a serious pressure and threat to Malta's biodiversity. The introduction of IAS threatens our biodiversity primarily because of the subsequent decrease in biodiversity which occurs, even if the number of species increases overall. The function of the ecosystem is inhibited by the presence of IAS on different levels (sometimes more than one), namely through:

- Competing for the same limited resources
- Predation
- Spreading diseases and parasites
- Cross-breeding with native species in the wild
- Change the food chain structure, thus destabilising the ecosystem

5.2.4 Other habitats

The Maltese terrestrial and marine habitats are important constituents of our natural heritage, even if not protected by national or international legislation. The assessment of ecological and environmental conservation status is carried out in line with the relevant directives through which the habitats are designated. Nevertheless, the ecological and environmental health of habitats such as valleys and watercourses are also important. In fact, many valleys and watercourses have been designated as important features in our national heritage as AEIs and SSIs. The habitats are therefore protected in accordance with various governmental notices in Maltese legislation.

5.2.5 Other environmental factors

The health of an ecosystem is dependent on both the biological (in terms of ecological relationships, biodiversity, presence of alien species, etc.) and environmental (in terms of chemical pollutants, physical functionality, etc.) factors of the area under study. For example, increases in chemical pollutants are likely to affect the ecological conservation status of inland waters, transitional waters and coastal waters. The biological, physical and chemical characteristics of the habitats have been taken into consideration in this SEA.

5.3 Climate change

Climate change is a process whereby greenhouse gases (GHGs), produced by both natural and anthropogenic activities, trap heat radiating from the Earth's surface and raise global temperatures (i.e. climate change). GHGs which have the highest impact on climate change are:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs);
- Sulphur hexafluoride (SF_6); and
- Natrium trifluoride (NF_3).

While climate change is a natural process, increased concentrations of anthropogenically produced GHGs have caused climate change to accelerate. Serious environmental issues are arising as a result of human-induced climate change and Malta is considered to be vulnerable to climate change as a small island state.

5.3.1 GHG emissions

The SoER (2018) and MALTA'S NATIONAL INVENTORY OF GREENHOUSE GAS EMISSIONS AND REMOVALS (2019) shows that there was an overall increase of 52% in Malta's GHG emissions between 1990 and 2012 (Figure 23 and Figure 24). This increase was followed by a steep 68% decrease between 2012 and 2016, primarily due to the commissioning of the Malta-Sicily interconnector which began importing electricity from the European grid. In 2017, the total GHG emissions rose to levels similar to 2015. 75% of the 2017 GHG emissions were caused by the energy sector, including transport.

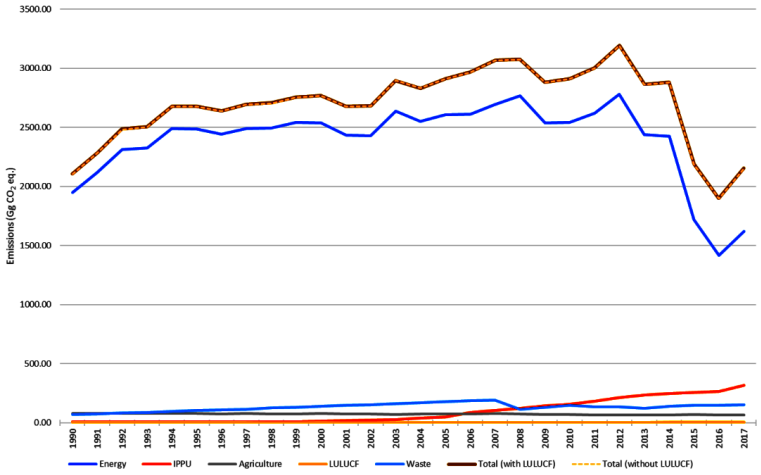

Figure 23: GHG emissions by different economic sectors (1990-2017)[12]

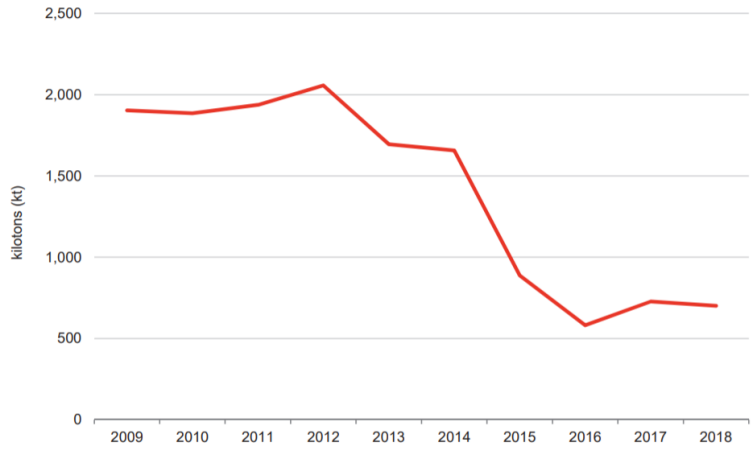

Figure 24: CO_2 equivalent emissions from power plants[3]

When taking into account the Maltese population, the GHG emissions per capita showed a slow and steady increase between 1990 and 2012. The GHG emissions/capita dropped to an all-time low in 2015, probably as a result of a number of factors:

1. The escalated increase in Maltese population between 2012 and 2015;
2. The start of operations of the Malta-Sicily interconnector in 2015 which increased the proportion of imported electricity to locally-generated electricity;
3. The closure of the Marsa Power Station in 2015; and
4. The conversion of the Delimara Power Station into a combined gas/diesel electricity generating plant in 2017.

[12] *MRA (2019). Malta's National Inventory of Greenhouse Gas Emissions and Removals, 2019.*

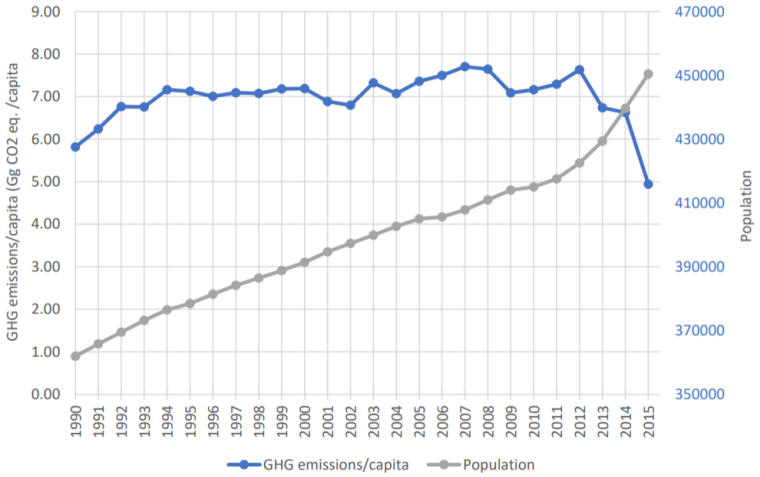

Figure 25: GHG emissions/capita between 1990 and 2015[5]

The ratio between the gross inland consumption of energy and GDP at constant process is known as the energy intensity, and is a measure of the energy used to create a unit of economic wealth, as well as the overall energy efficiency at a nation's economy. The energy intensity has decreased steadily between 1995 and 2015.

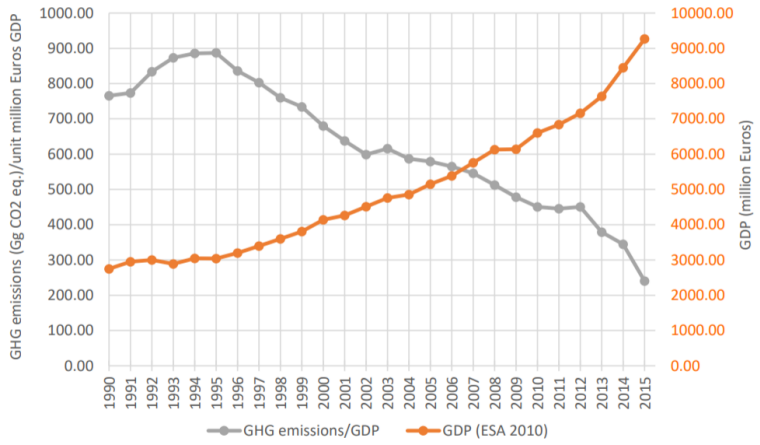

Figure 26: GHG emissions/GDP between 1990 and 2015[5]

5.3.2 Weather patterns

Climate change is associated with weather patterns over a number of years, as discussed in the 2018 SoER. Temperature and precipitation patterns amongst other factors contribute to the definition of a changing climate. While the temperature has fluctuated over the years, it has shown a general increasing trend between 1981 and 2015 (Figure 27).

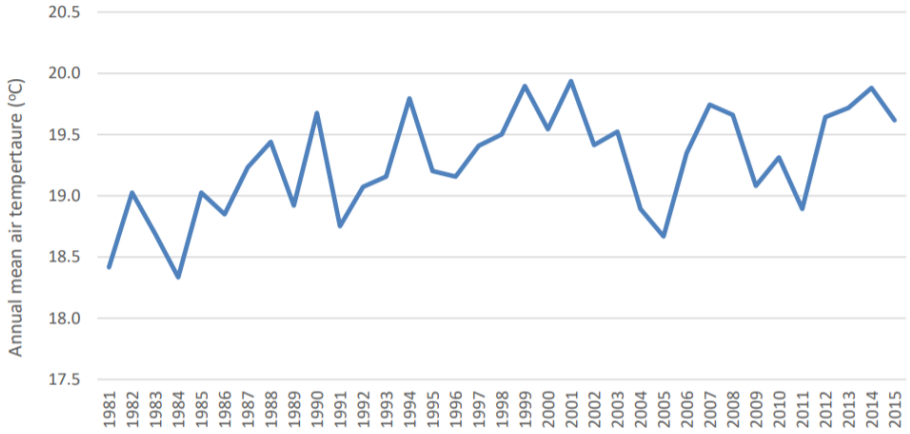

Figure 27: Annual mean air temperature in Malta[5]

In terms of precipitation, the number of consecutive dry days for the period 1967-2013 show an increased occurrence of dry conditions on the Maltese Islands. The 1981-2015 period (Figure 28) shows a decrease in total yearly precipitation, but so far this trend is not statistically significant and may be attributable to the relatively short-time period considered.

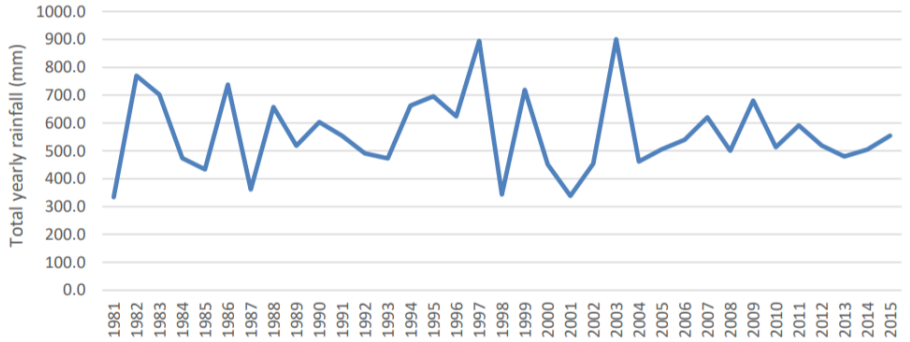

Figure 28: Annual total rainfall in Malta[5]

5.4 Cultural heritage

Cultural heritage is defined as the "legacy of physical artefacts and intangible attributes of a group or society that is inherited from past generations".[13] The method to classify artefacts or features as "heritage" is not set in stone, but is decided by the societies which are evaluating such features.

In terms of immovable heritage (i.e. buildings/architectural structures), the Superintendence of Cultural Heritage (SCH) launched its National Inventory in 2011. Since then, various features of cultural importance have been published on the Government Gazette and publicised on the online National Inventory.[14] These cultural features are classified as follows:

[13] *Falser, M. (2015). Cultural Heritage as Civilizing Mission. New York: Heidelberg. ISBN 978-3-319-13638-7.*

[14] *https://culture.gov.mt/en/culturalheritage/Pages/National%20Inventory.aspx.*

- Historical, military and archaeological sites (HMAS)
- Historical and archaeological sites (HAS)
- Chapels and niches (CN)
- Scheduled architecture (SA)
- Knights period fortifications (KPF)

Such features are protected in accordance with local legislation. A total of 2,412 features are currently scheduled, as shown in Figure 29. No new protected features have been added to the inventory since 2014 because the SCH have been occupied with other work, namely related to its participation in EU projects, its monitoring of the increased number of developments in Malta and conversion of the national inventory into spatial data available on a GIS.[15]

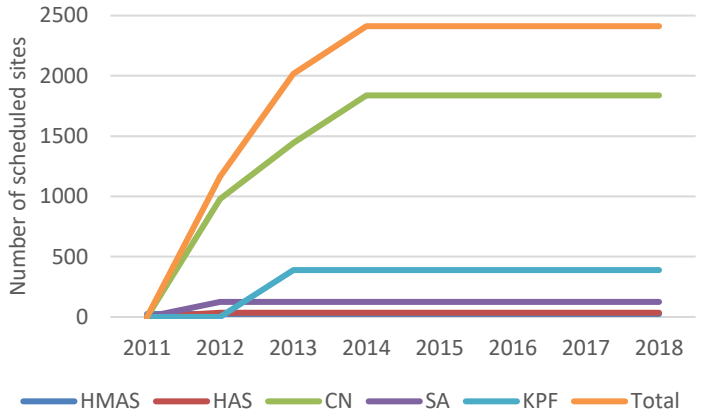

Figure 29: Number of scheduled sites by type on the national inventory[15]

5.5 Energy & water

5.5.1 Electricity generation

According to the SoER, the vast majority of the electricity generated in Malta is produced from non-renewable energy sources or imported (Figure 30).[5] NSO statistics place the contribution of local power plants at 68% and imports at 24% of the total electricity generation in Malta; only 8% of Malta's energy originates from renewable sources.[3]

Since 2015, there has also been an increasing trend in the amounts of imported energy, chiefly attributable to the start of operations of the Malta-Sicily interconnector.[3] The renewable energy share has nevertheless shown a considerable increase from 0.2% in 2011 and 8% in 2018, as shown in Figure 30.

[15] *https://culture.gov.mt/en/culturalheritage/Pages/AnnualReport.aspx.*

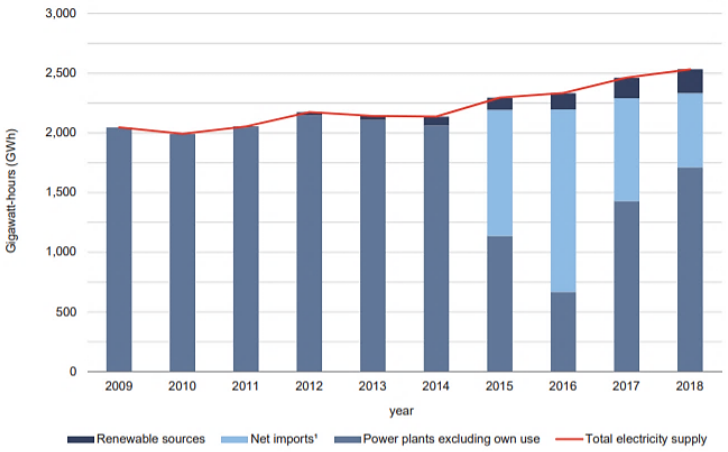

Figure 30: Total electricity supply in Malta by type[3]

Renewable energy technology in Malta is mostly generated by small installations in households, commercial and industrial units which have different primary functions. Renewable energy in Malta is mainly generated from solar panels, solar water heaters and microturbines. Most of the national renewable electricity (95.5%) is produced from photovoltaic panels, the installations of which have steadily increased from 2009 to 2018 (Figure 31).

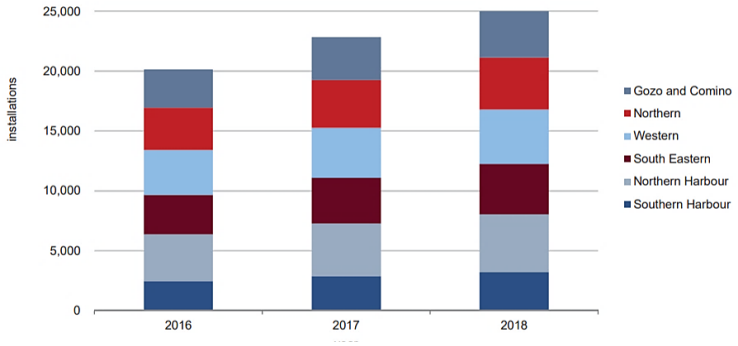

Figure 31: Stock of PV installations by district[16]

The data shows that while in 2016 a total of 162.2 GWh was produced from renewables, such electricity generation increased to 189.6 GWh in 2018, equating to an increase of 116%, as shown in Figure 32.[16] The Gozo & Comino localities have the largest number of PV panels per capita (Figure 33), but the total output is nevertheless higher in central/south Malta (Figure 34) due to the higher density of residences in this geographic region.

