

### 3. Size and Design

- a. Gross design capacity
- b. Net design capacity
- c. Estimated thermal efficiency
- d. Acres
- e. Design data reports

## **SECTION A: DESCRIPTION**

### 3. Size and Design

#### a. Gross Design Capacity

Under estimated average wind conditions in the Development site, the 367 MW wind power plant will deliver approximately 1,507,457.1 megawatt hours (MWh) per year.

## **SECTION A: DESCRIPTION**

### **3. Size and Design**

#### **b. Net Design Capacity**

A representative wind speed frequency distribution adjusted for inter-annual wind variation and adjusted using the shear coefficient have been used to predict average annual output for 2.3 MW turbines at the Development site. This frequency distribution described above sets forth the percentage of time the wind will occur in each one-mile per hour wind speed bin on an annual basis. This frequency distribution is matched to the 2.3 MW power curve to estimate the gross energy production. Net output for each turbine, or the actual energy delivered to the substation, is calculated by applying various loss factors.

Project:

**Napoleon**

Description:

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Note 2: The Windstatistic chosen is regarded to be representative for the long-term wind conditions at the site.

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**PARK - Main Result**

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC

Wake Model N.O. Jensen (RISØ/EMD)

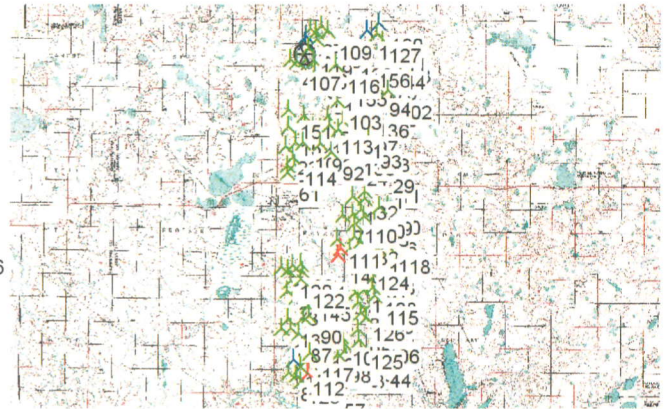
**Calculation Settings**

Air density calculation mode Individual per WTG  
Result for WTG at hub altitude 1.165 kg/m3 to 1.173 kg/m3  
Hub altitude above sea level (asl) 676.4 m to 741.4 m  
Annual mean temperature at hub alt. 3.5 °C to 3.9 °C  
Pressure at WTGs 925.3 hPa to 932.8 hPa

**Wake Model Parameters**

From angle [°] 345.0 15.0 45.0 75.0 105.0 135.0 165.0 195.0 225.0 255.0 285.0 315.0 Other  
To angle [°] 15.0 45.0 75.0 105.0 135.0 165.0 195.0 225.0 255.0 285.0 315.0 345.0 -  
Wake Decay Constant 0.047 0.044 0.041 0.053 0.048 0.041 0.040 0.040 0.040 0.042 0.045 0.052 0.040

Wind statistics US 45.72 m Napoleon Wind 08-2001 to 09-2006



Scale 1:500,000

New WTG

Site Data

**Key results for height 50.0 m above ground level**

Terrain UTM WGS84 Zone: 14

East	North	Name of wind distribution	Type	Wind energy [kWh/m2]	Mean wind speed [m/s]	Equivalent roughness
A 442,927	5,160,485	Park/Wasp Calc	WASP (RVEA0011 1, 0, 0, 13)	4,518	8.2	0.7

**Calculated Annual Energy for Wind Farm**

WTG combination	Annual Energy		Pork Efficiency [%]	Mean WTG energy [MWh]	Capacity Factor for	
	Result [MWh]	Result-10.0% [MWh]			Result [%]	Result-10.0% [%]
Wind farm	1,507,457.1	1,356,711.3	92.0	9,421.6	46.7	42.1

**Calculated Annual Energy for each of 160 new WTG's with total 368.0 MW rated power**

Terrain	WTG type		Power, rated	Rotor diameter	Hub height	Power curve Creator Name	Annual Energy		Pork Efficiency [%]	Mean wind speed [m/s]
	Valid	Manufact.					Type-generator	Result		
1 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	10,025.1	9,023	94.6	9.0
2 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,672.1	8,705	93.7	8.8
3 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	10,048.4	9,044	94.9	9.0
4 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,902.7	8,912	93.9	9.0
5 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,697.1	8,727	90.2	9.1
6 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,426.9	8,484	91.7	8.8
7 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,295.5	8,366	90.1	8.8
8 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,505.3	8,555	92.9	8.8
9 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,648.0	8,683	90.7	9.0
10 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,579.7	8,622	92.6	8.9
11 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,645.3	8,681	94.7	8.8
12 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,466.9	8,520	90.7	8.9
13 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,459.7	8,514	91.2	8.9
14 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,520.4	8,568	94.8	8.7
15 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,480.7	8,533	92.7	8.8
16 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,269.0	8,342	91.7	8.7
17 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,411.3	8,470	89.7	8.9
18 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,585.5	8,627	92.7	8.8
19 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,193.7	8,274	89.6	8.8
20 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,178.5	8,261	90.3	8.8
21 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,229.3	8,306	91.5	8.7
22 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,053.2	8,148	90.6	8.7
23 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0 USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,452.0	8,507	94.4	8.7

