

	
<p>Renewable Energy in Malta</p> <p><i>Data Gathering on Renewable Energies for the New Member States and Candidate Countries</i></p>	
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Overview

- ▶ Background to Malta's challenges and energy strategy;
- ▶ RES Potential - outline of the work undertaken :
 - Wind – onshore and offshore;
 - Solar photovoltaic;
 - Solar thermal;
 - Biomass – waste;
 - Biofuels.

Background

- ▶ Malta's geographical characteristics:
 - Land area: 316km² – urban area 23%;
 - Population: 400,000 inhabitants;
 - High population density: 1266 persons/km² compared to EU average: 112 persons/km²;
- ▶ Malta totally dependent upon imported fossil fuels for its energy needs:
 - Currently over 63% of the primary energy used for power generation;
 - Total electrical capacity of power stations – 571 MW;
 - Small isolated system and with no existing interconnections;
 - Annual Consumption: 2,300 GWh;
 - Maximum Demand: 414 GWh
- ▶ As yet Malta has no indigenous supplies of fossil fuels.

Malta's energy challenges

- ▶ Malta's draft energy policy based on 3 main objectives:
 - Security of supply and diversification of the fuel mix;
 - Competitive pricing of high quality energy services;
 - Environmental protection and climate change.
- ▶ Very much aligned with the EU's new energy package for a sustainable, competitive and secure supply of energy.
- ▶ Energy efficiency (EE) and renewable energy (RE) are important in assisting Malta to meet its energy challenges.
 - At the same time one needs to be realistic of the country's potential and limitations in addressing these challenges.

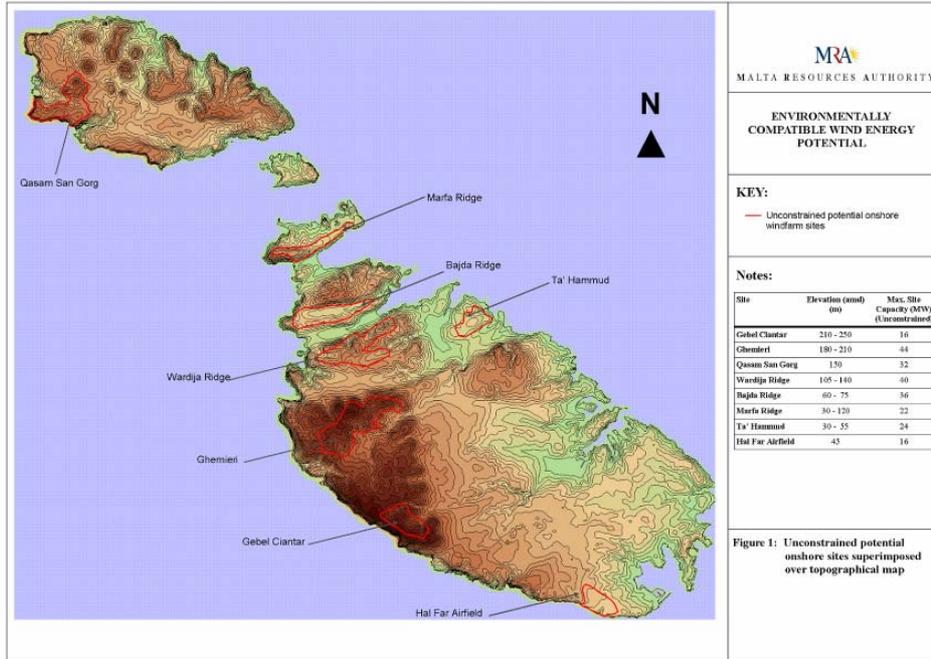
Renewable Energy Sources

- ▶ Studies have been carried out highlighting overall country's potential as well constraints and barriers:
 - Wind, solar photovoltaic (PV), biomass wastes, landfill gases and sewage treatment plant gas offer some potential for RES-E exploitation in Malta.
 - Tidal flow, geothermal, hydropower, biomass energy crops and wave do not appear to offer significant opportunities for exploitation on a commercial scale.
- ▶ Other RES:
 - Solar thermal applications (for hot water requirements) is RES with highest penetration rate so far in Malta.
 - Also some biofuel production carried out.

