Offshore Wind in Japan II
Engineering services by SENER

Renewables,
Power,
Oil & Gas

www.group.sener.es

SENER value proposal for offshore wind services

- SENER group experience in its 65 years history
- Engineering services for fixed & floating foundations in offshore wind

  Permitting design services
  Design of wind farms projects
  Design of fixed foundations
  Design of floating foundations

- Support to construction projects: Supervision to fabrication & Commissioning works for offshore wind farms

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SENER group experience

SENER
2020 Facts and figures

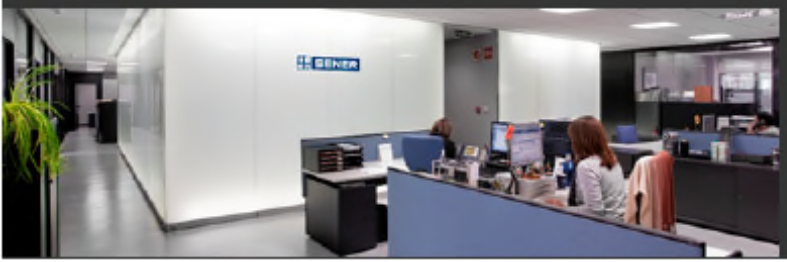
Founded in 1956, SENER ranks as the largest privately owned engineering company in Spain.

DISTINCTIVE VALUES
- Innovation
- Quality
- Independence

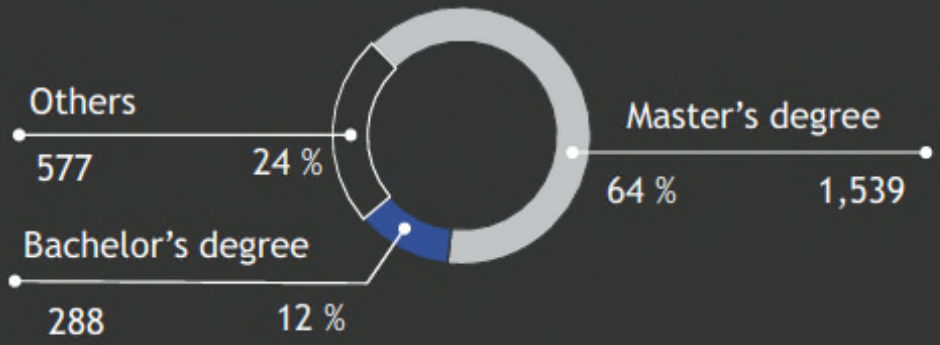
Turnover (M€): 417

Non Spanish sales: 82 %

Workforce: 2,404



PERCENTAGE OF GRADUATES IN ENGINEERING (2020)



SENER short presentation

SENER
Strategic business units

AEROSPACE

- Space
- Defense
- Aeronautics

INFRASTRUCTURE

- High speed railways
- Freight & mainline railways
- Metro systems
- LRTs & tramways
- Roads & highways
- Airports
- Ports
- Architecture

ENERGY

- Solar energy (CSP, PV)
- Biomass, Waste to Energy, Waste to Chemicals
- Energy Storage
- Offshore Wind
- Power (CCGT, CHP)
- Oil & Gas, LNG
- Industrial Plants

MARINE

- Marine engineering
- FORAN

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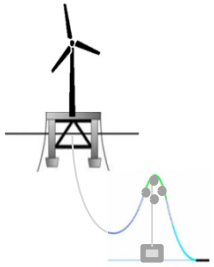
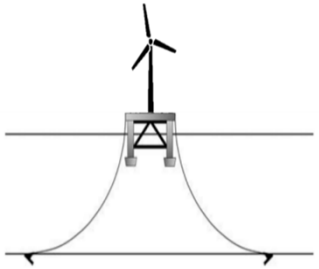
SENER short presentation

Global footprint

Offshore Wind capabilities

Our capabilities cover the full range of services in a wind farm project

- Permitting & Feasibility studies
- Mooring & Dynamic cable analysis
- Design of monopiles & TP
- Owner's Engineer Services
- Metocean & Wind resource
- Simulation of offshore turbines
- Design of floating foundations
- Construction Management and Commissioning

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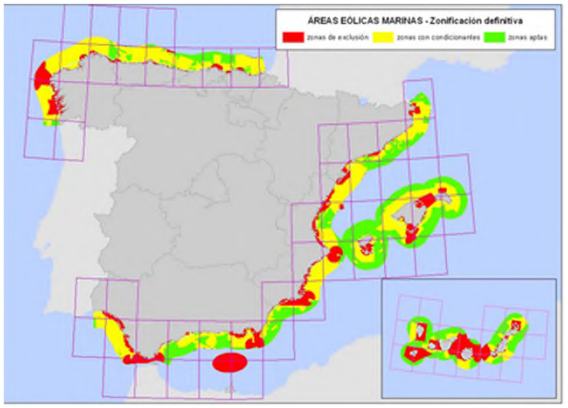
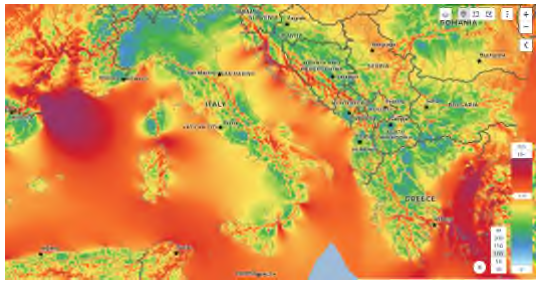
Offshore Wind – Permitting projects