[16] NSO (2019). Renewable energy from Photovoltaic Panels (PVs): 2018. News Release. https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_02/Regional_and_Geospatial_Statistics/Documents/2019/News2019_097.pdf.

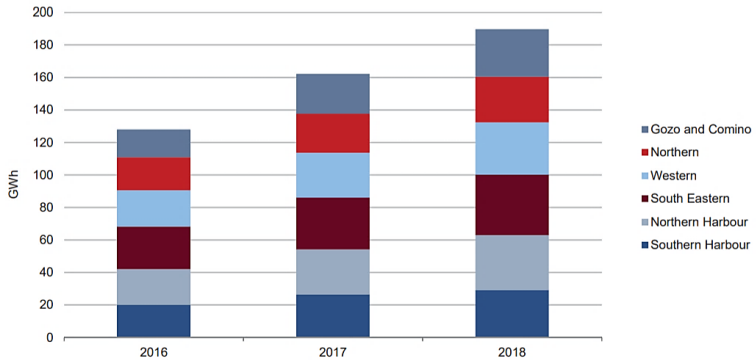

Figure 32: Estimated output of connected PVs by district[16]

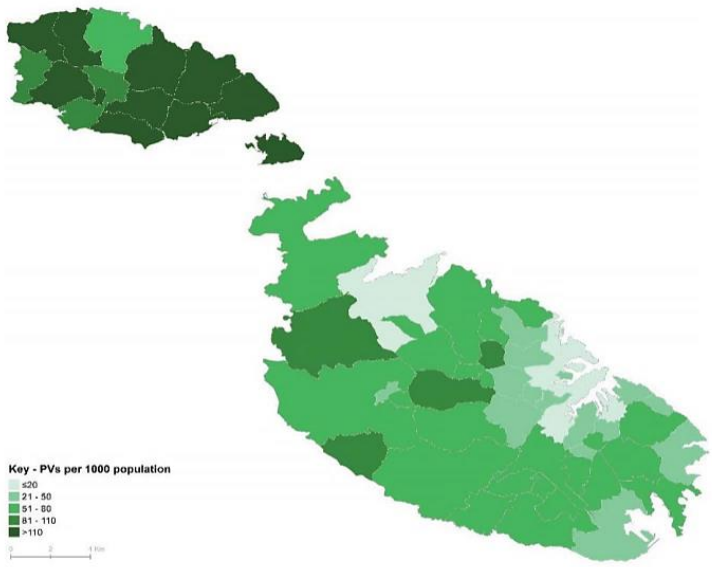

Figure 33: Total PVs installed in domestic sector per 1,000 residents in 2018[16]

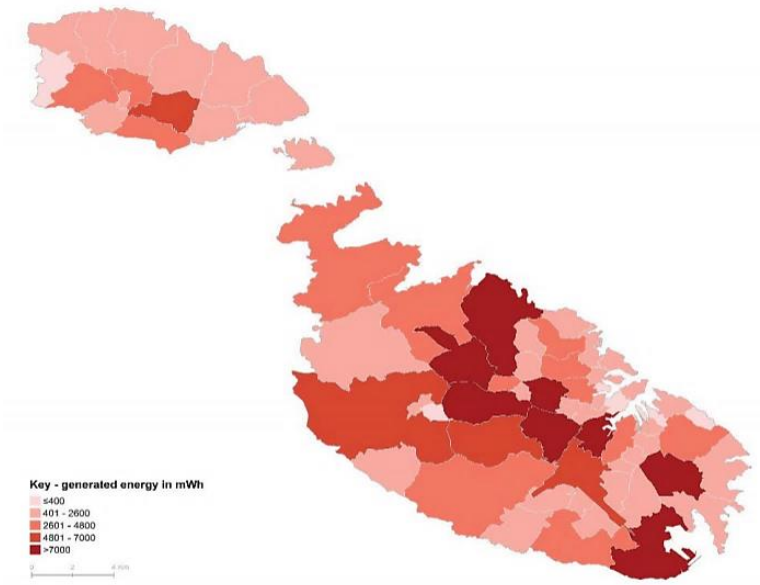

Figure 34: Total estimated energy generated from PVs in 2018[16]

5.5.2 Electricity consumption

The production of electricity from fossil fuels is of concern for Malta from a climate change perspective and is considered to be one of Malta's primary air pollution sources. Over the last two decades, there has been a general increase in the electricity generation and consumption for the Maltese Islands (Figure 35).[5] Between 2008 and 2015, billed electricity consumption increased from 1,665.2 GWh to 2,032.9 GWh, which equates to a 22.1% surge. The energy consumption by sector shows that between the 2008-2015 period, the transport, industrial and residential sectors have all reported increases in electrical consumption. The services sector reported the largest increase in consumption (37.1%) between 2008 and 2015. Other sectors which recorded notable increases in electrical consumption were the households' sector (32.3%) and the industrial sector (26.8%).

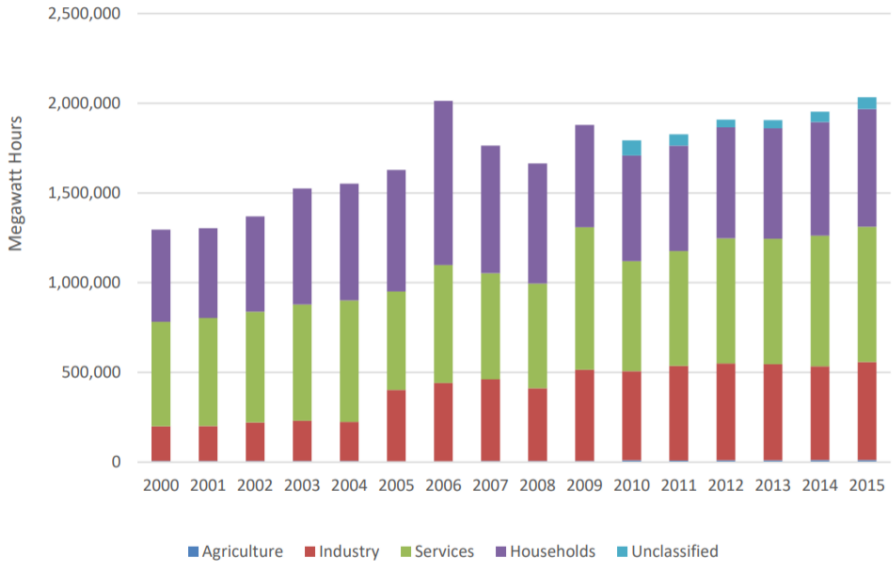

Figure 35: Billed electricity consumption by sector[5]

5.5.3 Fuel consumption

Fuel is primarily consumed in Malta to power internal combustion engines (ICE), generate electricity and to power various gas-powered household appliances and industrial machines. The primary use for motor gasoline (petrol) and automotive diesel is for road transport, which has increased at an accelerated rate between 2010 and 2018, as shown in Figure 36.[17, 18] The time period between 2010 and 2018 has seen increases of 6.9% and 34.7% of gross petrol and diesel, and 6.9% and 35.6% of transport-consumed petrol and diesel, respectively. Gross use of biodiesel has increased by a factor of 17.1, while use in road transport has increased by a factor of 16.7 in the same time period. Gross LPG usage has increased by 15.4% since 2012, with LPG consumption in road transport increasing by a factor of 31.7.

[17] NSO (2017). Transport Statistics: 2016. https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/B3_Environment_Energy_Transport_Agriculture_Statistics/Transport_Statistics_2016.pdf.

[18] NSO (2020). Transport Statistics: 2018. https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/B3_Environment_Energy_Transport_Agriculture_Statistics/Transport_Statistics_2019.pdf.

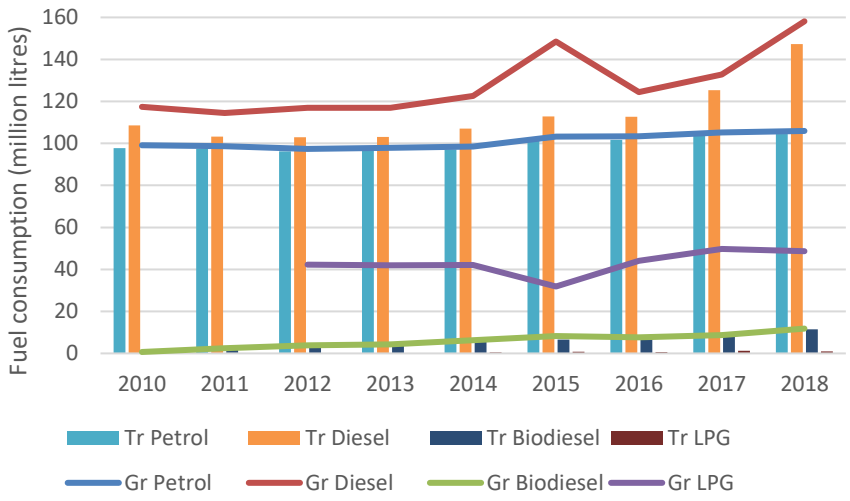

Figure 36: Gross (Gr) and transport (Tr) fuel consumption by road transport[17,18]

5.5.4 Security of supply

Security of supply can be achieved through a diversification of energy types and sources, thereby producing an "energy mix" of sources to deliver the supply. Close coordination between neighbouring countries is vital to ensure security of supply since energy markets are tightly interconnected. Threats to security of supply in the EU include:[19]

- Heavy reliance on imported fossil fuels such as coal, natural gas and oil;
- High energy consumption of EU member states;
- Security supply EU legislation limited to natural gas and electricity markets; and
- Need for grid modernisation to accommodate the trend for conversion to renewable energy sources and local power generation.

Malta's energy supply originates from two primary sources, namely the Malta-Sicily interconnector and the Delimara power station. The interconnector is a transnational, underwater power cable which supplies Malta's national electrical grid with power directly from Sicily. The Delimara power station burns diesel oil and natural gas to generate electricity.

Therefore, Malta's national energy production relies almost entirely on imported energy (be it electricity or non-renewable fossil fuels which is used in the power station). This energy production system poses two primary risks to our security of supply:

- The insecurity associated with energy from overseas, thereby depending on other Member States to keep our lights on; and
- Near-absolute reliance (97.3%) of Malta's national energy production on imported non-renewable fossil fuels, which are finite in nature.[20]

[19] *EPRS (2019). Energy supply and security. Briefing. https://www.europarl.europa.eu/RegData/etudes/BRIE/2018/630275/EPRS_BRI(2018)630275_EN.pdf.*

[20] *European Commission (2017). Energy Union Factsheet Malta. https://ec.europa.eu/commission/sites/beta-political/files/energy-union-factsheet-malta_en.pdf.*

The BP STATISTICAL REVIEW OF WORLD ENERGY (2019) concluded that if global demands for oil and natural gas sources continue at present rates, both non-renewable supplies are expected to run out on a global scale in about 50 years.[21] The introduction of infrastructure which can generate and supply renewable energy is vital, particularly with Europe's recent introduction of the EUROPEAN GREEN DEAL which aims to make Europe the first climate-neutral continent by 2050 (Figure 37).

Figure 37: European Green Deal[22]

5.5.5 Water production & consumption

Water is produced in Malta from two main sources, namely reverse osmosis production from seawater and groundwater extraction through pumping stations and boreholes (**Error! Reference source not found.**). The majority of Maltese public water is produced from reverse osmosis, which requires a significant amount of energy. Energy recovery systems have recently been introduced into local reverse osmosis, thereby reducing the overall consumption of the process.

[21] BP (2019). BP Statistical Review of World Energy. https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2019-full-report.pdf.

[22] European Commission (2019). The European Green Deal Communication. https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf.

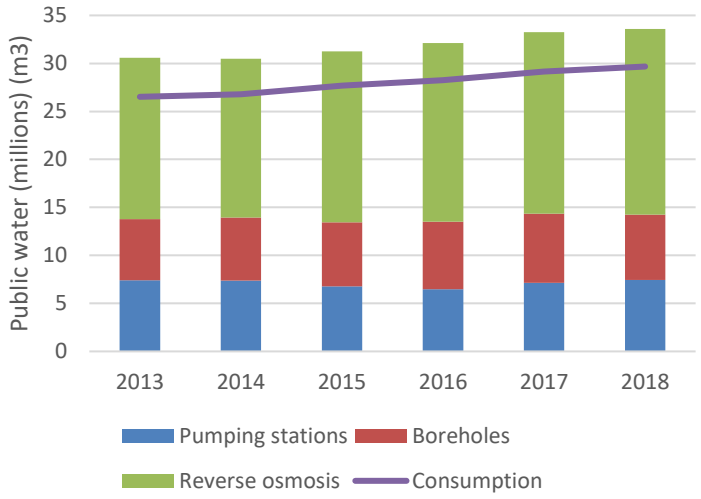

Figure 38: Water production and consumption (2013-2018)[23]

Between 2013 and 2018, public water production by about 12%, covering a 14% increase in consumption.[23] In 2018, a total of 33.6 million cubic metres of water were produced, approximately 3.7 million of which were lost through mains pipe leakages. The public water primarily originated from reverse osmosis (58%), while the remainder was produced from pumping stations (22%) and boreholes (20%).

Water from the national water supply is primarily lost through leakages in the water mains. The percentage of water lost through leakages has decreased from 13.15% in 2013 to 11.3% in 2018 through an intensive program to upgrade the infrastructure which was implemented by the Water Services Corporation.

5.6 Human health

As outlined in MALTA'S HEALTH SYSTEM REVIEW (2017) Maltese life expectancy is longer than the average European.[24] The local population generally spends almost 90% of their lifespan in good health, a proportion which is longer than any other EU country. Longevity and good health are largely due to low death rates from the majority of contributing illnesses – in fact, Malta has the lowest rates of preventable mortality in the EU. In 2014, life expectancy for people in Malta was found to be 79.8 years for men (EU average is 78.1 years) and 84.3 years for women (EU average is 83.3 years).

5.6.1 Obesity-related deaths

Obesity is a serious public health problem that is generally defined as a Body Mass Index (BMI) of 30kg/m^2 or higher. Obesity is the main public health problem in Malta, with 25% and 27% of adults and children (aged 11–15 years) considered to be obese, respectively.[24] These percentages are the highest amongst all EU-Member States.

[23] *NSO (2019). Key Figures for Malta. https://nso.gov.mt/en/nso/Media/Salient-Points-of-Publications/Pages/Key-Figures-for-Malta---2019.aspx.*

[24] *Azzopardi-Muscat, N., Buttigieg, S., Calleja, N. & Merkur, S. (2017). Malta: Health system review.* Health systems in transition*, 19(11).*

Table 11: Overweightness and obesity affecting health status (2002-2014)[24]

Morbidity and factors affecting health status, 2002–2014, selected years

		2002	2008	2014	EU average (2014)
BMI	Overweight + Obese	57.6	58.6	59.7	51.1
	Obese	23.1	22.3	25.3	16.1

The above conclusions are corroborated by the EUROPEAN HEALTH INTERVIEW SURVEY (2016), which states that almost 1 in 4 Maltese people are obese, in comparison with an EU average of 1 in 6 people.[25] The obesity proportion differs among age groups, with the share of obesity increasing with age. About 34% of older people and 12% of young people are considered as obese in Malta. Both values are higher than the EU averages of 22% obesity in older generations and 6% of young people. A significant difference between the proportions of obese men (28.1%) and women (23.9%) was also observed in Malta.

Premature mortality directly attributable to obesity was found to represent approximately 17% of the total number of deaths in Malta.[26]

5.6.2 Air pollution-related deaths

Another significant factor which affects the health of the Maltese population is air pollution. Pollutants are released from power stations or through other sources such as industry and traffic. In fact, European data indicates that the entirety of the Maltese population is exposed to high PM_{10} levels.[27] Effects of air pollution on human health is well-documented worldwide, and the primary issues arising from exposure to poor air quality are visualised in Figure 39. There is a growing concern that even low-level exposure to a complex mixture of pollutants can have considerable effects on human health, notwithstanding long time-lags between exposures and health effects which can prolong exposure.