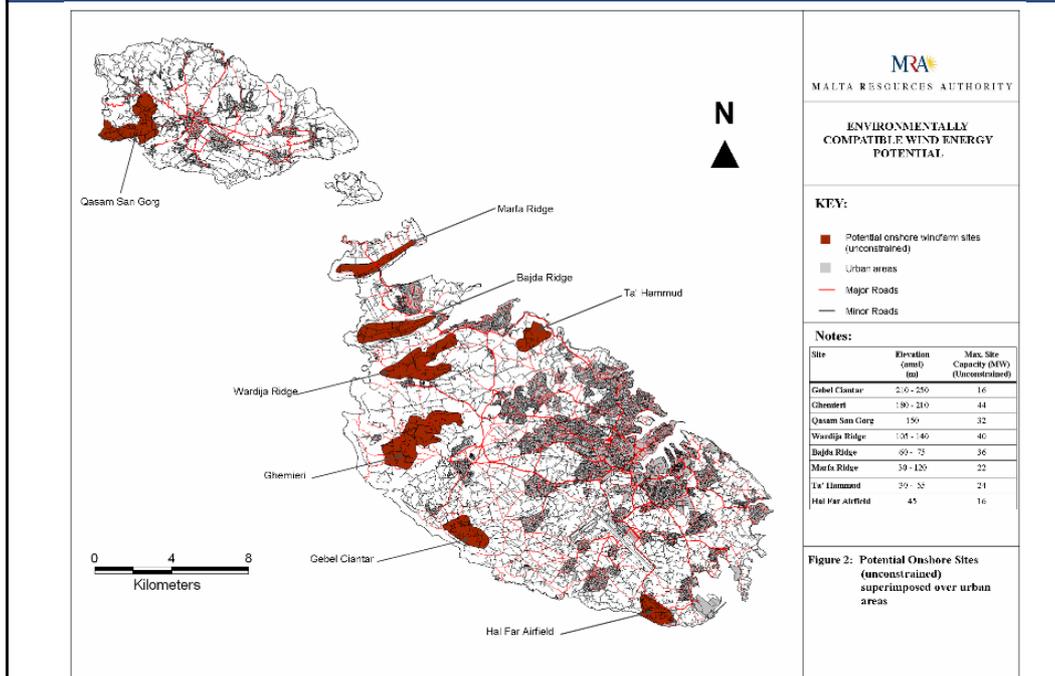
RES - Wind

- ▶ Wind - RE technology that can make a significant impact to the Maltese energy economy.
- ▶ Onshore wind:
 - Mature technology and well developed - RE technology comparing favourably to conventional electricity generation and with cheapest ACP - € 0.05/kWh
 - Various constraints and limitations to large scale deployment;
 - ✓ Grid stability issues: severity depends on ratio of generated power in relation to grid load. Wind capacity limited to 40 MW - Require interconnection to Europe for larger scale utilisation;
 - ✓ Energy output depends on wind characteristics and no relation to energy demand patterns;
 - ✓ Other constraints - site specific studies carried out:
 - Identification of sites with wind energy potential (wind speeds and elevation) and considering site specific constraints and EEA proposed methodology (2006);
 - Approaches involved consultation with key stakeholders.

Mapping unconstrained potential onshore sites



Mapping unconstrained potential onshore sites (2)