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Project:

**Napoleon**

Description:

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**PARK - Main Result**

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC

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Terrain	WTG type		Power, rated	Rotor diameter	Hub height	Power curve		Annual Energy		Park	
	Valid	Manufact. Type-generator				Creator	Name	Result	Result-10.0%	Efficiency	Mean wind speed
			[kW]	[m]	[m]			[MWh]	[MWh]	[%]	[m/s]
24 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,405.7	8,465	93.3	8.7
25 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,378.2	8,440	91.6	8.8
26 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,104.9	8,194	90.9	8.7
27 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,580.0	8,622	91.9	8.9
28 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,160.5	8,244	89.9	8.8
29 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,816.3	8,835	94.0	8.9
30 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,606.6	8,646	92.8	8.9
31 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,070.1	8,163	90.0	8.7
32 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,153.9	8,239	92.2	8.6
33 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,416.2	8,475	91.8	8.8
34 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,104.1	8,194	91.4	8.6
35 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,561.0	8,605	92.5	8.9
36 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,297.1	8,367	93.1	8.7
37 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,143.3	8,229	90.6	8.7
38 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,620.7	8,659	92.5	8.9
39 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,560.6	8,605	91.6	8.9
40 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,582.6	8,624	91.9	8.9
41 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,065.8	8,159	90.9	8.6
42 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,808.8	7,928	89.7	8.6
43 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,630.1	8,667	91.9	8.9
44 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,881.6	8,893	96.3	8.8
45 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	10,137.5	9,124	94.0	9.1
46 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,933.0	8,940	94.8	8.9
47 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,264.8	8,338	89.8	8.8
48 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,262.7	8,336	91.5	8.7
49 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,346.0	8,411	89.6	8.9
50 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,028.2	8,125	89.5	8.7
51 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,214.0	8,293	91.2	8.7
52 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,466.8	8,520	91.3	8.9
53 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,831.4	7,948	90.2	8.6
54 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,254.9	8,329	90.7	8.8
55 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,261.6	8,335	90.5	8.8
56 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,521.5	8,569	92.9	8.8
57 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,945.6	8,051	88.3	8.7
58 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,581.3	8,623	92.1	8.9
59 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,543.4	8,589	92.7	8.8
60 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,896.7	8,907	92.4	9.1
61 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,645.6	8,681	96.1	8.7
62 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,381.0	8,443	92.2	8.8
63 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,344.8	8,410	89.8	8.9
64 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,071.2	8,164	92.0	8.6
65 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,403.2	8,463	92.4	8.8
66 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,578.6	8,621	93.5	8.8
67 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,596.6	8,637	92.0	8.9
68 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,291.0	8,362	89.1	8.9
69 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,641.1	8,677	91.7	9.0
70 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,912.7	8,021	92.1	8.5
71 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,809.3	8,828	93.8	8.9
72 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,289.6	8,361	91.3	8.8
73 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,972.9	8,976	92.7	9.1
74 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,884.9	7,996	89.8	8.6
75 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,426.0	8,483	91.7	8.8
76 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,525.8	8,573	91.3	8.9
77 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,700.1	8,730	93.5	8.9
78 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,364.9	8,428	92.6	8.7
79 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,547.5	8,593	93.7	8.8
80 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,441.5	8,497	91.7	8.8
81 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,317.1	8,385	91.5	8.8
82 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,062.5	8,156	88.8	8.8
83 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,205.4	8,285	90.2	8.8
84 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,329.7	8,397	92.4	8.7
85 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,104.5	8,194	91.2	8.7
86 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,791.3	8,812	91.8	9.0
87 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,072.7	8,165	91.6	8.6
88 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,778.0	8,800	95.1	8.8
89 A	Yes	Siemens SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,385.1	8,447	91.1	8.8

Continued on next page...

Project:  
**Napoleon**

Description:  
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Note 2: The Windstatistic chosen is regarded to be representative for the long-term wind conditions at the site.

