A new Wind Atlas for Italy

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Wind energy in Italy

Installed power 2012: ~ 8 GW
Installed power 2022: ~11 GW ➔ just 3 GW in 10 yrs!

2030 goal (Fit for 55):
21.5 GW, plus 3.5 GW offshore!

It is essential to have reliable data of wind availability and distribution on the territory for an effective exploitation
• Renewal of the original Italian Wind Atlas 20 yrs after its release using of state-of-the-art tools
Atlante EOLico ItaliANo (AEOLIAN)

- Joint effort between RSE and the National Center for Atmospheric Research (NCAR), Boulder, CO
- 30 years of data (1990 - 2019)
- Hourly temporal resolution, 1.33 km horizontal resolution
- Coverage of the whole territory and marine areas
- WRF-ARW dynamical downscaling of ECMWF ERA5 + observational nudging (~300 Italian regional stations, 10m wind)
- Weather modeling + statistical post-processing (Analog Ensemble) to reduce computational burden
Methodology

WRF-ARW v3.9
- 1990-2014: 4 km
- 2015-2019: 4km+1.33 km

Analog Ensemble (AnEn)
Statistical extension of 5 years at 1.33 km to previous 25 years
Verification

94 10-m stations (●+ ●)

Bias
AnEn vs WRF

Bias
AEOLIAN vs NEWA

https://map.neweuropeanwindatlas.eu/
Verification

10 upper-height stations (●)

Bias
AEOLIAN vs NEWA

MAESS
AEOLIAN vs NEWA
Full Load Hours (FLH)

- map @100 m agl/asl
- 60% of offshore > 3000 MWh/MW!
- The exploitation of wind resources is essential in pursuing the extremely ambitious decarbonization objectives of the EU.
Next

- Extension of additional parameters to 1990-2014 by AnEn (e.g., wind direction @ same vertical levels of ws)
- Weibull parameters
- Extension of AEOLIAN ahead of 2019 by WRF
Thank you for your attention!