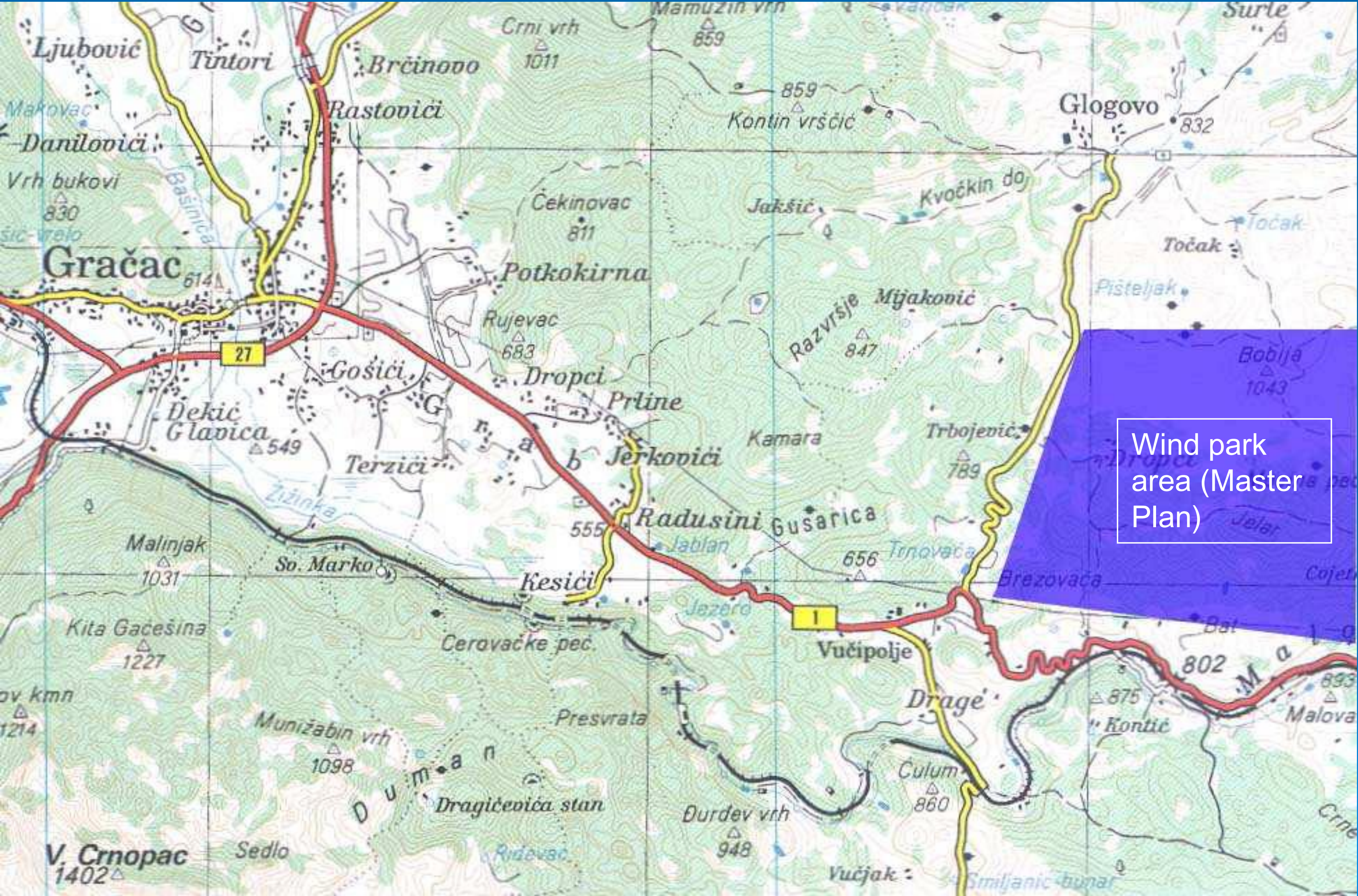
WINDPARK PRESENTATION

Locations:


VARAŽDIN
ZAGREB
RIJEKA
KARLOVAC
SISAK
OSIJEK
KRK
PULA
WP 5 - N.VINODOLSKI
WP 4 - ONDIĆ
ZADAR
WP 1 - VUČIPOLJE
SPLIT
KNIN
KORČULA
DUBROVNIK

Project: WP 1 - VUČIPOLJE

Location:


Wind park area (Master Plan)
Gračac
Ljubović
Tintori
Brčinovo
Rastovići
Danilovići
Vrh bukovi
830
Crni vrh
1011
Mamuzin vrh
859
Kontin vršćić
Glogovo
832
Surle
Čekinovac
811
Potkokirna
Rujevac
683
Gošići
Dropci
Prline
Jerkovići
Dekić Glavica
549
Terzići
Jakšić
Kvočkin do
Točak
Pišteljak
Mijaković
Razvršje
847
Kamara
Trbojević
789
Bobija
1043
Radusini
Gušarica
555
Jablan
656
Trnovača
Brezovača
Malinjak
1031
So. Marko
Kesići
Jezero
Vučipolje
Kita Gaćešina
1227
Cerovačke peć
Drage
802
875
Kontić
Munižabin vrh
1098
Presvrata
Duman
Dragićevića stan
Đurdev vrh
948
Čulum
860
V. Crnopac
1402
Sedlo
Vučjak
27
1

WIND PARK BASIC DATA:

Wind parka area:	**33,4 km2**
Unit WEC power:	**2,0 MW (preliminary)**
Number of WEC:	**41**
Wind park power:	**82 MW**

LEGISLATION:

1. Regulations on RES: prescribes possibilities and conditions of use RES

2. Minimum share of electricity from RES:

- 5.8 % 2010.,
- 20 % 2020. according to EU target

3. Tariff system:

- 12 years guaranteed price: C (n)=k x C(n-1)xIRP (n-1)
- Electricity price depends on “local content”:

local content >=60 % - k=1
local content =50 % - k=0.9533
local content<=45 % - k=0.93

C(2010)=0,65x0,93x1,052x1,059x1,024 = 0,6896 kn/kWh
= 0,0938 €/kWh

In case of local content >=60 % - C=0,10 €/kWh

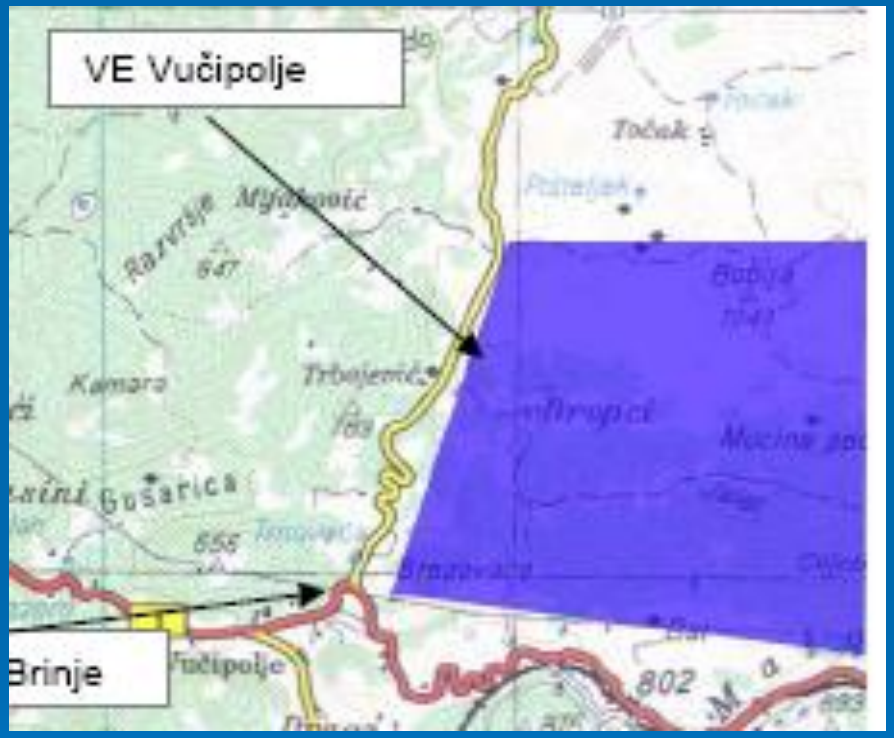
- Correction of el. price yearly according to retail price growth (IRP)

4. Regulation on privileged status of electricity producer from RES

5. By law act on incentive (contribution) to el. producers from RES: all consumers of electricity pay contribution in fond in order to finance incentives

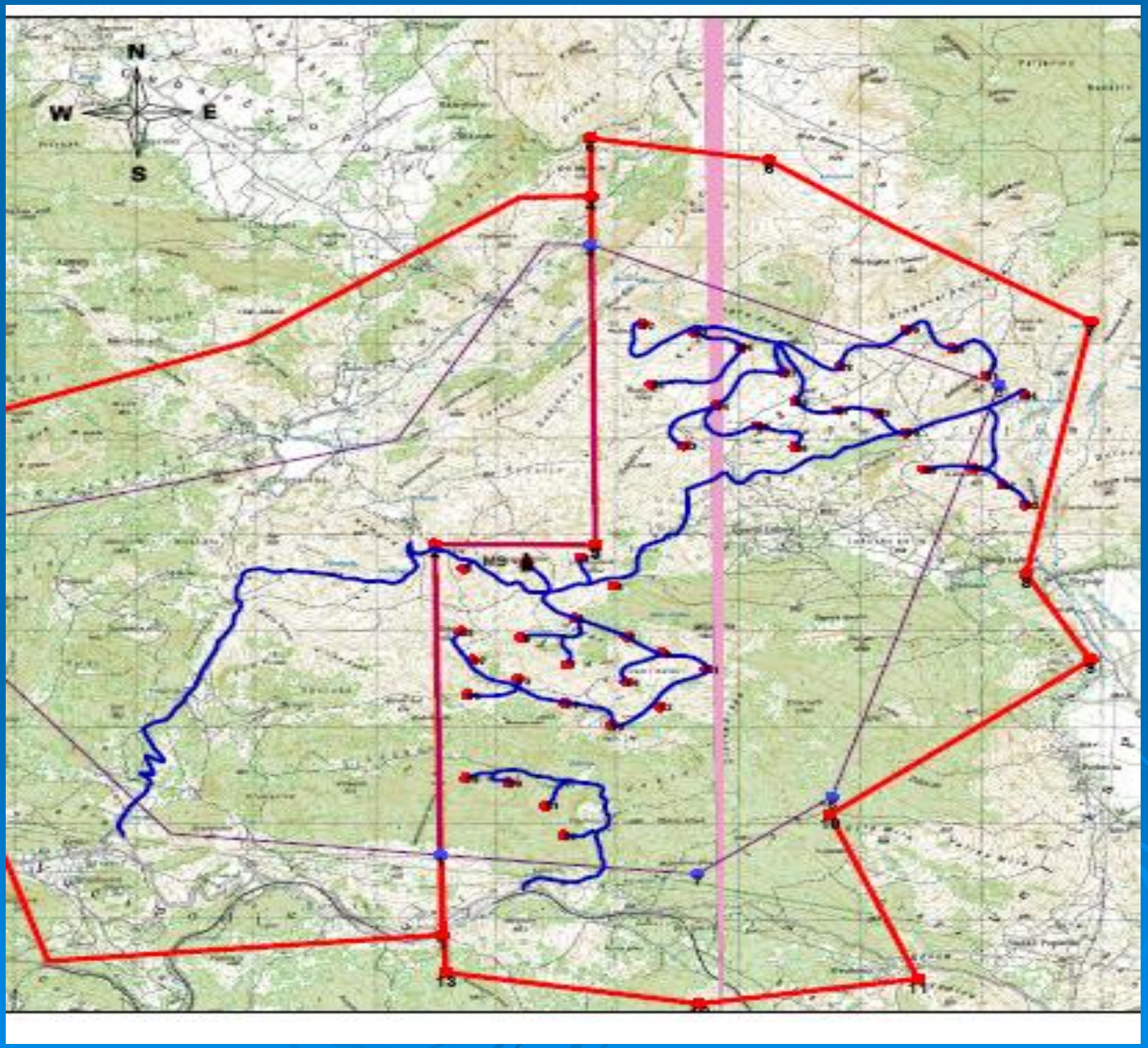
ENVIRONMENT PROTECTION:

- Vučipolje location has been planned in Master plan like a wind park as narrow area – to change Master Plan



- Flora and fauna must be protected according to the law on environment protection,
- Study on environment protection is in progress.