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**PARK - Main Result**

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC

...continued from previous page

Terrain	WTG type		Type-generator	Power, rated	Rotor diameter	Hub height	Power curve		Annual Energy Result	Park		Mean wind speed
	Valid	Manufact.					Creator	Name		Result-10.0%	Efficiency	
90 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,512.0	8,561	91.6	8.9
91 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,591.0	8,632	92.1	8.9
92 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,630.6	8,668	93.2	8.9
93 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,631.5	8,668	92.1	8.9
94 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,052.5	8,147	91.8	8.6
95 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,539.2	8,585	92.2	8.9
96 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,180.7	8,263	89.8	8.8
97 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,650.0	8,685	91.9	8.9
98 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,652.7	8,687	91.5	9.0
99 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,184.3	8,266	90.8	8.7
100 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,569.2	8,612	91.6	8.9
101 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,350.6	8,416	90.4	8.9
102 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	10,178.5	9,161	94.0	9.1
103 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,633.2	8,670	92.5	8.9
104 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,168.5	8,252	90.6	8.7
105 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,482.7	8,534	93.8	8.7
106 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,569.6	8,613	92.1	8.9
107 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,434.2	8,491	92.7	8.8
108 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,423.2	8,481	91.0	8.9
109 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,776.6	8,799	92.5	9.0
110 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,750.5	7,875	89.4	8.5
111 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,565.2	8,609	92.5	8.8
112 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,214.4	8,293	91.8	8.7
113 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,963.2	8,067	89.0	8.7
114 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,392.0	8,453	93.0	8.7
115 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,514.8	8,563	92.1	8.9
116 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,476.2	8,529	91.2	8.9
117 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,282.7	8,354	90.9	8.8
118 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,316.4	8,385	91.9	8.7
119 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,468.6	8,522	91.5	8.9
120 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,434.2	8,491	91.1	8.9
121 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,000.6	8,100	89.6	8.7
122 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,622.2	8,660	90.5	9.0
123 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,371.7	8,435	92.5	8.7
124 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,305.5	8,375	90.0	8.9
125 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,357.9	8,422	92.5	8.7
126 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,185.9	8,267	90.9	8.7
127 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,698.5	8,729	93.7	8.9
128 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,119.4	8,207	89.7	8.8
129 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,948.5	8,054	88.8	8.7
130 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,284.6	8,356	92.0	8.7
131 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,155.3	8,240	90.9	8.7
132 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,212.0	8,291	90.4	8.8
133 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,664.0	8,698	93.6	8.8
134 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,384.8	8,446	91.3	8.8
135 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,155.7	8,240	90.5	8.7
136 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,694.6	8,725	92.5	8.9
137 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,438.5	8,495	90.7	8.9
138 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,617.9	8,656	93.6	8.8
139 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,574.4	8,617	91.1	9.0
140 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,108.8	8,198	92.7	8.6
141 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,330.2	8,397	93.9	8.6
142 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,219.9	8,298	90.9	8.7
143 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,810.3	8,829	94.6	8.9
144 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,352.4	8,417	92.9	8.7
145 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,695.3	8,726	91.3	9.0
146 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,871.3	8,884	92.0	9.1
147 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,741.9	8,768	94.7	8.8
148 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,751.3	8,776	96.7	8.7
149 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,030.9	8,128	90.0	8.7
150 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	8,965.2	8,069	90.0	8.6
151 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,426.8	8,484	95.0	8.6
152 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,567.6	8,611	94.1	8.7
153 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,258.6	8,333	91.3	8.7
154 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,395.1	8,456	91.3	8.8
155 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER	60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,267.8	8,341	91.9	8.7

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## PARK - Main Result

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC

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Terrain	WTG type		Type-generator	Power, rated	Rotor diameter	Hub height	Power curve Creator Name	Annual Energy		Park	
	Valid	Manufact.						Result	Result-10.0%	Efficiency	Mean wind speed
				[kW]	[m]	[m]		[MWh]	[MWh]	[%]	[m/s]
156 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,310.2	8,379	93.2	8.7
157 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,062.0	8,156	96.1	8.3
158 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,397.0	8,457	93.3	8.7
159 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,691.2	8,722	94.6	8.8
160 A	Yes	Siemens	SWT-2.3-93-2,300	2,300	92.6	80.0	USER 60HZ Level 0 -- SIEMENS 2.3 MW, 106,5 dB - 04-2006	9,764.3	8,788	95.4	8.8

## WTG siting

UTM WGS84 Zone: 14

	East	North	Z	Row data/Description
UTM WGS84 Zone: 14			[m]	
1 New	448,359	5,151,870	651.1	1
2 New	441,700	5,144,255	640.1	2
3 New	448,715	5,154,430	654.1	3
4 New	448,444	5,153,525	652.3	4
5 New	443,511	5,155,516	645.2	5
6 New	447,104	5,150,610	634.0	6
7 New	447,048	5,149,417	637.0	7
8 New	448,634	5,149,297	643.1	8
9 New	444,424	5,159,977	643.1	9
10 New	448,699	5,150,076	640.1	10
11 New	448,730	5,152,255	648.2	11
12 New	445,052	5,154,721	643.1	12
13 New	447,856	5,142,723	655.3	13
14 New	441,333	5,141,693	637.0	14
15 New	446,278	5,150,723	627.9	15
16 New	448,459	5,148,632	640.1	16
17 New	445,726	5,140,086	655.8	17
18 New	442,860	5,156,338	631.5	18
19 New	445,670	5,140,653	649.2	19
20 New	447,820	5,148,950	638.5	20
21 New	442,883	5,142,476	644.1	21
22 New	447,250	5,142,459	643.1	22
23 New	441,589	5,154,241	608.0	23
24 New	446,448	5,153,504	630.9	24
25 New	443,447	5,154,330	624.8	25
26 New	444,930	5,140,691	641.6	26
27 New	443,306	5,162,243	643.1	27
28 New	446,143	5,147,187	640.1	28
29 New	448,293	5,152,966	652.3	29
30 New	444,091	5,162,470	643.1	30
31 New	446,462	5,148,900	630.1	31
32 New	447,137	5,151,149	624.8	32
33 New	443,179	5,143,207	649.6	33
34 New	447,096	5,154,478	632.5	34
35 New	442,347	5,143,860	646.2	35
36 New	448,440	5,157,570	623.4	36
37 New	446,659	5,143,477	643.1	37
38 New	443,783	5,139,452	644.7	38
39 New	448,168	5,150,062	643.1	39
40 New	446,793	5,155,957	643.5	40
41 New	443,259	5,140,602	634.0	41
42 New	447,080	5,148,556	627.7	42
43 New	446,223	5,139,549	650.7	43

