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Sicily-Malta Interconnector

Environmental Impact Assessment and technologies to minimize
impacts on the marine ecosystem

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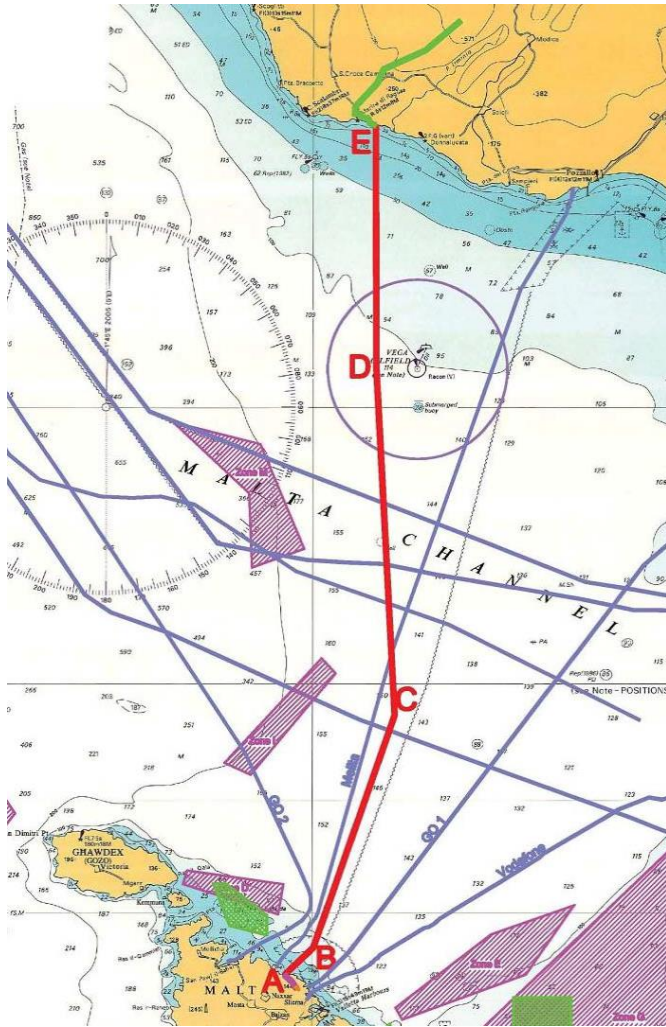


S. Martorana



Introduction

- Malta island is located in the Mediterranean about 100 km south of Sicily
- The European Union supported the connection because Malta wasn't connected to the European energy grids (electricity and natural gas)
- Since March 2015, Malta is synchronously connected to the Italian National transmission network (i.e. to the ENTSO-E continental system) by means of the world's longest 245 kV-50 Hz cable line (119 km).



Introduction

The Malta Sicily interconnector is owned by ENEMALTA, the Maltese distribution system operator.

Terna, as main contractor, was involved in the project from the very beginning, developing:

- feasibility study (before 2008)
- Preliminary project (2009)
- Definitive project (2010)
- Environmental impact assessment
- Authorization process (2011-2013)
- Construction phase (Ragusa substation)
- Testing and commissioning phase

Activities have been carried out by TERNA (Engineering Dept., and since 2011, also by TERNA plus, as regards construction phase).

Introduction

The Malta-Sicily interconnector is part of the Trans-European Energy Network, financed through the “European Energy Program for Recovery”



Goals:

- improving the reliability of the Maltese energy supply
- reduce energy cost in Malta
- reducing fossil fuels consumption and pollutant emissions
- integrating the two countries energy networks while fulfilling a common sustainability strategy