Preliminary Lay out:



Met Mast location (yellow pin):

Met Mast:

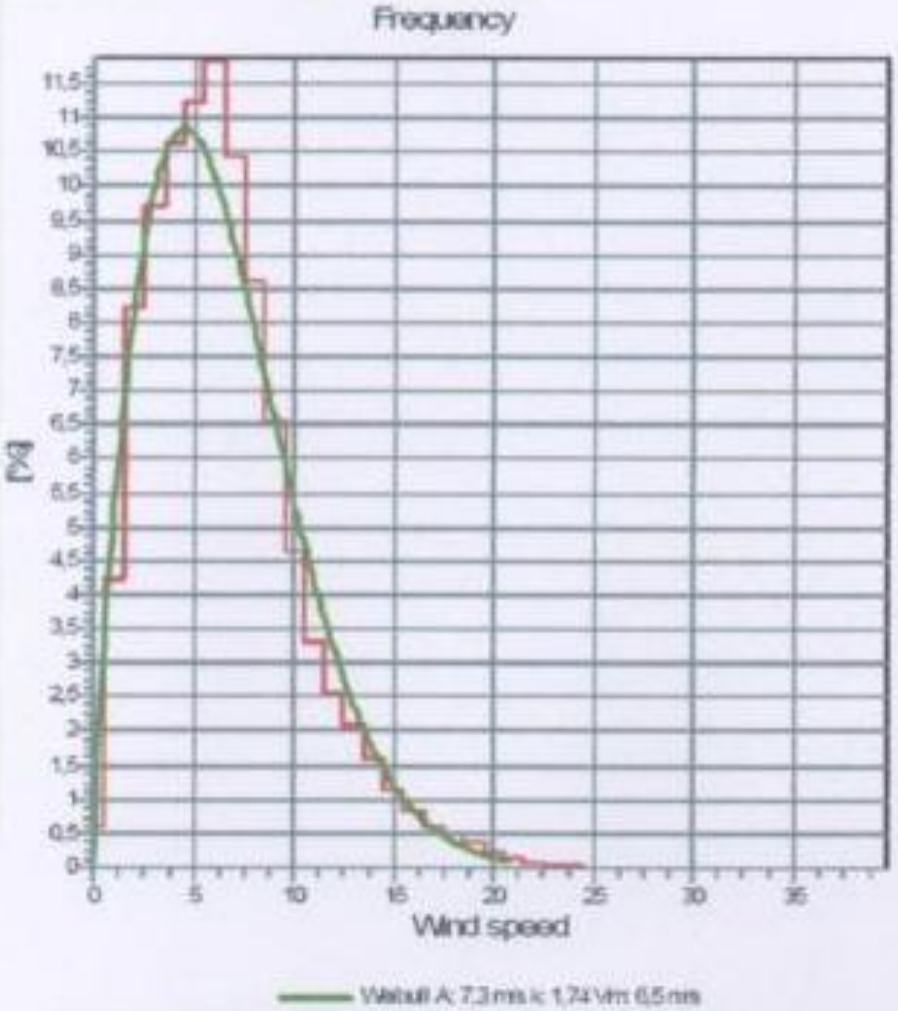
Landscape-terrain configuration:

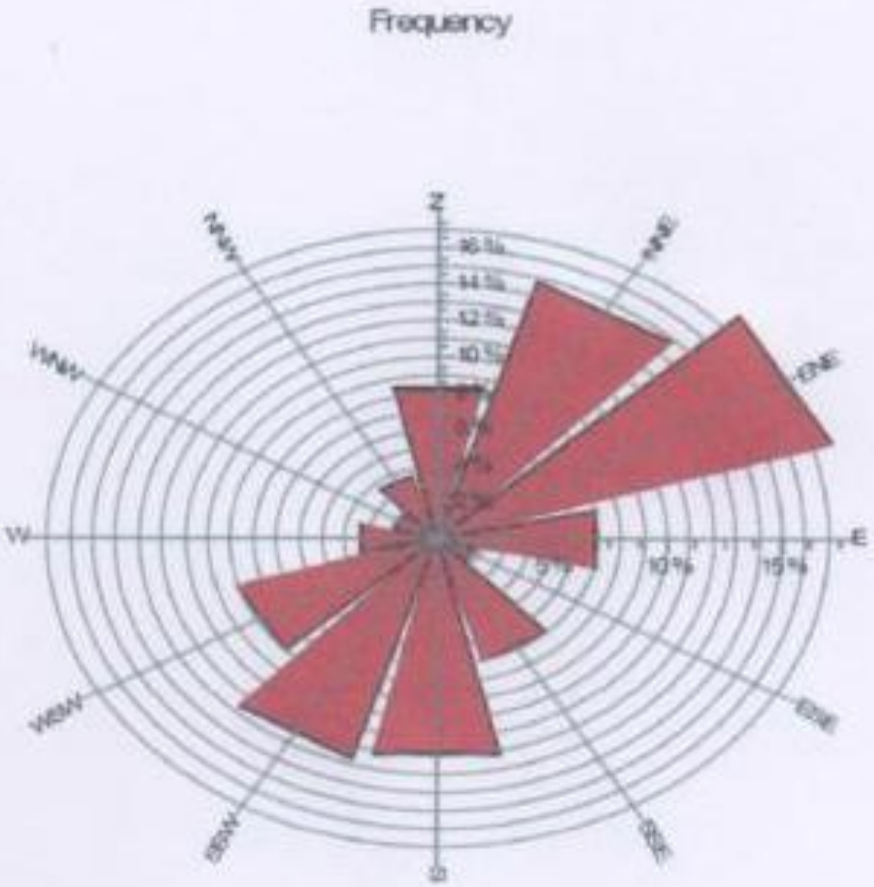

View direction North


View direction South

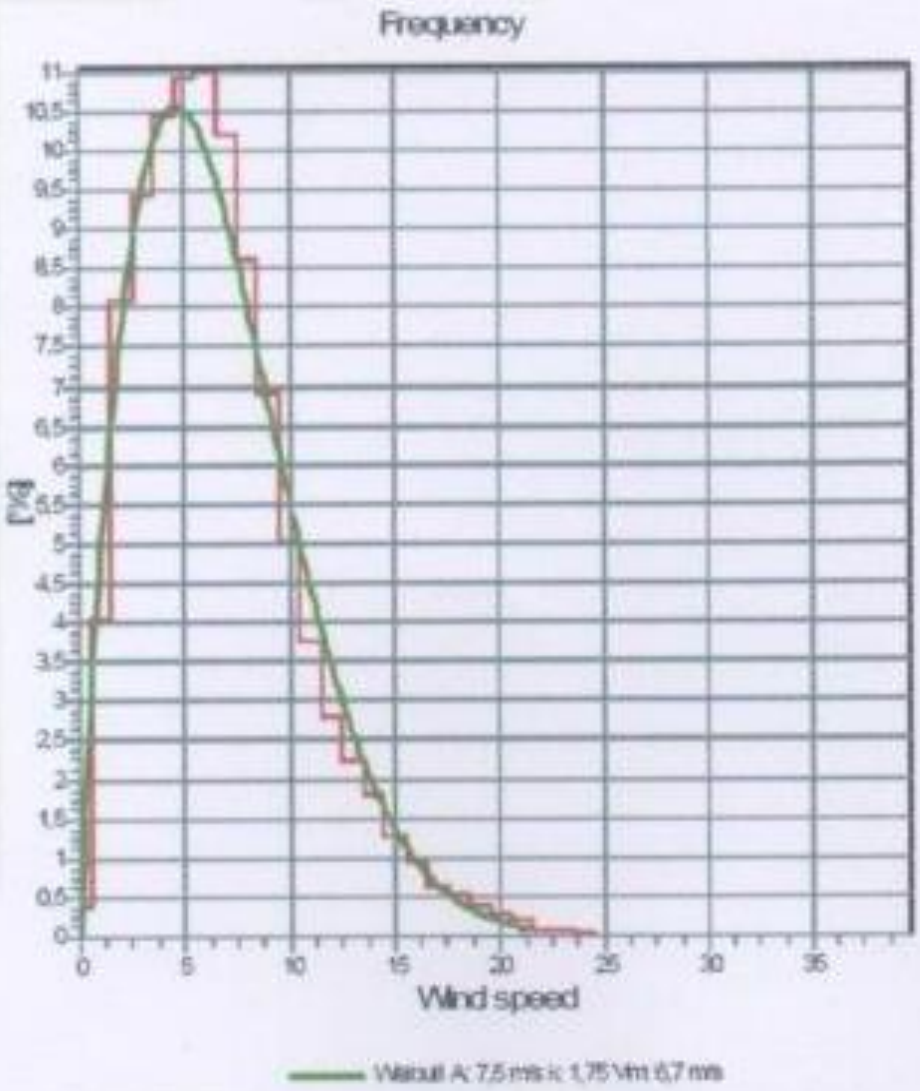
WIND CHARACTERISTICS:

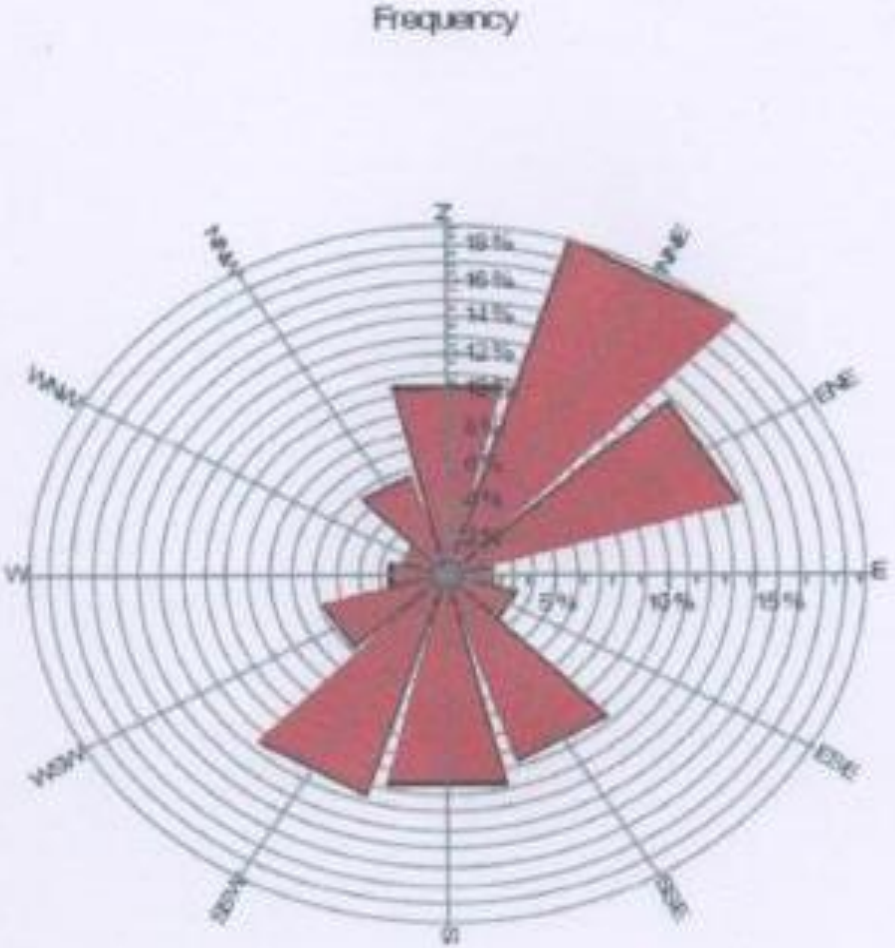
7.4.3.3 Wind speed distribution at 79.3 and Weibull fit