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**PARK - Main Result**

**Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC**

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UTM WGS84 Zone: 14

	East	North	Z	Row data/Description
	UTM WGS84 Zone: 14			[m]
44 New	448,078	5,139,576	636.3	44
45 New	446,853	5,139,993	657.5	45
46 New	441,890	5,160,197	640.1	46
47 New	443,686	5,162,074	643.1	47
48 New	442,958	5,155,532	624.8	48
49 New	444,753	5,155,068	643.1	49
50 New	447,668	5,145,977	650.7	50
51 New	443,010	5,139,389	632.4	51
52 New	443,605	5,159,477	640.1	52
53 New	446,499	5,144,091	631.2	53
54 New	448,059	5,146,593	649.2	54
55 New	444,514	5,156,266	637.0	55
56 New	444,058	5,158,385	631.8	56
57 New	447,293	5,147,397	643.4	57
58 New	448,314	5,145,986	655.3	58
59 New	447,913	5,157,369	630.9	59
60 New	446,001	5,156,944	655.0	60
61 New	441,716	5,152,383	607.7	61
62 New	446,932	5,157,672	630.9	62
63 New	446,664	5,146,828	652.5	63
64 New	448,025	5,158,999	618.6	64
65 New	441,961	5,141,671	640.9	65
66 New	448,544	5,141,461	652.3	66
67 New	448,039	5,142,215	657.5	67
68 New	444,143	5,159,557	641.0	68
69 New	448,221	5,141,216	661.4	69
70 New	443,190	5,138,567	615.7	70
71 New	441,698	5,152,890	620.2	71
72 New	445,572	5,155,987	640.1	72
73 New	444,416	5,140,018	661.4	73
74 New	447,096	5,144,320	639.8	74
75 New	443,610	5,144,606	643.1	75
76 New	444,063	5,158,865	640.9	76
77 New	442,201	5,152,986	618.7	77
78 New	445,628	5,149,487	624.8	78
79 New	448,459	5,159,415	627.9	79
80 New	441,957	5,144,930	640.1	80
81 New	442,752	5,140,206	634.0	81
82 New	446,851	5,147,669	643.1	82
83 New	442,485	5,144,533	644.4	83
84 New	442,285	5,154,529	616.7	84
85 New	445,499	5,147,180	627.9	85
86 New	445,845	5,139,570	655.6	86
87 New	442,546	5,141,329	630.9	87
88 New	441,846	5,138,608	624.8	88
89 New	442,656	5,146,116	637.0	89
90 New	443,258	5,142,576	653.7	90
91 New	447,844	5,145,343	658.4	91
92 New	444,777	5,153,875	636.6	92
93 New	447,406	5,154,722	648.5	93
94 New	448,013	5,158,255	621.8	94
95 New	446,671	5,141,606	646.2	95
96 New	443,576	5,160,102	634.0	96
97 New	447,158	5,155,619	650.3	97
98 New	445,267	5,139,911	655.3	98
99 New	444,002	5,154,448	627.6	99

Continued on next page...

Project:

**Napoleon**

Description:

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## PARK - Main Result

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC

...continued from previous page

		UTM WGS84 Zone: 14			
		East	North	Z	Row data/Description
		UTM WGS84 Zone: 14			
				[m]	
100	New	442,770	5,154,504	627.9	100
101	New	442,791	5,145,557	644.2	101
102	New	448,704	5,158,098	643.1	102
103	New	445,231	5,157,377	640.1	103
104	New	445,458	5,141,152	643.0	104
105	New	441,318	5,145,907	624.7	105
106	New	447,872	5,141,225	658.4	106
107	New	442,328	5,160,066	634.2	107
108	New	447,731	5,144,499	655.3	108
109	New	444,544	5,162,167	646.2	109
110	New	446,274	5,149,519	618.7	110
111	New	445,238	5,147,835	634.0	111
112	New	442,646	5,139,009	627.9	112
113	New	444,653	5,155,727	634.0	113
114	New	442,097	5,153,493	612.6	114
115	New	447,805	5,143,926	653.8	115
116	New	445,082	5,159,880	637.0	116
117	New	443,312	5,139,999	640.1	117
118	New	448,661	5,147,420	643.1	118
119	New	443,182	5,160,936	638.2	119
120	New	441,783	5,145,682	637.0	120
121	New	445,264	5,155,390	634.0	121
122	New	442,657	5,145,053	655.3	122
123	New	442,346	5,138,450	624.9	123
124	New	447,195	5,146,270	655.8	124
125	New	446,764	5,140,897	641.1	125
126	New	446,847	5,142,807	643.1	126
127	New	447,963	5,161,923	627.9	127
128	New	448,011	5,147,184	646.2	128
129	New	444,027	5,155,466	631.2	129
130	New	446,154	5,154,204	630.9	130
131	New	448,246	5,147,759	640.1	131
132	New	446,420	5,148,031	638.2	132
133	New	446,001	5,160,604	634.0	133
134	New	444,816	5,158,285	628.7	134
135	New	446,752	5,145,359	643.1	135
136	New	447,150	5,156,786	640.1	136
137	New	442,130	5,145,998	640.1	137
138	New	441,750	5,142,339	643.1	138
139	New	447,502	5,143,262	658.4	139
140	New	445,273	5,146,698	620.6	140
141	New	448,329	5,161,410	618.7	141
142	New	443,725	5,161,549	637.0	142
143	New	448,672	5,160,573	634.0	143
144	New	448,307	5,160,109	626.4	144
145	New	443,130	5,144,150	659.2	145
146	New	442,992	5,160,168	646.2	146
147	New	442,676	5,137,988	624.8	147
148	New	443,181	5,137,373	618.6	148
149	New	446,832	5,144,770	641.4	149
150	New	446,906	5,149,879	624.8	150
151	New	441,793	5,156,746	612.6	151
152	New	441,810	5,155,572	614.7	152
153	New	442,940	5,161,301	634.0	153
154	New	443,015	5,161,765	640.3	154
155	New	445,582	5,158,934	624.8	155