[25] *Eurostat (2016). European Health Interview Survey.*

[26] *PWC (2017). Weighing the costs of obesity in Malta. https://www.pwc.com/mt/en/publications/assets/weighing-the-cost-of-obesity.pdf.*

[27] *https://www.eea.europa.eu/themes/air/country-fact-sheets/2019-country-fact-sheets/malta*

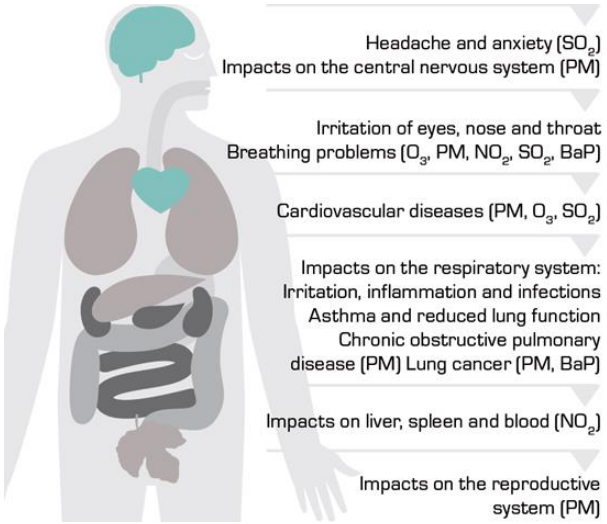

Figure 39: Major health effects of air pollution[5]

In fact, the ENVIRONMENT REPORT 2008[28] mentions air pollution as one of Malta's principal causes of respiratory diseases. In 2008, particulate matter and ozone in Malta exceeded EU standards in various locations, which was highlighted in the 2018 SoER.[5] The overall PM_{10} concentrations decreased between 2009 and 2015 at all monitoring stations. Although heavy traffic congestion in Msida caused infrequent exceedances in NO_2 concentrations in Msida, the concentrations remained largely within the annual limits between 2009 and 2015. Over the same time period, sulphur dioxide concentrations declined, probably due to the phasing out of high-sulphur content fuels.

According to the EEA report, 210 premature deaths in Malta (0.05% of the population) from exposure to $PM_{2.5}$ may occur on an annual basis.[7] Conversely, 20 people (0.004% of the population) may die early from exposure to ozone. Although the concentration of NO_2 at one of the stations was found to be close to the EU limit value (refer to Section 5.1.5), less than one premature death per year is expected from NO_2 exposure in Malta.

5.6.3 Asthma morbidity

Inevitably, the high exposure rate of the population to such high levels of particulate matter will take a toll on human health. In the HEALTH SYSTEM REVIEW FOR MALTA, prevalence of asthma in the population has followed an upward trend between 2002 and 2014, increasing by approximately 45% in the 12-year period, culminating to 5.8% of the Maltese population having experienced asthma in the previous 12 months 2014 (Table 12).[24]

[28] NSO (2010). The Environmental Report 2008. https://era.org.mt/en/Documents/The%20Environment%20Report%202008.pdf.

Table 12: Asthma and diabetes affecting health status (2002-2014 [24]

Morbidity and factors affecting health status, 2002–2014, selected years

		2002	2008	2014	EU average (2014)
Morbidity past 12 months	Diabetes	5.7	6.7	8.3	
	Asthma	4.0	5.5	5.8	

5.7 Landscape

Landscape is defined by the EUROPEAN LANDSCAPE CONVENTION as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*".[29] Landscape does not only comprise of visual aspects of the environment, but also includes the character of an area perceived through the remaining four senses. For example, the aromas of local flora and the sound/smell of the sea also contribute to the beauty of a location. In order to study impacts on landscape, visual aspects are chiefly used to render the exercises more manageable.

As described in the LANDSCAPE ASSESSMENT OF THE MALTESE ISLANDS (LAMI),[30] the quality of a landscape and its uniqueness aid in:

- Bestowing a sense of place and identity by distinguishing the area from all others and rendering the area special and important;
- Inspiring relaxation and improving the perceivers' state-of-mind;
- Promoting enjoyable experiences with recreational, inspiration and educational potential by instilling a sense of awe and wonder; and
- Increasing employment through the tourism industry.

The Maltese Islands are comprised of three main inhabited islands and numerous small uninhabited ones which lie in the centre of the Mediterranean. Malta's natural landscape is characterised by terraced fields, dry vegetation, rock and limestone, largely due to the long hours of sunshine throughout the year. Karstic rock formations with nearby water bodies, Mediterranean flora and fauna prevail in the natural areas. The local landscape also includes many interspersed vantage points providing panoramic views, vertical cliffs and a varied scenery, along with numerous valleys and waterways.

The urban landscape is dominated by high-density development interspersed with a variety of historical features and occasional pockets of landscaped gardens. Due to Malta's topography, the sea is visible from the majority of areas of the Islands, which has an overall positive effect on the local landscape.

Contributors to the Maltese natural landscape are listed hereunder:

1. **Geomorphology**: Low bathymetric depth along the North East coast of Malta and in many of the Bays introduces shades of colour to the water body; and offshore

[29] *Council of Europe (2002). European Landscape Convention. Florence, 20.X.2000.*

[30] *MEPA (2004). Landscape Assessment Study of the Maltese Islands. https://era.org.mt/en/Documents/LandscapeAssessment-MalteseIslands-MEPA-2004.pdf.*

islands tend to greatly enhance the quality of a coastal landscape, especially when these islands lie within the visibility radius of an observation point.

2. **Climate**: Typical of the central Mediterranean, as the year is split into two main seasons, namely hot dry summers and mild cool winters. The overall mild climate contributes to the aesthetic appeal of the Islands.

3. **Vegetation**: Natural vegetation with endemic species and scarce woodland areas (less than 0.5% coverage) which have mostly been created or augmented through human intervention.

Landscape sensitivity in the Maltese Islands is characterised into five hierarchal levels with decreasing sensitivity as listed hereunder and mapped in Figure 40.

- Category 1: Area of Very High Landscape Sensitivity (AVHLS)
- Category 2: Area of High Landscape Sensitivity (AHLS)
- Category 3: Area of Significant Landscape Sensitivity (ASLS)
- Category 4: Area of Moderate Landscape Sensitivity (AMLS)
- Category 5: Areas Requiring Landscape Upgrading (ARLU)

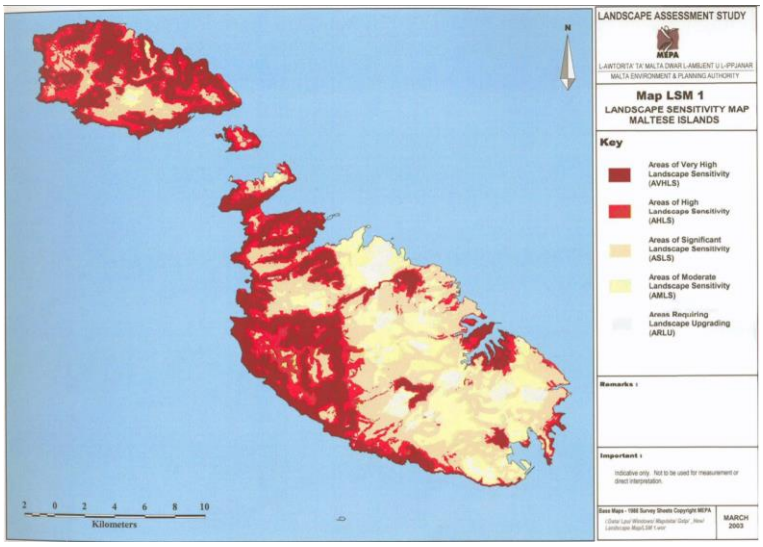

Figure 40: Landscape sensitivity map for the Maltese Islands[30]

The Landscape chapter of the 2005 SoER highlights scheduled areas of high landscape value, protected landscape features and protected sites for cultural heritage including sites of archaeological importance & scheduled buildings (Figure 41).[31] A total of 51% of Malta's land area was characterised as being of high or very high landscape sensitivity in the LANDSCAPE ASSESSMENT STUDY of 2004.[32] AHLVs, which cover 12% of the Maltese Islands, were scheduled by local legislation between 1996 and 2000. During 2006, the extent of AHLVs increased to 33% covering 106km^2 of the Maltese Islands, equating to almost three times as much as

[31] *https://era.org.mt/en/Documents/SOER_05.pdf.*

[32] *MEPA (2006). LS1: Areas protected for landscape value. https://era.org.mt/en/Documents/LS1_Areas_protected_for_landscape_value%202006.pdf.*

2000. AHLVs are designated under the STRUCTURE PLAN FOR THE MALTESE ISLANDS (1990) to protect specific landscape features.

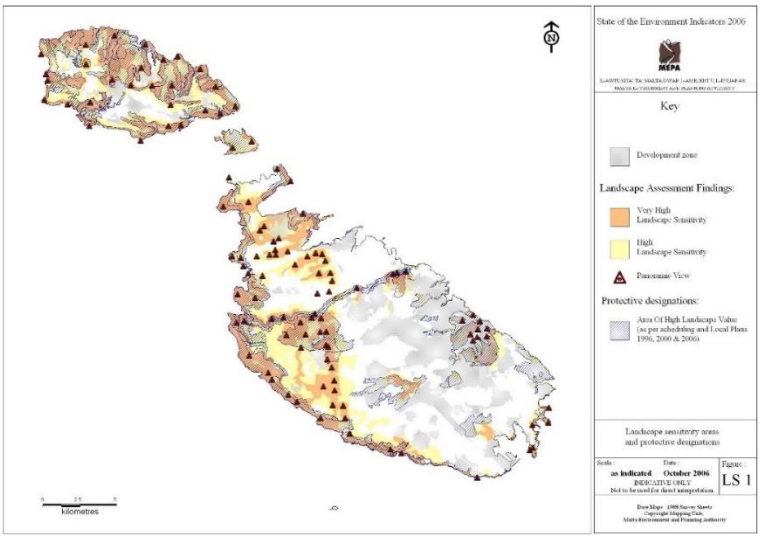

Figure 41: Landscape sensitivity areas and protective designations[32]

Threats to the Maltese landscape include the increased take-up of open spaces for urban and coastal development, taller buildings on urban fringes which obstruct views of historic centres, modern agricultural practices and increased vehicular access.

5.8 Transportation & related infrastructure

5.8.1 Vehicles by type

Malta's population is heavily reliant on motor vehicles for transportation, with a steady increase of 67 vehicles per day licensed in Q4 of 2019, which has persisted since 2016, as shown in Figure 42.[33] As at the end of December 2019, only approximately 1.1% of the entire vehicle stock on the road constitutes electric and hybrid vehicles, totalling 4,493 vehicles. Nevertheless, increases of 148%, 65% and 52% in electric, hybrid/diesel and hybrid/petrol vehicles, respectively were noted between Q4 of 2018 to Q4 of 2019.

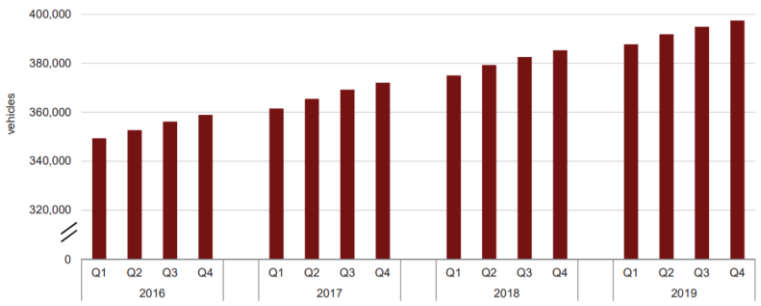

Figure 42: Stock of licensed motor vehicles (2016-2019)[33]

[33] *NSO (2020). Motor vehicles: Q4/2019. News Release. https://nso.gov.mt/en/News_Releases/Documents/2020/01/News2020_015.pdf.*

5.8.2 Bicycle and e-bicycle usage

Bicycle usage on Maltese roads has increased in popularity in the last decade, with new arterial roads being equipped with bicycle priority lanes. Nevertheless, since bicycles do not require registration, the statistics on bicycle usage in Malta is generally limited to the number of road accidents and injuries.[34] The 2018 NATIONAL CYCLING STRATEGY AND ACTION PLAN stated that there were 25km worth of designated traditional cycle lanes in the Maltese Islands, along with another 7.7km planned for implementation along the main network.

The data relating to e-bicycle usage and registration are combined with those of motorcycles, as shown in Figure 42.[35] The data indicates that the stock of licensed motorcycles/e-bicycles has been increasing at an ever expanding rate, with a 67% increase in licensed vehicles of these types on the road between 2011 and 2017.

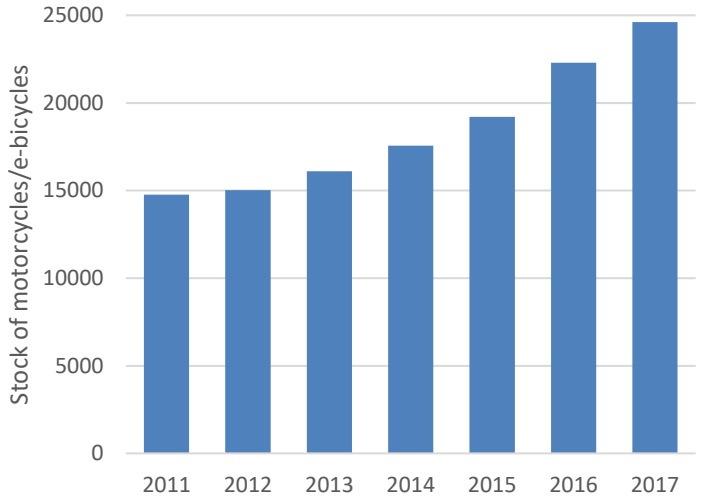

Figure 43: Stock of licensed motorcycles/e-bicycles (2015-2017)[35]

5.8.3 Public transport usage

Public transport in Malta mostly comprises of the public bus system which is operated by Malta Public Transport (Figure 44). A ferry service also transports passengers and vehicles between Malta and Gozo (Figure 45). Although other ferry systems shuttle passengers between various locations (including Sliema-Valletta-Three Cities; and Malta-Comino-Gozo) such services are privately operated and no data is provided by the NSO.

According to Maltese NSO statistics (Figure 44), the number of public transport commuters in 2017 totalled 48.1 million passengers, representing an 11% increase from the previous year.[35] The number of personalised public transport card holders had also increased by 8.9%, implying an increase in regular public transport users. There are seasonal differences in the number of public transport commuters throughout the year, with peaks in the summer

[34] *TM (2018). National Cycling Strategy and Action Plan for the Maltese Islands. https://meae.gov.mt/en/Public_Consultations/MTI/Documents/TM%20National%20Cycling%20Strategy.pdf.*

[35] *NSO (2018). Transport Statistics 2018: Reference year 2017. https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/B3_Environment_Energy_Transport_Agriculture_Statistics/Transport_Statistics_2018.pdf.*

months and troughs in the winter, primarily due to the influx of tourists in the former season.

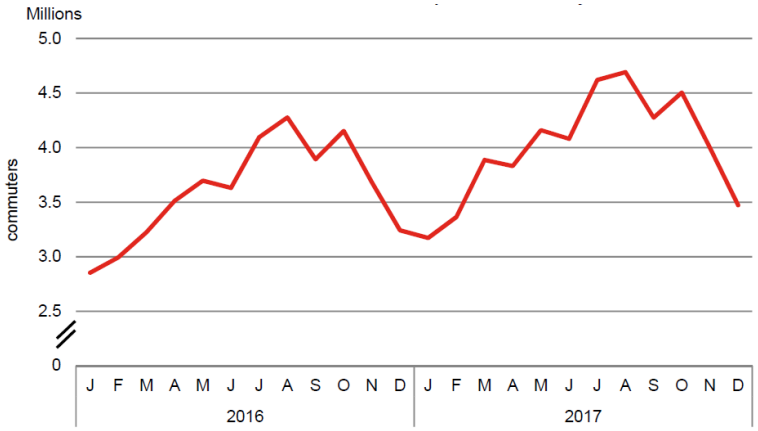

Figure 44: Public transport commuters by month (2016-2017) [35]

The total number of annual commuters between Malta and Gozo has steadily increased over the years as a direct result of the steady increase in tourist numbers visiting the islands (Figure 45).[36] The number of trips in 2019 increased by 17% over the previous year, associated with an increase in 7.4% of vehicle movements and 2.8% of passengers. There is a similar seasonal pattern to the number of Malta-Gozo commuters as observed in public transport, with peaks in the summer months and troughs in the colder periods.

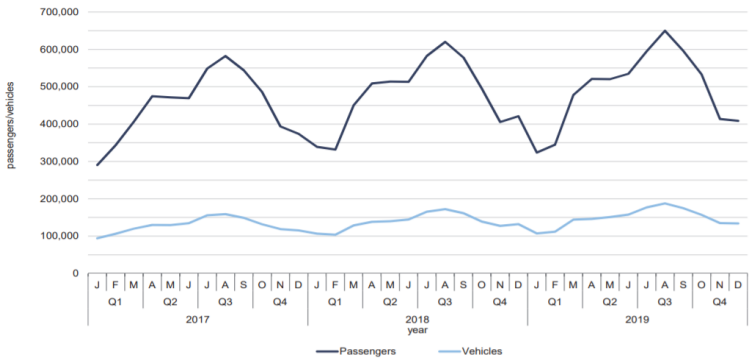

Figure 45: Commuters between Malta and Gozo (2017-2019)[36]

5.9 Waste and resource management

Waste generation represents a loss of resources, and the management of waste places pressure on the environment in terms of air, water quality and land take-up. In line with relevant EU regulations, waste is divided into 4 categories:

1. Municipal waste;
2. Hazardous waste;
3. Construction and demolition waste; and

[36] *NSO (2020). Sea Transport between Malta and Gozo: Q4/2019. https://nso.gov.mt/en/News_Releases/Documents/2020/01/News2020_006.pdf.*

4. Commercial and industrial waste.

Data on waste generation by type in Malta was obtained from published NSO statistics.[37,38] Figure 46 demonstrates a general upwards trend in waste generation in Malta, predominantly due to an increase in non-hazardous mineral waste. The amount of annual mineral waste generation fluctuates, with 2013 and 2017 showing spikes which are attributable to an above-average number of construction sites.

