Projet cofinancé par le Fonds Européen de Développement Régional (FEDER)
Project cofinanced by the European Regional Development Fund (ERDF)

ENERSCAPES - Territory Landscape And Renewable Energies

CONTEXT ANALYSIS & DEFINITION OF METHOD

PUBLIC PARTICIPATION SCENARIO ASSESSMENT

MALTA

Name of the partner **MIEMA**

Country **MALTA**

MED Operational Programme – Cohesion Policy 2007-2013
Europe in the Mediterranean
This project is part-financed by the European Union
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1 BACKGROUND

1.1 The Enerscapes project strives to analyse the effects of unregulated use of Renewable Energy Sources (RES) on the environment. RES can present a radical change on the environment, and the potential effects can be on aesthetics, ecology and natural habitats, geology, archaeology and heritage, and also on social and financial environments.

1.2 The objectives of Enerscapes are to:

- define and test an energy planning method able to assess and minimise territorial impacts deriving from the use of RES;
- take into account landscape and environment in the development of the RES market that is one of the main actions introduced to reach the 20-20-20 objective in the EU;
- assess the local governance processes in place and their impact on the involvement of local stakeholders as part of the decision and planning processes.

1.3 A shared assessment of landscape 'historic', 'social' and 'environmental' value within the process of introduction of RES systems into Med territories and landscapes is being carried out, and the project is investigating and evaluating impacts on distinct but recurring patterns of landscape all over the Mediterranean regions.

1.4 The Enerscapes project has a diverse set of specialist partners covering a vast range of territory in the Mediterranean region. This ensures a wide-encompassing study covering various scenarios, territories, case studies and different legal frameworks. The eight partners come from seven countries, as follows:

•MIEMA, Malta
•Andalucia, Spain
•Magnesia, Greece
•Cyprus Energy Agency, Cyprus
•Vercelli Provice & Lazio Region, Italy
•University of Maribor, Slovenia
•RhonalpEnergie, France

1.5 Investment in sustainable renewable energy sources is a rapidly expanding market and needs to be done in the most responsible and regulated manner possible. Enerscapes helps re-affirm the validity of RES and will identify the best solutions on how these can be compatible with landscape.

1.6 Based on desk research carried out, together with a number of meetings held with other project partners as part of the Enerscapes project, a SWOT analysis has been produced in the document 'Malta Background Report & SWOT'. The SWOT results are being reproduced here for ease of reference. In the Maltese case, the study now focuses on photovoltaics, and has led to

the formulation of a number of scenarios. These scenarios represent the different options available and the study will now analyse their possible impact on the landscape.

1.7 This document is being issued as a Public Consultation document. Stakeholders, interested organisations, and the general public are encouraged to give their feedback so as to identify the scenario considered to be the most relevant for the Maltese Islands. This document can be accessed at www.miema.org

2 SWOT RESULTS

2.1 **Procedure** – Based on the research carried out as part of this project, it has been possible to identify some Strengths, Weaknesses, Opportunities and Threats related to the RES – Landscape situation in Malta. This SWOT is carried out from a number of perspectives, namely the Technical perspective, the Environmental perspective, the Economic perspective, the Social perspective, the Visual perspective and the Land Use perspective.

STRENGHTS	WEAKNESSES
Economy: - very good performances in tourism sector, thanks also to underwater landscapes - high relevance of fishing sector, offshore/inshore - Increase in PV efficiency and decrease in costs to install new PV technologies and to maintain - increasing prices for electricity generated by hydrocarbon fuel encourage the development of sustainable energy production - potential energy production from waste biomass - better environmental image for tourism - PVs easily integrated in existing building mass/structures ***Society:*** - presence of R&D departments in academic institutions - presence of a National Plan regarding RES development (NREAP) - political commitment for EU 2020 strategy - elaboration of a strategy of sustainable development for Gozo (Eco Gozo Strategy, 2008) - national investments in recent years in Environment Protection and Infrastructure Development with a planned update to the strategic plans - financial support from government for new RES installations - low energy bills mean more disposable income - savings in health care - PVs are completely silent and potentially non-intrusive (visually as they follow terrain or non visible from streetscape if on roofs ***Territory:*** - flexibility, reversibility, and possibility to easily integrate PV plants, especially in urban and industrial environment ***Environment:*** - good potential for solar energy development, due to the latitude of Malta - good potential for wave energy production due to the high presence of offshore areas	***Economy:*** - low rate of return of investment in RES (long payback period) - high dependence from oil fired generated electricity production - peaks of waste production during summer season, that make difficult to manage waste biomass as a long lasting source of energy ***Society:*** - low development in research on RES, especially regarding wave energy - high installation capital costs ***Territory:*** - small land area with many competing land uses and small average land property sizes, making difficult to realize big size plants - fragmentation of land ownership points towards difficulty in employing large tracts of land for PVs - demanding logistics needed to import PV systems and maintain supply - PVs's south reflection negatively affects drivers and landing aircrafts - difficulties to integrate PV plants in landscape, due to the high level of inter-visibility in Malta - low development of RES technologies, especially in wave energy - large land areas are needed for commercialisation - ancillary infrastructure needed for large plants ***Environment:*** - closeness to the sea is a factor of corrosion, especially for current PV technology - visual clutter in existing urban and industrial areas, degrading the landscape quality