Continued on next page...

Project:

**Napoleon**

Description:

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## PARK - Main Result

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC

...continued from previous page

UTM WGS84 Zone: 14				
	East	North	Z	Row data/Description
UTM WGS84 Zone: 14			[m]	
156 New	447,220	5,160,251	621.8	156
157 New	444,158	5,137,476	596.4	157
158 New	442,140	5,139,512	624.8	158
159 New	447,244	5,162,167	627.9	159
160 New	448,062	5,162,655	621.8	160

## **SECTION A: DESCRIPTION**

### **3. Size and Design**

- c. Estimated Thermal Efficiency- does not apply until our substation has been designed. At that time our engineering groups can calculate our line losses for underground and collector systems and feeder lines. When we have this information we will forward it to you.







## **SECTION A: DESCRIPTION**

### 3. Size and Design

#### d. Number of Proposed Acres

The proposed Development site is located in Logan County, North Dakota, near the town of Napoleon. The Development site will be within three townships in Logan County: Glendale (T-136-N, R-72-W), Bryant (T-135-N, R-72-W), and Starkey (T-134-N, R-72-W) (Figure 1). Just Wind has obtained Lease Options and Wind Energy Lease Agreements. All turbines will be sited within the Development site boundary. The total Development site area including the wind plant and land leases is approximately 55,000 acres.

# Just Wind, LLC Wind Turbines Phase I


-  July 2008 Turbines
-  Phase I Project Boundary
-  Township Line
-  Section Line
-  Railroad
-  Corporate Boundary

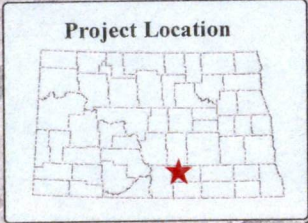
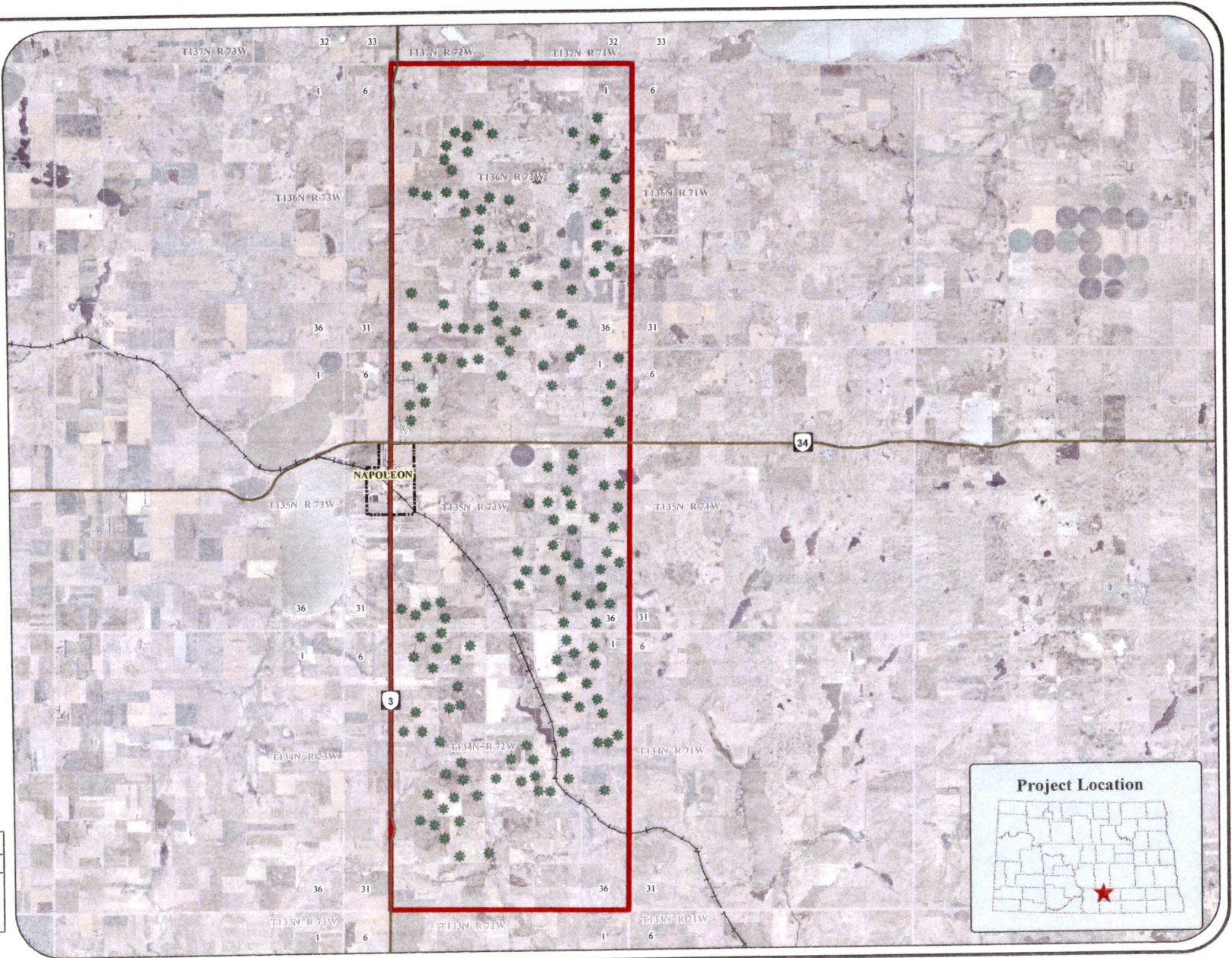
Data downloaded from the ND GIS Data Hub.  
Background is 2006 USDA-FSA Aerial Photography.