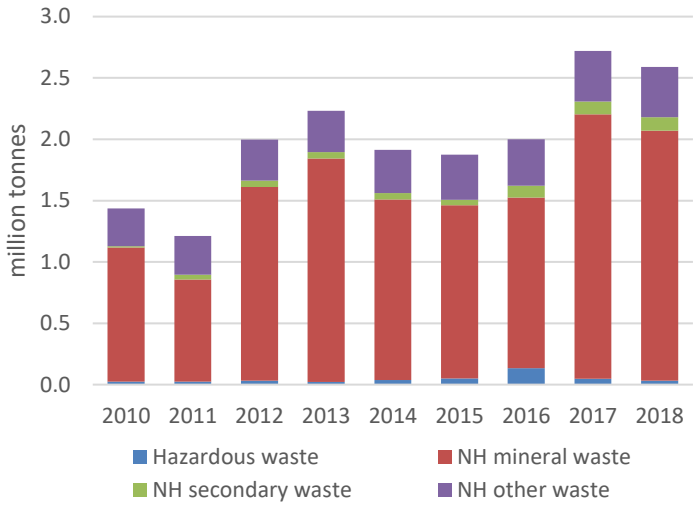

Figure 46: Waste generation by type (2010-2018) [37,38]

61.1% of the total 2010 waste was landfilled, which decreased to 13.5% in 2018 (equating to a 6% annual reduction). This decreasing trend is mainly linked to an increase in recycling and recovery from 8.4% to 16.2% in the same time period.[37,38] Figure 47 shows the pattern of varying waste treatments in Malta. The increase in waste recovery between 2010 and 2018 is attributable to increasing recovery from civic amenity sites, green/grey bag collection from households and organic waste, the latter of which was introduced in 2015. The proportions of waste collected through each system is presented in Figure 48.

[37] *NSO (2016). Solid waste management: 2014. https://nso.gov.mt/en/News_Releases/Archived_News_Releases/Documents/2016/News2016_007.pdf.*

[38] *NSO (2020). Solid waste management: 2018. https://nso.gov.mt/en/News_Releases/Documents/2020/02/News2020_023.pdf.*

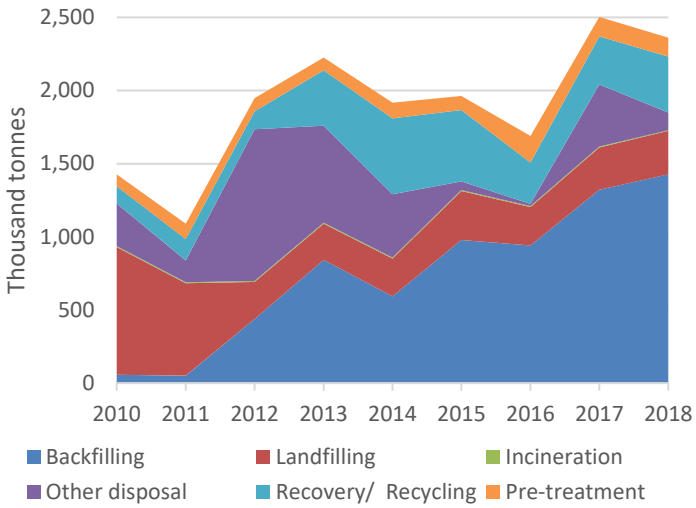

Figure 47: Waste treatment by type (2010-2018)[37,38]

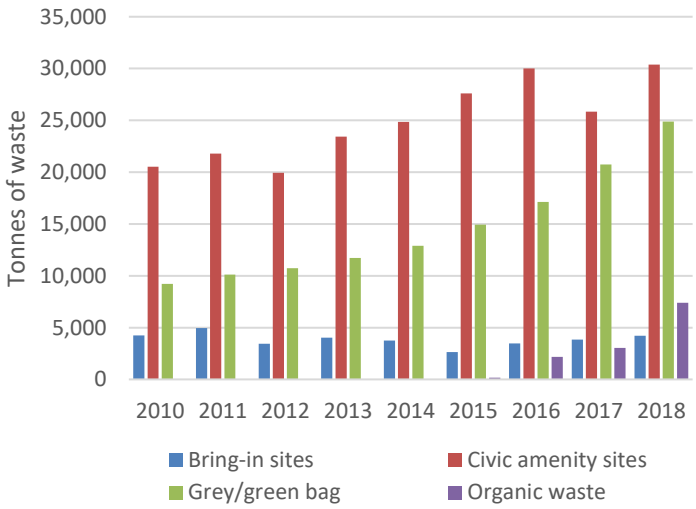

Figure 48: Separate collection of waste fractions (2010-2018)[37,38]

6.0 Alternatives

The NECP includes some proposed policies and measures (PaMs) which are new, and others which were already implemented through other policies and have been extended/amplified through the NECP. Most of the measures proposed in the NECP were extracted from other policies, and have been included in the NECP due to their relationship with energy and climate.

The PaMs have been assessed as part of this SEA in terms of three alternative scenarios, as listed hereunder:

Alternative 1: As proposed in the policy (WPM scenario)
Alternative 2: Minimum intervention
Alternative 3: Zero-option (WEM scenario)

Alternative 1 assumes full implementation of the policy according to the proposed PaMs. The minimum intervention scenario (Alternative 2) follows the partial implementation of the PaMs in the following ways:

- PaMs which are already in place in accordance with other policies (such as Malta's National Risk Assessment) are assumed to be fully implemented in Alternative 2
- PaMs which are well on their way to completion and would be impractical to reverse (such as the Marsa junction project whose construction is already into its final phase) are also assumed to be fully implemented in Alternative 2
- Partial implementation of some PaMs (such as 50% uptake of the units proposed in the Solar Water Heaters Scheme) which may be more difficult to fully execute

The zero-option (Alternative 3) assumes no implementation of the NECP PaMs, thereby representing the WEM scenario as the status quo. Since many of the PAMs include projects that have already been completed or are well underway, the zero-option is only being used as a theoretical alternative.

The proposed PaMs for each alternative are listed in Table 13. The list of PaMs to be considered and included in the Alternative 2 scenario was discussed with all three relevant authorities, as follows:

- **PaMs E.2.1 to E.2.10**: These Alternative 2 PaMs were provided by the Energy and Water Agency (EWA)
- **PaMs C.2.1 to C.2.3**: These Alternative 2 PaMs were proposed to the Ministry of the Environment, Sustainable Development, and Climate Change (MESDC), who provided its approval
- **PaMs T.2.1 to T.2.19**: These Alternative 2 PaMs were proposed to the Ministry of Transport, Infrastructure and Capital Projects (MTIP), who acknowledged receipt but did not provide comments/approval

Table 13: Proposed measures for each alternative of the WPM scenario

Policy and measure		Alternative[39]		
		1	2	3
E.2.1	Financial support schemes for Solar PV	F	F	N
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	F	P[40]	N
E.2.3	Energy efficiency: electricity tariffs	F	F	N
E.2.4	Support Scheme for Services and Industry	F	F	N
E.2.5	Energy Efficient Street Lighting	F	P[41]	N
E.2.6	Projects in primary water network and wastewater treatment plant	F	F	N
E.2.7	Biofuels Substitution Obligation (2021-2030)	F	F	N
E.2.8	Acquisition of renewable energy credits from other Member States	F	F	N
E.2.9	Gas Security of Supply	F	F	N
E.2.10	Development of R&I Strategy for Energy and Water	F	F	N
C.2.1	Management of Farm Slurries in the Maltese Islands	F	N	N
C.2.2	WtE Facility	F	F	N
C.2.3	Waste Management Plan 2020 - 2030	F	F	N
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	F	F	N
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	F	F	N
T.2.3	Road and infrastructure projects	F	N	N
T.2.4	Malta - Gozo Tunnel	F	N	N
T.2.5	Implement Public Transport Quality Corridors (PTQC)	F	F	N
T.2.6	Improvement of Ferry Landing Places	F	F	N
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	F	N	N
T.2.8	Smart Parking System for Valletta	F	N	N
T.2.9	Fast passenger ferry link between Malta and Gozo	F	N	N
T.2.10	Free Transport for Youths, Students, and school children	F	F	N
T.2.11	Increase use of Intelligent Transport Systems in traffic management	F	F	N
T.2.12	National bicycle sharing scheme	F	N	N
T.2.13	Last-Mile Delivery for Valletta	F	N	N
T.2.14	Implementation of a cycling corridor	F	F	N
T.2.15	Car-Sharing Scheme	F	F	N
T.2.16	Sustainable Urban Mobility Plan for Valletta	F	N	N
T.2.17	National Bicycle Strategy and Action Plan	F	F	N
T.2.18	Introduction of electric buses in Gozo	F	N	N
T.2.19	Continuation of EV Grants and Electromobility Action Plan	F	F	N

[39] *F = full implementation; P = partial implementation; N = no implementation*

[40] *Partial implementation through 50% uptake of the units proposed*

[41] *Partial implementation through the postponement of the installation to a later date, circa 2022/2023*

7.0 Impact assessment

An impact assessment has been carried out on each of the three alternatives described in Section 6.0, the results of which are presented in the following subsections.

Various techniques were used to assess the significance of each of the identified impacts. Such techniques included the use of expert judgements, the use of thresholds, reference to legislation and consultation with stakeholders. The assessment factors have been classed as follows:

- **Effect**: neutral, adverse and beneficial
- **Probability**: remote, unlikely, possible, likely and certain
- **Duration**: permanent and temporary
- **Frequency**: permanent, regular, frequent, infrequent and rare
- **Reversibility**: reversible and irreversible
- **Cumulative effects**: remote, unlikely, possible, likely and certain
- **Transboundary effects**: remote, unlikely, possible, likely and certain
- **Magnitude**: high, medium and low
- **Spatial extent**: description as applicable
- **Value and vulnerability**: high, medium and low
- **Significance**: described in Table 14

Table 14: Legend for the impact effect and significance

Effect	Significance	Marking
Adverse	Major	
	Moderate	
	Minor	
Negligible		
Beneficial	Minor	
	Moderate	
	Major	
Unclassified		?

The measures were assessed by comparing the national scenario with the implemented measures (i.e. the WPM scenario) to the existing situation (WEM scenario). Impacts relating to the implementation phase itself (such as planning, design, pilot studies, etc.) have not been applied to the proposed measures, save for those which include extensive construction works, for example the Waste to Energy (WtE) facility and the Malta-Gozo tunnel. In such cases, construction impacts such as land take-up, dust dispersion and waste generation have been factored into the assessment.

7.1 Effect on environmental themes

The effects of the PaMs on the environmental themes (representing the WPM scenario or Alternative 1) are outlined in the following subsection. The impact assessment results for the PaMs of Alternatives 2 and 3 is included in Appendix 1.

7.1.1 Air quality

Atmospheric emissions are generated on a daily basis from a multitude of sources. In Malta, the primary threats to air quality include emissions from fuel combustion from power plants and internal combustion engines (ICE) in vehicles and on ships/vessels. Other sources include waste incineration, rubber tyre wear and road wear. For the purposes of this SEA, air pollution has been assessed in terms of particulate matter, ozone, benzene & VOCs, nitrogen dioxide and sulphur dioxide.

Atmospheric impacts on a national scale primarily depend on the following factors:

- Electricity demand which exerts a load on the Delimara power station;
- Proportion of national electricity produced from renewable sources, an increase of which reduces the demand on the Delimara power station;
- Electricity efficiency, an increase of which reduces the demand on the Delimara power station;
- Quantity of waste incinerated, which on the one hand would tend to reduce the demand on the Delimara power station but on the other generate additional atmospheric emissions;
- Number of active vehicles/vessels generating atmospheric emissions, including those generated from the induced demand effect (vide Section 8.0); and
- Average speed of active ICE vehicles, which generate higher atmospheric emissions in slow-moving traffic.

The extent (or significance) of the impact for each measure on air quality depends on the success of the measure and its ability to affect Malta's air quality on a national scale. In some cases, the overall effect is difficult to estimate as the measure would reduce one factor and increase another; such measures have been considered as unclassified as further studies would be necessary to infer conclusions.

The NECP includes various measures which are aimed towards five dimensions: (i) decarbonisation, (ii) energy efficiency, (iii) energy security, (iv) internal energy market and (v) research, innovation & competitiveness. Dimensions (i) and (ii) go hand-in-hand with air quality, and therefore the majority of the measures proposed as part of the WPM scenario yield a positive impact on Malta's national air quality.

Overall, the WPM scenario (Alternative 1) produces the largest number of beneficial impacts to Malta's national air quality, as shown in Table 15. The minimum intervention scenario (Alternative 2) produces fewer beneficial impacts, while Malta's air quality is expected to continue decreasing in the WEM scenario (Alternative 3).

Table 15: Final assessment matrix for the PaMs (air quality)

Environmental theme: Air quality		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Medium	National	Medium		Reduced power station demand
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Medium	National	Low		Reduced electricity demand
E.2.3	Energy efficiency: electricity tariffs	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	High	National	Medium		Reduced electricity demand
E.2.4	Support Scheme for Services and Industry	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Low	National	Low		Reduced electricity demand
E.2.5	Energy Efficient Street Lighting	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	Low	National	Low		Reduced electricity demand
E.2.6	Projects in primary water network and wastewater treatment plant	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	High	National	Medium		Reduced electricity demand
E.2.7	Biofuels Substitution Obligation (2021-2030)	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Certain	Medium	National	Medium		Increased proportion of renewables causing lower GHG emissions
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on Malta's air quality
E.2.9	Gas Security of Supply	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on Malta's air quality
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Adverse	Likely	Permanent	Regular	Reversible	Likely	Remote	Low	National	Low		Increased electricity demand
C.2.2	WtE Facility	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced power station demand and increased waste incineration
C.2.3	Waste Management Plan 2020 - 2030	Beneficial	Likely	Permanent	Permanent	Reversible	Certain	Remote	Low	National	Low		Decreased waste generation needing lower production energy
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Remote	Low	National	Low		Reduced traffic bottlenecks & increased alternative transport usage
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced bottlenecks and induced demand

Environmental theme: Air quality		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
T.2.3	Road and infrastructure projects	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced bottlenecks and induced demand
T.2.4	Malta - Gozo Tunnel	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Unlikely	High	National	High		Reduced usage of the Gozo Channel ferry and its associated emissions
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Beneficial	Possible	Permanent	Permanent	Reversible	Possible	Remote	Medium	National	Medium		Increased public transport efficiency and usage
T.2.6	Improvement of Ferry Landing Places	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced vehicles and increased ferry trips
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Beneficial	Possible	Permanent	Permanent	Reversible	Unlikely	Remote	Low	Immediate surroundings	Low		Fewer high-emitting vehicles (limited extent)
T.2.8	Smart Parking System for Valletta	Beneficial	Likely	Permanent	Temporary	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Fewer vehicles searching for on-street parking (limited extent)
T.2.9	Fast passenger ferry link between Malta and Gozo	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced vehicles and increased ferry trips
T.2.10	Free Transport for Youths, Students, and school children	Beneficial	Likely	Permanent	Temporary	Reversible	Certain	Remote	Medium	National	Medium		Increased public transport usage
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Beneficial	Possible	Permanent	Permanent	Reversible	Possible	Remote	Low	National	Low		Increased public transport usage
T.2.12	National bicycle sharing scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased vehicle usage
T.2.13	Last-Mile Delivery for Valletta	Beneficial	Certain	Permanent	Temporary	Reversible	Certain	Remote	Low	Immediate surroundings	Low		Decreased vehicle usage (limited extent)
T.2.14	Implementation of a cycling corridor	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	High	National	Medium		Decreased vehicle usage
T.2.15	Car-Sharing Scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased proportion of ICE vehicles
T.2.16	Sustainable Urban Mobility Plan for Valletta	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Decreased vehicle usage (limited extent)
T.2.17	National Bicycle Strategy and Action Plan	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased vehicle usage
T.2.18	Introduction of electric buses in Gozo	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Remote	Medium	Gozo	Medium		Decreased proportion of ICE vehicles
T.2.19	Continuation of EV Grants and Electromobility Action Plan	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	National	Low		Decreased proportion of ICE vehicles

7.1.2 Biodiversity

Biodiversity comprises all living native organisms and the diverse habitats in which they inhabit, and is also considered to be the natural heritage of that area/country. Threats to biodiversity generally include land take-up which cause direct loss of species and habitats and indirect impacts such as trampling, settlement of dust on habitats and dispersion of pollutants via land, water and air. For the purposes of this SEA, biodiversity has been assessed in terms of the statuses of local protected habitats & species, status of other habitats (valleys and watercourses) and status of environmental factors (coastal water, groundwater, geology and soil).

