



Italian National Agency for New Technologies,  
Energy and Sustainable Economic Development

# Renewable energy potential maps for Lesotho

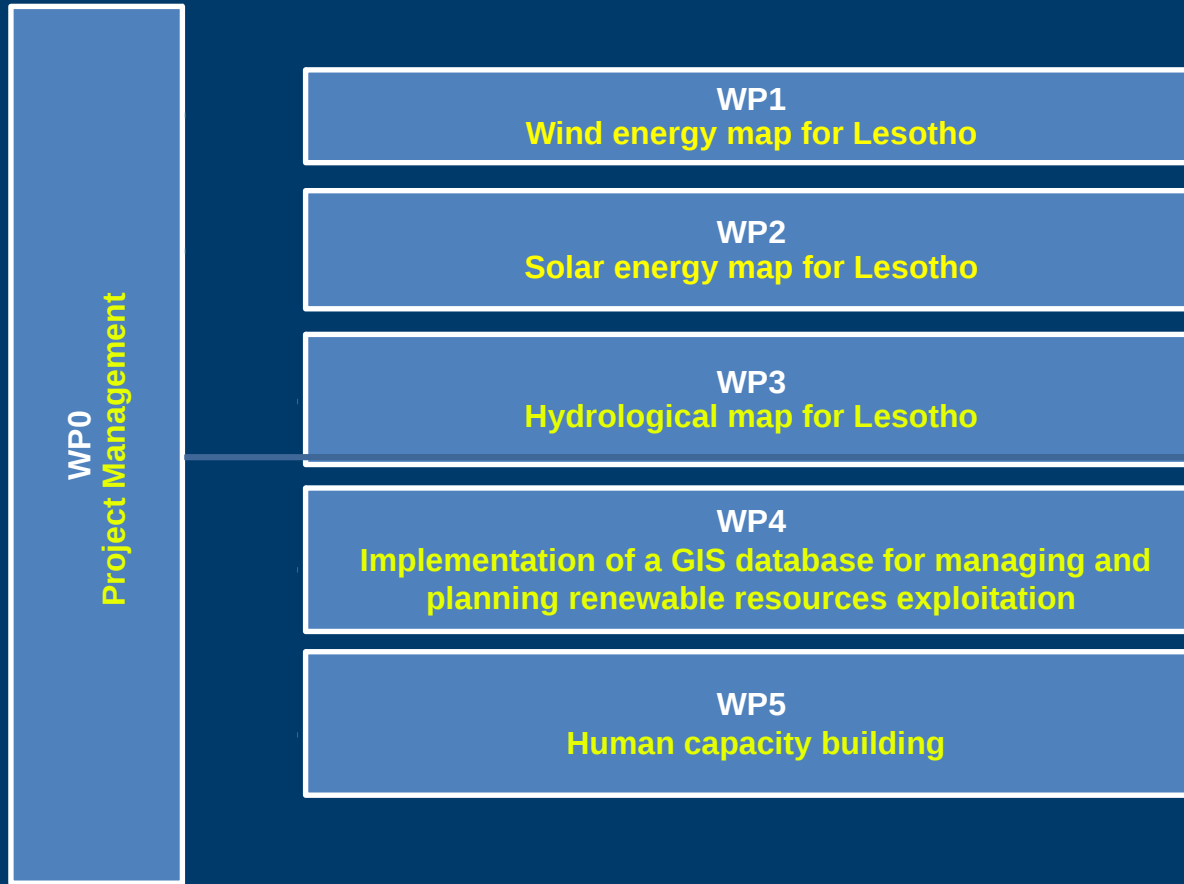
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# Project Work Packages (March 2018 – March 2020)



# Solar PV and wind energy maps production

- Solar and wind energy maps were produced by means of the WRF meteorological model.
- One test year WRF hourly simulations at 1km horizontal resolution were performed on ENEA CRESCO HPC facility
- Final maps will rely on 30 years WRF years simulation

# WRF application for solar and wind energy

1. One test year (2015)
2. Repeated in **four different** configurations
3. **Comparison** with available observations
4. **Best model** configuration chosen (best statistical scores)  
to perform 30 years simulation before the end of the  
project

# WRF application within the project

- 2-way nesting configuration, 3 domains:
  - d01: 15km grid spacing
  - d02: 5km
  - d03: 1km

	d01	d02	d03
NLON	85	211	256
NLAT	66	191	274
LEVELS	38	38	38

ECMWF ERA5 reanalysis at boundary (30km, hourly)

