



REGIONE BASILICATA



PROVINCIA DI MATERA



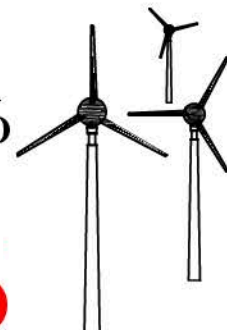
COMUNE DI SALANDRA



COMUNE DI FERRANDINA

# PROGETTO PER LA COSTRUZIONE E L'ESERCIZIO DI UN IMPIANTO EOLICO PER LA PRODUZIONE DI ENERGIA ELETTRICA, DELLE OPERE E DELLE INFRASTRUTTURE CONNESSE, DENOMINATO "TORRICELLI"

## DA REALIZZARSI NEI COMUNI DI SALANDRA (MT) E FERRANDINA (MT), DI POTENZA PARI A 31 MW ACCOPPIATO AD UN SISTEMA DI ACCUMULO PARI A 8 MW



# PROGETTO DEFINITIVO

PROPONENTE:



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PROGETTISTI:



**PD**  
PROGETTO DEFINITIVO

ELABORATO:

RELAZIONE SPECIALISTICA STUDIO ANEMOLOGICO

Tavola:

SAL-PDEF-REL- 003

Filename:

Data 1° emissione:

Redatto:

Verificato:

Approvato:

Scala:

Protocollo

n° revisione

1  
2  
3  
4



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## 1. Objective

The objective of this report is to determine the expected Annual Energy Yield of Salandra in Basilicata. The layout is made with 5 turbines.

Rev.003 New scenario has been evaluated.

In the evaluation we considered this following new scenario:

Scenario	Turbine Type	Number of WTGs	Capacity (MW)
1	5 x SG170 6.2MW @115m	5	31

The overall long term uncertainty for the project is 10.3%.

The main risks and uncertainties in this analysis include the following:

- For the evaluation we used one met mast at 4km, 60m high. We suggest to install a met mast on site at least at 100m.
- No turbine suitability studies have been supplied to EDPR.
- No grid curtailment or curtailments due to turbulence, noise, birds, bats, etc. have been considered for this WF.

## 2. References

DR01	TPO-EA-A.05	Wind Energy assessment general procedure
DR02	TPO-EA-A.06	Wind flow and wind modeling extrapolation
DR03	TPO-EA-A.07	Long term & vertical wind data extrapolation
DR04	TPO-EA-A.08	Calculation of Uncertainty and variability



### 3. Results

The following table summarizes the estimated long-term net production of the project:

Project	
Analysis ID	TCRP-ITAEAWR-TCRP-00322_003
Layout ID	TCRP-ITAEAWR-LC-00138_004
Appian Scenario ID	6813
Turbine scenario	[31 MW] 5 x Siemens-Gamesa 170-6.2 (SG170) @ 115m
Turbine Model	SG170-6.2MW
Hub Height	115
Turbine Rated Power (MW)	6.2
Number of Turbines	5
Capacity (MW)	31
Gross Production summary	
Adjusted Gross AEP (GWh)	81.42
Adjusted Gross Capacity Factor	29.96%
Adjusted Gross Equivalent Hours	2627
Summary of Net Adjustments	
Availability WTG	98.11%
Availability BoP	99.80%
Curtailement	100.00%
Electrical Losses	97.00%
Special Climatic Conditions	99.00%
TI Correction	99.00%
Stat. Correction Factor	96.00%
Wind Sector Management	100.00%
LHH	99.66%
Wake & Array Losses	95.01%
Total Net Adjustments	84.91%
Net Production summary	
<b>Net AEP (GWh)</b>	<b>68.89</b>
<b>Net Capacity Factor</b>	<b>25.37%</b>
<b>Net Equivalent Hours</b>	<b>2223</b>
Production Uncertainty	
Temporal Scope	LT
Total	10.32%
P99	19.28%
P95	21.07%
P90	22.02%
P75	23.61%
P65	24.36%
P55	25.04%
<b>P50</b>	<b>25.37%</b>
P45	25.70%
P35	26.38%
P25	27.14%
P10	28.73%
P05	29.68%
P01	31.46%



#### 4. Action Items

1. Installation of a met mast on site, at least at 100m.
2. There is no site suitability study from the manufacturer. No WSM losses have been considered.
3. No grid curtailment or curtailments due to noise, birds, bats, etc. have been considered for this WF.