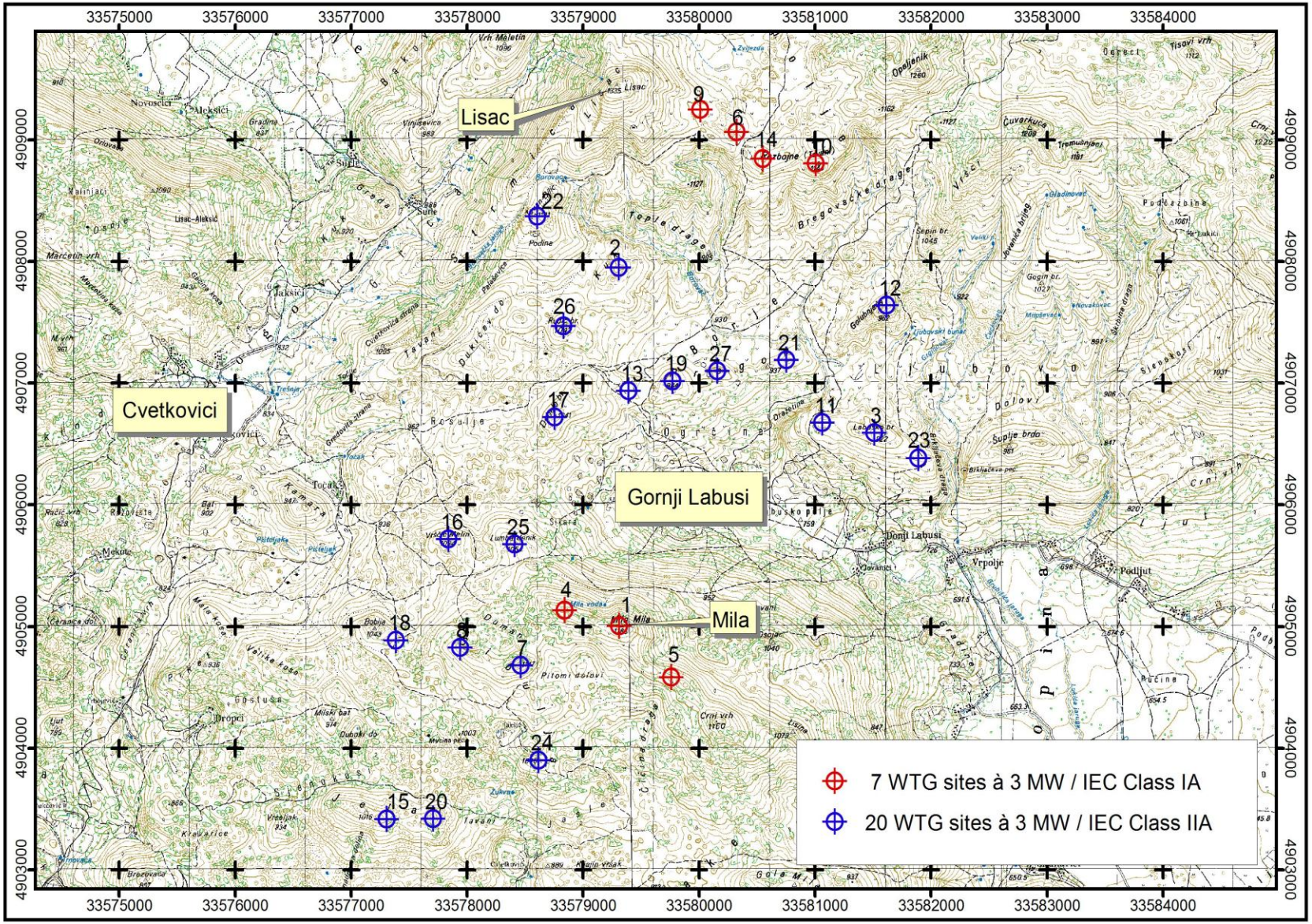


7.4.1.3 Wind speed distribution at 100.5 m and Weibull fit

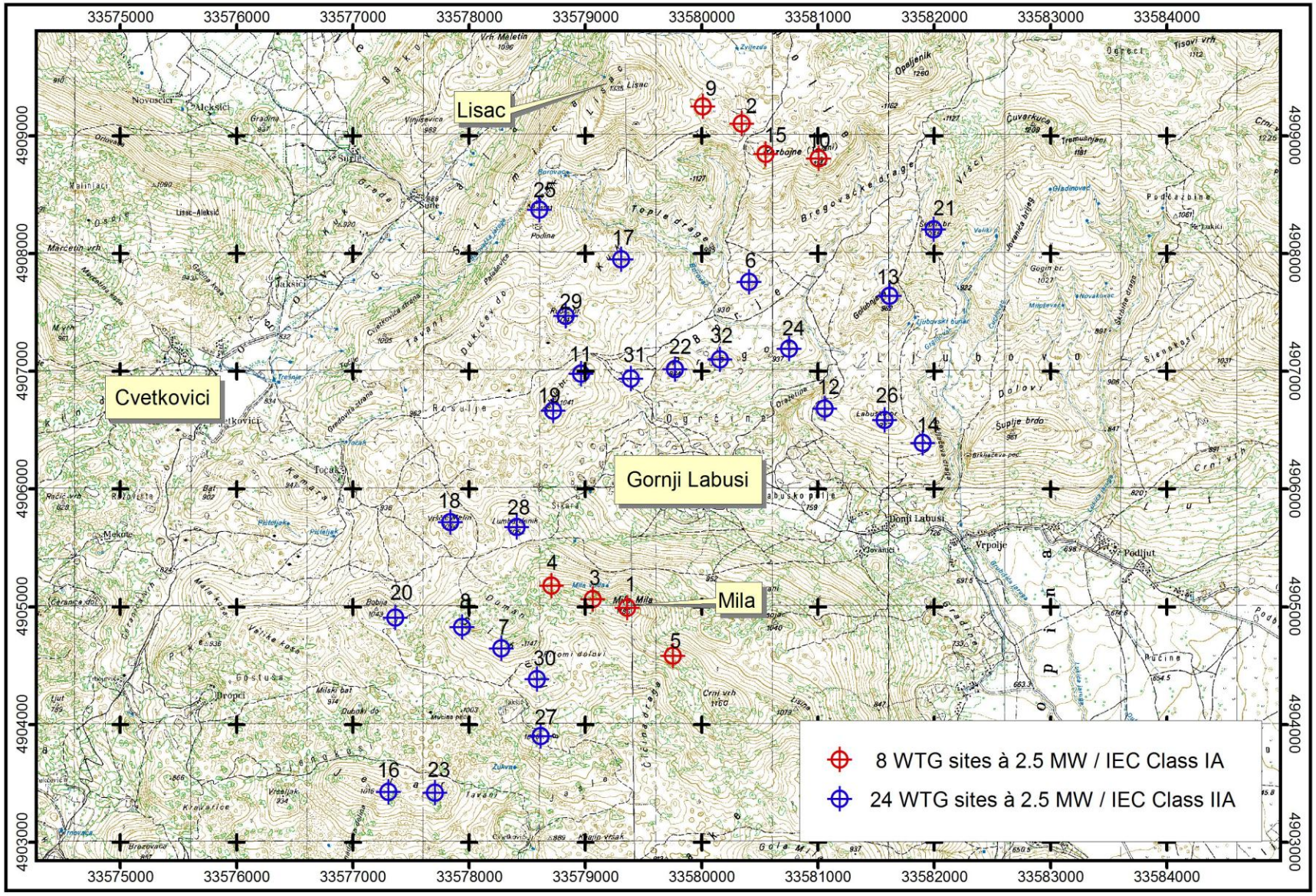




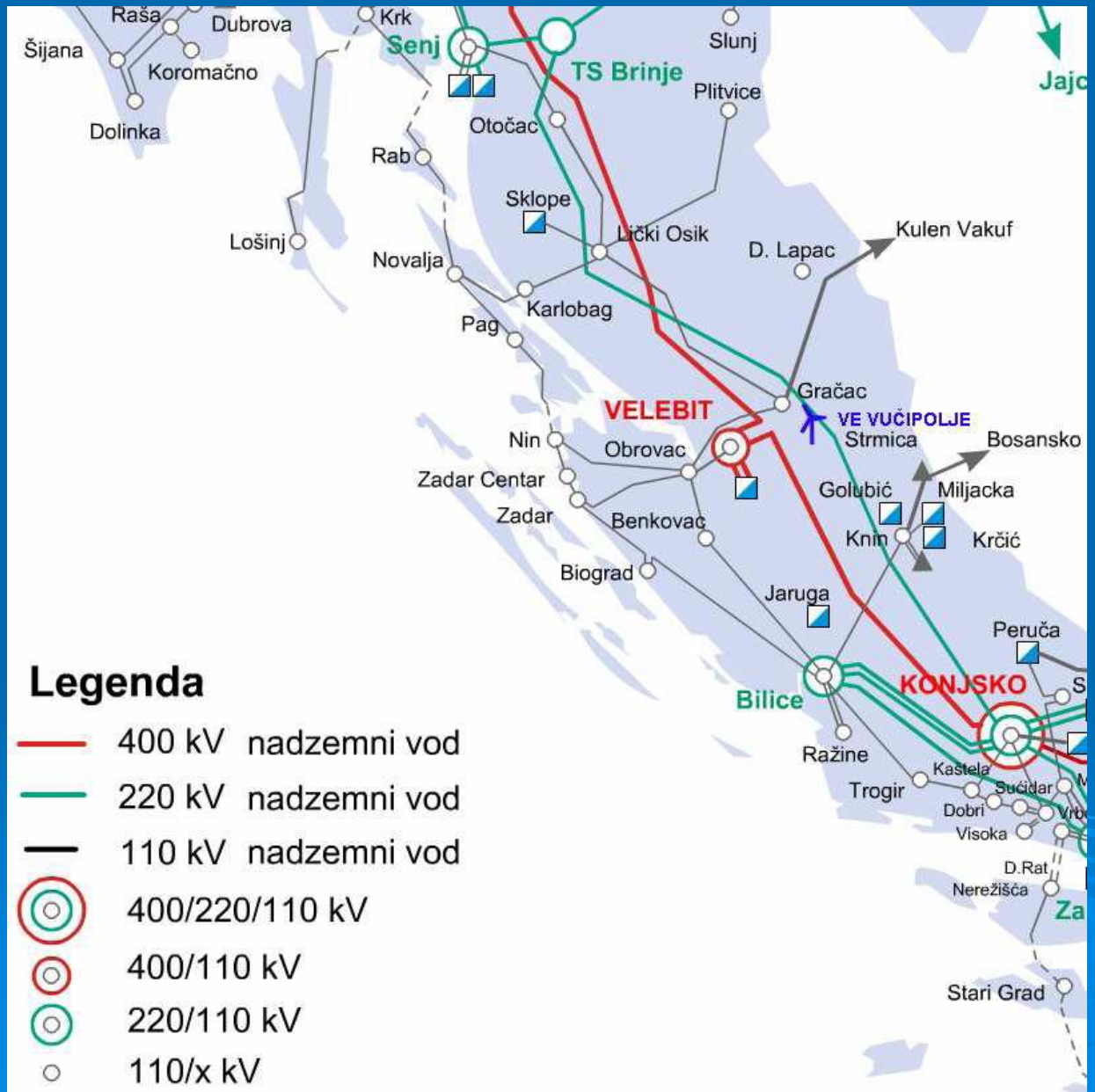
GN Micrositing: 27 x 3 MW:



GN Micrositing: 32 x 2,5 MW:



GRID NEAR VUČIPOLJE:



POSSIBILITY OF THE CONNECTION:

Close to WP there are:

- 110/35 KV trafo station Gračac (8 km),
- 110 kV line Lički Osik-Gračac,
- 110 kV line Gračac-Obrovac,
- 110 kV line Gračac-Kulen Vakuf (BiH),
- 220 kV line Lički Osik-Knin.