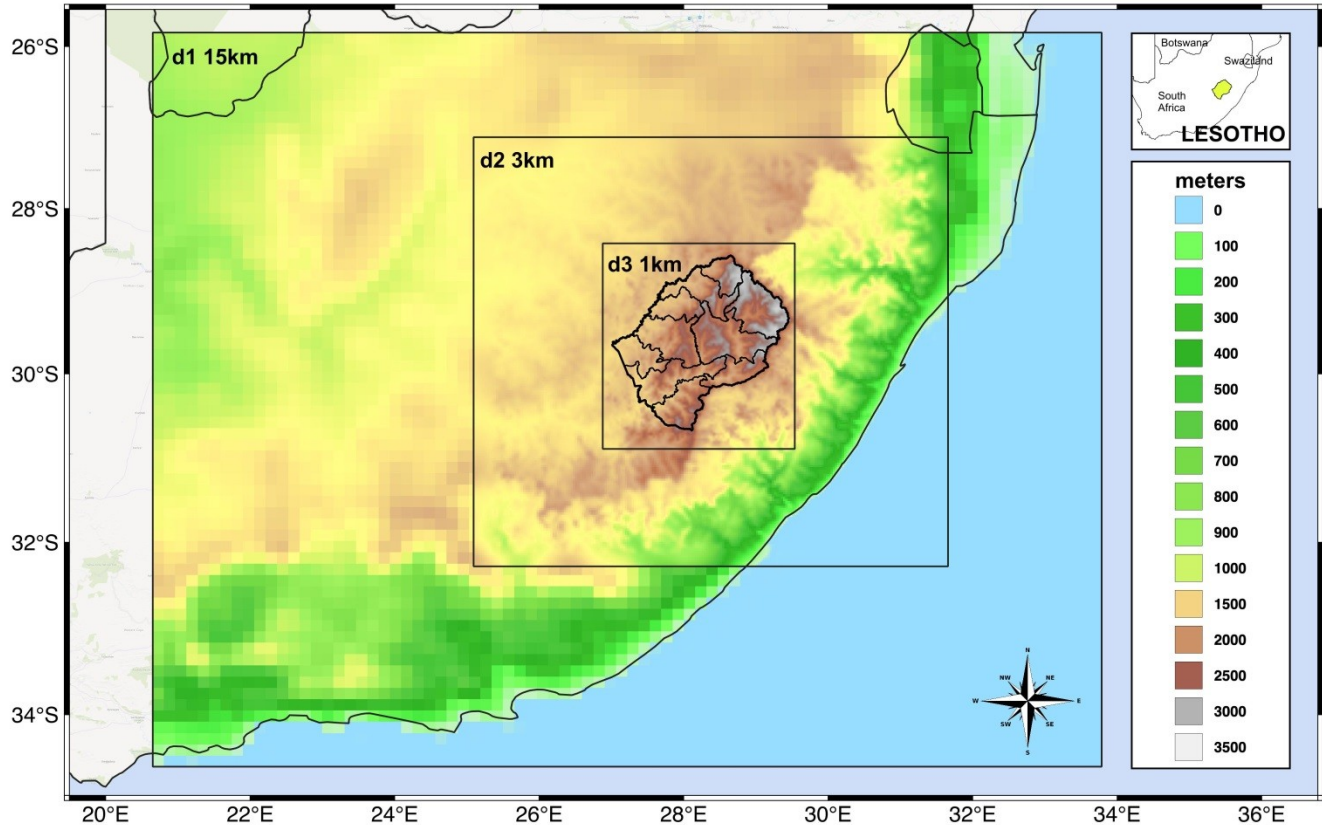
<https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5>

# WR

- 2-way n
- d01: 1
- d02: 5
- d03: 1

ECMWF ERA

<https://www.era4re.eu/>



# WRF application within the project

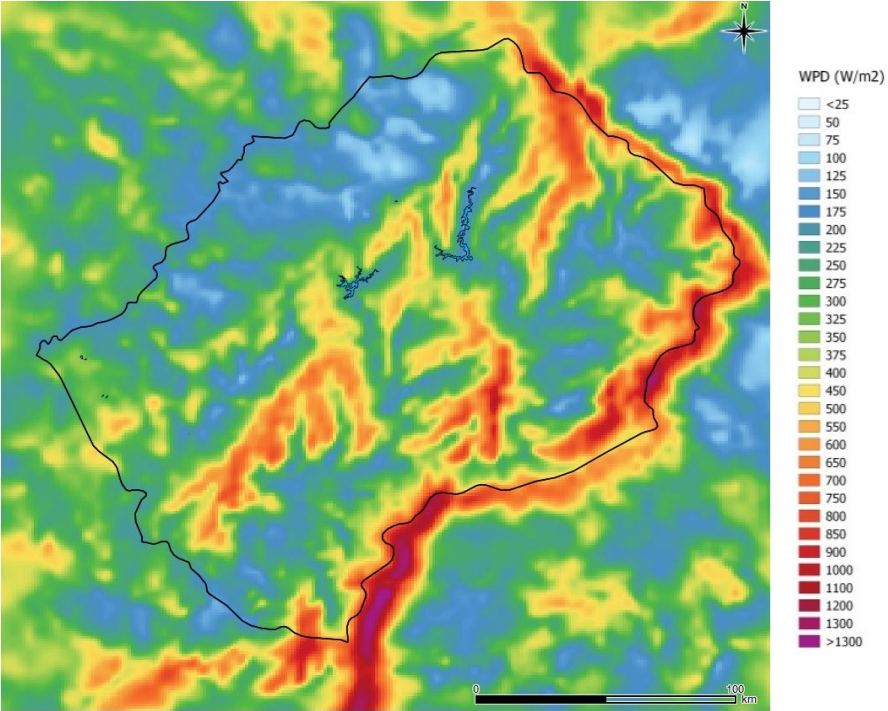
Storage(HPC high speed parallel storage, DDN-GPFS)

- One year (hourly outputs) -> 1.7TB, 4 configurations: 6.8TB

## Computational time

- Simulations performed over CRESCO6 cluster (224 cores)
- 1 simulated day in 70 min. -> one year in 18 days

# Results: preliminary wind power density produced for one year (2015)





# Results: preliminary photovoltaic power produced for one year (2015)