0 0.5 1 2 3 4 Miles

Wind Turbines					
Scale	Drawn by	Checked by	Project No.	Date	Sheet
AS SHOWN	KZS		5162-000	07/1/08	

Map created by:  
 Houston Engineering, Inc.  
 4091 S. Fish Lake Rd., Suite 148  
 Maple Grove, MN 55369  
 Bus: (763) 293-0522  
 Fax: (763) 293-0572



**SECTION A: DESCRIPTION**

- 3. e. Design Data Reports

See map book reference B.2 Wind farm Turbine Locations

Project:

**Napoleon**

Description:

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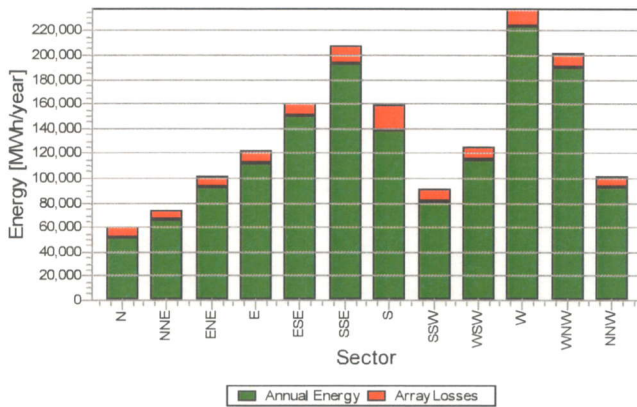
**PARK - Production Analysis**

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC WTG: All new WTG's, Air density varies with WTG position 1.165 kg/m3 - 1.173 kg/m3

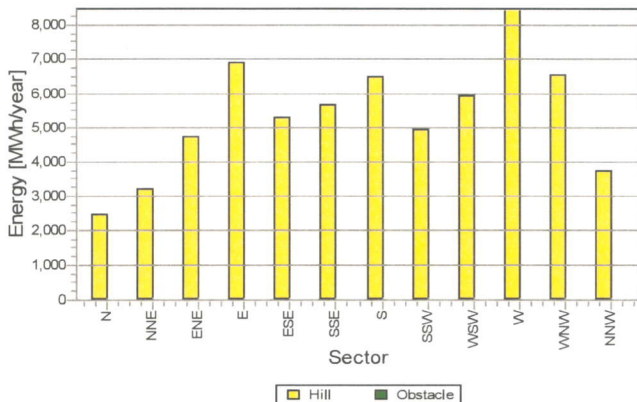
**Directional Analysis**

Sector		0 N	1 NNE	2 ENE	3 E	4 ESE	5 SSE	6 S	7 SSW	8 WSW	9 W	10 WNW	11 NNW	Total
Roughness based energy	[MWh]	57,404.1	69,877.2	96,634.4	114,748.7	154,320.2	201,252.4	152,942.8	85,760.9	119,704.1	229,845.3	195,300.1	97,140.3	1,574,929.4
+Increase due to hills	[MWh]	2,460.5	3,221.7	4,709.6	6,930.1	5,316.5	5,655.6	6,508.9	4,939.6	5,924.7	8,492.9	6,547.9	3,740.4	64,448.5
-Decrease due to array losses	[MWh]	7,670.9	6,883.8	8,582.6	9,523.9	9,001.8	14,752.6	20,866.0	10,451.8	10,494.4	14,048.4	11,589.2	8,056.8	131,922.1
<b>Resulting energy</b>	<b>[MWh]</b>	<b>52,193.7</b>	<b>66,215.2</b>	<b>92,761.4</b>	<b>112,155.0</b>	<b>150,635.0</b>	<b>192,155.4</b>	<b>138,585.7</b>	<b>80,248.7</b>	<b>115,134.5</b>	<b>224,289.9</b>	<b>190,258.9</b>	<b>92,823.9</b>	<b>1,507,457.8</b>
Specific energy	[kWh/m2]													1,399
Specific energy	[kWh/kW]													4,096
Increase due to hills	[%]	4.3	4.6	4.9	6.0	3.4	2.8	4.3	5.8	4.9	3.7	3.4	3.9	4.1
Decrease due to array losses	[%]	12.8	9.4	8.5	7.8	5.6	7.1	13.1	11.5	8.4	5.9	5.7	8.0	8.0
Utilization	[%]	26.5	26.9	26.8	30.3	25.3	25.6	30.0	31.5	28.0	23.0	23.8	27.7	26.2
Operational	[Hours/year]	424	478	587	737	708	859	797	540	629	1,068	956	598	8,382
Full Load Equivalent	[Hours/year]	142	180	252	305	409	522	377	218	313	609	517	252	4,096