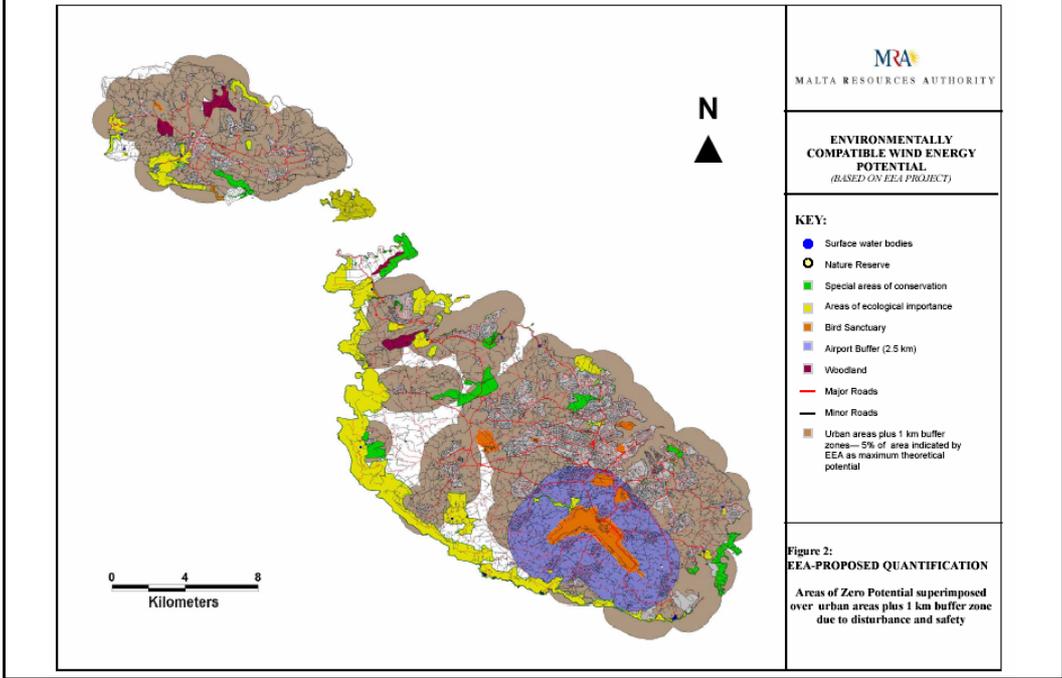
Onshore Wind

- ▀ Constraints to large scale onshore wind with respect to each specified site:
 - Lack of access:
 - ✓ serious barriers at Qasam San Gorg, Gozo
 - Airport interference analysis:
 - ✓ excludes Hal Far Airfield and Gebel Ciantar;
 - ✓ Ghemieri and Wardija Ridge highly compromised,
 - ✓ possible impacts at Bajda Ridge, Marfa Ridge, Ta' Hammud and Qasam San Gorg;
 - Ecology and landscape Impacts:
 - ✓ Least compromised sites: Ta' Hammud, Marfa Ridge, Bajda Ridge
 - ✓ Maximum capacity at sites likely to be reduced by planning constraints, ecological value and landscape sensitivity;
 - ✓ Bajda Ridge limited by bird sanctuaries;
 - ✓ Marfa Ridge surrounded by various grades of designated landscape.
 - Visual Impacts:
 - ✓ In view of characteristics of Maltese landscape and scale of development – visual impacts can be significant and likely to limit number of windfarms;