OPPORTUNITIES	THREATS
Economy: - possibility to improve RES efficiency and energy production due to the expectable increase of energy consumption in next years - further increases of households' disposable incomes if a plan of development of integrated PV plants is adopted - significant reduction of dependence on non-renewable energy sources - waste biomass could be used as energy source, reducing also the waste transportation and disposal costs - RES can satisfy the ever increasing energy needs - high solar exposure of Malta means more efficient PV installations - potential use for walls as against roofs would generate spinoffs inclusive of building protection (extra protective anti-fungal layer as well as sealant) ***Society:*** - Malta could act as a test bed for innovative technologies - Malta could improve job numbers in the sector of RES development, installation and maintenance - a local action plan may improve citizens' awareness regarding CO2 emissions' reduction and sustainable development - the reduction on CO2 emissions will improve the health state of Malta's population - R&D departments in academic institutions ***Territory:*** - Local Municipalities in Malta could sign the Covenant of Mayors - Malta could achieve 2020 goals in reduction of CO2 emissions - significant roof areas are available in urban public areas and private individuals/entities could be brought on board ***Environment:*** - a balanced Local Energy Plan will have positive effects on landscape and environment integration - the development of RES will reduce CO2 emissions - the high presence of offshore areas can support a development of wave energy production without negative impacts on tourism - mitigation measures, including screening, can be applied	***Economy:*** - a development of PV plants and other RES without appropriate landscape concerns will negatively affect tourism, which is the main source of income in the country - without an adequate technological development *in loco*, logistics can become very demanding for Malta's economy - without adequate financial measures, PV generated electricity storage/pricing will be unfavourable - the activities of deep-sea fishing, coastal fishing, sport fishing and underwater tourism can be threatened by a unbalanced development of wave energy production - shade from high buildings and canyonisation (high buildings close enough to result in narrow street canyons) - increase in National recurrent expenditure ***Territory:*** - the coastal environment, due to salinity, may threaten the development of specific RES, especially PV plants with current technology - without a reinforcement of land use regulations, the landscape can be damaged by RES development ***Environment:*** - need to develop ancillary infrastructures may negatively affect ecological conditions - biomass waste plants may have negative effects on ecological conditions

3 SCENARIOS CONSIDERED

3.1 **Methodology** – This assessment takes account of the progress achieved so far in the Enerscapes project, including decisions taken by the partners since the beginning of the project. This document therefore is one of a series, and should be read in conjunction with the previously produced documents, in particular the 'Malta Background Report & SWOT'. The main concept includes the analysis of a number of options from zero to four so as to reach the goals of the project. It is inherent in this process that a number of assumptions are made for each scenario.

3.2 **Energy targets** – This study adopts the current strategic thinking, and that the energy targets for 2020 will remain as specified in the National Renewable Energy Action Plan. This mentions that the Maltese target for 2020 is that **13.8%** of electricity will be generated from renewable energy sources using a combination of PV, wind and waste treatment.

3.3 **The Zero Option** – This is the zero scenario and describes the evolution of present territorial and landscape conditions without any interventions. It is also called *scenario as usual* - the picture of RES development in the next five to ten years, taking into account energy trade, laws and general (national or regional) goals.

PV (domestic and government roofs)	19.1 GWh pa
Wind (onshore and offshore)	253.0 GWh pa
Waste treatment	55.5 GWh pa
Total	**327.6 GWh pa**

The PV part of this equation will be reached through the implementation of current schemes, which have identified a number of government owned properties for the installation of PV panels, and which also have issued favourable grants encouraging private domestic and commercial installations of PV panels. Using the assumption of Section 4 of the Malta Background Report & SWOT, i.e. that 2.5sqm of roof area will be needed to produce 400kWh pa, this translates to 119375sqm or 0.12sqkm of roof space needed. The PV effect on the landscape of this scenario will probably be minimal and close to zero. However, one has to take into account the potentially huge environmental, social and economic effects of implementing this strategy when the effects of the proposed wind farms are also taken into consideration.