Energy vs. sector



Impact of hills and obstacles vs. sector



Project:

**Napoleon**

Description:

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## PARK - Power Curve Analysis

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC WTG: 1 - Siemens SWT-2.3-93 60Hz 2300 92.6 101 60Hz Level 0 - - SIEMENS 2.3 MW, 106,5 dB - 04-2006, Hub height: 90.0 m

Name: 60Hz Level 0 - - SIEMENS 2.3 MW, 106,5 dB - 04-2006

Source: SIEMENS

Source/Date	Created by	Created	Edited	Stop wind speed [m/s]	Power control	CT curve type
04/27/2006	USER	07/31/2003	04/12/2007	25.0	Pitch	User defined
60 Hz 93m RD						

HP curve comparison - Note: For standard air density and weibull k parameter = 2

Vmean [m/s]	5	6	7	8	9	10
HP value [MWh]	3,105	4,944	6,835	8,658	10,173	11,525
1 [MWh]	3,225	5,122	7,026	8,770	10,275	11,508
Check value [%]	-4	-3	-3	-1	-1	0

The table shows comparison between annual energy production calculated on basis of simplified "HP-curves" which assume that all WTG's performs quite similar - only specific power loading (kW/m<sup>2</sup>) and single/dual speed or stall/pitch decides the calculated values. Productions are without wake losses.

For further details, ask at the Danish Energy Agency for project report J.nr. 51171/00-0016 or see WindPRO manual chapter 3.5.2.

The method is refined in EMD report "20 Detailed Case Studies comparing Project Design Calculations and actual Energy Productions for Wind Energy Projects worldwide", jan 2003.

Use the table to evaluate if the given power curve is reasonable - if the check value are lower than -5%, the power curve probably is too optimistic due to uncertainty in power curve measurement.

### Power curve

Original data from Windcat, Air density: 1.225 kg/m<sup>3</sup>

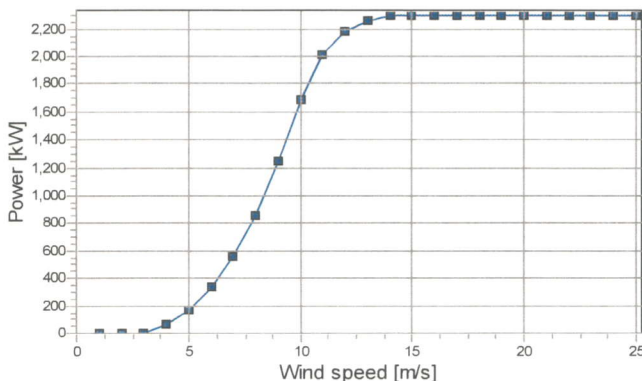
Wind speed [m/s]	Power [kW]	Ce	Wind speed [m/s]	Ct curve
1.0	0.0	0.00	1.0	0.00
2.0	0.0	0.00	2.0	0.00
3.0	0.0	0.00	3.0	0.00
4.0	65.0	0.25	4.0	0.81
5.0	180.0	0.35	5.0	0.84
6.0	352.0	0.40	6.0	0.83
7.0	590.0	0.42	7.0	0.85
8.0	906.0	0.43	8.0	0.86
9.0	1,308.0	0.43	9.0	0.87
10.0	1,767.0	0.43	10.0	0.79
11.0	2,085.0	0.38	11.0	0.67
12.0	2,234.0	0.32	12.0	0.45
13.0	2,283.0	0.26	13.0	0.34
14.0	2,296.0	0.21	14.0	0.26
15.0	2,299.0	0.17	15.0	0.21
16.0	2,300.0	0.14	16.0	0.17
17.0	2,300.0	0.12	17.0	0.14
18.0	2,300.0	0.10	18.0	0.12
19.0	2,300.0	0.08	19.0	0.10
20.0	2,300.0	0.07	20.0	0.09
21.0	2,300.0	0.06	21.0	0.07
22.0	2,300.0	0.05	22.0	0.06
23.0	2,300.0	0.05	23.0	0.06
24.0	2,300.0	0.04	24.0	0.05
25.0	2,300.0	0.04	25.0	0.05