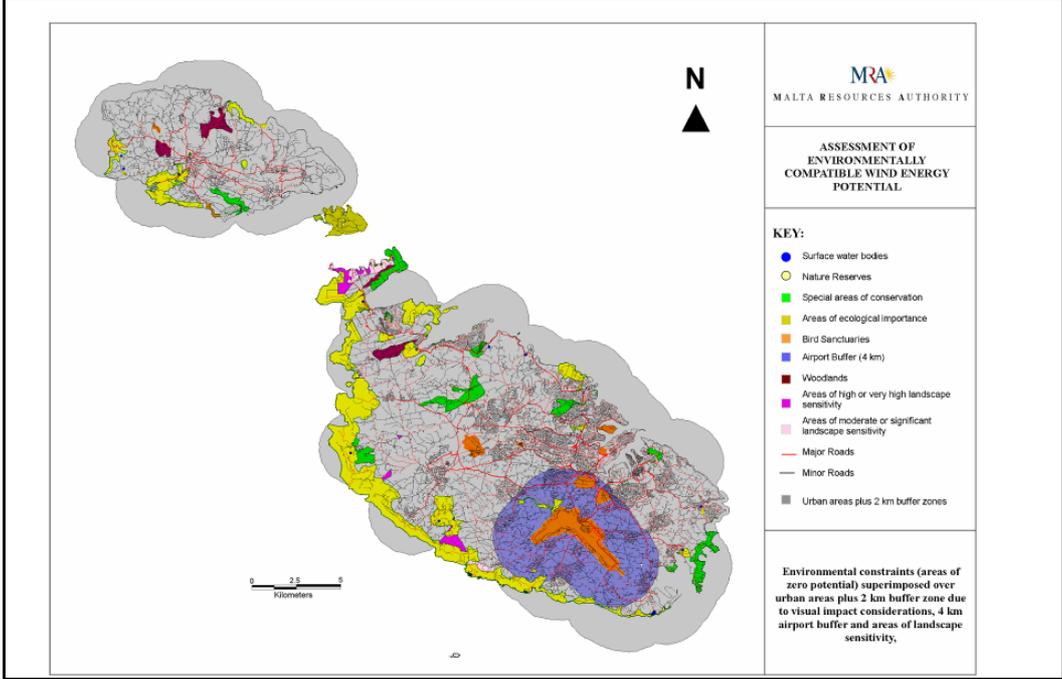
Onshore Wind: resource potential

- ▀ Areas of zero potential based on adapted EEA criteria :
 - Infrastructures (roads); surface water bodies; touristic sites; military areas; woodland/ forests; water bodies; Natura 2000 sites; important bird areas.
 - Airports + 4 km buffer (based on ICAO requirements for physical obstacle limitation namely those included with ICAO Annex 14 Vol 1: Aerodromes – Chapter 4 (Obstacle Control and Removal));
 - Urban areas – buffer zone proposed 2 km – taking into account:
 - ✓ sensitivity of the Maltese landscape may be an important barrier to windfarms;
 - ✓ best sites in terms of wind speeds and elevations are located in sensitive landscape areas;
 - ✓ landscape is open with little tree cover affording long distance views;
 - ✓ Skyline dominated by the cupolas of churches and historic buildings. Tallest building rises some 70m from the ground and may be seen from any panoramic location within Malta and from high points in Gozo.
 - ✓ Weather in Malta characterised by low number of days with poor visibility and very good natural light;
 - ✓ A combination of all these factors suggests that large onshore wind farm development likely to have a significant visual impact and likely to be prominent from a large number of areas.

Mapping areas of zero potential plus urban areas and buffer zones



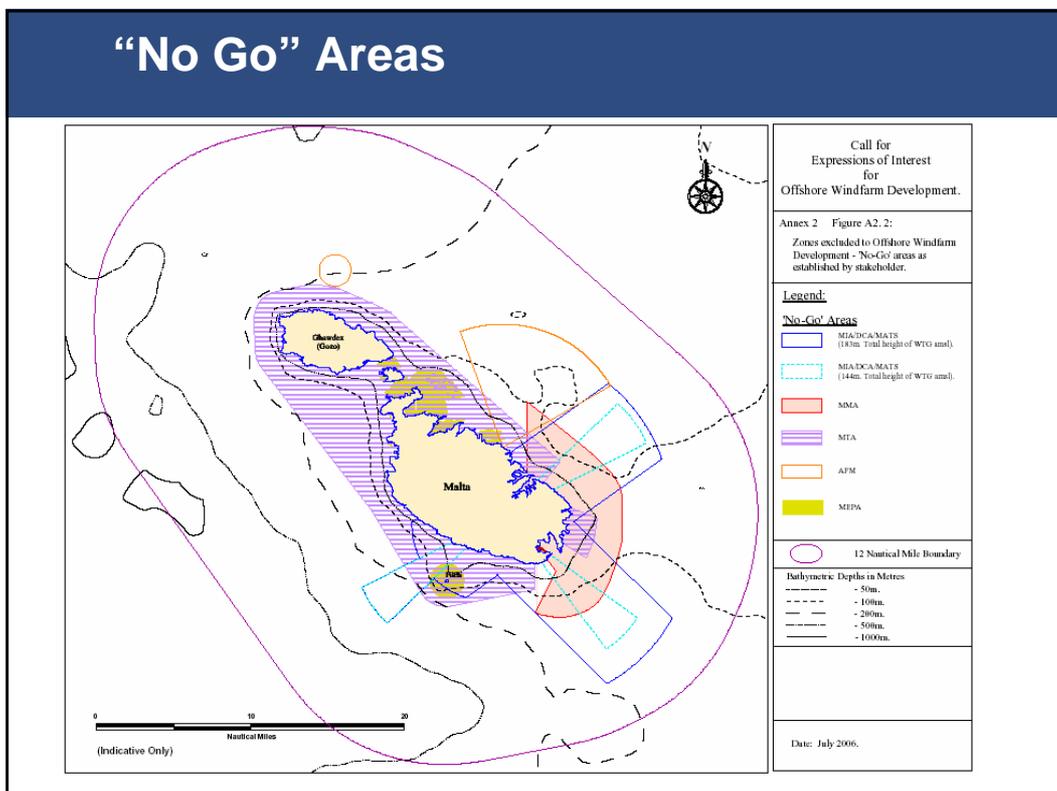
Mapping of potential areas taking into account areas of landscape sensitivity, local visual (2km buffer around urban areas) and aviation concerns (4km buffer)