Scenario 0 - Artist's impression of the proposed wind farm
(Source – The Times)

Given the current situation whereby studies are still being carried out and requested by the authorities related to the wind farms, including the Malta Environment and Planning Authority, it is felt that it will not be prudent to investigate this option in more detail.

3.4 **The Landscape Option** – Scenario 1 will show the RES development in the next 5-10 years if landscape values will be highly restrictive and defended at most, and if biodiversity will be integrally preserved. In this scenario, RES plants will be localized in urban areas avoiding big RES plants in high quality (in ecological and cultural terms) landscape areas. In rural areas, agriculture will be preserved as the dominant activity, permitting only small, well-integrated RES plants.

Scenario 1 – Environmental considerations given maximum importance

Using very broad assumptions for comparison purposes only, if one assumes that with the current system the PV would occupy 15% of the roof area of the uppermost floor, the required overall area would go up to 0.8sqkm. Assume further that only 30% of roof space

in all buildings would be adequate to install PVs, due to issues of shading, alternative uses etc, taking the figure up to 2.65sqkm. Assume further that buildings only make up 40% of the urban area, resulting in an overall area required of 6.6sqkm. Finally, include a margin of error of 100%, and the total urban area needed to attain this figure will result in an area of 13.3sqkm. Bearing in mind that the urban area of the Maltese Islands, including industrial areas, covers an overall area of approximately 29% of 316sqkm, or 92sqkm, it is clear that the current estimate (as in Option 0) for the use of photovoltaic technology for energy production is very low. If one considers that this technology is rapidly evolving to make thin film technology more readily available, more efficient and with improved characteristics, then the current estimate for the generation of only 19.1GWh pa of electrical energy from PVs is highly conservative indeed.

By inverse logic, if one uses the same assumptions as before, it is estimated that the urban area in Malta can accommodate current type installations to produce up to 133.7GWh pa of electricity. With the availability of thin film technology during the next decade, this figure can increase substantially more, possibly attaining around 200GWh pa of electricity from urban areas. These figures are only indicative and deeper, detailed studies will have to be carried out in order to establish a more precise estimate. They do however expose the huge potential of PV energy in Malta.

This scenario will therefore assume that the urban area in Malta will be maximised for the installation of PV technology. This means that only minimal rural areas will be needed, if any. Using the technical assumptions for current PV systems, for the generation of up to an additional 100GWh pa of electricity, a rural area of up to 0.625sqkm would be needed.

3.5 **The Balanced Landscape Option** – Scenario 2 postulates that RES development will be established respecting landscape features. Although priority will still be given to urban areas, it will be assumed that only the targets of the Zero Option will be reached, and the eventuality of not attaining the wind energy targets will be considered, hence putting more pressure of increasing PV farms in rural areas. Such RES plants will be integrated as much as possible into the landscape.

Scenario 2 – Balanced approach favouring environmental issues

This scenario therefore assumes that there will be some negative effect on the landscape. It also assumes that PVs will contribute at least 100GWh pa of electricity generation, with the excess of the zero option being located in the rural areas. A minimum of 0.625sqkm of rural area will be needed. Such PV farms may be located close to sensitive areas as long as mitigation measures will be applied. PV farms may also be visible as long as their location has a minimal negative effect in terms of visual impact. In this scenario, landscape issues will continue to prevail over technical factors.

3.6 **The Balanced RES Option** – Scenario 3 assumes that RES development will be defined on the ground of energy needs, establishing rules on dimensions, inter-visibility and land use, giving attention to the needs of both local stakeholders and of investors. It therefore assumes that there will be some influence by landscape considerations, but that PV location will be mainly based on technical requirements.

Scenario 3 – Balanced approach favouring technical issues

In this scenario, it is estimated that PVs will contribute 200GWh pa of electricity generation, located in rural areas apart from the amount specified in the zero option. The land take-up will therefore amount up to 1.35sqkm. Most PVs will be located in technically favourable areas, and technical considerations will be the most influential factor.

3.7 **The RES Option** – Scenario 4 represents RES development when considering the use of renewable resources as the main goal, even accepting a certain degree of landscape deterioration. RES plants will be located following the areas of maximum energy potential, without restrictions in plant dimensions.

