Analysis of offshore wind energy harvesting potential in the Adriatic sea

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Introduction:

European Union legislation requires an increase of offshore wind energy to 300 GW by 2030. Additionally, countries' incentives for diversification of renewable energy sources require the installation of offshore wind turbines in areas that were previously not considered for installation. The possibility of installation of offshore wind farms in the Adriatic Sea is explored by investigating natural conditions. For four pilot locations, two of which are in Croatia and two in Italy, wind energy harvesting potential is estimated. Furthermore, an evaluation of physical natural conditions was conducted to determine appropriate technical solutions for installation for considered locations.

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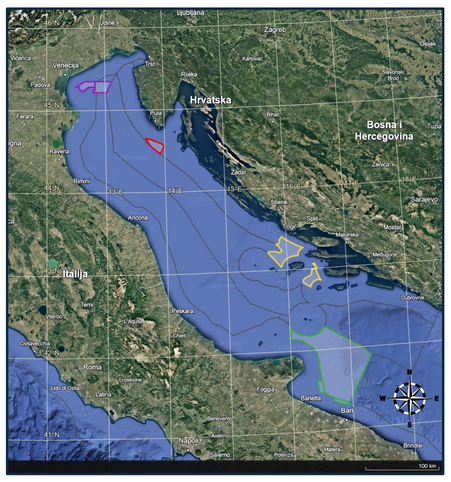
Test regions



Source: Google Earth

Italian side
- Puglia region
- Veneto region

Croatian side
- Istria region
- Dalmatia region

Seabed substrate

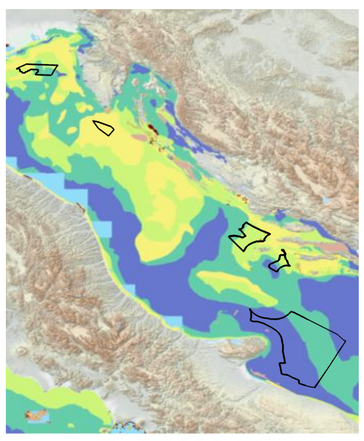
The Folk 7 classification defines seven different substrate types based on grain size.

Istria
- Sand

Dalmatia
- Sandy Mud
- Muddy Sand
- Sand
- Rock & Boulders

Puglia
- Mud
- Sandy Mud

Veneto
- Sand
- Muddy Sand
- Sandy Mud

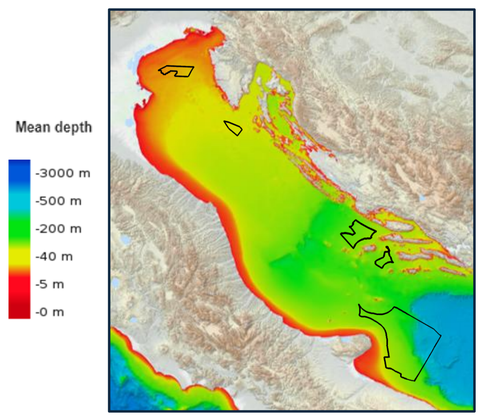


Source: EMODnet

Pyhsical natural conditions in the Adriatic Sea

Sea depth

- data source European Marine Observation and Data Network (EMODnet) [1] with resolution of 115 m



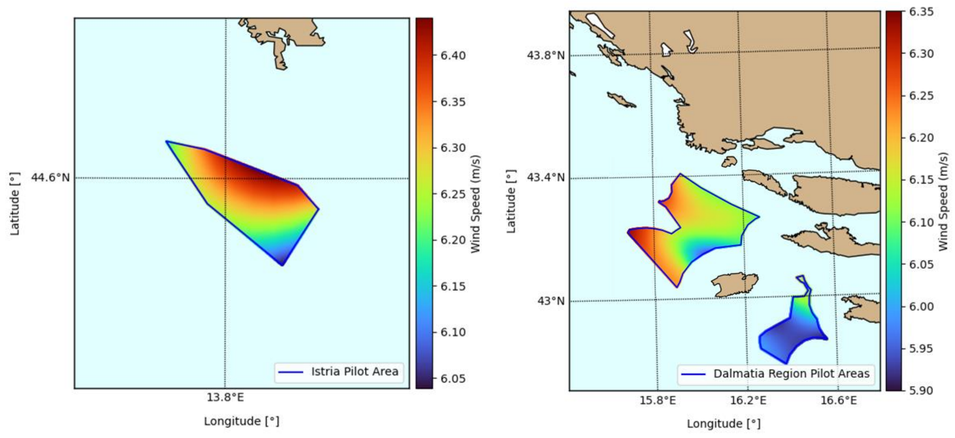
Source: EMODnet

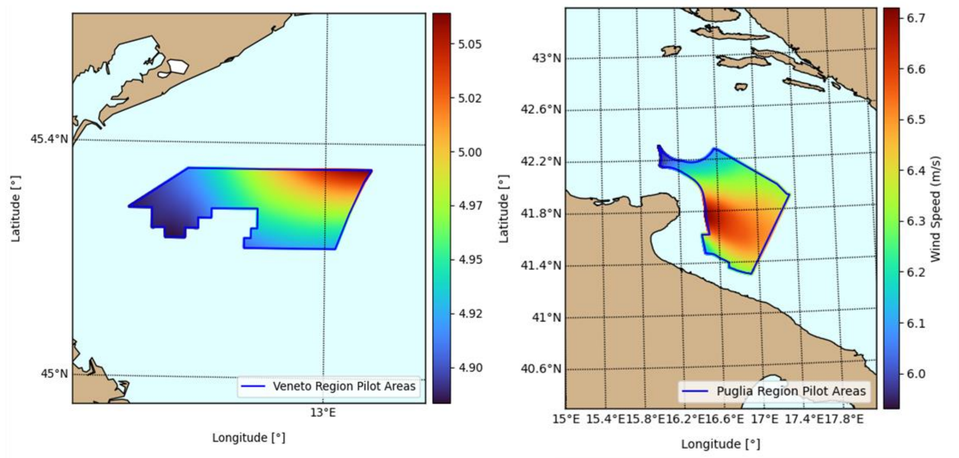
Depth range
- Istria region (40 m – 50 m)
- Dalmatia region (64 m -146 m)
- Puglia region (55 m – 998 m)
- Veneto region (19 m – 32 m)

Wind speed

- data source New European Wind Atlas [2] - mean long-term modelled wind speed (1989.-2018.)

averaged wind speed data for the period of 1 year (2018.)





Average wind speed range
- Istria region (6 m/s – 6.4 m/s)
- Dalmatia region (5.9 m/s – 6.3 m/s)
- Puglia region (5.9 m/s – 6.7 m/s)
- Veneto region (4.9 m/s – 5.1 m/s)

Protected areas

Source: EMODnet

Future work

The average wind speeds for all four regions are around 6 m/s which indicates that turbines that have the best performance at lower wind speeds should be considered.

Additionally, appropriate technical solutions should be found that would provide sufficient renewable energy sources while minimizing negative ecological impact.

References

[1] EMODnet Digital Bathymetry (DTM 2022). EMODnet Bathymetry Consortium https://doi.org/10.12770/ff3aff8a-cff1-44a3-a2c8-1910bf109f85

[2] Data obtained from the "New European Wind Atlas, a free, web-based application developed, owned and operated by the NEWA Consortium. www.neweuropeanwindatlas.eu.