The extents of biodiversity impacts arising from the PaMs primarily depend on the following factors:

- Impact types such as land take-up causing loss of habitats;
- Impact natures such as permanent (ex: loss of species) or temporary (ex: trampling);
- Statuses of the habitats/species present, such as the presence of protected species or habitats; and
- The physical distance between the impact source and the biodiversity receptor

Reducing the extent of the impacts can be achieved by limiting the extent of land take-up, limiting the impact duration, or maximising the distance from the impact source. The measures themselves are targeted to achieve targets in the five energy dimensions. No targets have been established to improve biodiversity, so impacts which arise from the WPM scenario are negligible or adverse in nature. The NECP does not promote the protection of terrestrial and marine biodiversity as carbon sinks which can sequester carbon dioxide from the atmosphere; further discussion on this matter is provided in Section 8.0.

Overall, the WPM scenario (Alternative 1) produces the largest number of adverse impacts on biodiversity, mostly attributable to additional land take-up from projects such as the WtE facility, dewatering facilities and road infrastructure projects, as summarised in Table 16. The minimum intervention scenario (Alternative 2) produces fewer adverse impacts when compared to the baseline WEM scenario (Alternative 3).

Table 16: Final assessment matrix for the PaMs (biodiversity)

Environmental theme: Biodiversity		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Adverse	Likely	Permanent	Permanent	Reversible	Likely	Possible	Low	Immediate surroundings	Low		Reflection of PV panels cause disorientation of birds (limited extent)
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
E.2.3	Energy efficiency: electricity tariffs	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on biodiversity
E.2.4	Support Scheme for Services and Industry	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on biodiversity
E.2.5	Energy Efficient Street Lighting	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
E.2.6	Projects in primary water network and wastewater treatment plant	Adverse	Possible	Temporary	Infrequent	Irreversible	Unlikely	Remote	Low	Immediate surroundings	Medium		Projects may require land take-up which could infringe on local biodiversity (limited extent)
E.2.7	Biofuels Substitution Obligation (2021-2030)	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on biodiversity
E.2.9	Gas Security of Supply	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on biodiversity
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Adverse	Likely	Permanent	Permanent	Irreversible	Possible	Remote	Medium	Immediate surroundings	Medium		Loss of biodiversity from land take-up (limited extent)
C.2.2	WtE Facility	Adverse	Likely	Permanent	Permanent	Irreversible	Possible	Remote	Medium	Immediate surroundings	High		Loss of biodiversity from land take-up (limited extent)
C.2.3	Waste Management Plan 2020 - 2030	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Adverse	Certain	Permanent	Permanent	Irreversible	Possible	Remote	Low	Immediate surroundings	Low		Loss of biodiversity from land take-up (limited extent)
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Adverse	Certain	Permanent	Permanent	Irreversible	Possible	Remote	Low	Immediate surroundings	Low		Loss of biodiversity from land take-up (limited extent)
T.2.3	Road and infrastructure projects	Adverse	Likely	Permanent	Permanent	Irreversible	Possible	Remote	High	Immediate surroundings	Medium		Loss of biodiversity from land take-up (limited extent)

Environmental theme: Biodiversity		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
T.2.4	Malta - Gozo Tunnel	Adverse	Certain	Permanent	Permanent	Irreversible	Certain	Possible	High	National	High		Biodiversity loss through land/sea take-up for tunnel and excavation material disposal at sea
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.6	Improvement of Ferry Landing Places	Adverse	Certain	Permanent	Permanent	Irreversible	Certain	Possible	Low	Immediate surroundings	Medium		Loss of biodiversity from land/sea take-up (limited extent)
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.8	Smart Parking System for Valletta	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.9	Fast passenger ferry link between Malta and Gozo	Adverse	Certain	Permanent	Permanent	Irreversible	Certain	Possible	Low	Immediate surroundings	Medium		Loss of biodiversity from land/sea take-up (limited extent)
T.2.10	Free Transport for Youths, Students, and school children	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.12	National bicycle sharing scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.13	Last-Mile Delivery for Valletta	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.14	Implementation of a cycling corridor	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.15	Car-Sharing Scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.16	Sustainable Urban Mobility Plan for Valletta	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.17	National Bicycle Strategy and Action Plan	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.18	Introduction of electric buses in Gozo	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on biodiversity
T.2.19	Continuation of EV Grants and Electromobility Action Plan	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on biodiversity

7.1.3 Climate change

Climate change is a process whereby greenhouse gases, produced by both natural and anthropogenic activities, trap heat radiating from the Earth's surface and raise global temperatures. Contribution to climate change often goes hand in hand with the threats to air quality, namely emissions from fuel combustion from power plants and ICE in vehicles and on ships/vessels. For the purposes of this SEA, climate change has been assessed in relation to national GHG emissions and their proportional contribution to climate change in Malta.

Climate change impacts on a national scale primarily depend on the following factors:

- Electricity demand which exerts a load on the Delimara power station, producing additional GHG emissions;
- Proportion of national electricity produced from renewable sources, an increase of which reduces the demand on the Delimara power station;
- Electricity efficiency, an increase of which reduces the demand on the Delimara power station;
- Number of active vehicles/vessels generating atmospheric emissions, including those generated from the induced demand effect (vide Section 8.0); and
- Average speed of active ICE vehicles, which generate higher GHG emissions in slow-moving traffic.

The extent (or significance) of the impact for each measure on climate change depends on the success of the measure and its contribution to Malta's national GHG emissions. In some cases, the overall effect is difficult to estimate as the measure would reduce one factor and increase another; such measures have been considered as unclassified.

Dimensions (i) and (ii) assessed by the NECP, namely decarbonisation and energy efficiency, are directly related to climate change, and therefore the majority of the measures proposed as part of the WPM scenario yield a positive impact in relation to this environmental theme.

Overall, the WPM scenario (Alternative 1) produces the largest number of beneficial impacts to climate change in Malta, as shown in Table 17. The minimum intervention scenario (Alternative 2) produces fewer beneficial impacts, while Malta's contribution to climate change is expected to continue on its current increasing trend in the WEM scenario (Alternative 3).

Table 17: Final assessment matrix for the PaMs (climate change)

Environmental theme: Climate change		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	High	National	Medium		Reduced electricity demand
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Medium	National	Low		Reduced electricity demand
E.2.3	Energy efficiency: electricity tariffs	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	High	National	Medium		Reduced electricity demand
E.2.4	Support Scheme for Services and Industry	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Low	National	Low		Reduced electricity demand
E.2.5	Energy Efficient Street Lighting	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	Low	National	Low		Reduced electricity demand
E.2.6	Projects in primary water network and wastewater treatment plant	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	High	National	Medium		Reduced electricity demand
E.2.7	Biofuels Substitution Obligation (2021-2030)	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Certain	Medium	National	Medium		Increased proportion of renewables causing lower GHG emissions
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on Malta's climate change potential
E.2.9	Gas Security of Supply	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on Malta's climate change potential
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Adverse	Likely	Permanent	Regular	Reversible	Likely	Remote	Low	National	Low		Increased electricity demand causing higher power plant emissions
C.2.2	WtE Facility	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on net energy production from waste incineration and losses through cooling water system
C.2.3	Waste Management Plan 2020 - 2030	Beneficial	Likely	Permanent	Permanent	Reversible	Certain	Remote	Low	National	Medium		Decreased waste generation needing lower production energy
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Remote	Low	National	Low		Reduced traffic bottlenecks & increased alternative transport usage
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced bottlenecks and induced demand

Environmental theme: Climate change		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
T.2.3	Road and infrastructure projects	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced bottlenecks and induced demand
T.2.4	Malta - Gozo Tunnel	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Unlikely	High	National	High		Reduced usage of the Gozo Channel ferry
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Beneficial	Possible	Permanent	Permanent	Reversible	Possible	Remote	Medium	National	Medium		Increased public transport usage
T.2.6	Improvement of Ferry Landing Places	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced vehicular trips and increased ferry trips
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Beneficial	Possible	Permanent	Regular	Reversible	Unlikely	Remote	Low	Immediate surroundings	Low		High-emitting vehicles may be discouraged (limited extent)
T.2.8	Smart Parking System for Valletta	Beneficial	Likely	Permanent	Regular	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Fewer vehicles searching for on-street parking (limited extent)
T.2.9	Fast passenger ferry link between Malta and Gozo	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced vehicular trips and increased ferry trips
T.2.10	Free Transport for Youths, Students, and school children	Beneficial	Likely	Permanent	Regular	Reversible	Certain	Remote	Medium	National	Medium		Increased public transport usage
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Beneficial	Possible	Permanent	Permanent	Reversible	Possible	Remote	Medium	National	Medium		Increased public transport usage
T.2.12	National bicycle sharing scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased vehicle usage
T.2.13	Last-Mile Delivery for Valletta	Beneficial	Certain	Permanent	Frequent	Reversible	Certain	Remote	Low	Immediate surroundings	Low		Decreased vehicle usage (limited extent)
T.2.14	Implementation of a cycling corridor	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	High	National	Medium		Decreased vehicle usage
T.2.15	Car-Sharing Scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased proportion of ICE vehicles
T.2.16	Sustainable Urban Mobility Plan for Valletta	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Decreased vehicle usage (limited extent)
T.2.17	National Bicycle Strategy and Action Plan	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased vehicle usage
T.2.18	Introduction of electric buses in Gozo	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Remote	Medium	Gozo	Medium		Decreased proportion of ICE vehicles
T.2.19	Continuation of EV Grants and Electromobility Action Plan	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	National	Low		Decreased proportion of ICE vehicles

7.1.4 Cultural heritage

Cultural heritage is defined as the "legacy of physical artefacts and intangible attributes of a group or society that is inherited from past generations".[13] Threats to cultural heritage generally include land take-up which may uncover and potentially damage unknown cultural heritage features, along with accidental damage to known features. For the purposes of this SEA, cultural heritage has been defined in terms of the number and status of scheduled sites.

The extent of cultural heritage impacts primarily depend on the following factors:

- Impacts type such as excavation which could uncover and potentially damage unknown archaeological features;
- Location of the works, particularly relating to the likelihood of archaeological discoveries;
- Cultural importance of the features present, both known and unknown, and their designation by law; and
- The physical distance between the impact source and the cultural heritage receptor.

Reducing the extent of the impacts can be achieved by limiting the extent of land take-up, limiting the impact duration and maximising the distance from the impact source. The PaMs themselves are targeted to achieve targets in the five energy dimensions, so no direct beneficial impacts on cultural heritage are anticipated in the WPM scenario.

The archaeological sensitivity of an area was factored into the assessment. For example, Marsa is known to be an area with a high concentration of archaeological findings, meaning this locality is considered to be archaeologically sensitive. In fact, the excavation works at the Marsa junction projects have recently uncovered significant information on what the area was historically used for, most notably agricultural practices. Additional findings of tombs, pottery, vine trenches and other modern features of cultural importance were also uncovered whilst constructing this large-scale infrastructural project. Such tendencies for archaeological discoveries have been taken into account in the assessment. Cultural heritage impacts are considered to have a national spatial extent since loss of such features is a loss of our Maltese heritage.

Overall, the WPM scenario (Alternative 1) produces the largest number of adverse impacts on cultural heritage largely arising from excavation works associated with the proposed projects such as the WtE facility, road infrastructure upgrades and dewatering facilities, as summarised in Table 18. Conversely, the minimum intervention scenario (Alternative 2) proposes less projects and therefore produces fewer adverse impacts, while Malta's cultural heritage is expected to remain unchanged in the WEM scenario (Alternative 3).

Table 18: Final assessment matrix for the PaMs (cultural heritage)

Environmental theme: Cultural heritage		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
E.2.3	Energy efficiency: electricity tariffs	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
E.2.4	Support Scheme for Services and Industry	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
E.2.5	Energy Efficient Street Lighting	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on cultural heritage
E.2.6	Projects in primary water network and wastewater treatment plant	Adverse	Possible	Temporary	Infrequent	Irreversible	Unlikely	Remote	Medium	National	Medium		Damage to cultural heritage from excavation works
E.2.7	Biofuels Substitution Obligation (2021-2030)	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
E.2.9	Gas Security of Supply	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Adverse	Possible	Temporary	Infrequent	Irreversible	Unlikely	Remote	Low	National	Low		Damage to cultural heritage from excavation works
C.2.2	WtE Facility	Adverse	Possible	Temporary	Infrequent	Irreversible	Unlikely	Remote	Medium	National	Low		Damage to cultural heritage from excavation works
C.2.3	Waste Management Plan 2020 - 2030	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on cultural heritage
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Adverse	Likely	Temporary	Infrequent	Irreversible	Unlikely	Remote	High	National	High		Damage to cultural heritage from excavation works in area of high archaeological value
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Adverse	Likely	Temporary	Infrequent	Irreversible	Unlikely	Remote	High	National	High		Damage to cultural heritage from excavation works in area of high archaeological value
T.2.3	Road and infrastructure projects	Adverse	Possible	Temporary	Infrequent	Irreversible	Unlikely	Remote	Medium	National	Medium		Damage to cultural heritage from excavation works
T.2.4	Malta - Gozo Tunnel	Adverse	Possible	Temporary	Infrequent	Irreversible	Unlikely	Remote	Medium	National	High		Damage to cultural heritage from excavation works and disposal of

Environmental theme: Cultural heritage		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
													excavated material at sea
T.2.5	Implement Public Transport Quality Corridors (PTQC)	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.6	Improvement of Ferry Landing Places	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on cultural heritage
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.8	Smart Parking System for Valletta	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.9	Fast passenger ferry link between Malta and Gozo	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on cultural heritage
T.2.10	Free Transport for Youths, Students, and school children	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.11	Increase use of Intelligent Transport Systems in traffic management	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.12	National bicycle sharing scheme	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.13	Last-Mile Delivery for Valletta	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on cultural heritage
T.2.14	Implementation of a cycling corridor	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on cultural heritage
T.2.15	Car-Sharing Scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on cultural heritage
T.2.16	Sustainable Urban Mobility Plan for Valletta	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.17	National Bicycle Strategy and Action Plan	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.18	Introduction of electric buses in Gozo	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage
T.2.19	Continuation of EV Grants and Electromobility Action Plan	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on cultural heritage

7.1.5 Energy & water

For the purposes of this SEA, energy & water has been defined in terms of electricity generation & consumption, fuel consumption, security of supply and water production.

As of 2018, electricity in Malta mostly originates from two sources: local power plants (68%) and imports (24%); and only 8% of Malta's energy originates from renewable sources.[3] Security of electrical supply is generally quantified through the amount of different energy types and sources in the "energy mix" used to deliver energy; the larger the energy mix, the more contingencies are in place in case of failure of one of the systems. Fuel is primarily consumed in Malta to power internal combustion engines (ICE), generate electricity and to power various gas-powered household appliances and industrial machines.

In Malta, water is obtained from two sources: desalination of seawater via reverse osmosis and groundwater extraction.[23] Water obtained from such systems is pumped and distributed at through a series of underground tunnels and pipes. Some of this water is lost through leakages in the water mains. The quantity of water leakages has decreased in recent years as a result of a leakage reduction program implemented by the WSC.

Impacts to Malta's energy and water primarily depend on the following factors:

- Electricity demand which exerts a load on the Delimara power station, producing additional atmospheric emissions;
- Proportion of national electricity produced from renewable sources, an increase of which reduces the demand on the Delimara power station;
- Electricity efficiency of a given system (including mains water), an increase of which reduces the demand on the Delimara power station;
- Quantity of waste incinerated, which reduces the demand on the Delimara power station; and
- Quantity of water lost through leakages of the water mains.

The measures' impact significances on energy and water depend on their implementation success and ability to affect Malta's utilities on a national scale. All five dimensions assessed by the NECP go hand-in-hand with energy, and therefore the majority of the measures proposed as part of the WPM scenario yield a positive impact on Malta's utility services.

Overall, the WPM scenario (Alternative 1) produces the largest number of beneficial impacts to energy and water, as shown in Table 19. Nevertheless, this scenario has a large number of unclassified impacts (8 in total) which arise as a result of two factors. Firstly, while road widening works reduce congestion and increase fuel efficiency over a short time period, the induced demand effect must be considered. Secondly, although the use of electric vehicles reduces the consumption of fuels, such vehicles increase the demand on the national electricity grid system. Additionally, if the electricity used to power the vehicles is generated from non-renewable energy sources, then the overall lifecycle impact of electric vehicles on energy and water is adverse. Further information is provided in Section 7.3.2.