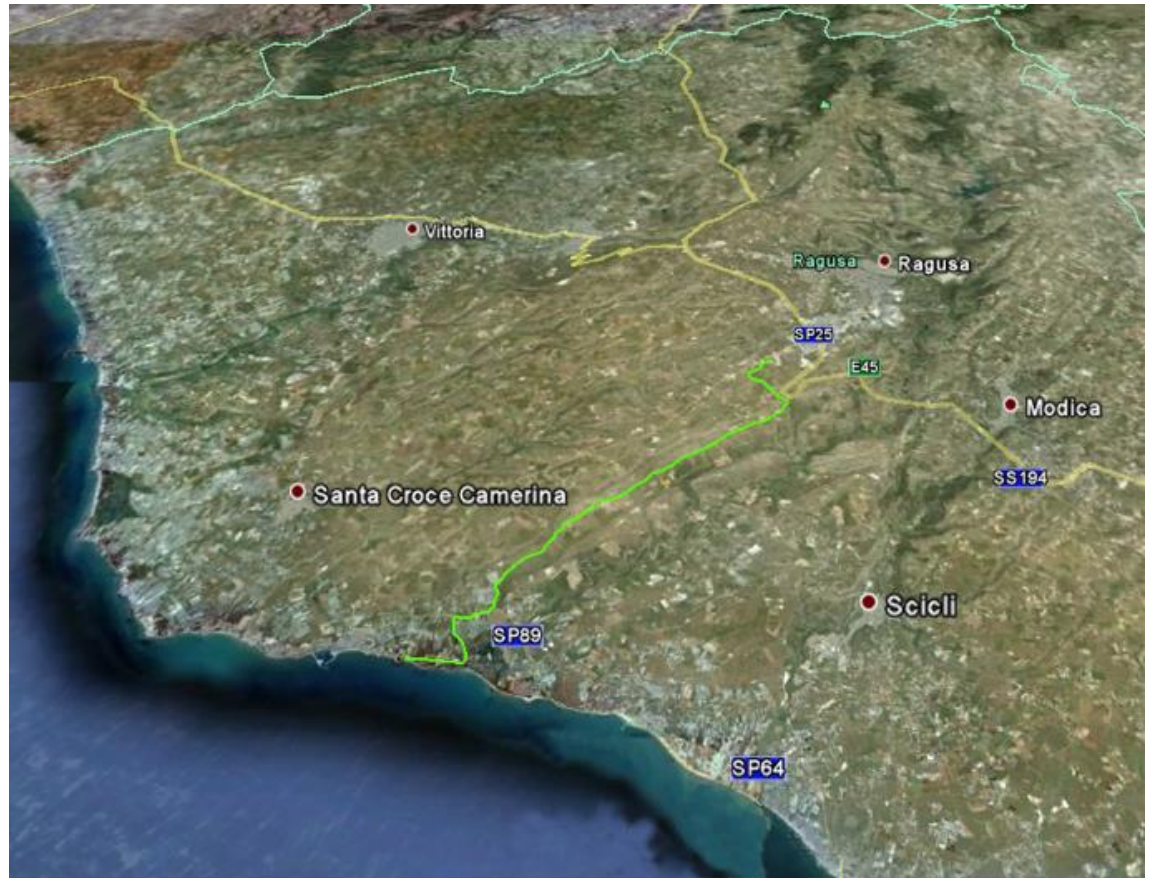
Environmental Impact Assessment

1. Archeological Study Impact assessment on heritage assets, both marine and inland
2. Impact Assessment Analysis of interactions with Nature2000 protected areas: SCI ITA080001 “Foce del Fiume Irminio”, SCI ITA080010 “Fondali Foce del Fiume Irminio”
3. Landscape report Project landscape compatibility, including impact assessment on protected landscapes
4. Geological report Geological survey of areas interested by the project

Land cable

The land part is a 19,1 Km double circuit 220 kV underground cable insulated in XLPE from the existing substation of Cimillà to the landing point in Marina di Ragusa.

In order to minimize visual and environmental impact the project has been developed entirely underground, thus the impact can be confined to the construction phase