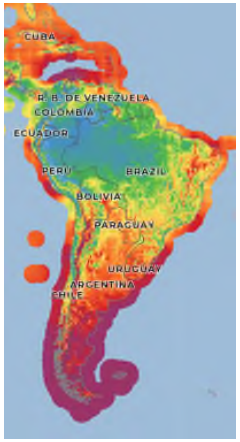
Offshore wind project in NE Spain
www.parctramuntana.com



Other offshore Wind permitting projects in Spain

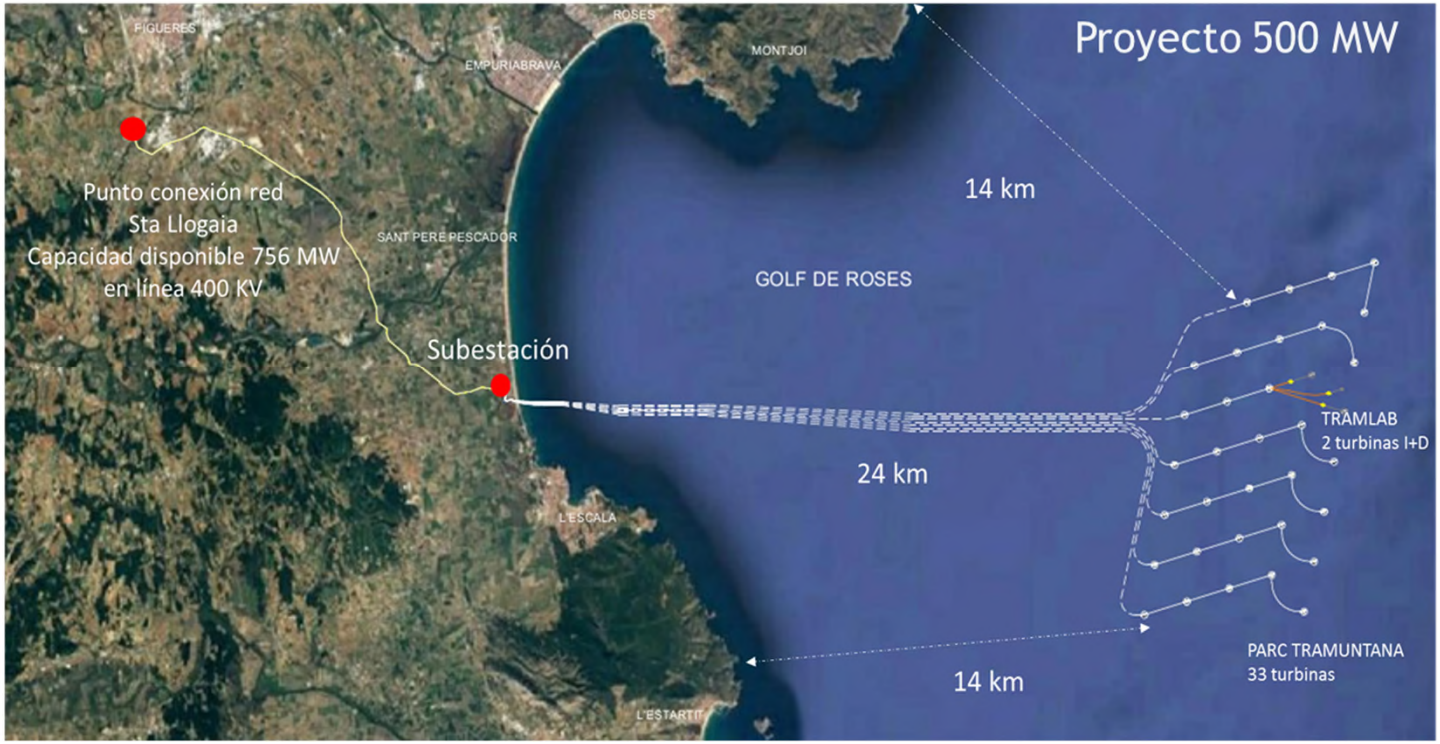


Offshore Wind permitting projects in Italy



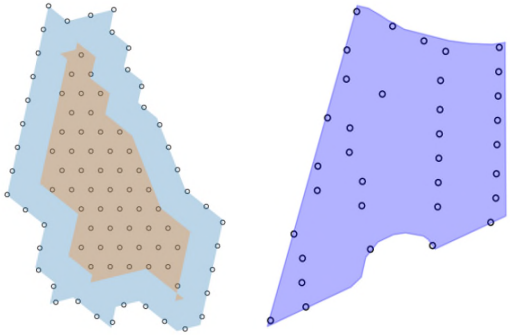
Offshore Wind permitting projects in South America