The minimum intervention scenario (Alternative 2) produces fewer beneficial impacts. Alternative 3 (WEM scenario) shows no beneficial impacts and the largest number of adverse impacts.

Table 19: Final assessment matrix for the PaMs (energy and water)

Environmental theme: Energy and water		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	High	National	Medium		Reduced electricity demand
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Medium	National	Low		Reduced electricity demand
E.2.3	Energy efficiency: electricity tariffs	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	High	National	Medium		Reduced electricity demand
E.2.4	Support Scheme for Services and Industry	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Low	National	Low		Reduced electricity demand
E.2.5	Energy Efficient Street Lighting	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	Low	National	Low		Reduced electricity demand
E.2.6	Projects in primary water network and wastewater treatment plant	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	High	National	Medium		Increased energy efficiency and decreased water losses
E.2.7	Biofuels Substitution Obligation (2021-2030)	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Certain	Medium	National	Medium		Reduced electricity demand
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on Malta's energy & water
E.2.9	Gas Security of Supply	Beneficial	Likely	Permanent	Permanent	Reversible	Certain	Possible	High	National	Medium		Increased supply security
E.2.10	Development of R&I Strategy for Energy and Water	Beneficial	Possible	Permanent	Frequent	Reversible	Possible	Unlikely	Medium	National	Medium		Increased knowledge for improved energy and water market
C.2.1	Management of Farm Slurries in the Maltese Islands	Adverse	Likely	Permanent	Regular	Reversible	Likely	Remote	Low	National	Low		Increased electricity demand
C.2.2	WtE Facility	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on net energy production from waste incineration and losses through cooling water system
C.2.3	Waste Management Plan 2020 - 2030	Beneficial	Likely	Permanent	Permanent	Reversible	Certain	Remote	Low	National	Medium		Decreased waste generation needing lower production energy
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on improved fuel efficiency and induced demand
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on improved fuel efficiency and induced demand
T.2.3	Road and infrastructure projects	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on improved fuel

Environmental theme: Energy and water		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
													efficiency and induced demand
T.2.4	Malta - Gozo Tunnel	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on reduced Gozo Channel trips, induced demand and energy to light and ventilate the tunnel
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Beneficial	Likely	Permanent	Frequent	Reversible	Certain	Remote	Medium	National	Low		Reduced traffic, causing increased fuel efficiency
T.2.6	Improvement of Ferry Landing Places	Beneficial	Likely	Permanent	Frequent	Reversible	Certain	Remote	Low	National	Low		Reduced traffic, causing increased fuel efficiency
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on Malta's energy & water
T.2.8	Smart Parking System for Valletta	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on Malta's energy & water
T.2.9	Fast passenger ferry link between Malta and Gozo	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on reduced Gozo Channel trips and increased fast ferry trips
T.2.10	Free Transport for Youths, Students, and school children	Beneficial	Likely	Permanent	Frequent	Reversible	Certain	Remote	High	National	High		Reduced traffic, causing increased fuel efficiency
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on Malta's energy & water
T.2.12	National bicycle sharing scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Certain	Remote	High	National	High		Reduced traffic, causing increased fuel efficiency
T.2.13	Last-Mile Delivery for Valletta	Beneficial	Likely	Permanent	Frequent	Reversible	Certain	Remote	Low	Immediate surroundings	Low		Reduced traffic, causing increased fuel efficiency
T.2.14	Implementation of a cycling corridor	Beneficial	Likely	Permanent	Permanent	Reversible	Certain	Remote	Medium	National	High		Reduced traffic, causing increased fuel efficiency
T.2.15	Car-Sharing Scheme	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on increased electricity demand and reduced fuel consumption
T.2.16	Sustainable Urban Mobility Plan for Valletta	Beneficial	Likely	Permanent	Frequent	Reversible	Certain	Remote	Low	Immediate surroundings	Low		Reduced traffic, causing increased fuel efficiency
T.2.17	National Bicycle Strategy and Action Plan	Beneficial	Likely	Permanent	Permanent	Reversible	Certain	Remote	Medium	National	High		Reduced traffic, causing increased fuel efficiency
T.2.18	Introduction of electric buses in Gozo	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on increased electricity

Environmental theme: Energy and water		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
													demand and reduced fuel consumption
T.2.19	Continuation of EV Grants and Electromobility Action Plan	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on increased electricity demand and reduced fuel consumption

7.1.6 Human health

The quality of human health varies according to genetics (nature) and is influenced by the surrounding environment (nurture). For the purposes of this SEA, human health has been quantified in terms of three environmentally related factors, namely obesity-related deaths, air pollution-related deaths and asthma morbidity. Other factors contribute to human health, but for the purposes of this SEA, are not believed to be significantly affected by the proposed PAMs.

National human health impacts primarily depend on the following factors:

- Power station load and related atmospheric emissions;
- Electricity efficiency, an increase of which reduces the demand on the Delimara power station;
- Quantity of waste incinerated, which generates atmospheric emissions;
- Number of active vehicles/vessels generating atmospheric emissions;
- Average speed of active internal combustion engine ICE vehicles, which generate higher atmospheric emissions in slow-moving traffic; and
- Physical activity such as bicycle usage and walking, an increase of which reduces Malta's obesity problem.

The extent (or significance) of the impact for each measure on human health depends on the success of the measure and its ability to affect the health of Malta's population.

Although the NECP does not include measures that directly target human health, dimensions (i) and (ii) for decarbonisation and energy efficiency would reduce the load (and consequently the atmospheric emissions) of Malta's power station. The majority of the measures proposed as part of the WPM scenario therefore yield a positive impact on Malta's human health.

Overall, the WPM scenario (Alternative 1) produces the largest number of beneficial impacts to the health of the Maltese population, as summarised in Table 20. The minimum intervention scenario (Alternative 2) produces fewer beneficial impacts, while human health on a national scale is expected to continue deteriorating in the WEM scenario (Alternative 3).

Table 20: Final assessment matrix for the PaMs (human health)

Environmental theme: Energy and water		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Medium	National	Medium		Reduced power station emissions
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Low	National	Low		Reduced power station emissions
E.2.3	Energy efficiency: electricity tariffs	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Medium	National	Medium		Reduced power station emissions
E.2.4	Support Scheme for Services and Industry	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Possible	Low	National	Low		Reduced power station emissions
E.2.5	Energy Efficient Street Lighting	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	Low	National	Low		Reduced power station emissions
E.2.6	Projects in primary water network and wastewater treatment plant	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Possible	Low	National	Low		Reduced power station emissions
E.2.7	Biofuels Substitution Obligation (2021-2030)	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Certain	Low	National	Medium		Reduced emissions from fuel impurities
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on human health
E.2.9	Gas Security of Supply	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on human health
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on human health
C.2.2	WtE Facility	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced power station demand and increased waste incineration
C.2.3	Waste Management Plan 2020 - 2030	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on human health
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Remote	Low	National	Low		Reduced traffic emissions & increased bicycle use
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change from reduced bottlenecks and induced demand
T.2.3	Road and infrastructure projects	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change from reduced bottlenecks and induced demand

Environmental theme: Energy and water		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
T.2.4	Malta - Gozo Tunnel	Beneficial	Likely	Permanent	Permanent	Reversible	Possible	Remote	High	National	High		Reduced Gozo Channel emissions
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Beneficial	Likely	Permanent	Frequent	Reversible	Likely	Remote	Medium	National	High		Increased public transport usage
T.2.6	Improvement of Ferry Landing Places	Beneficial	Likely	Permanent	Frequent	Reversible	Certain	Remote	Low	Immediate surroundings	Low		Reduced traffic emissions & increased walking (limited extent)
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Beneficial	Likely	Permanent	Regular	Reversible	Possible	Remote	Low	Immediate surroundings	Low		Reduced traffic emissions (limited extent)
T.2.8	Smart Parking System for Valletta	Beneficial	Possible	Permanent	Frequent	Reversible	Possible	Remote	Low	Immediate surroundings	Medium		Reduced active ICE vehicles looking for parking (limited extent)
T.2.9	Fast passenger ferry link between Malta and Gozo	Beneficial	Likely	Permanent	Regular	Reversible	Certain	Remote	Medium	National	Low		Reduced traffic emissions & increased walking
T.2.10	Free Transport for Youths, Students, and school children	Beneficial	Likely	Permanent	Regular	Reversible	Certain	Remote	High	National	High		Increased public transport usage
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Beneficial	Possible	Permanent	Frequent	Reversible	Likely	Remote	Medium	National	Low		Increased public transport usage
T.2.12	National bicycle sharing scheme	Beneficial	Likely	Permanent	Regular	Reversible	Likely	Remote	Medium	National	High		Reduced traffic emissions & increased bicycle usage
T.2.13	Last-Mile Delivery for Valletta	Beneficial	Possible	Permanent	Frequent	Reversible	Possible	Remote	Low	Immediate surroundings	Low		Reduced traffic emissions (limited extent)
T.2.14	Implementation of a cycling corridor	Beneficial	Possible	Permanent	Frequent	Reversible	Likely	Remote	High	National	Medium		Reduced traffic emissions & increased bicycle usage
T.2.15	Car-Sharing Scheme	Beneficial	Possible	Permanent	Frequent	Reversible	Likely	Remote	Low	National	Low		Reduced traffic emissions
T.2.16	Sustainable Urban Mobility Plan for Valletta	Beneficial	Possible	Permanent	Frequent	Reversible	Possible	Remote	Low	Immediate surroundings	Medium		Reduced traffic emissions & increased walking (limited extent)
T.2.17	National Bicycle Strategy and Action Plan	Beneficial	Likely	Permanent	Regular	Reversible	Likely	Remote	High	National	High		Reduced traffic emissions & increased bicycle usage
T.2.18	Introduction of electric buses in Gozo	Beneficial	Possible	Permanent	Permanent	Reversible	Possible	Remote	Medium	Gozo	Medium		Reduced traffic emissions
T.2.19	Continuation of EV Grants and Electromobility Action Plan	Beneficial	Possible	Permanent	Permanent	Reversible	Possible	Remote	Low	National	Low		Reduced traffic emissions

7.1.7 Landscape

Landscape is defined by the EUROPEAN LANDSCAPE CONVENTION as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors".[29] Landscape does not only comprise of visual aspects of the environment, but also includes the character of an area perceived through the remaining four senses. For the purposes of this SEA, landscape has been assessed from a visual perspective, in terms of the status of landform and topography, landscape, the natural beauty and scenic amenity of the landscape.

Landscape impacts on a national scale primarily depend on the following factors:

- Take-up of open spaces which would have adverse impacts on the landscape of the surrounding areas; and
- Number of active vehicles/vessels which are generally considered to be unsightly.

The extent (or significance) of impacts is dependent on the implementation location and area of land taken up by developments. For some particularly open-ended measures, the overall effect is difficult to estimate; such measures have been considered as unclassified.

The WPM scenario (Alternative 1) shows a mixture of beneficial and adverse impacts in relation to Malta's landscape, as shown in Table 21. Beneficial impacts relate to a decrease in the number of vehicles on the road through the implementation of various PaMs, while adverse impacts are expected to occur from the proposed developments such as road infrastructure and the WtE facility. The minimum intervention scenario (Alternative 2) produces an intermediate number of beneficial and adverse impacts. The WEM scenario (Alternative 3) shows no beneficial or adverse impacts and some adverse impacts from the expected increase in vehicles on the road.

Table 21: Final assessment matrix for the PaMs (landscape)

Environmental theme: Landscape		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Adverse	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Reduced landscape quality from PVs (limited extent)
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Adverse	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Reduced landscape quality from solar water heaters (limited extent)
E.2.3	Energy efficiency: electricity tariffs	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on landscape
E.2.4	Support Scheme for Services and Industry	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on landscape
E.2.5	Energy Efficient Street Lighting	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on landscape
E.2.6	Projects in primary water network and wastewater treatment plant	Adverse	Likely	Permanent	Permanent	Irreversible	Likely	Remote	Low	Immediate surroundings	Low		Development infringes on landscape (limited extent)
E.2.7	Biofuels Substitution Obligation (2021-2030)	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on landscape
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on landscape
E.2.9	Gas Security of Supply	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on landscape
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Adverse	Certain	Permanent	Permanent	Irreversible	Possible	Remote	Medium	Immediate surroundings	Low		Development infringes on landscape (limited extent)
C.2.2	WtE Facility	Adverse	Certain	Permanent	Permanent	Irreversible	Likely	Remote	Medium	Immediate surroundings	Medium		Development infringes on landscape (limited extent)
C.2.3	Waste Management Plan 2020 - 2030	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on landscape
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Adverse	Certain	Permanent	Permanent	Irreversible	Possible	Remote	Medium	Immediate surroundings	Medium		Development infringes on landscape (limited extent)
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Adverse	Certain	Permanent	Permanent	Irreversible	Possible	Remote	Low	Immediate surroundings	Low		Development infringes on landscape (limited extent)
T.2.3	Road and infrastructure projects	Adverse	Likely	Permanent	Permanent	Irreversible	Possible	Remote	High	Immediate surroundings	Medium		Developments infringe on

Environmental theme: Landscape		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
													landscape (limited extent)
T.2.4	Malta - Gozo Tunnel	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the tunnel design and location of entry points
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on landscape
T.2.6	Improvement of Ferry Landing Places	Adverse	Certain	Permanent	Permanent	Irreversible	Possible	Remote	Medium	Immediate surroundings	Low		Development infringes on landscape (limited extent)
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Low	Immediate surroundings	Low		Reduced vehicular traffic (limited extent)
T.2.8	Smart Parking System for Valletta	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Low	Immediate surroundings	Low		Reduced vehicular traffic (limited extent)
T.2.9	Fast passenger ferry link between Malta and Gozo	Adverse	Certain	Permanent	Permanent	Irreversible	Possible	Remote	Medium	Immediate surroundings	Low		Development infringes on landscape (limited extent)
T.2.10	Free Transport for Youths, Students, and school children	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Medium	National	Medium		Reduced vehicular traffic
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Low	National	Low		Reduced vehicular traffic
T.2.12	National bicycle sharing scheme	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Medium	National	Low		Reduced vehicular traffic
T.2.13	Last-Mile Delivery for Valletta	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Low	Immediate surroundings	Low		Reduced vehicular traffic (limited extent)
T.2.14	Implementation of a cycling corridor	Beneficial	Possible	Permanent	Frequent	Reversible	Possible	Remote	Low	National	Low		Reduced vehicular traffic
T.2.15	Car-Sharing Scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on landscape
T.2.16	Sustainable Urban Mobility Plan for Valletta	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Low	Immediate surroundings	Low		Reduced vehicular traffic (limited extent)
T.2.17	National Bicycle Strategy and Action Plan	Beneficial	Likely	Permanent	Frequent	Reversible	Possible	Remote	Low	National	Low		Reduced vehicular traffic
T.2.18	Introduction of electric buses in Gozo	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on landscape
T.2.19	Continuation of EV Grants and Electromobility Action Plan	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on landscape

7.1.8 Transport & related infrastructure

Malta's population is heavily reliant on motor vehicles for transportation, with an approximate increase of 67 vehicles per day licensed in Q4 of 2019.[33] The number of users of electric/hybrid vehicles and alternative/public modes of transport have nevertheless shown a steady increase in recent years. For the purposes of this SEA, vehicles by type, bicycle & e-bicycle usage and public transport usage have been used as indicators.

Impacts on transport on a national scale primarily depend on the following factors:

- Number of trips necessary to transport waste or other materials;
- Length of travel time;
- Proportions of active ICE vehicles/vessels and electric/hybrid vehicles;
- Usage of alternative modes of transport such as bicycles or e-bicycles; and
- Usage of public transport.

The extent (or significance) of the impact for each measure on transport depends on the success of the measure and its ability to affect Malta's transport system on a national scale.

Overall, the WPM scenario (Alternative 1) produces the largest number of beneficial impacts to Malta's national transport system, as shown in Table 22. The minimum intervention scenario (Alternative 2) produces fewer beneficial impacts, while Malta's transport system is expected to become even more congested in the WEM scenario (Alternative 3).