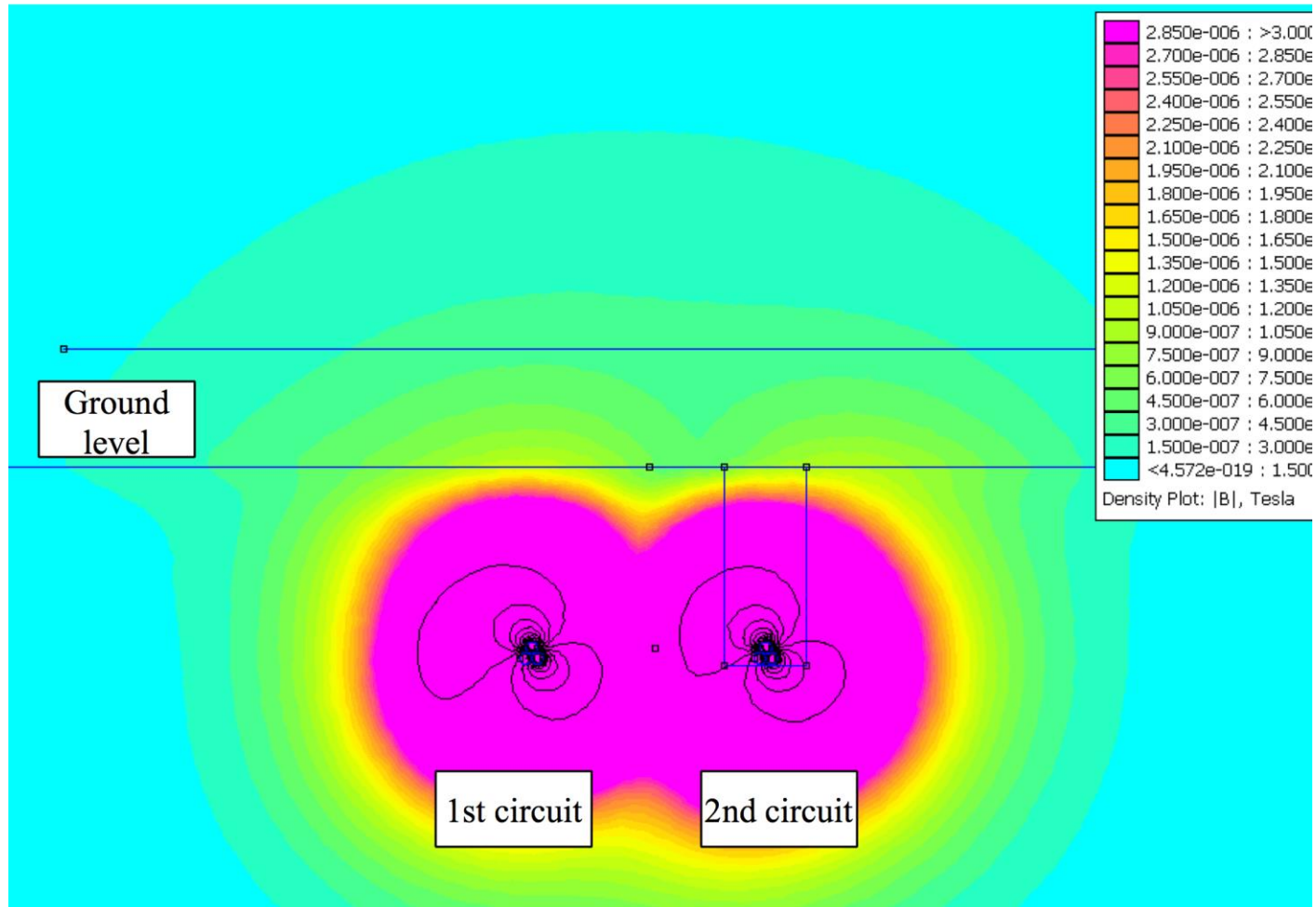
Land cable

The cable is entirely below an existing secondary road, avoiding any environmental impact on land.