Scenario 4 – Technical considerations given maximum importance

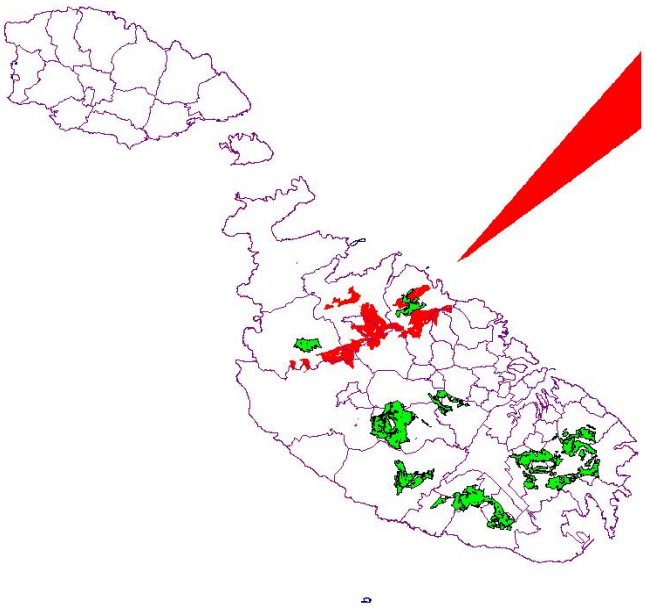
In this scenario, landscape and visual issues will not affect PV farm location. These farms will contribute over 200GWh pa of electricity generation and will cover more than 1.35sqkm in area. PVs will be located in technically favourable areas, and technical considerations will be the influential location factor.

4 LOCATIONAL ASSESSMENT

4.1 **Locational Action Plan** – The above scenarios are being analysed taking into consideration both technical issues and landscape/environmental issues. Socio-economic issues will only be considered indirectly at this stage. A number of indicators will be selected and these used at a latter part of the process.

The process involves a sieve mapping analysis whereby the map of the Maltese Islands has been sieved through a number of parameters. Given that these options are concentrating on the effects of PV farms on rural sites, the urban areas are removed from the map area under study. The next map layers to be reviewed in the study include high value protected sites, such as Sites of Scientific Importance and Special Conservation Areas, proximity to coast, proximity to protected heritage and cultural areas. Issues of national security are also taken into consideration and therefore Military sites are also excluded. Finally, basic technical parameters are taken into consideration, such as the technically-essential aspect and slope ratios, viewsheds as well as the issue of longevity of the panels themselves.

4.2 **Visual Effects** - It is considered that from a landscape point of view, the first qualifying consideration is the visual effect of PV farms. A desk exercise using spatial software has been used to generate possible location maps based on the visibility of the particular site from the rest of the Maltese Islands, using topography as the main factor. This analysis also takes all the above factors into consideration.



Sample Image of Proposed Viewshed Analysis

The above process was carried out for each scenario 1 to 4. Sieve maps for the Maltese Islands were created, based on the factors highlighted above and on a topographical analysis related to the viewshed possibilities for each site.

This resulted in the identification of 70 sites that matched the selection criteria for the different scenarios.

4.3 **Indicators** – The above action will be followed with a more detailed analysis of the characteristics of each site, and will lead to formulation of recommendations and input so as to reach the general aims of the project. Indicators will cover the following dimensions, as applicable:

- *Biodiversity, flora and fauna*: effects of RES regarding habitats conservation;
- *Population and human health*: the concentration of health problems and the noise pollution at the local level;
- *Social and economical*: the impacts regarding issues like the number of involved people, the job market, the effects on tourism, the diffusion of programmes of environmental education;
- *Soils and geology*: effects on areas at risk of erosion or flooding, but also on relevant geological sites;
- *Water*: quality of surface, marine and ground water, biodiversity, and effects on fishing and beach accessibility;
- *Air and climatic factors*: impacts of RES on GHG reduction, the achievement of local, national and European goals, and the increase of people awareness concerning atmospheric pollution and energy production;
- *Infrastructures*: impacts of (eventual) new infrastructures connected to the RES plants, the coherence with national and local plans, the effects on landscapes;
- *Waste and wastewater infrastructures, drinking water*: impacts on waste production and recycling and the drinking water status;
- *Forest*: focus upon biodiversity and accessibility of forests for local communities, both in economic and social terms;
- *Cultural heritage*: interferences of RES plants with high value archeological or architectural sites, the integrity of archeological landscapes, the relations with historical buildings or infrastructures;
- *Visual aspects*: effects on scenic views, scenic roads, and the visual consistency of landscape.
- *Proximity to urban areas:* areas that are close to the urban part would fit better in terms of direct links to the grid, the minimisation of visual impact, a minimal extension to the development zone as well as a no-need intervention on agricultural or pristine countryside.