Options:

1) New TS at WP-110 kV line to Gračac-connection to TS Gračac, (analyzed and proposed by Energy Institute),
2) New TS at WP-110 kV line to Obrovac (23 km), analyzed by Electro technical faculty Zagreb and suggested by HEP,
3) New TS at WP and connection to 220 KV (proposal Končar)

STATUS OF THE PROJECT:

No	ACTIVITY	STATUS
1.	**Preliminary Approval for construction of WP** (issued by Ministry of Economy)	**Done**
2.	**Wind Potential Campaign**	**Done**
3.	**Settlement of ownership legal relations**	
3.1.	Obtaining of drawing of WP lots from Land Register	Done
3.2.	Obtaining of data on ownerships on the WP lots	Done
3.3.	Contract closing with State Office for Property Management on land use	
3.4.	Contract Closing with private land owners on land use	

4.	**Location Permit**	
4.1.	Study on Connection to the grid	Done
4.2.	Basic design of wind park:	
	- Optimized Wind turbine characteristics	Done
	- Wind Resource Map	Done
	- Micrositing and Energy yield assessment	Done
	- Communication and connection Plan	In procedure
	- Geotechnical Analysis	In procedure
	- Harmonization of Design with Master plan	In procedure
	- Report on the design	
4.3.	Study on impact to Environment	In procedure
4.4.	Preliminary grid connection approval	In procedure

5.	**Grid Connection Agreement - (** HEP)	
5.1.	Connection Agreement	
6.	**Approval for WP Construction - (**Ministry of Economy)	
6.1.	Feasibility study	
6.2.	Location Permit	
7.	**Permission on energy production activities** (HERA)	

8.	**Building Permit -** issued by Ministry of environment protection	
8.1.	Main design of Wind park with Specifications which include:	
	- General arrangement of WP	
	- Calculations, analysis, drawings	
	- Electrical design	
	- Mechanical design	
	- Civil engineering Design	
	- Report on Geotechnical Research	
	- Report on Communication Plan	
	- Technological Report	
	- Report on conformity with Spatial Plan	

	- Report on noise impact	
	- Transportation analysis	
	- Report on Safety on work during the construction	
	- Report on fire protection analysis	
	- Final design of temporary objects	
8.2.	Translation and Conversion of Final Design	
	(documents made according to foreign standards)	
9.	**Project management and logistic**	

FINANCIAL ANALYSIS:

1. REVENUE

- Electricity price 2010.: 0.0938 € / kWh – supposed constant price 20 years, correction on growth of the retail price included (IRP)
- Electricity production: 205.000.000 kWh / year
- Capacity factor: 0.285
- 19.229.000 € / year

2. COSTS:

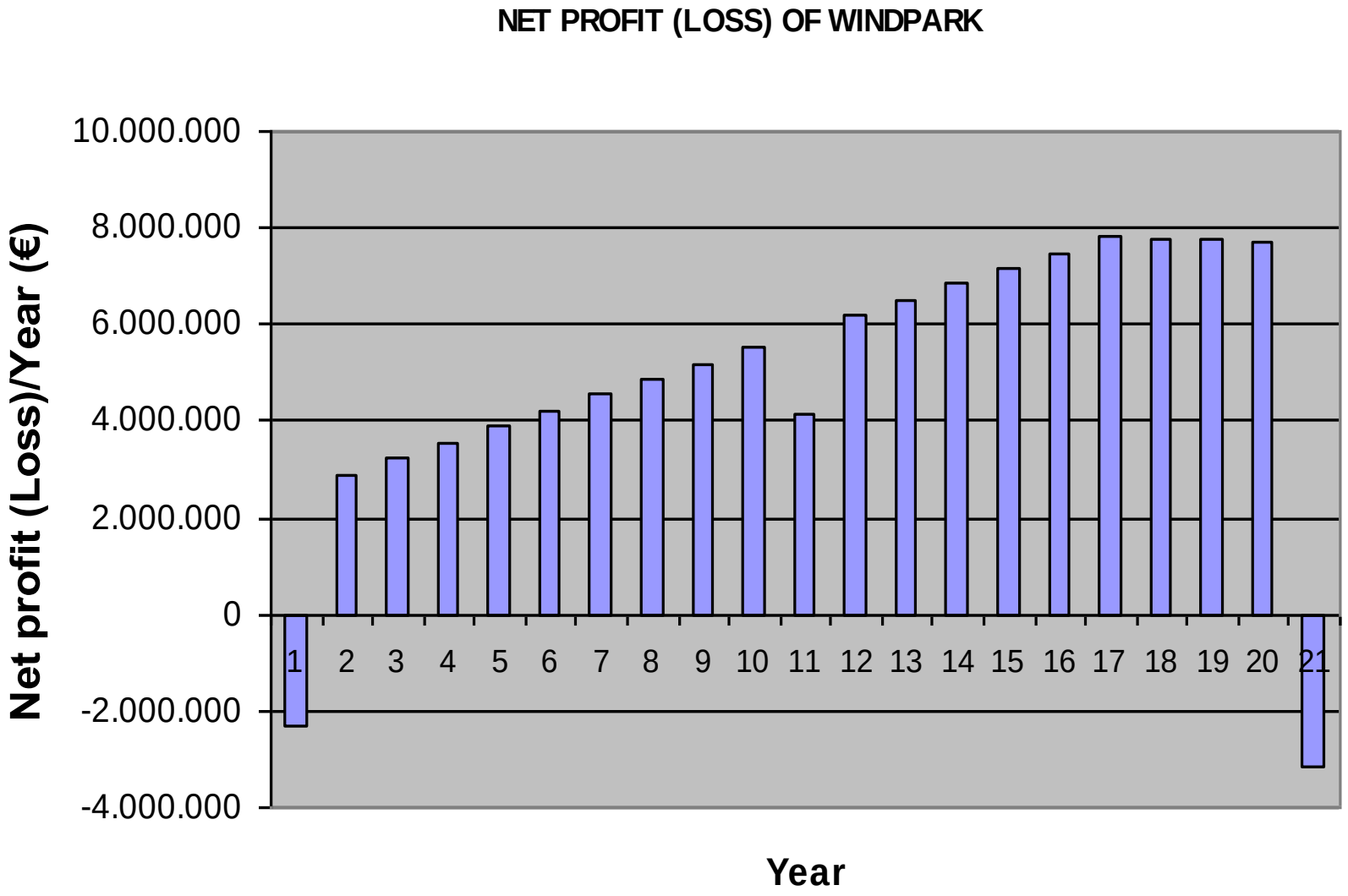
No	ACTIVITY	COST (€)	% INVEST.
1.	**Win Park Development**	**4.260.952**	3,811
2.	**Wind Park Construction:**	**105.868.200**	94,689
2.1.	Wind turbines: Nacelle, Blades, Control	82.000.000	
2.2.	Civil engineering works:	5.339.500	
2.3.	Electrical works:	3.051.750	
2.4.	Connection to the grid:	4.429.950	
2.5.	Transport cost:	6.027.000	
2.6.	Installation (15 month):	4.353.000	
2.7.	Other cost of construction:	667.000	
3.	**Financial Arrangement (1,5%)**	**1.677.143**	1,500
	SUMM (1+2+3) = INVESTMENT COST	**111.806.295**	100,000

No	ACTIVITY	COST (€)	% INVEST.
4.	**Operating costs:**		
4.1.	Maintenance costs (1.5 % II Faze)	1.585.500	
4.2.	Insurance(1,25 % II Faze)	1.321.250	
4.3.	Contribution to local authority (0,01 kn/kWh)	300.000	
4.4.	Legal and administration works	30.000	
4.5.	Other costs	50.000	
	SUMM	**3.286.750**	
5.	**Separate costs:**		
5.1.	General repair in 11. year operating (2% II Faze)	2.115.000	
5.2.	Decommission costs in 21.year (3 % II Faze)	3.171.000	
	SUMM	**5.286.000**	

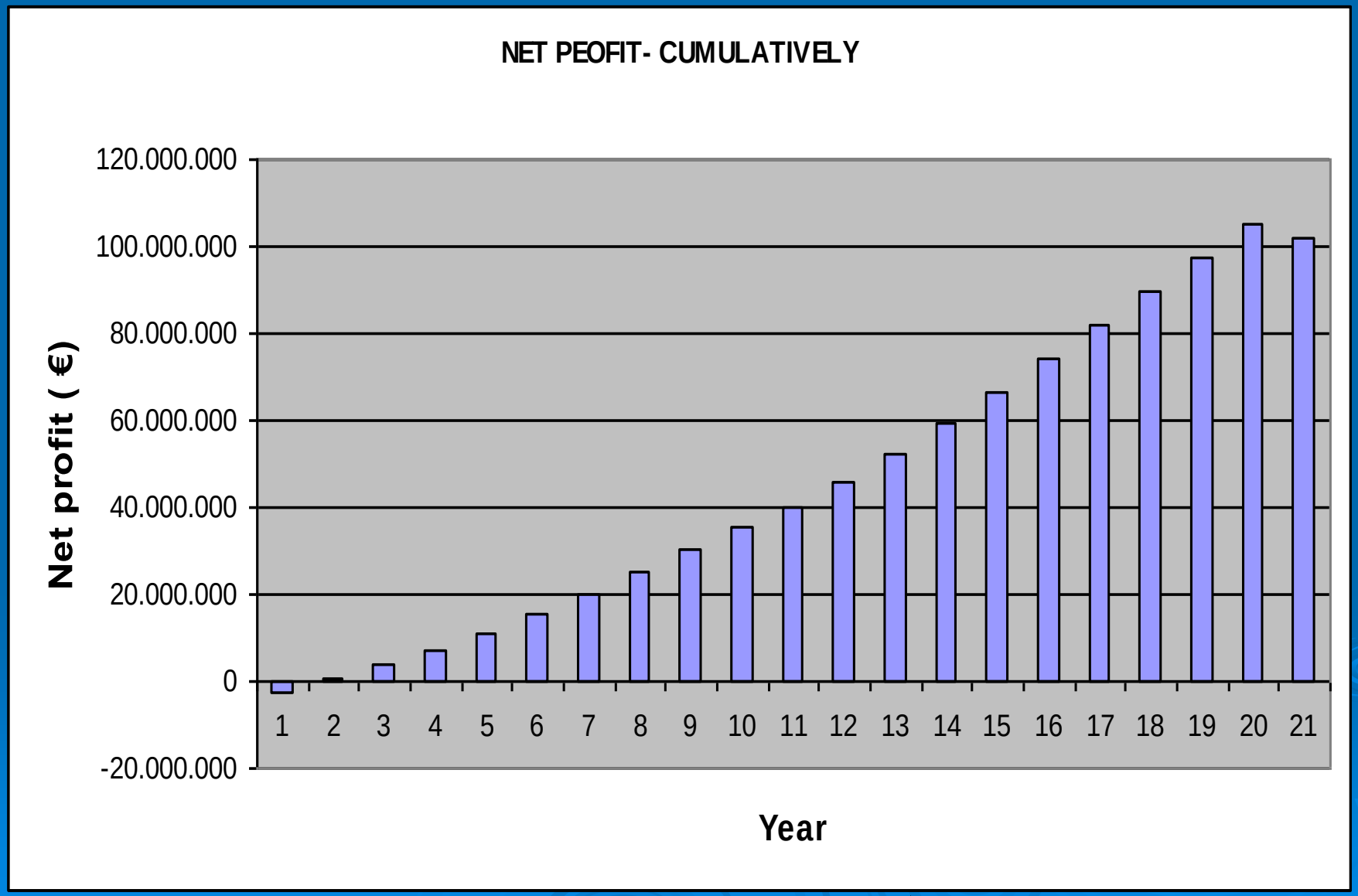
3. PROFIT AND LOSS ACCOUNT: calculation model