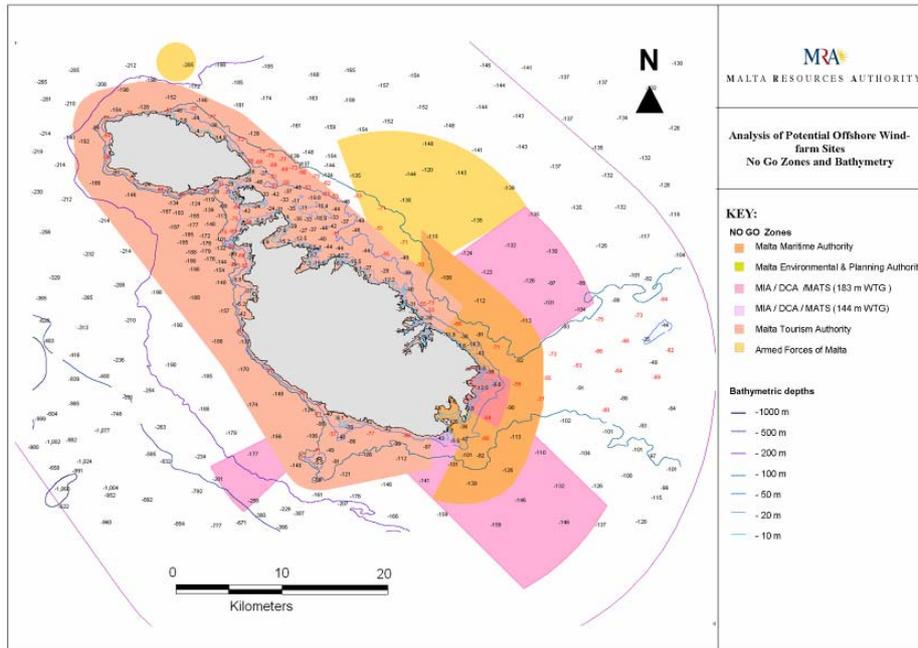
RES - Offshore Wind

- ▶ Offshore wind - 2nd most economic option after onshore wind;
 - Few shallow water sites in Maltese waters & located within 4 km from coast;
 - Analysis of impacts of development of offshore wind on maritime and other activities as well as environmental impacts carried out to determine potential sites for Call for EOI for 75 – 100 MW offshore windfarm;
 - Stakeholder consultation:
 - ✓ Aviation: Department of Civil Aviation, Malta International Airport, Malta Air Traffic Services Ltd.;
 - ✓ Maritime: Malta Maritime Authority;
 - ✓ Environment: Malta Environment & Planning Authority;
 - ✓ Tourism: Malta Tourism Authority;
 - ✓ Fisheries: Fisheries Conservation and Control Division;
 - ✓ Military: Armed Forces of Malta;
 - ✓ Communications: Malta Communications Authority.
 - 3 categories of zones/areas identified:
 - ✓ 'No go' areas – any proposal in areas so designated not be accepted.
 - ✓ 'Sensitive' areas – before consent is given, certain investigations over and above that which is normally included in EIA are required.
 - ✓ 'Other areas' – normal EIA process.

“No Go” Areas



No Go areas & Bathymetry



RES - Offshore Wind

► Examples:

□ 'No Go Areas':

- ✓ Harbour approaches, runway approaches, unacceptable impact on radar, marine protection areas, areas for military purposes, tourism perspective.

□ 'Sensitive Areas':

- ✓ Fisheries, VOR coverage, navigation, bunkering and related activities, environment, visual and tourism impact, telecommunications.

□ 'Other Zones'.

