

# HELLENIC CABLES GROUP



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HELLENIC CABLE INDUSTRY S.A.

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CABLE INDUSTRY



**EU-CARIBBEAN  
SUSTAINABLE ENERGY  
CONFERENCE**

## HVAC SUBMARINE CABLE INTERCONNECTIONS – CASE STUDY EU-CARIBBEAN SUSTAINABLE ENERGY CONFERENCE 10-11 October 2016

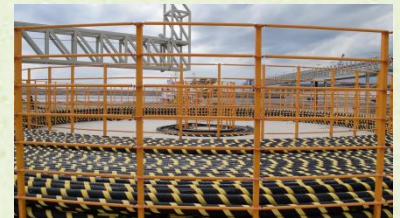
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Cable Engineering & Marketing Manager

# SUBMARINE INTERCONNECTION PROJECTS

Submarine High Voltage interconnection projects are usually turnkey projects, including manufacture , installation, burial / protection of High Voltage subsea cables and of underground cables , transition joints at landing, connection to substations at both ends and commissioning of the system.



*Two 150 kV subsea interconnections in the Aegean Sea will be briefly presented as a case study*



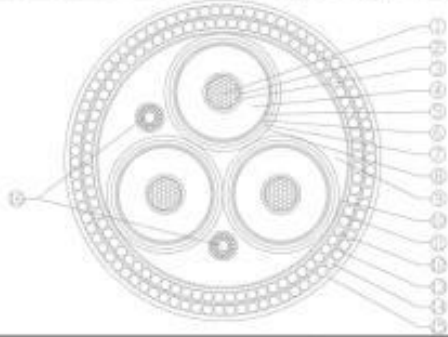
The cables are manufactured each in a single continuous length per route or in the case of very long interconnections, sea joints may be used.



# THE HVAC SUBMARINE CABLE DESIGN

## Submarine Cable Description

Three - core submarine cable with copper round compacted conductors, XLPE insulation, Lead sheath, PPY, double layer galvanized steel wire armour, PPY with two interstitial armoured optical fibre elements - 87/ 150 kV IEC 60840



1. Copper round stranded compacted conductor longitudinally water sealed
2. Semiconducting waterblocking tape
3. Extruded conductor screen
4. XLPE insulation
5. Extruded screen over insulation
6. Semiconducting waterblocking tape
7. Lead alloy sheath
8. Semiconducting PE sheath
9. Filler at the outer interstices between cores
10. Binding synthetic tape
11. Bedding of polypropylene yarn
12. First layer of galvanized round steel wires
13. Separating layer
14. Second layer of galvanized round steel wires
15. Polypropylene yarn layer
16. Armoured optical unit which consists of a stainless steel tube (containing optical fibres), PE inner sheath, galvanized steel wire armour and PE overbraid.

Note: The two layers of armour shall be applied in opposite lay directions.

- Three core construction in one continuous length\*
- XLPE insulation
- Pb sheath over each core with PE jacket
- Single or double Galvanized Steel Wire armour
- Integrated Fibre Optic units in core interstices



Cable weight in air typically from 60 to 110 kg/m

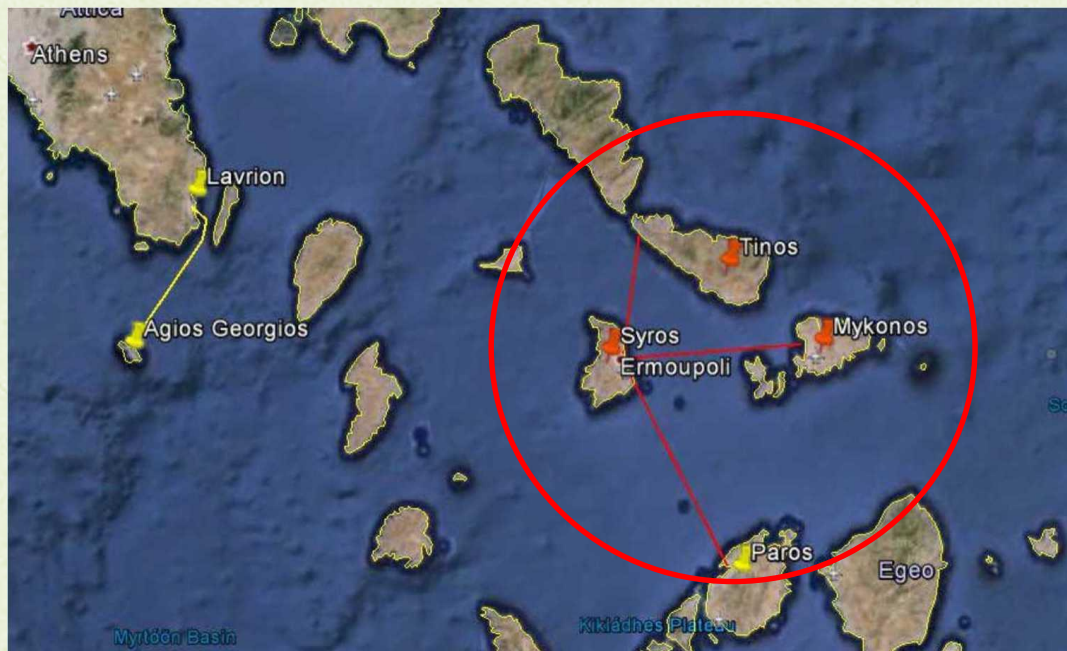
\* Usually the ship laying vessel sets the cable length limits