#### 5. Tower Information

The following met tower was used in this estimate.

Met_ID	Installation Date	Decommission Date	Anemometers (m)
San Giovanni	07/2009	09/2014	60m, 50m, 40m

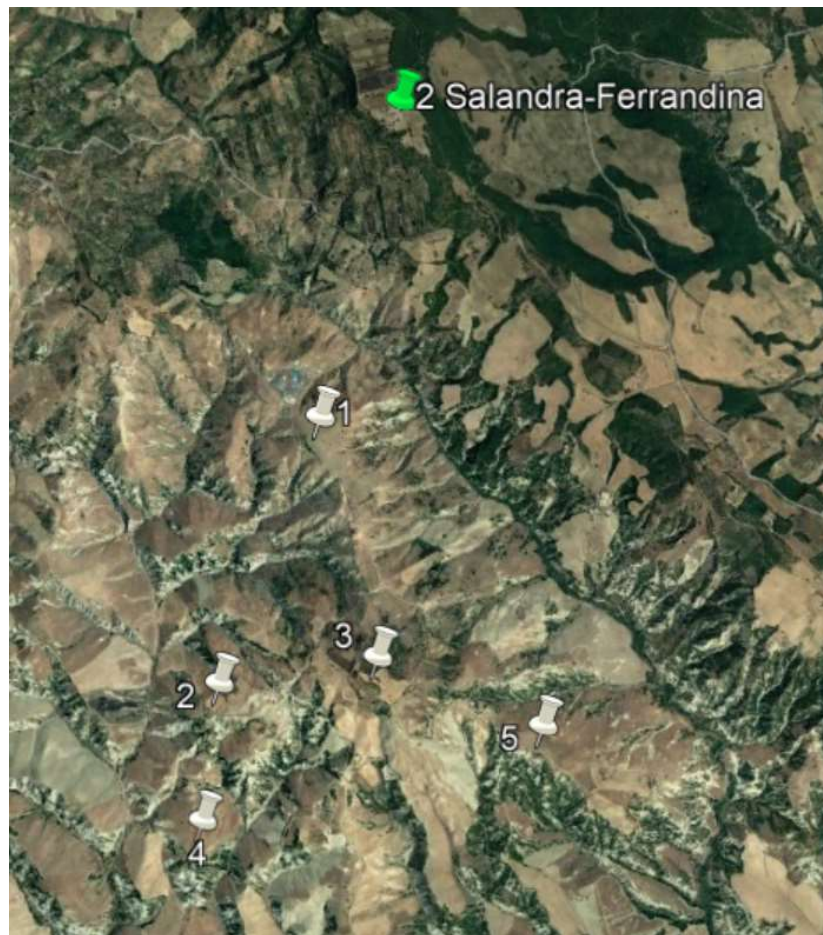
#### 6. Layout analysis

The layout is composed of 5 wind turbines, which coordinates are as follows:

WGS84		
WTG	X	Y
1	614044	4485101
2	613416	4483428
3	614437	4483628
4	613310	4482557
5	615453	4483198



And the layout configuration is shown in the image below:



## 7. Turbine information

Turbine	Document of reference
SG170 6.2MW 1.158kg/m3	D2075735/04

## 8. Revision Tracking

Rev.001 New scenario has been evaluated

Rev.002 The layout has changed, WTG5 has been eliminated due to the overlapping of another project, WTG7 has been moved in order to respect 4D as minimum distance.



## Annex I: Estimated Third party P-values and uncertainty

n/a

## Annex II: Operational Strategies

1. **Bat Curtailment:** n/a
2. **Noise Curtailment:** n/a

## Annex III: Model inputs

### Met data

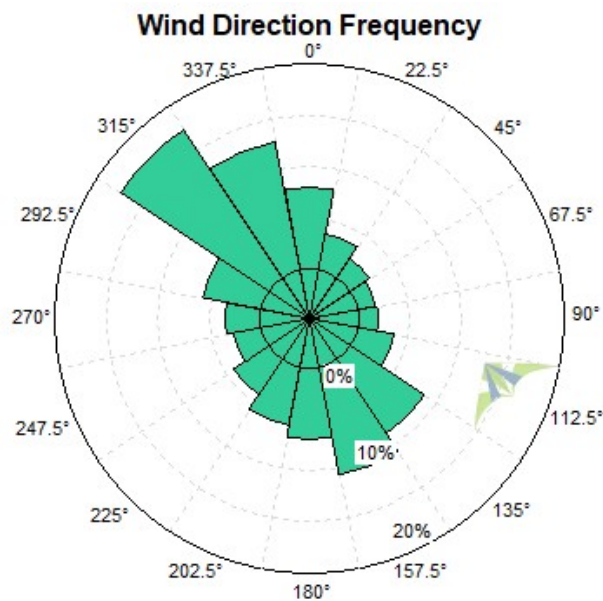
There is one met mast installed on site used in this estimation.