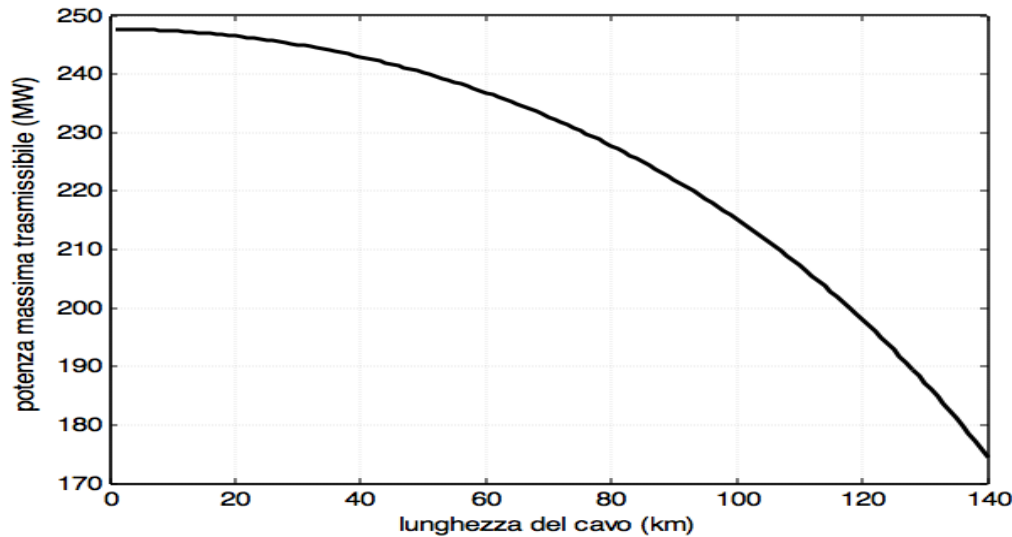


Land cable

Thanks to the trefoil cable arrangement the magnetic field is always lower than the Italian limit of $3 \mu\text{T}$.



Routing constraints



Technical constrain:

1. The Receiving substation must be open to receive the 2 x 200MW both direction
2. In order to have an available power of 200 MW using AC power, the max cable length is 120 km. Taking into account a winding factor of 0.9, the max length is reduced to 108km

Two substations fulfil requirement number 1:

Ragusa and Chiaramonte Gulfi

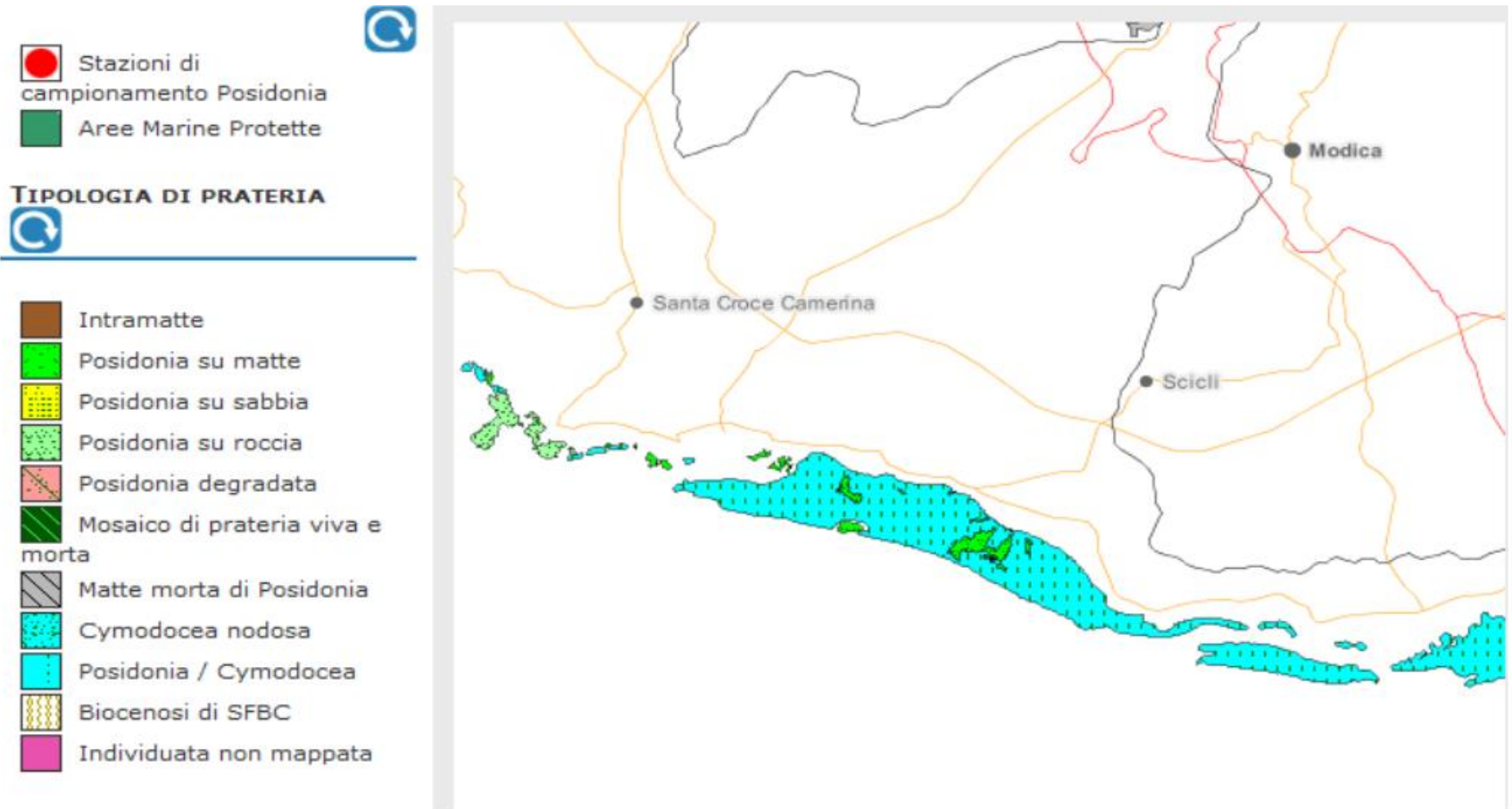
but only Ragusa is within the range calculated in number 2