POSITION	1 year	2 year	3 year
Annual production (kWh)	205.000.000	205.000.000	205.000.000
El. price (€ / kWh)	0,09380	0,09380	0,09380
Revenue (€)	**19.229.000**	**19.229.000**	**19.229.000**
Maintenance costs (incr. 2%/year)	-1.585.500	-1.617.210	-1.649.554
Insurance costs	-1.321.250	-1.321.250	-1.321.250
General Repair cost	0	0	0
Decommission costs	0	0	0
Contribution to local authority	-300.000	-300.000	-300.000
Legal and administrative works	-30.000	-30.000	-30.000
Other costs	-50.000	-50.000	-50.000
Cost of I Faze (Development)	-4.260.952	0	0
Financial arrangement fee	-1.677.143	0	0
Operating Costs (€)	**-9.224.845**	**-3.318.460**	**-3.350.804**
EBITDA	**10.004.155**	**15.910.540**	**15.878.196**
Depreciation	-5.590.315	-5.590.315	-5.590.315
EBIT	**4.413.840**	**10.320.225**	**10.287.881**
Interest payment	-6.708.378	-6.708.378	-6.261.153
GROSS PROFIT	**-2.294.538**	**3.611.848**	**4.026.729**
Profit tax (20 %)	0	-722.370	-805.346
NET PROFIT	**-2.294.538**	**2.889.478**	**3.221.383**
Net profit - cumulatively	-2.294.538	594.940	3.816.323

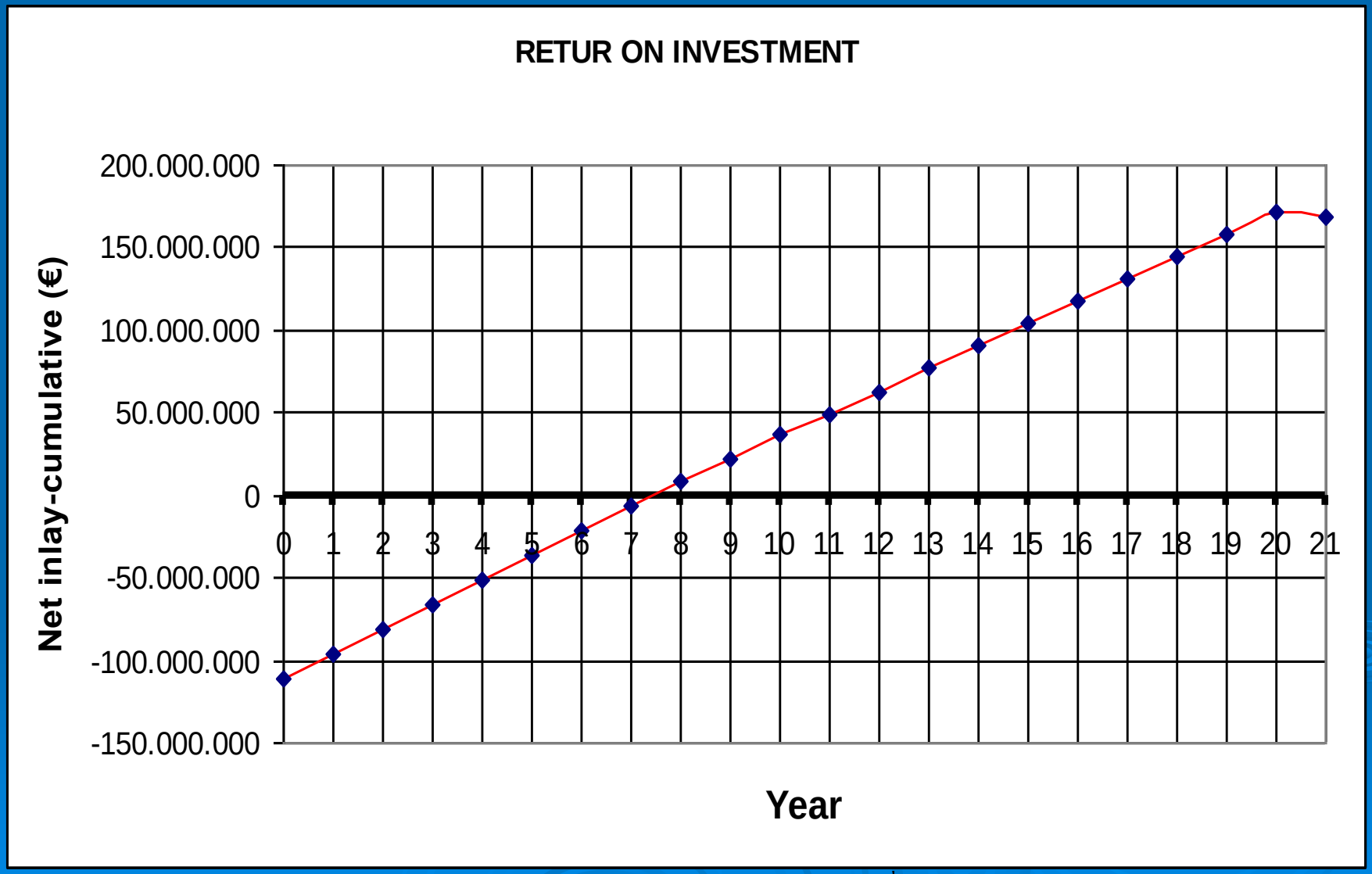
4. NET PROFIT:


NET PROFIT (LOSS) OF WINDPARK
Net profit (Loss)/Year (€)
10.000.000
8.000.000
6.000.000
4.000.000
2.000.000
0
-2.000.000
-4.000.000
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Year

Net profit-Cumulatively:

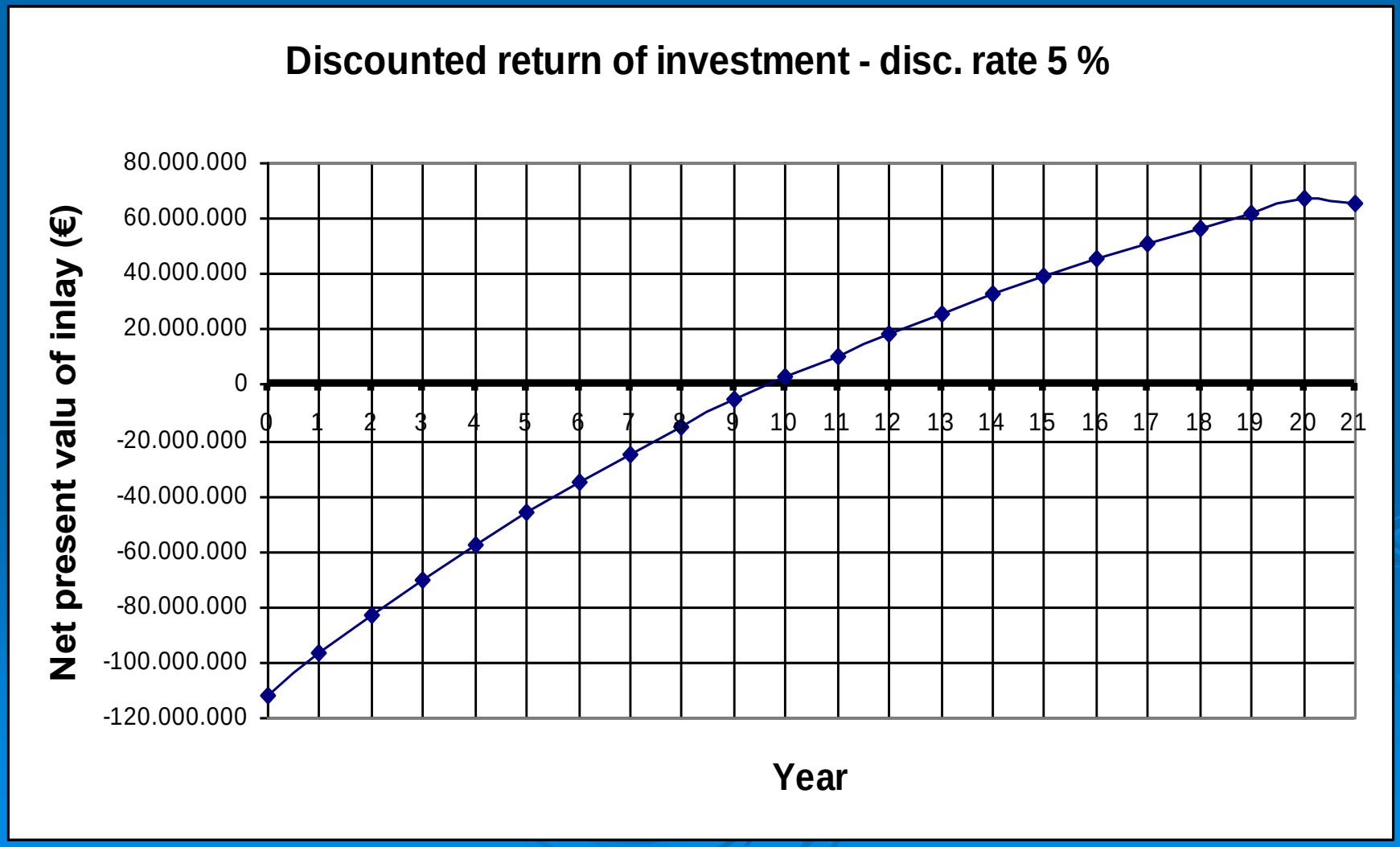


5. PROFITABILITY OF THE PROJECT:



Net Present Value:

- **Discount rate = 5 %**
- **NPV = 65.932.400 €**
- **Internal Profitability Rate =11.575,**
- **Relative Net Present Value =0.59**