Name	Levels	Measured period	UTM coordinates (UTM-WGS84)		Observations
			E	N	
San Giovanni	60m- 50m-40m	07/2009 - 09/2014	614542	4487033	

San Giovanni met mast is at 500m of elevation, the wind data series cover a period of 4 year.

The wind speed average at 60m is 6.01m/s.

The prevalent wind directions are NW and SE.

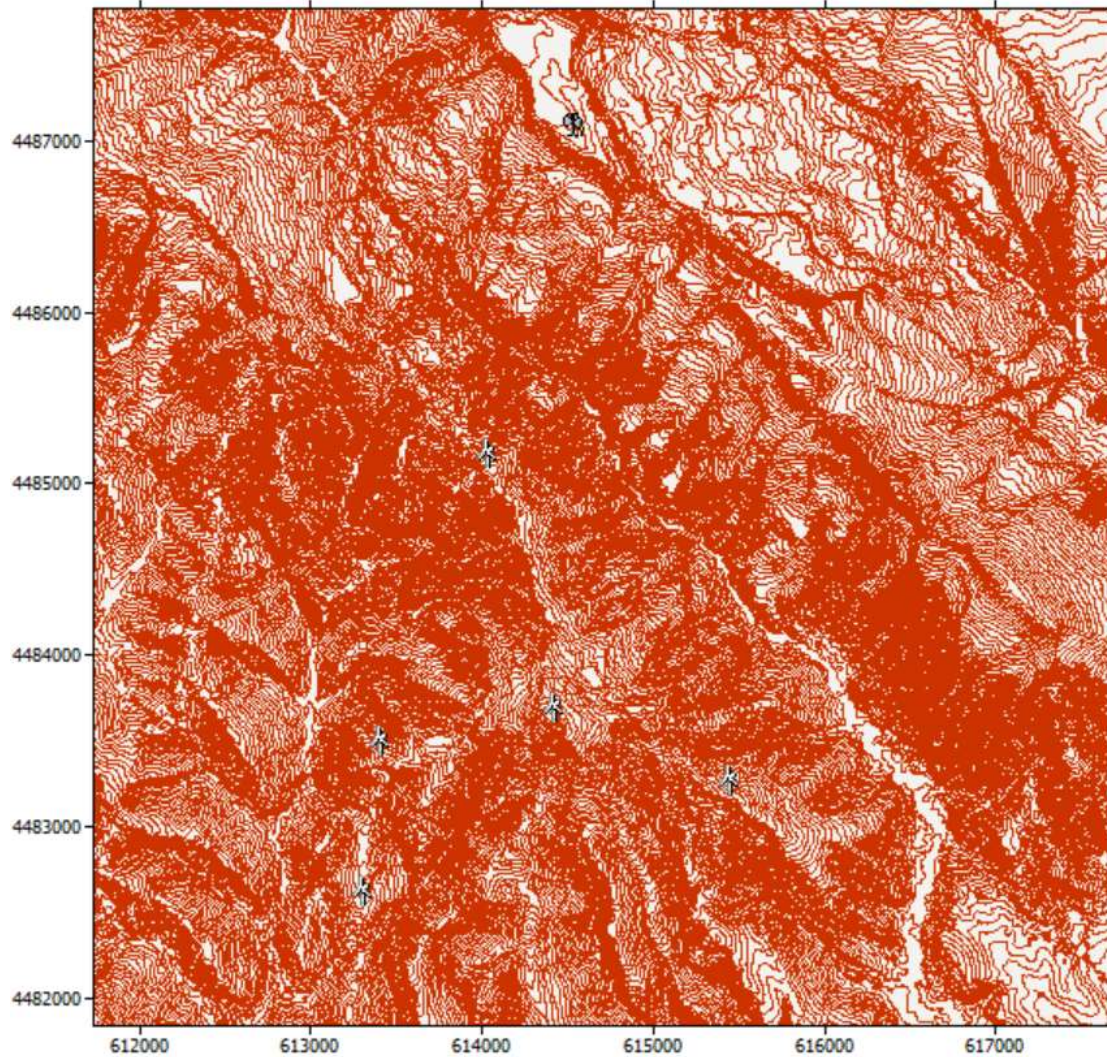






### Horizontal Extrapolation

Meteodyn has been used to horizontal extrapolation.