- Malta actively following developments in deepwater offshore windfarm.

RES – E : Solar photovoltaic

- ▶ Solar photovoltaic:
- ▶ Unconstrained PV resource potential is high :
 - Annual mean of daily global; irradiation on inclined south facing solar panel – 5.49 kWh /m²/day;
 - Electrical potential of a 1 kWp PV system: 1600 kWh /annum;
 - Flat rooftops and amenable to distributed generation;
 - Realistic realisable potential mainly constrained by high capital costs of PV systems:
 - ✓ Average cost of power – €0.33 / kWh;
 - ✓ Requires significant financial support ;
 - ✓ RES policy identifies targets of PV penetration to 2010 – 120-240 kWp /annum



Support Mechanisms : Micro-generation

- ▶ Support schemes to promote micro-generation from RES (photovoltaic and microwind);
- ▶ Capital grants on PVs and microwind for domestic use;
 - Net metering with a spill tariff - €0.07 / kWh;
- ▶ Government leading by example (PV installations on public buildings and micro-wind installations);
- ▶ Removal of planning barriers for solar PVs - fast track notification systems established for solar and microwind;
- ▶ Response so far slow and further measures necessary for increased uptake:
 - PV installations: 96 kW_p; microwind installations: 3.8 kW_p.
- ▶ National education campaign on sustainable energy use: awareness raising on RES and Government support schemes;
- ▶ Government has announced intention to allocate further funds to support RES-E from such installations.

RES – H : Solar thermal

- ▶ Solar water heaters – technology with highest penetration so far in Malta
- ▶ Estimated capacity of total installations in Malta in 2006 = 16,700kW_{th};
 - Approx. 41.8 kW_{th}/1,000 capita in 2006:
 - ✓ Compared to EU average & CH - 27 kW_{th}/1,000 capita;
 - ✓ Local contribution of solar thermal in 2006 estimated as equivalent to 0.28% of Malta's annual electricity consumption.
- ▶ Other potential:
 - Solar thermal cooling technologies offer particularly strong potential for the future although widespread commercialisation of smaller units is still not fully developed.



Support Mechanisms: Solar Water Heaters

- ▶ **Various measures introduced to promote solar thermal:**
 - Capital grants on solar water heaters for domestic use (25% grant on cost & capped at €233);
 - Uptake in grants for SWHs increased from 360 installations in 2005 to 1,540 in 2006;
 - Use also of solar water heaters in various public housing schemes;



RES - Biomass

▸ Measures undertaken to date for electricity generation:

- Preparatory work for the generation of electricity from landfill gas (Maghtab) and mechanical biological treatment plant (Sant Antnin) with a target for electricity generated from waste for 2010:
 - ✓ from biogas from Mechanical Biological Treatment (MBT): 0.24%;
 - ✓ from landfill gas: 0.09%.
 - ✓ **2010 potential: 0.33% of electricity consumption**
- Additional - Post 2010 potential (with reference to estimated 2010 electricity consumption) (2.24% + 0.33% = 2.57%)
 - ✓ 2 additional MBT plants are planned : 0.67 %;
 - ✓ Additional electricity generated from landfill gas : 0.30%;
 - ✓ RDF in waste to energy plant : 1.27%.
- Additional potential of electricity generated from waste which is being evaluated for Post 2010 (1.09%):
 - ✓ Energy recovery from sewage sludge : 0.24%;
 - ✓ Anaerobic digestion of animal waste : 0.85%.

RES - Biofuels

▸ Biofuel production in Malta:

- Limited agricultural land and water are major constraints to growing of feedstock for biofuels;
- Biodiesel is produced from waste edible oil;

▸ Measures undertaken to date to promote biofuels:

- Support scheme for biofuels through exemption of excise duty;
 - ✓ In 2005 the biofuels national target for Malta was 0.3% of total fuel used for road transport. This was exceeded and bio diesel accounted for 0.52%.
 - ✓ In 2006 approximately 1.68 million litres of biodiesel sold.



RES - Biofuels

- Other work being carried out.
 - Trials for use of biofuel for electricity generation being planned by Enemalta (main power generator).
- Possible studies which Malta would be interested:
 - Research into potential and impacts (environmental) of biofuel production from marine sources;