# AEGEAN SEA INTERCONNECTIONS CASE STUDY

## Cyclades Islands 140 MVA & 200 MVA 150 kV Interconnections

*Subsea cables Interconnect Aegean Sea islands*

The islands of Tinos, Paros and Mykonos, with the implementation of this project, are connected by subsea cables with the island of Syros which in turn is connected – with a different project -to the main grid in Lavrion substation also by a subsea interconnection. Local autonomous power generation using diesel fuel will then be required as backup only



Project owner IPTO,  
Greek TSO

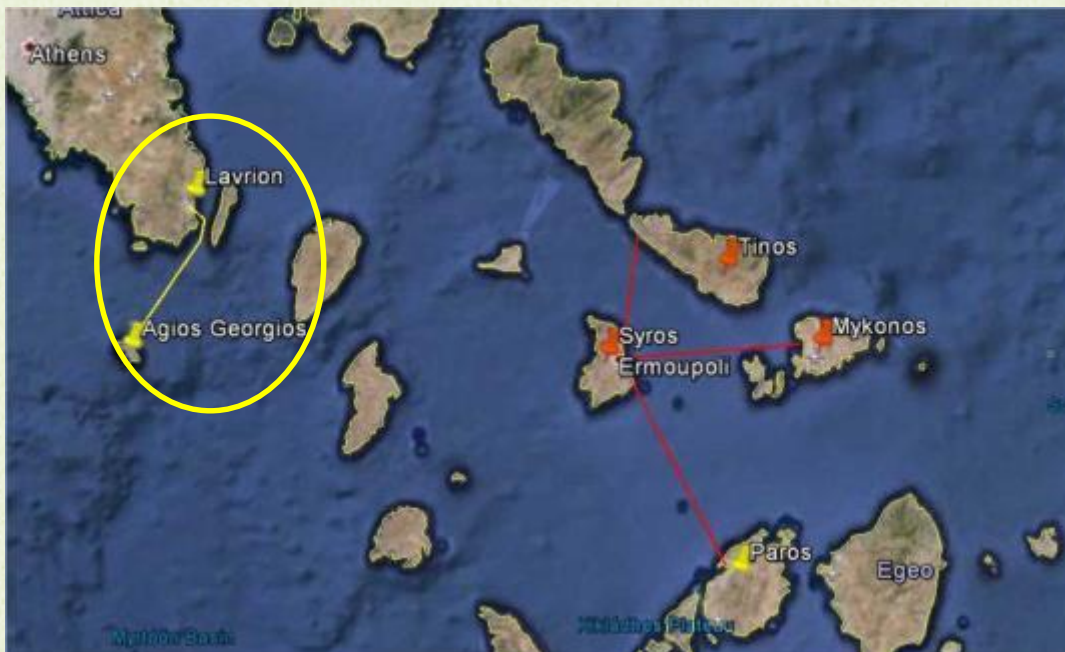


# AEGEAN SEA INTERCONNECTIONS CASE STUDY

## Agios Georgios (St. George) – Lavrion 70 MW 150 kV Interconnection

*Subsea cables export power from wind farms on island to main grid*

1. 23 wind turbines 3 MW each installed on the small uninhabited island of **Agios Georgios** are connected with the main grid at **Lavrion** substation. This is a typical onshore – offshore wind farm with no inter array cables but only export subsea cables.