### Hub Height Extrapolation

Measured data collected by the met mast have been used to calculate wind shear at the site.  
The estimated alpha is 0.12.



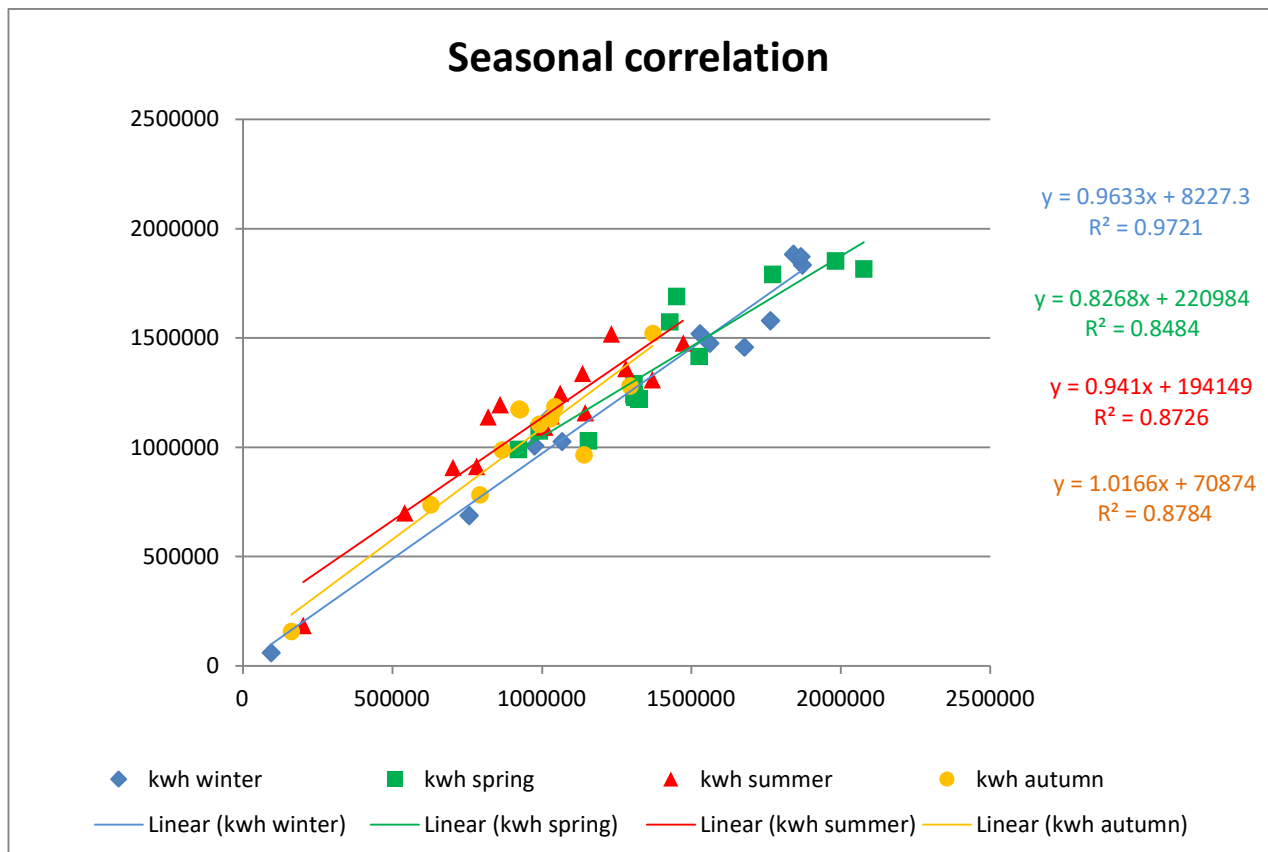


## Long Term

Long term correction factor of the period used in the assessment is estimated using LT reference Vortex CFSR.

The correlation between Vortex and data serie is very good, and we apply 0.9685 as correction factor on production.

The graphic below shows seasonal correlation between met mast and Vortex CFSR.





### Neighboring wind farms

In the image below Salandra WF with pink placeholders and the other wind farms considered in the evaluation.