Table 22: Final assessment matrix for the PaMs (transport and related infrastructure)

Environmental theme: Transport and related infrastructure		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.3	Energy efficiency: electricity tariffs	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.4	Support Scheme for Services and Industry	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.5	Energy Efficient Street Lighting	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.6	Projects in primary water network and wastewater treatment plant	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.7	Biofuels Substitution Obligation (2021-2030)	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on transport
E.2.9	Gas Security of Supply	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Adverse	Possible	Permanent	Regular	Reversible	Likely	Remote	Low	National	Low		Increased transport of slurries to dewatering facilities
C.2.2	WtE Facility	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on transport since facility will be in Magħtab Complex
C.2.3	Waste Management Plan 2020 - 2030	Adverse	Possible	Permanent	Regular	Reversible	Likely	Unlikely	Low	National	Low		Increased recycling requires additional heavy vehicle trips between facilities
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Remote	Low	National	Low		Reduced traffic bottlenecks & increased alternative transport usage
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced bottlenecks and induced demand
T.2.3	Road and infrastructure projects	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on emission change due to reduced

Environmental theme: Transport and related infrastructure		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
													bottlenecks and induced demand
T.2.4	Malta - Gozo Tunnel	Beneficial	Certain	Permanent	Regular	Reversible	Likely	Remote	Medium	National	Medium		Decreased travel time
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Beneficial	Likely	Permanent	Regular	Reversible	Possible	Remote	Medium	National	Medium		Increased public transport use
T.2.6	Improvement of Ferry Landing Places	Beneficial	Likely	Permanent	Regular	Reversible	Possible	Remote	Medium	National	Low		Increased alternative transport use
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Beneficial	Possible	Permanent	Permanent	Reversible	Unlikely	Remote	Low	Immediate surroundings	Low		High-emitting vehicles discouraged (limited extent)
T.2.8	Smart Parking System for Valletta	Beneficial	Likely	Permanent	Temporary	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Fewer vehicles searching for on-street parking (limited extent)
T.2.9	Fast passenger ferry link between Malta and Gozo	Beneficial	Certain	Permanent	Regular	Reversible	Likely	Remote	Medium	National	Low		Increased alternative transport use
T.2.10	Free Transport for Youths, Students, and school children	Beneficial	Likely	Permanent	Temporary	Reversible	Certain	Remote	Medium	National	Medium		Increased public transport use
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Beneficial	Possible	Permanent	Permanent	Reversible	Possible	Remote	Low	National	Low		Decreased travel time and increased public transport use
T.2.12	National bicycle sharing scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	High	National	Medium		Decreased travel time and increased alternative transport use
T.2.13	Last-Mile Delivery for Valletta	Beneficial	Certain	Permanent	Temporary	Reversible	Certain	Remote	Low	Immediate surroundings	Low		Decreased vehicle use (limited extent)
T.2.14	Implementation of a cycling corridor	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	High	National	High		Decreased travel time and increased alternative transport use
T.2.15	Car-Sharing Scheme	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased proportion of ICE vehicles
T.2.16	Sustainable Urban Mobility Plan for Valletta	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	Immediate surroundings	Low		Decreased travel time and increased alternative transport use (limited extent)
T.2.17	National Bicycle Strategy and Action Plan	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Decreased travel time and increased alternative transport use
T.2.18	Introduction of electric buses in Gozo	Beneficial	Certain	Permanent	Permanent	Reversible	Certain	Remote	Low	Gozo	Low		Decreased proportion of ICE vehicles
T.2.19	Continuation of EV Grants and Electromobility Action Plan	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	National	Low		Decreased proportion of ICE vehicles

7.1.9 Waste and resource management

Waste generation represents a loss of resources, and the management of waste places pressure on the environment in terms of air, water quality and land take-up. For the purposes of this SEA, the quantity of waste generated by type and the proportion of waste separation and recycling have been used as indicators.

Impacts on waste and resource management on a national scale primarily depend on the following factors:

- Waste generation and recovery;
- Waste incineration which reuses material for electricity generation;
- Energy-efficient lighting systems such as the use of LED bulbs, an increase of which causes a decrease in WEEE generation;
- Efficiency of the national water supply system, an increase of which causes a reduction in reject water; and
- Generation of C&D waste from construction sites.

The extent (or significance) of the impact for each measure on transport depends on the success of the measure and its ability to affect Malta's waste system on a national scale.

The WPM scenario (Alternative 1) shows a mixture of beneficial and adverse impacts, as shown in Table 23. Beneficial impacts arise from a reduction in waste anticipated from the proposed WtE facility and the WASTE MANAGEMENT PLAN 2020-2030. Adverse impacts from implementation of the PaMs are expected from an increase in WEEE from increased solar photovoltaic panels and electric vehicles and an increase in C&D waste from road infrastructure projects and the Malta-Gozo tunnel.

Photovoltaic panels can only be recycled using advanced machinery to separate the various materials, and about 96% of the materials can be reused for production of new panels.[42] Lead-acid batteries from electric vehicles are about 96% recoverable, but further studies are necessary to determine the recyclability extent of lithium-ion batteries, which have been introduced in the market relatively recently.[43]

The fixed link between Malta's two largest islands is expected to generate large amounts of waste (equating to at least half of Malta's annual non-hazardous mineral waste generation). Such extensive waste quantities arising from one development would put considerable pressure on Malta's waste system, which is already critically close to full capacity.

The minimum intervention scenario (Alternative 2) is expected to generate fewer beneficial and fewer adverse impacts than the WPM scenario. Although the WEM scenario (Alternative 3) is not expected to generate any beneficial impacts on this environmental theme, some of the adverse impacts from the PaMs are not expected to materialise in this scenario.

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[42] Vekony, A.T. (2020). The opportunities of solar panel recycling: What happens to PV panels when their life cycle ends. https://www.greenmatch.co.uk/blog/2017/10/the-opportunities-of-solar-panel-recycling.

[43] Hall-Geisler (n.d.). Can electric car batteries be recycled? https://auto.howstuffworks.com/can-electric-car-batteries-be-recycled.htm.

Table 23: Final assessment matrix for the PaMs (waste and resource management)

Environmental theme: Waste and resource management		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
E.2.1	Financial support schemes for Solar PV	Adverse	Likely	Permanent	Permanent	Irreversible	Certain	Possible	High	National	High		Increased generation of WEEE
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
E.2.3	Energy efficiency: electricity tariffs	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
E.2.4	Support Scheme for Services and Industry	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on waste
E.2.5	Energy Efficient Street Lighting	Beneficial	Likely	Permanent	Permanent	Irreversible	Possible	Unlikely	Low	National	Low		Energy-efficient bulbs last longer, generating less WEEE
E.2.6	Projects in primary water network and wastewater treatment plant	Beneficial	Likely	Permanent	Permanent	Reversible	Likely	Remote	Low	National	Medium		Improved efficiency causing less reject and lost water
E.2.7	Biofuels Substitution Obligation (2021-2030)	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on waste
E.2.8	Acquisition of renewable energy credits from other Member States	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on waste
E.2.9	Gas Security of Supply	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		No effect on waste
E.2.10	Development of R&I Strategy for Energy and Water	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on the type of research financed
C.2.1	Management of Farm Slurries in the Maltese Islands	Beneficial	Certain	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	Medium		Material recovery and reuse
C.2.2	WtE Facility	Beneficial	Certain	Permanent	Permanent	Reversible	Likely	Remote	High	National	High		Waste reuse for electricity generation
C.2.3	Waste Management Plan 2020 - 2030	Beneficial	Certain	Permanent	Permanent	Reversible	Likely	Remote	Medium	National	High		Reduced waste generation and improved waste recovery
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Adverse	Certain	Temporary	Temporary	Irreversible	Certain	Possible	Low	National	Low		Increased generation of C&D waste
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa	Adverse	Certain	Temporary	Temporary	Irreversible	Certain	Possible	Low	National	Low		Increased generation of C&D waste
T.2.3	Road and infrastructure projects	Adverse	Certain	Temporary	Temporary	Irreversible	Certain	Possible	Medium	National	Medium		Increased generation of C&D waste
T.2.4	Malta - Gozo Tunnel	Adverse	Certain	Temporary	Temporary	Irreversible	Certain	Possible	High	National	High		Large amount of C&D waste which is difficult to reuse/ recycle

Environmental theme: Waste and resource management		Effect	Probability	Duration	Frequency	Reversibility	Cumulative effects	Transboundary effects	Magnitude	Spatial extent	Value and vulnerability	Significance	Justification
T.2.5	Implement Public Transport Quality Corridors (PTQC)	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.6	Improvement of Ferry Landing Places	Adverse	Certain	Temporary	Temporary	Irreversible	Certain	Possible	Low	National	Low		Increased generation of C&D waste
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.8	Smart Parking System for Valletta	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.9	Fast passenger ferry link between Malta and Gozo	Adverse	Certain	Temporary	Temporary	Irreversible	Certain	Possible	Low	National	Low		Increased generation of C&D waste
T.2.10	Free Transport for Youths, Students, and school children	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.11	Increase use of Intelligent Transport Systems in traffic management	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.12	National bicycle sharing scheme	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.13	Last-Mile Delivery for Valletta	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on whether electric vehicles will be used
T.2.14	Implementation of a cycling corridor	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.15	Car-Sharing Scheme	Adverse	Likely	Permanent	Permanent	Irreversible	Certain	Possible	Medium	National	Medium		Increased generation of WEEE
T.2.16	Sustainable Urban Mobility Plan for Valletta	Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	?	Effect dependent on whether electric vehicles will be used
T.2.17	National Bicycle Strategy and Action Plan	Negligible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Minimal effect on waste
T.2.18	Introduction of electric buses in Gozo	Adverse	Likely	Permanent	Permanent	Irreversible	Certain	Possible	Medium	National	Medium		Increased generation of WEEE
T.2.19	Continuation of EV Grants and Electromobility Action Plan	Adverse	Likely	Permanent	Permanent	Irreversible	Certain	Possible	Medium	National	Medium		Increased generation of WEEE

7.2 Impact assessment appraisal

Table 24 provides the overall impact assessment appraisal for each alternative.

Air quality, climate change, energy & water, human health and transport & related infrastructure show a clear and direct improvement in the WPM scenario (Alternative 1) when compared to the WEM scenario (Alternative 3). All five dimensions assessed by the NECP go hand-in-hand with air quality and climate change and therefore the majority of the measures proposed as part of the WPM scenario yield a positive impact on these environmental themes. Transport measures are included in the list of PAMs, so an overall improvement in the WPM scenario is expected. The health of the Maltese human population is indirectly benefitted through a reduction in air pollution and an increase in physical activity through alternative transport such as cycling and walking.

Conversely, biodiversity and cultural heritage are likely to be impacted in the WPM scenario due to the additional land take-up envisaged for various projects such as the dewatering facilities, road infrastructure projects and W2E facility. Since the minimum intervention (Alternative 2) scenario represents the implementation of only some measures, the impacts for this alternative generally lie somewhere in between the other two.

Table 24: Impact assessment appraisal for each alternative[44]

Impact Significance	No. of Impacts		
	Alt 1	Alt 2	Alt 3
Air quality			
Major beneficial	3	2	0
Moderate beneficial	10	7	0
Minor beneficial	10	6	0
Negligible	2	4	5
Minor adverse	1	7	21
Moderate adverse	0	2	6
Major adverse	0	0	0
Biodiversity			
Major beneficial	0	0	0
Moderate beneficial	0	0	0
Minor beneficial	0	0	0
Negligible	21	25	32
Minor adverse	6	5	0
Moderate adverse	2	1	0
Major adverse	2	0	0
Climate change			
Major beneficial	4	3	0
Moderate beneficial	10	7	0
Minor beneficial	9	5	0
Negligible	2	4	4
Minor adverse	1	7	21
Moderate adverse	0	2	7
Major adverse	0	0	0

Impact Significance	No. of Impacts		
	Alt 1	Alt 2	Alt 3
Cultural heritage			
Major beneficial	0	0	0
Moderate beneficial	0	0	0
Minor beneficial	0	0	0
Negligible	24	27	32
Minor adverse	1	0	0
Moderate adverse	3	2	0
Major adverse	3	2	0
Energy & water			
Major beneficial	6	5	0
Moderate beneficial	6	5	0
Minor beneficial	6	4	0
Negligible	4	13	22
Minor adverse	1	0	7
Moderate adverse	0	0	3
Major adverse	0	0	0
Human health			
Major beneficial	4	3	0
Moderate beneficial	7	4	0
Minor beneficial	13	7	0
Negligible	4	12	18
Minor adverse	0	1	9
Moderate adverse	0	2	5
Major adverse	0	0	0

Impact Significance	No. of Impacts		
	Alt 1	Alt 2	Alt 3
Landscape			
Major beneficial	0	0	0
Moderate beneficial	2	1	0
Minor beneficial	7	3	0
Negligible	12	19	30
Minor adverse	4	5	2
Moderate adverse	5	3	0
Major adverse	1	0	0
Transport & related infrastructure			
Major beneficial	2	1	0
Moderate beneficial	7	5	0
Minor beneficial	8	3	0
Negligible	10	12	15
Minor adverse	2	5	11
Moderate adverse	0	4	6
Major adverse	0	0	0
Waste & resources			
Major beneficial	1	1	0
Moderate beneficial	2	1	0
Minor beneficial	2	2	0
Negligible	15	20	26
Minor adverse	4	4	4
Moderate adverse	4	2	0
Major adverse	2	1	2

[44] *For each impact significance, the largest number of impacts between the three scenarios is highlighted in its respective colour. Unknown impacts have been excluded.*

7.3 Data gaps and other difficulties

A number of broad areas of uncertainty and limitations exist in this Environment Report which are highlighted below.

7.3.1 SEA limitations

The NECP will be operating at a national scale, which brings about a number of limitations in terms of collecting and analysing information. In accordance with the regulations and practice guidance on SEA, the collection of data and level of detail presented in the impact appraisal is restricted to the indicators identified at scoping stage, and by the spatial resolution that can be expected from the NECP.

The baseline is formulated as a trajectory in terms of changing environmental themes over time, meaning the baseline (being a prediction of what might take place in future) is imperfectly defined. The actual outcome from the actions which are already being planned might be different from those estimated. Since it is difficult to quantify impacts on many of the environmental themes, the SEA was carried out on a qualitative basis.

7.3.2 Data gaps & assumptions

The SEA made use of data relevant to the national context which is available in the public domain. Some data gaps were encountered during this SEA, such as statistics on bicycle usage which are not available in the public domain since bicycles do not require registration.

The NECP includes a variety of PaMs, some of which are particularly complex and/or open-ended. The overall effect of such PaMs is difficult to estimate due to their ambiguous nature; such measures have been considered as unclassified, as outlined in Table 25.

Table 25: PaMs with unclassified impacts

PaM	Unclassified env. themes	Justification
Development of R&I Strategy for Energy and Water	All themes except energy & water	Effect dependent on the type of research financed
WtE Facility	Air quality and human health	Effect dependent on emission change due to reduced power station demand and increased waste incineration
	Climate change and energy & water	Effect dependent on net energy production from waste incineration and losses through cooling water system
Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project	Energy & water	Effect dependent on increased fuel efficiency from reduced bottlenecks and increased number of vehicles through induced demand
Remove traffic bottleneck at Addolorata junction, Marsa	Air quality, climate change, energy & water, human health and	Effect dependent on increased fuel efficiency from reduced bottlenecks and increased number of vehicles through induced demand

PaM	Unclassified env. themes	Justification
	transport & related infrastructure	
Road and infrastructure projects	Air quality, climate change, energy & water, human health and transport & related infrastructure	Effect dependent on increased fuel efficiency from reduced bottlenecks and increased number of vehicles through induced demand
Malta - Gozo Tunnel	Energy & water	Effect dependent on increased fuel efficiency from reduced bottlenecks and increased number of vehicles through induced demand
	Landscape	Effect dependent on the tunnel design and location of entry points
Improvement of Ferry Landing Places	Air quality and climate change	Effect dependent on emission change due to reduced vehicles and increased ferry trips
Fast passenger ferry link between Malta and Gozo	Air quality, climate change and energy & water	Effect dependent on overall fuel combustion through decreased number of vehicles and increased ferry trips
Last-Mile Delivery for Valletta	Waste & resource management	Effect dependent on whether electric vehicles will be used
Car-sharing scheme	Energy & water	Effect dependent on increased electricity demand and reduced fuel consumption
Sustainable Urban Mobility Plan for Valletta	Waste & resource management	Effect dependent on whether electric vehicles will be used
Introduction of electric buses in Gozo	Energy & water	Effect dependent on increased electricity demand and reduced fuel consumption
Continuation of EV Grants and Electromobility Action Plan	Energy & water	Effect dependent on increased electricity demand and reduced fuel consumption

Unclassified impacts from road infrastructure projects are related to the phenomenon known as the "induced demand effect". Numerous studies have concluded that an increase in arterial roads and road widening projects have a detrimental long-term effect on traffic congestion. A recent paper quantified this demand and concluded that a 1% increase in capacity of major roads causes an increase in traffic of up to 0.68% in the short term (1-2 years) and 0.3-1.1% in the long term (5 years later).[45] The phenomenon of induced traffic indicates that increasing the capacity of roads has a short-term effect and eventual congestion is inevitable, as presented in Figure 49. Nevertheless, no studies of this effect have been carried out in the local context, which constitutes a data gap.