Routing constraints



Once the terminal stations were identified (Ragusa and Magtab), maximum cable length constraint dictates landing point location, in a limited portion of the Sicilian Shore.

Poseidonia meadows



Poseidonia is widely present inside the identified portion of the coast

Urban / touristic areas



Going from West to East we can see a homogeneous urban area along the coast until Marina di Ragusa, where an agricultural area is located behind the dunes, and then begins the protected areas (SCI)

Landing point



A degraded area, nearby an old sewage treatment plant, was chosen for the landing point.



Directional drilling



Directional drilling limits the impact on the *Posidonia Oceanica*, growing in front of the coast.

However, the exit point was next to the meadows and this arose the concern on debris potentially suffocating the plants.

In response to this instead of using Bentonite as drilling fluid, for the final part of the drilling was used Xanthan gum a polysaccharide secreted by bacteria, commonly used as food thickener and completely biodegradable.

Cast Iron Shells

In presence of *Poseidonia* seagrass meadows, the cable was not buried: cast iron shells allowed for a proper cable protection without damaging the seagrass.



Posidonia rhizomes transplant

The Posidonia meadow surface directly interested by the cable is about 45,5 m² (35cm wide for a linear extension of 130m).

In order to compensate this net loss of meadows, a transplant project was developed following the directions of the Environment Protection Agency.

The project envisioned the relocation of Posidonia rhizomes from the meadows impacted in Marina di Ragusa (RG) and the transplant on a designated meadows subject to regression in Mondello bay (PA).



Patented biodegradable anchoring system

Posidonia rhizomes transplant

48 modules were positioned for a total of 960 plants, covering a surface area of 57.5 m².

As far as today, the transplant has been successful, both for survival and growth rate, and also for division of the rhizomes.

Monitoring is already ongoing and it will continue for the next four years, providing data on growing rate and surface colonized.



CO₂ and pollutant emission reduction

The average CO₂ emission factor in Malta in 2011 was about 0.85 CO₂ kg / kWh, whereas in Italy it was about 0.4 CO₂ kg / kWh; the latter value has been further reduced to 0.33 CO₂ kg / kWh due to the substantial renewable generation increase in Italy.

Considering the yearly energy transmission of 1.3 TWh (corresponding to about 60% of total electricity need of the Maltese islands) through the Malta-Sicily link, about 676 000 t of CO₂ emissions have been already avoided in the first year of operation.

This corresponds to about 361 000 t of Heavy Fuel Oil (0.5% Sulphur content) consumption reduction.

This also means that about 3600 t of Sulphur oxides emissions have also been avoided in Malta.