Project: WP 5 – NOVI VINODOLSKI

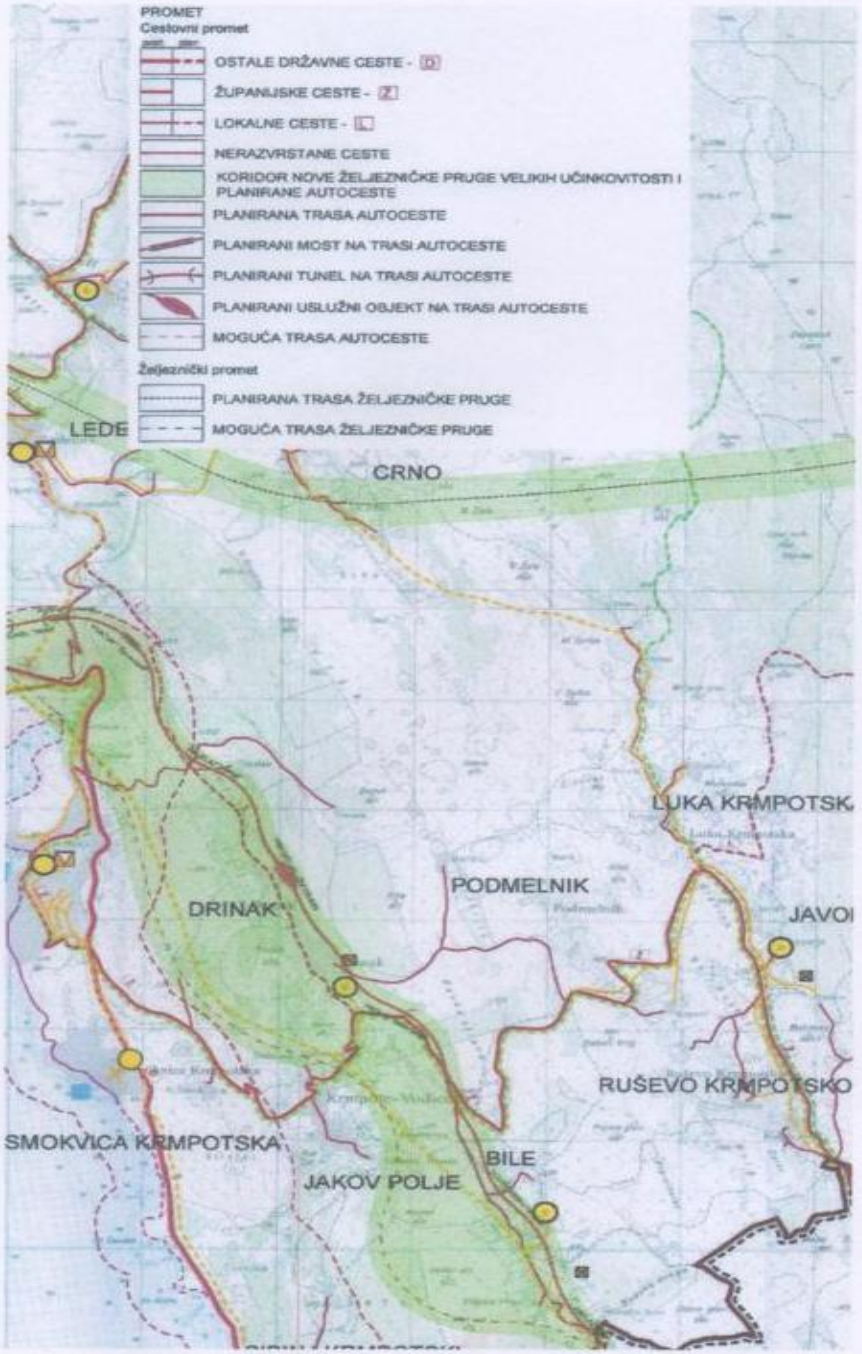
WIND PARK BASIC DATA:

Location:	**City Novi Vinodolski**
Wind parka area:	**27,4 km2**
Unit WEC power:	**3,0 MW (preliminary)**
Number of WEC:	**22**
Wind park power:	**66 MW**

MASTER PLAN (see next slide):

- **Close to wind park N. Vinodolski WP Vrataruša is in operation.**
- **Area of WP N. Vinodolski accepted as wind park-harmonization is under way.**
- **WP N. Vinodolski harmonized with communication requirements – planned highway and railway.**

Master Plan: Communications

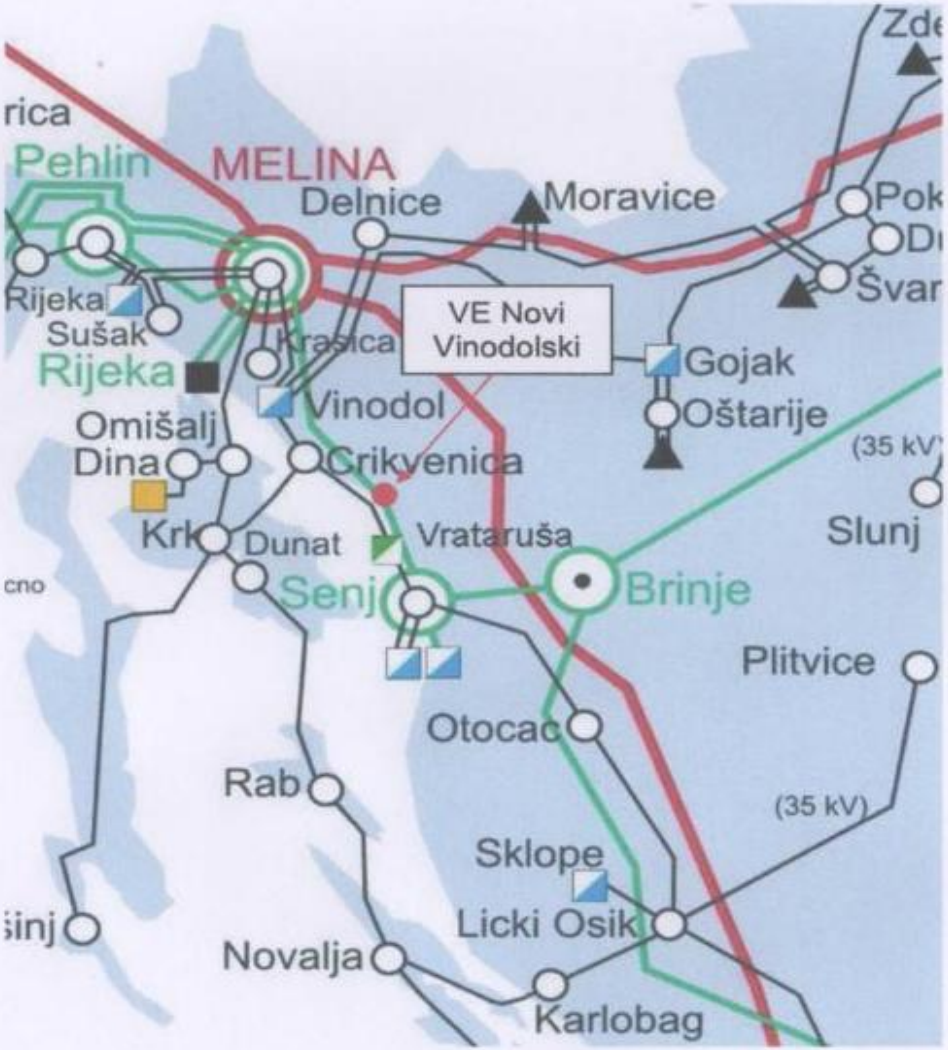


Slika 5-3 izvadak iz Prostornog plana (PP) Novog Vinodolskog – korištenja i namjena površina (promet)

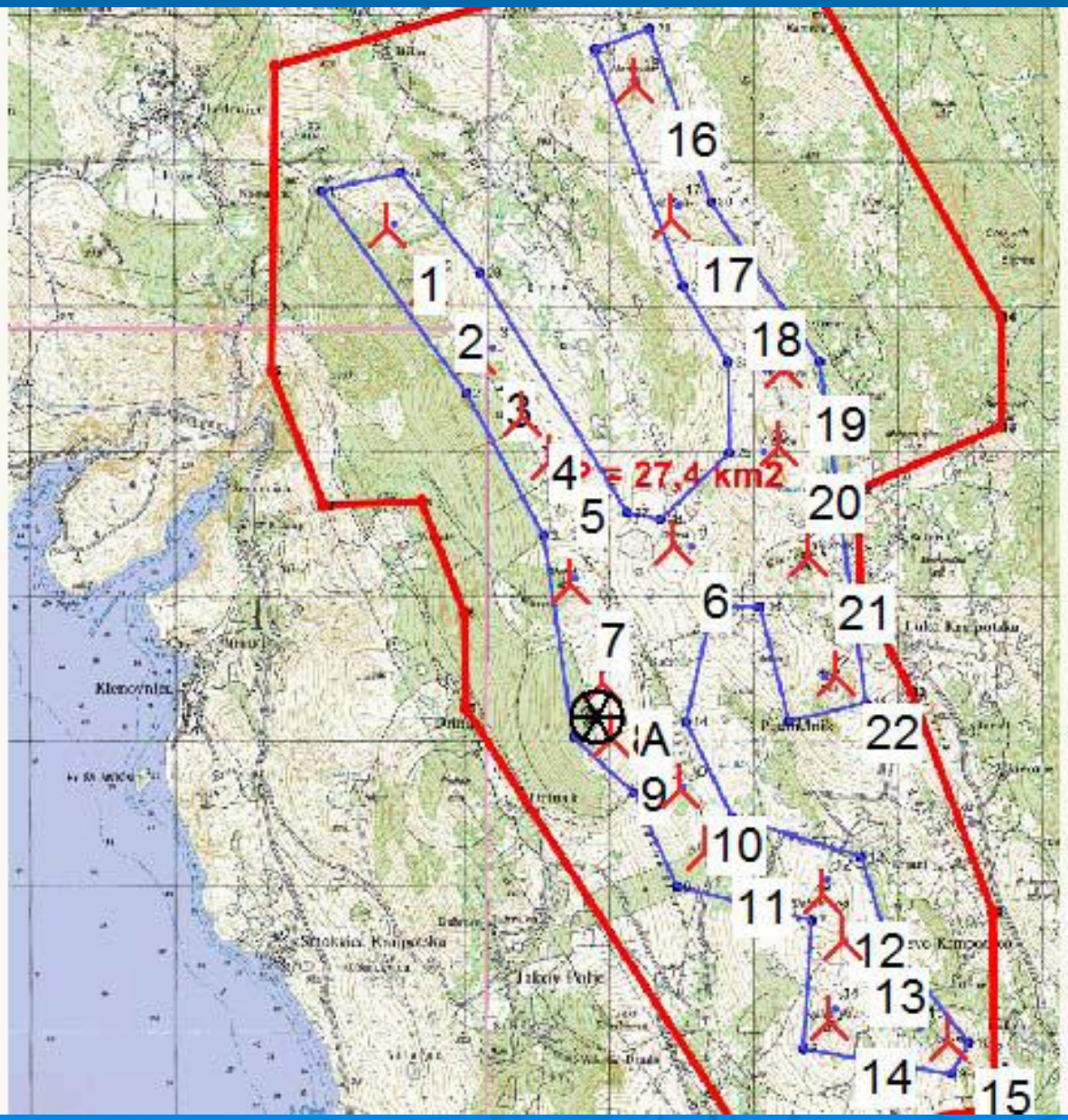
DOCUMENTS:

- Pre feasibility study done by Energy institute, Zagreb,
- Preliminary permit for wind park construction issued by Ministry of the economy,
- Permit for Met mast 100 m installation,
- Preliminary micrositing and energy yield assessment prepared by Ken Tec, Denmark,
- Two month wind potential report by Geo-Net.