Project owner TERNA -  
ENERGY



# CYCLADES ISLANDS INTERCONNECTIONS

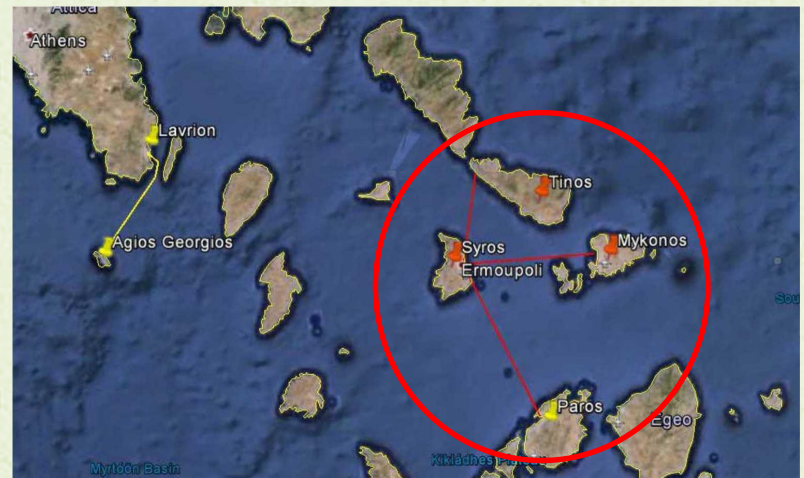
## Cyclades Islands Interconnection Project

- ✘ Syros – Mykonos interconnection: 140 MVA – 3X300 mm<sup>2</sup> Cu + 1FO cable, 35 km route -110m max. depth
- ✘ Syros – Tinos interconnection: 200 MVA – 3X630 mm<sup>2</sup> Cu + 1FO element, 33 km route -200m max. depth
- ✘ Syros – Paros interconnection: 140 MVA – 3X300 mm<sup>2</sup> Cu + 1FO element, 46 km route -110m max. depth

Syros - Mykonos :  
cable installed in May 2015

Syros - Tinos :  
cable installed in November 2015

Syros - Paros :  
cable installed in May 2016



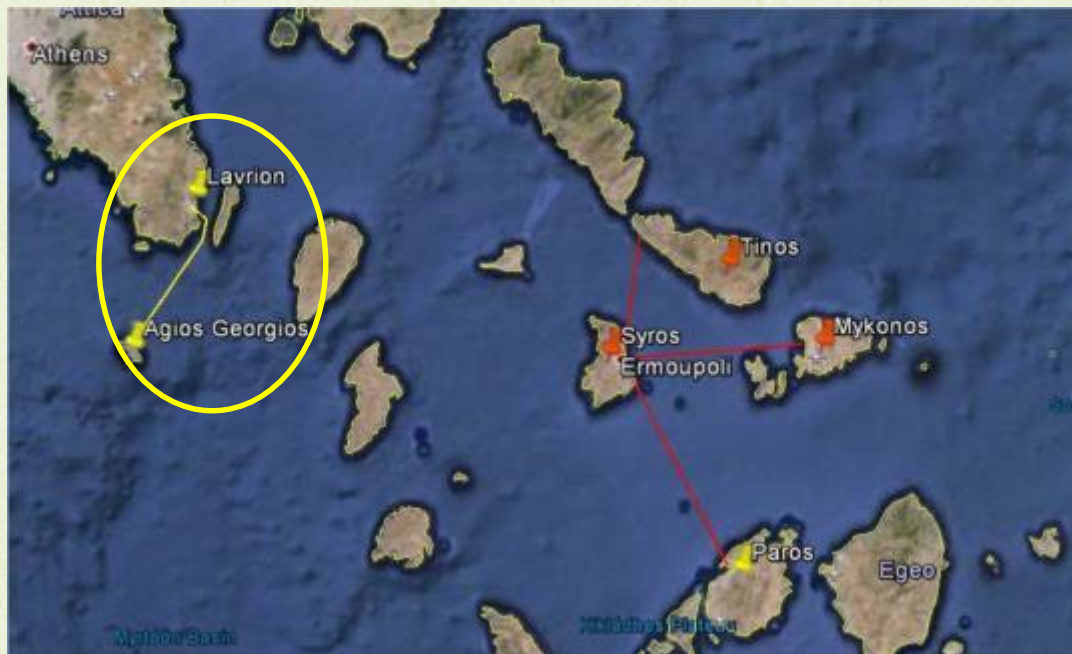
Note: The Lavrion - Syros 110 km interconnection was implemented as a separate project



# AGIOS GEORGIOS – LAVRION INTERCONNECTION

## Agios Georgios - Lavrion Interconnection Project

3X300 mm<sup>2</sup> Cu/XLPE/PB/SC\_PE/PPY/DWA/PPY + 2 FO elements  
36 km route - 230 m max depth



The cable was installed  
in September 2015

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Thank you!