[45] *Milam, R., Birnbaum, M., Ganson, C., Handy, S., & Walters, J. (2017). Closing the Induced Vehicle Travel Gap Between Research and Practice. Transportation Research Record: Journal of the Transportation Research Board, 2653(1), 10-16. doi: 10.3141/2653-02.*

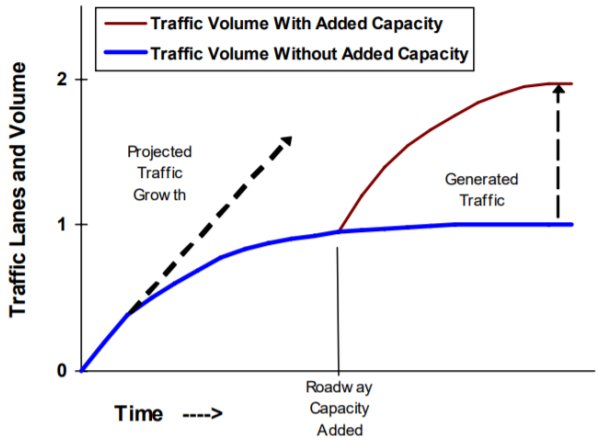

Figure 49: Generation of road traffic from increase in road capacity[46]

Additionally, the SEA has assumed that the introduction of electric/hybrid vehicles in Malta has an overall beneficial impact on climate change. However, additional energy is needed to manufacture and dispose of specialised battery cells, which depend on the make and model of the batteries and their components; such factors were not taken into consideration.

[46] *Litman (2011). Generated traffic: Implications for transport planning. Ite Journal, 71(4): 38-47.*

8.0 Shortcomings and recommendations

The SEA process identified some shortcomings in the NECP, as described hereunder. The inclusion of the below measures would yield a more holistic and comprehensive NECP. NECPs prepared by other Member States have been consulted in preparation of this section.

Carbon sequestration

Although the decarbonisation dimension refers to GHG emissions and removals, no measures have been established to remove GHGs from the atmosphere. Terrestrial and marine ecosystems have the potential to act as carbon sinks by removing GHGs from the atmosphere. *Posidonia oceanica* meadows (endemic to the Mediterranean Sea) are considered to be the most efficient carbon sinks in the world, accumulating up to 104 g of organic carbon per square metre annually.[47] Soils in European grasslands, forests and other natural vegetation also typically act as carbon sinks and help to mitigate against climate change.[48] The omission of biodiversity measures in the NECP is not considered as an adverse impact, but a limitation to the NECP. The NECP has the opportunity to include projects that increase these types of terrestrial and marine ecosystems and by so doing, the NECP would be enriched.

Electricity production, efficiency, storage & security

No targets for development of renewable energy generating plants have been included in the NECP. Development of facilities such as onshore solar farms and wind farms have limited potential in Malta due to restricted brownfield land area available for development. Nevertheless, the Maltese territorial waters cover an area of 3,976km^2 -- over 16 times the land area of the Maltese Islands. This area offers the potential for the development of offshore renewable energy plants. Acknowledging that the waters around the Maltese Islands are deep and that technology is still developing, recent technological advancements in both fields have been made.

Renewable energy can be stored in a variety of forms, such as Battery Energy Storage System (BESS), Hydrogen Energy Storage (HES) and thermal energy storage. Natural gas can also be stored through various existing technologies. Such storage systems improve energy security, to provide backup to the existing power grid during periods of high demand. While the NECP makes reference to ongoing research into large-scale battery energy storage, assessment of the potential for other forms of energy storage should also be included. Such systems would support RES generation by storing energy generated during off-peak times and supporting the national electricity grid during peak times.

No targets to implement mandatory renewable energy generation in newly constructed buildings or retrofit old buildings with renewable energy generating systems have been included in the NECP. These targets would encourage the development of low-carbon

[47] *Serrano, O., Lavery, P., López-Merino, L., Ballesteros, E., & Mateo, M. (2016). Location and Associated Carbon Storage of Erosional Escarpments of Seagrass Posidonia Mats. Frontiers in Marine Science, 3. doi: 10.3389/fmars.2016.00042.*

[48] *EC (2011). Soil: The hidden part of the climate cycle. Luxembourg: Publications Offi ce of the European Union. doi: 10.2779/30669.*

buildings in Malta, as recommended by MALTA'S SUSTAINABLE DEVELOPMENT VISION 2050, and improve the energy efficiency of existing buildings.

No mention of the existing NATIONAL ZERO ENERGY BUILDINGS PLAN FOR MALTA, its success since 2015 and its extension beyond 2020 has been made in the NECP. This policy should be updated and extended beyond 2020 to ensure that any limitations that were encountered in the past 5 years are addressed and improved upon.

Transport & related infrastructure

As discussed in Section 7.3.2, increasing the capacity of the road network has limited effectivity in the long-term, since the increased capacity is ultimately confined to the finite land area of a small island. The proposed improvements to the national transport network will have various benefits such as the increase in bicycle lanes and public transport corridors. However, Malta's society remains heavily reliant on private vehicles, with an increase in 67 licensed vehicles per day.[33] The NECP sets no targets to reduce the rate of increase of private and licensed vehicles on Maltese roads. Additionally, no specific targets for the improvement of pedestrian infrastructure for promotion of walking are included in the NECP.

A large number of the cars on the road are energy inefficient and generate excessive amounts of atmospheric pollutants and GHGs. No targets on progressive ban of inefficient cars has been included in the NECP.

9.0 Monitoring and measurements

As remarked in the NECP, periodic monitoring and review of the plan is necessary to enable continued success of the strategy. The monitoring plan is set to reflect the changes in national patterns for all environmental themes, technology development and ongoing discussions at European level relating to energy and climate change.

Measurable indicators are necessary to quantitatively assess the strategy's implementation success. In fact, such indicators have been used to predict how the nine environmental themes will be affected by the realisation of the PaMs. Making use of the same indicators to monitor the effectiveness of the NECP would facilitate the interpretation of the results.

In most cases, the indicators can be obtained from existing programmes and/or datasets gathered as a result of environmental permitting, environmental assessments and/or other national monitoring programmes which are associated with the implementation of environmental obligations. Duplication of efforts is avoidable in this way. The aim of the monitoring programme within this environment report is to have a consistent set of data relating to waste management activities upon which potential adverse environmental impacts can be identified.

There are also project-level mechanisms that are in place to protect the environment, such as environmental permitting and detailed EIAs in line with the EIA REGULATIONS. Such reporting devices should also be considered so as to ensure that the PAMs in the NECP are implemented without having, individually or cumulatively, significant adverse environmental impacts.

The monitoring and measurements recommended for the implementation stage of the NECP are discussed in the following subsections.

9.1 Air quality

Monitoring of air quality is required to study the success of policies which aim to increase energy efficiency, reduce electricity demand, reduce vehicular traffic and convert from ICE vehicles to electrical vehicles. Adverse impacts are envisaged from various construction works. The nature of the air quality impact of the WtE facility could not be classified since it depends on the balance between decreased emissions from power plant demand and increased emissions from the facility's own chimney. Emissions to air from such waste management facilities need to be monitored and kept in check with national air quality objectives and EU emission limit values. Monitoring of such facilities can be achieved through the reporting of such facilities in line with their operational permits.

The chemical parameters used in this SEA are regularly being monitored by the ERA in relation to national monitoring programmes and reported by the NSO; such data can be made use of for monitoring purposes.

9.2 Biodiversity

Criteria for biodiversity ensure that the conservation of designated areas is maintained and safeguarded. This is measurable by studying the impacts on designated areas as a result of

various developments which take-up virgin/agricultural land. Such data can be obtained from the respective environmental impact assessments.

Biodiversity also includes the conservation of freshwater or marine biodiversity. This is possible by measuring the size of the population and geographical distribution of indicator species such as *Posidonia oceanica* or *Cystoseira amentacea*. Several parameters are monitored from terrestrial and marine protected areas through environmental permitting conditions and national monitoring programmes; such data is readily available from the ERA.

Any projects in the NECP which are likely to have a significant adverse impact on Special Areas of Conservation (SACs) and/or Special Protection Areas (SPAs) will also require an Appropriate Assessment in line with the FLORA, FAUNA AND NATURAL HABITATS PROTECTION REGULATIONS, TREES AND WOODLANDS PROTECTION REGULATIONS and CONSERVATION OF WILD BIRDS REGULATIONS. Moreover, the proposals in the NECP should take into consideration the road network and other sensitive receptors such as the coast, valleys, protected natural and cultural heritage sites, residential areas, etc. This information will provide the potential impacts of the proposals contained in the NECP, particularly on biodiversity, cultural heritage and landscape and ensure that important decisions on large infrastructural facilities are not taken in a fragmented and ad hoc manner.

9.3 Climate change

The PaMs of the NECP aim to promote energy efficiency and decarbonisation through increased renewable energy sources. To monitor the success of the Plan, the net atmospheric emissions of greenhouse gases on a national scale should be measured and monitored over time. Such data sets are readily available from the NSO and ERA.

9.4 Cultural heritage

Maintaining the conservation status of cultural heritage can be achieved by protecting scheduled and designated areas from various threats such as take-up of virgin land which may uncover archaeological features of national importance. Monitoring the success of this criterion involves the assessment of the number of complaints relating to features of cultural heritage affected by the PaMs, and the archaeological monitoring of such developments to properly document any discoveries.

9.5 Energy and water

Energy generation, security of supply and water sources merit protection from any measures whose construction phase may have adverse impacts on these utility services, such as the proposed Malta-Gozo fixed link. Increased electricity demand is also envisaged from the increase in proportion of electric/hybrid vehicles anticipated from the PaMs, which should be monitored accordingly.

The vast majority of the PaMs are nevertheless targeted towards improving Malta's national energy infrastructure, including reducing electricity demand, increasing the use of renewable energy sources, etc. Such datasets are readily available from the NSO.

9.6 Human health

Data regarding air pollution-related illnesses and deaths, along with obesity-related deaths are readily available through various sources such as the NSO, PwC Malta, European Environment Agency and Eurostat. These data sources can be used to monitor the health of the Maltese human population in relation to the implementation of various PaMs.

9.7 Landscape

Multiple developments being proposed as PaMs for the NECP are likely to have an adverse effect on the Maltese landscape, while other proposals aimed at reducing vehicular traffic would have the opposite outcome. Although impacts on landscape are difficult to quantify, indicators such as the extent of AHLVs can be used to monitor and measure these impacts; such data is readily available from the ERA.

9.8 Transport and related infrastructure

Transport and related infrastructure are generally expected to improve through the implementation of the PaMs. Monitoring of the national traffic situation is required to assess the success of the policy; this can be achieved through measurable parameters such as vehicles by type, bicycle and e-bicycle usage and public transport usage. Such data is readily available from various entities such as the NSO, EWA and TM.

9.9 Waste & resource management

Efficient resource management is achieved through the promotion of sustainable waste management by following the waste hierarchy. Measures which are expected to increase waste generation, such as construction works and measures promoting the use of WEEE (photovoltaic panels or electric vehicles), should be monitored. Monitoring parameters to assess the success of resource management include evaluating the recycling rates for WEEE, the volume of C&D waste generated and disposed of (not reused). Such datasets are readily available from MESDC and Wasteserv.

10.0 Non-technical summary

The NATIONAL ENERGY AND CLIMATE PLAN (NECP) for the Maltese Islands has been drafted to improve the national energy infrastructure and reduce Malta's contribution towards climate change. The NECP, which covers the period between 2021 and 2030, includes various policies and measures (PaMs) which are aimed towards five dimensions: (i) decarbonisation, (ii) energy efficiency, (iii) energy security, (iv) internal energy market and (v) research, innovation & competitiveness. The PaMs were proposed by the authorities responsible for energy and water (MEW), environment (MESDC) and transport (MTIP).

The SEA studied the effect of the PaMs on nine environmental themes: (i) air quality, (ii), biodiversity, (iii) climate change, (iv) cultural heritage, (v) energy & water, (vi) human health, (vii) landscape, (viii) transport & related infrastructure and (ix) waste & resource management. Numerous beneficial impacts which are expected to arise from the implementation of the PaMs have been identified by the SEA, primarily related to air quality, climate change, energy & water, human health and transport & related infrastructure. Conversely, biodiversity and cultural heritage are likely to be adversely impacted by the PaMs due to the additional land take-up envisaged for various projects such as the Malta-Gozo tunnel, dewatering facilities, road infrastructure projects and W2E facility.

Some shortcomings have been identified in the NECP, including: (i) the lack of consideration to carbon sinks which sequester greenhouse gases from the atmosphere, (iii) the lack of targets for the implementation of mandatory renewable energy generation in newly constructed buildings or retrofitting of old buildings with renewable energy generating systems, and (iv) the lack of targets for reducing the number of licensed private vehicles on the road.

The indicators for each environmental theme should be measured and monitored in the long-term to assess the success of the NECP. Such monitoring will provide the necessary knowledge to improve or replace ineffective PaMs in the updated NECP following its expiry in 2030. Data sources which were used for the compilation of this SEA can be used to monitor the success of the NECP.

Appendix 1: Impact assessment for all Alternatives

The impact assessments for all three alternatives are presented in Table 26 and Table 27.

Table 26: Impact assessment appraisal for all three alternatives (part 1)

Policy or measure		Air Quality			Biodiversity			Climate change			Cultural heritage			Energy and water		
		Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
E.2.1	Financial support schemes for Solar PV															
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme															
E.2.3	Energy efficiency: electricity tariffs															
E.2.4	Support Scheme for Services and Industry															
E.2.5	Energy Efficient Street Lighting															
E.2.6	Projects in primary water network and wastewater treatment plant															
E.2.7	Biofuels Substitution Obligation (2021-2030)															
E.2.8	Acquisition of renewable energy credits from other Member States															
E.2.9	Gas Security of Supply															
E.2.10	Development of R&I Strategy for Energy and Water															
C.2.1	Management of Farm Slurries in the Maltese Islands															
C.2.2	WtE Facility															
C.2.3	Waste Management Plan 2020 - 2030															
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project															
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa															
T.2.3	Road and infrastructure projects															
T.2.4	Malta - Gozo Tunnel															
T.2.5	Implement Public Transport Quality Corridors (PTQC)															
T.2.6	Improvement of Ferry Landing Places															
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'															
T.2.8	Smart Parking System for Valletta															
T.2.9	Fast passenger ferry link between Malta and Gozo															
T.2.10	Free Transport for Youths, Students, and school children															
T.2.11	Increase use of Intelligent Transport Systems in traffic management															
T.2.12	National bicycle sharing scheme															
T.2.13	Last-Mile Delivery for Valletta															
T.2.14	Implementation of a cycling corridor															
T.2.15	Car-Sharing Scheme															
T.2.16	Sustainable Urban Mobility Plan for Valletta															
T.2.17	National Bicycle Strategy and Action Plan															
T.2.18	Introduction of electric buses in Gozo															
T.2.19	Continuation of EV Grants and Electromobility Action Plan															

Table 27: Impact assessment appraisal for all three alternatives (part 2)

Policy or measure		Human health			Landscape			Transport			Waste & resource		
		Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
E.2.1	Financial support schemes for Solar PV												
E.2.2	Solar Water Heaters / Heat Pump Water Heater Scheme												
E.2.3	Energy efficiency: electricity tariffs												
E.2.4	Support Scheme for Services and Industry												
E.2.5	Energy Efficient Street Lighting												
E.2.6	Projects in primary water network and wastewater treatment plant												
E.2.7	Biofuels Substitution Obligation (2021-2030)												
E.2.8	Acquisition of renewable energy credits from other Member States												
E.2.9	Gas Security of Supply												
E.2.10	Development of R&I Strategy for Energy and Water												
C.2.1	Management of Farm Slurries in the Maltese Islands												
C.2.2	WtE Facility												
C.2.3	Waste Management Plan 2020 - 2030												
T.2.1	Removing traffic bottlenecks and reducing severance between urban communities - Marsa Road Project												
T.2.2	Remove traffic bottleneck at Addolorata junction, Marsa												
T.2.3	Road and infrastructure projects												
T.2.4	Malta - Gozo Tunnel												
T.2.5	Implement Public Transport Quality Corridors (PTQC)												
T.2.6	Improvement of Ferry Landing Places												
T.2.7	Introduction of a low-emission zone (LEZ) in the 'hub'												
T.2.8	Smart Parking System for Valletta												
T.2.9	Fast passenger ferry link between Malta and Gozo												
T.2.10	Free Transport for Youths, Students, and school children												
T.2.11	Increase use of Intelligent Transport Systems in traffic management												
T.2.12	National bicycle sharing scheme												
T.2.13	Last-Mile Delivery for Valletta												
T.2.14	Implementation of a cycling corridor												
T.2.15	Car-Sharing Scheme												
T.2.16	Sustainable Urban Mobility Plan for Valletta												
T.2.17	National Bicycle Strategy and Action Plan												
T.2.18	Introduction of electric buses in Gozo												
T.2.19	Continuation of EV Grants and Electromobility Action Plan												