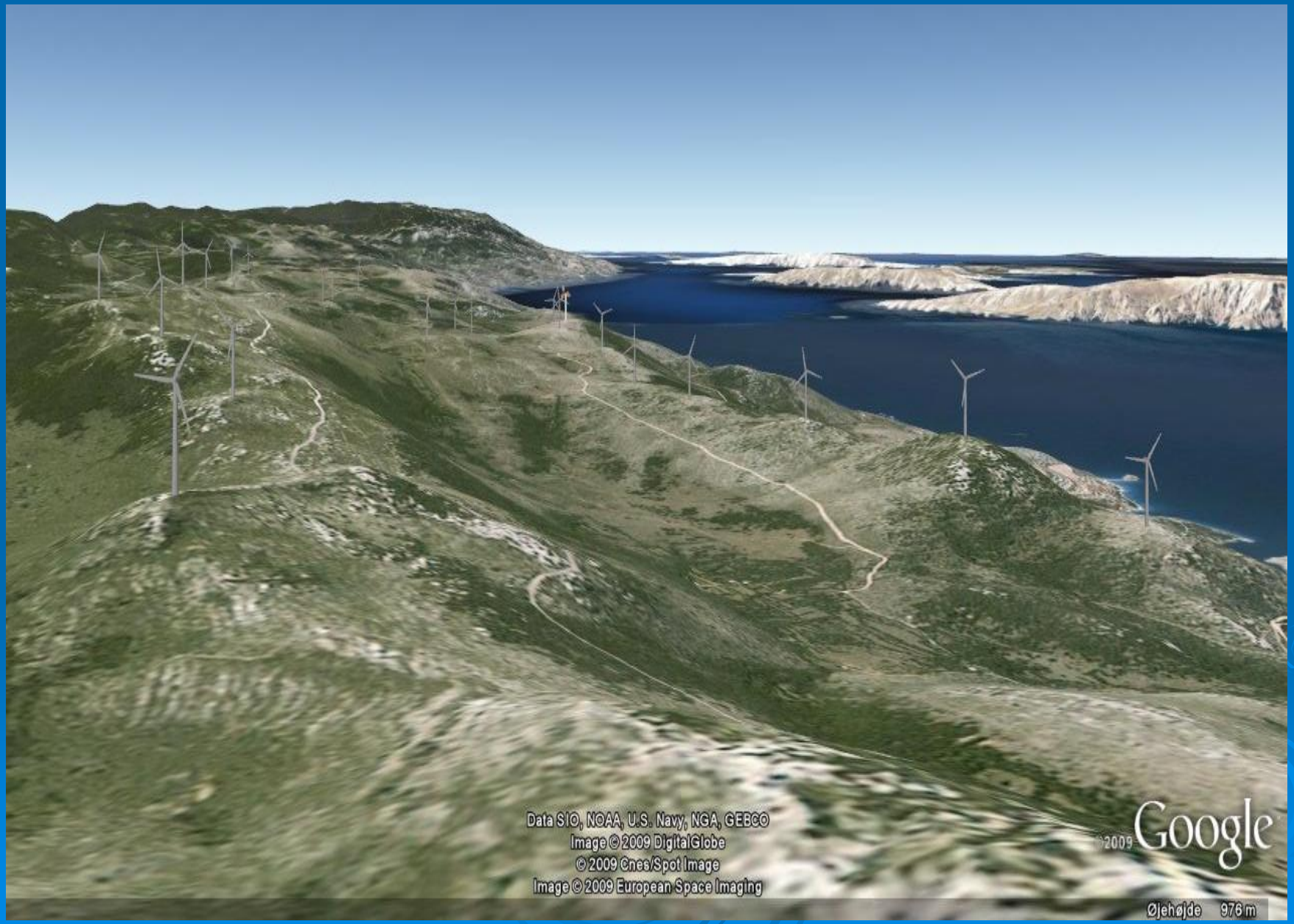
Connection to the grid:
Pre feasibility study proposed to connect WP to 110 kV line Crikvenica-Senj



WP lay out - preliminary



WP N. Vinodolski

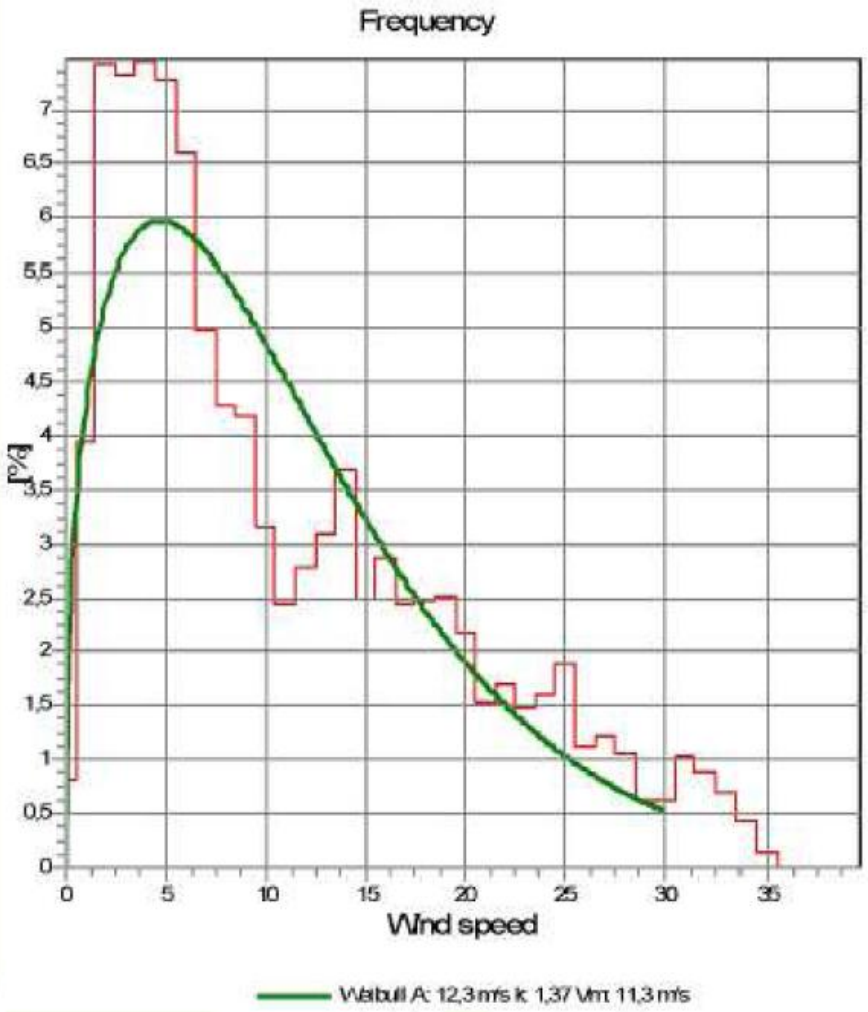


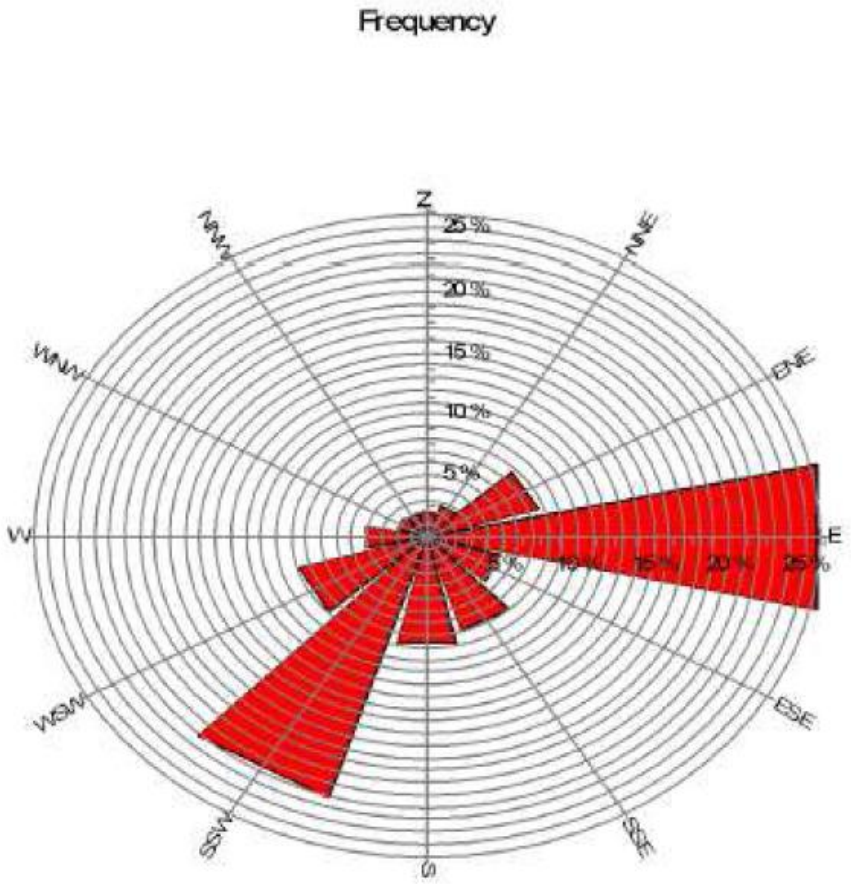
Wind speed November and December 2010.:

1.2 Overview of wind speed average values and extreme values

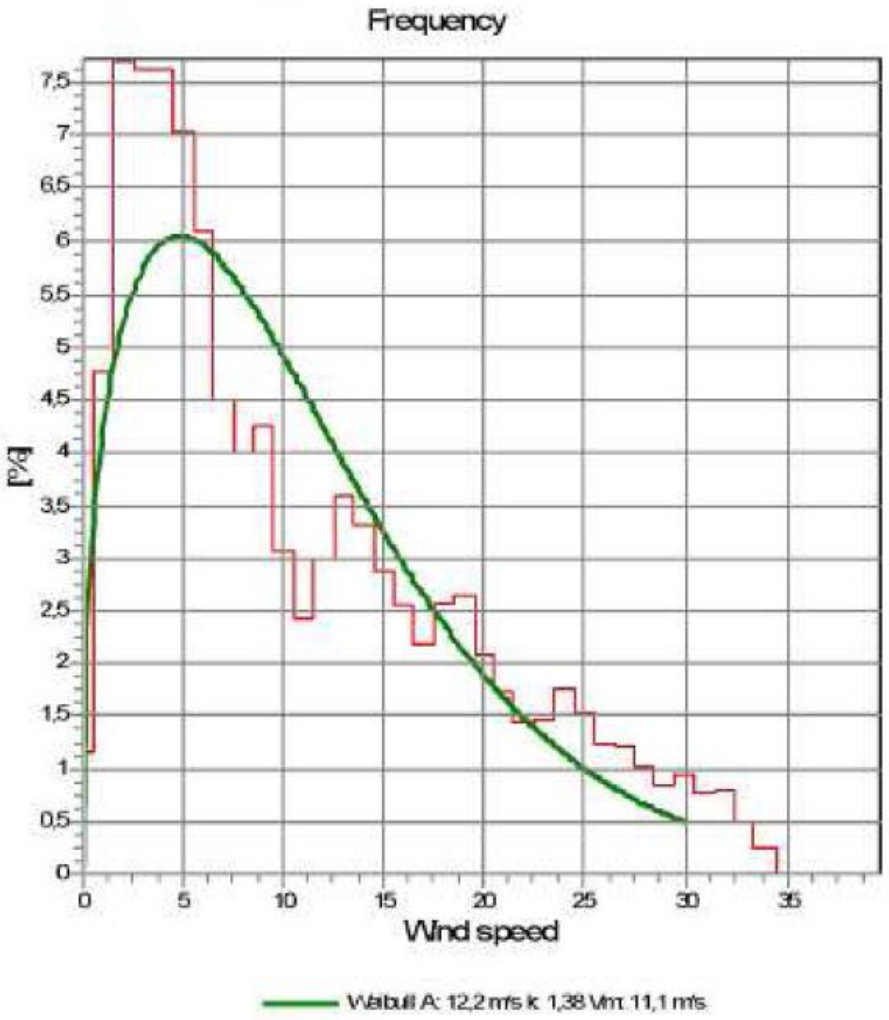
Height	Mean wind speed [m/s]	10-min maximum wind speed [m/s]	1-sec maximum wind speed [m/s]
100.5 m	11.17	35.07	45.10
99 m	11.16	34.82	44.28
70 m	10.94	34.42	43.81
40 m	10.86	34.55	43.18