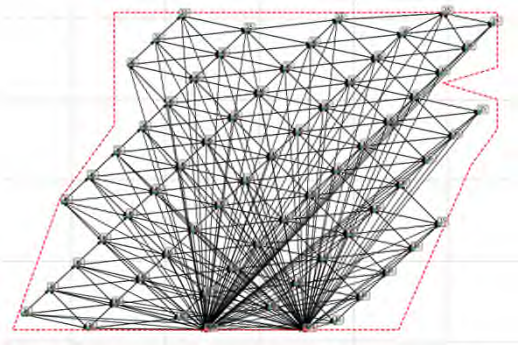
Offshore Wind – Design of Wind Farms



Offshore wind project in NE Spain
www.parctramuntana.com

Offshore Wind – Optimization of Wind Farms lay-out





Output:

- Optimal distribution of the park.
- Result of AEP (GWh / year).
- Result of wake loss (%) for the optimal distribution.
- Result of all electrical losses (%).
- Distribution of AEP as a function of wind direction.
- Optimal interconnection layout.
- LCOE results.

FARMWISE software for Wind Farms layout optimization

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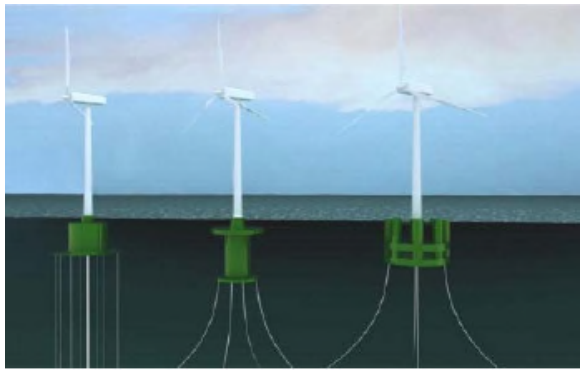
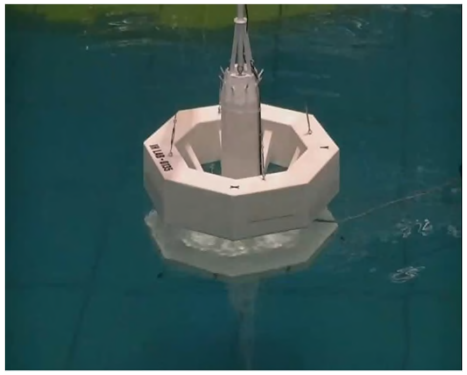
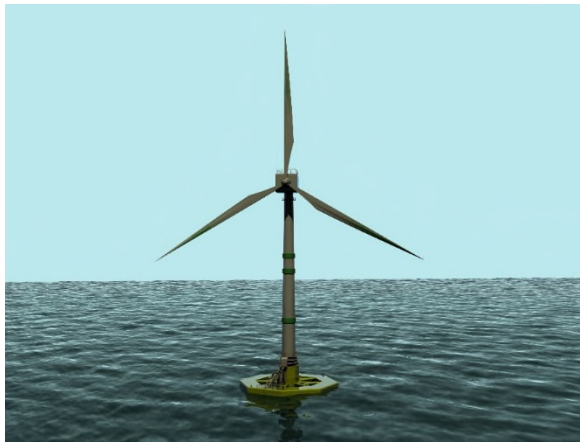
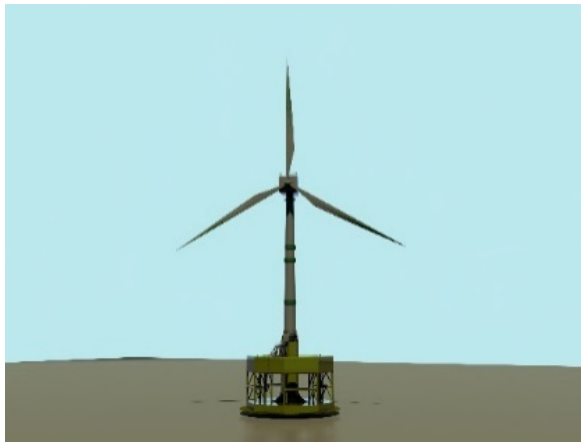
Experience by SENER in OW floating platforms design

Platforms designed: SPAR, TLP and SEMISUB









- Naval architecture
- Numerical modelling (openfast, orcaflex)
- Hydrodynamics: 1storderQTF and full CFD
- Numerical control model (inhouse modelling and ROSCO)
- SKS and export cabling design and dynamic calculation

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Support to offshore wind construction projects

SENER provides support for offshore wind construction projects (Owner's engineer services, EPCM, Construction & Commissioning Supervision). We provide flexible proposals to match our clients' problems.

Fabrication & Commissioning supervision
COBRA Kincardine (UK) 50 MW floating wind farm

Framework Agreement Scottish Power & Avangrid (Iberdrola)

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THANK YOU

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