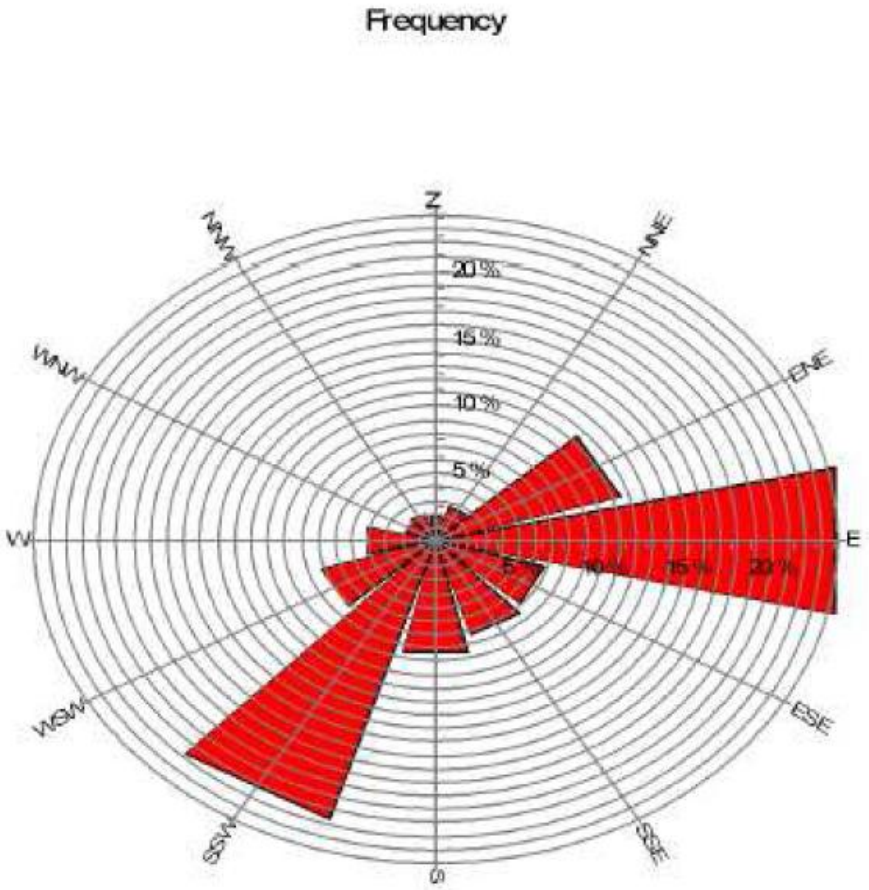
2.1.3. Wind speed distribution at 100.5 m and Weibull fit (wind direction distribution at 98.5 m)





2.3.3. Wind speed distribution at 70 m and Weibull fit (wind direction distribution at 70 m)





STATUS OF THE PROJECT:

- Pre feasibility study prepared by Energy Institute Zagreb,
- Preliminary permit for wind park construction issued by Ministry of the economy,
- Preliminary Calculation of Annual Energy for Wind Farm performed by Ken Tec, Denmark,
- Met mast 100 m was installed,
- Wind campaign organized with Geo-Net,
- Two months measuring wind data,
- Wind potential report November/December 2010.

Project: WP 4 - ONDIĆ

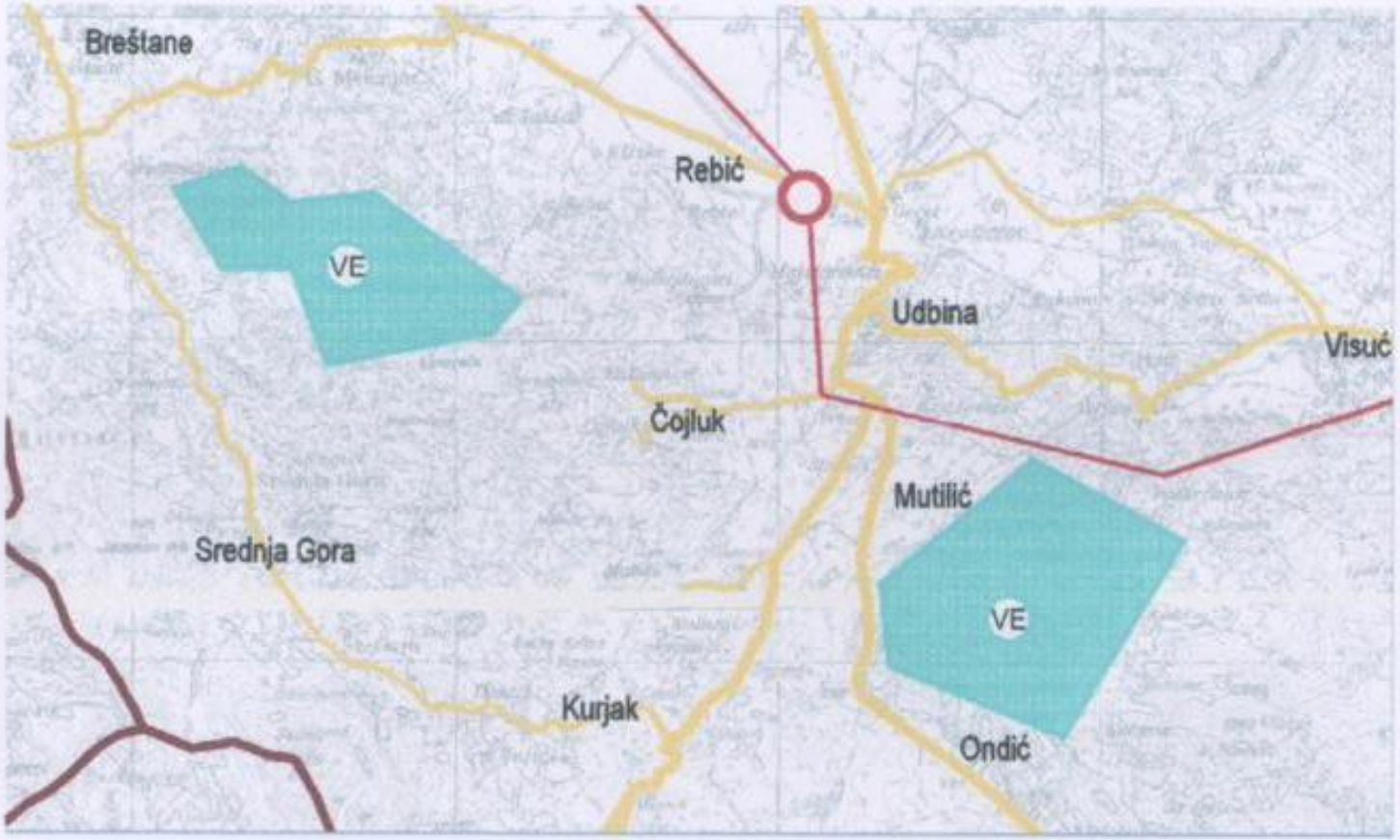
WIND PARK BASIC DATA:

- Location: City Udbina
- Wind parka area: 12,6 km2
- Unit WEC power: 2,0 MW (preliminary)
- Number of WEC: 15
- Wind park power: 30 MW

MASTER PLAN:

- County's Master plan foreseen wider area as wind parks,
- County's authority ready to include wind park area in Master plan,
- Wind parks incorporated in strategic documents of County.

Master plan:



Slika 5-2 Izvadak iz Prostornog plana (PP) Ličko-senjske županije – energetski sustav

DOCUMENTS:

- Pre feasibility study prepared by Energy institute Zagreb.
- Preliminary permit for WP construction issued by Ministry of the economy,
- Preliminary lay out (next slide),
- Permit for installation of Met mast 100 m,
- Met mast steel construction ready.

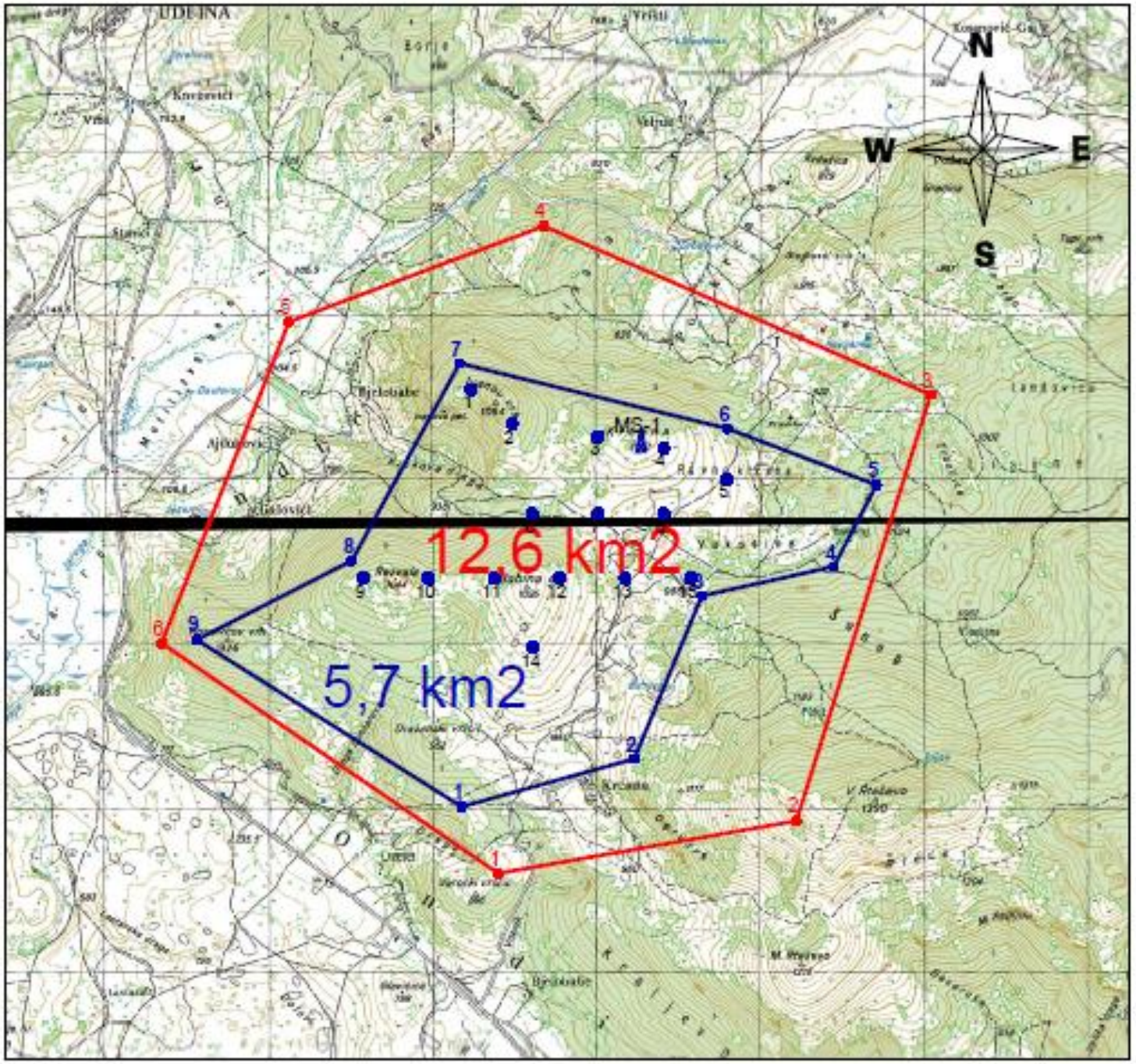
Connection to the grid:

Pre feasibility study proposed connection to the line 110 kV Gračac-Kulen Vakuf (BiH)

Slika 4-2 Položaj VE Ondić u EES Hrvatske

Preliminary

WP Lay out



THANK YOU FOR ATTENTION

July, 2011.

Prepared by M. Čuvalo