### Power, Efficiency and energy vs. wind speed

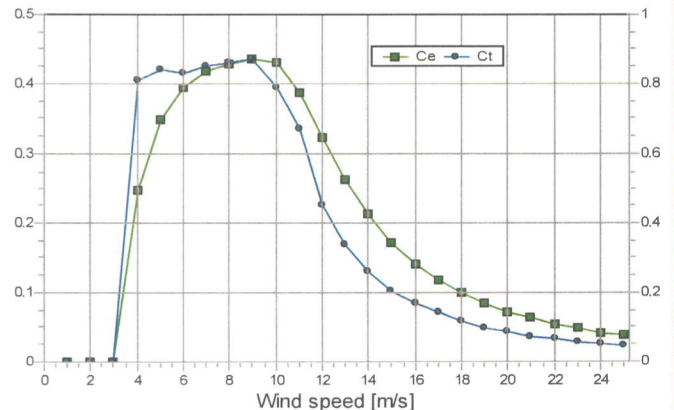
Data used in calculation, Air density: 1.166 kg/m<sup>3</sup>

Wind speed [m/s]	Power [kW]	Ce	Interval [m/s]	Energy [MWh]	Acc. Energy [MWh]	Relative [%]
1.0	0.0	0.00	0.50-1.50	0.0	0.0	0.0
2.0	0.0	0.00	1.50-2.50	0.0	0.0	0.0
3.0	0.0	0.00	2.50-3.50	5.5	5.5	0.1
4.0	61.9	0.25	3.50-4.50	34.7	40.2	0.4
5.0	171.4	0.35	4.50-5.50	110.6	150.7	1.5
6.0	335.1	0.40	5.50-6.50	251.9	402.6	4.0
7.0	561.8	0.42	6.50-7.50	469.6	872.2	8.7
8.0	862.6	0.43	7.50-8.50	757.1	1,629.3	16.3
9.0	1,245.4	0.43	8.50-9.50	1,075.8	2,705.1	27.0
10.0	1,692.5	0.43	9.50-10.50	1,330.8	4,035.9	40.3
11.0	2,019.1	0.39	10.50-11.50	1,404.3	5,440.2	54.3
12.0	2,186.9	0.32	11.50-12.50	1,279.0	6,719.2	67.0
13.0	2,258.9	0.26	12.50-13.50	1,043.7	7,762.9	77.4
14.0	2,296.0	0.21	13.50-14.50	785.6	8,548.6	85.3
15.0	2,299.0	0.17	14.50-15.50	553.8	9,102.4	90.8
16.0	2,300.0	0.14	15.50-16.50	369.5	9,471.9	94.5
17.0	2,300.0	0.12	16.50-17.50	235.0	9,706.9	96.8
18.0	2,300.0	0.10	17.50-18.50	142.7	9,849.6	98.2
19.0	2,300.0	0.09	18.50-19.50	82.8	9,932.5	99.1
20.0	2,300.0	0.07	19.50-20.50	46.0	9,978.5	99.5
21.0	2,300.0	0.06	20.50-21.50	24.4	10,002.9	99.8
22.0	2,300.0	0.05	21.50-22.50	12.4	10,015.3	99.9
23.0	2,300.0	0.05	22.50-23.50	6.1	10,021.4	100.0
24.0	2,300.0	0.04	23.50-24.50	2.8	10,024.2	100.0
25.0	2,300.0	0.04	24.50-25.50	0.9	10,025.1	100.0

Power curve  
Data used in calculation



Ce and Ct curve



Project:

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**PARK - Terrain**

**Calculation:** 20080625-Siemens 2.3-93-80-368MW User WDC **Site Data:** A - Park/Wasp Calc

**Obstacles:**

0 Obstacles used

**Roughness:**

Calculation uses following MAP files:

V:\EAPC WIND PROJECTS\20064001 - Just Wind - Napoleon 2.6\ROUGHNESSLINE\_Napoleon\_0\_BR10.wpo

Min X: 414,010, Max X: 476,341, Min Y: 5,117,909, Max Y: 5,192,708, Width: 62,331 m, Height: 74,800 m

Limited by a square on 40.0 km x 40.0 km around the current site

**Orography:**

Calculation uses following MAP files:

V:\EAPC WIND PROJECTS\20064001 - Just Wind - Napoleon 2.6\DEMs\OPT Thinned 5ft 20ft hcl MapMart.wpo

Min X: 414,885, Max X: 468,464, Min Y: 5,109,148, Max Y: 5,191,438, Width: 53,579 m, Height: 82,290 m

Limited by a square on 10.0 km x 10.0 km around the current site

**Project:**  
**Napoleon**

**Description:**  
Note 1: EAPC does not warrant, guarantee, or make any such representations regarding the contents of this report. EAPC cannot be held liable for erroneous results caused by errors or omissions in the delivered data, or inaccuracy, limitations, or malfunctioning of models or software used. For any claim whatsoever related to the subject matter of this report, the liability of EAPC for actual damages, regardless of the form of action, shall be limited to the total amount paid to EAPC for the services provided as part of this consultancy service.

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Note 2: The Windstatistic chosen is regarded to be representative for the long-term wind conditions at the site.

Calculated:  
06/26/2008 8:22 AM/2.6.0.204

**PARK - Wind Data Analysis**

**Calculation:** 20080625-Siemens 2.3-93-80-368MW User WDC **Wind data:** A - Park/Wasp Calc; Hub height: 45.7

**Site Coordinates**

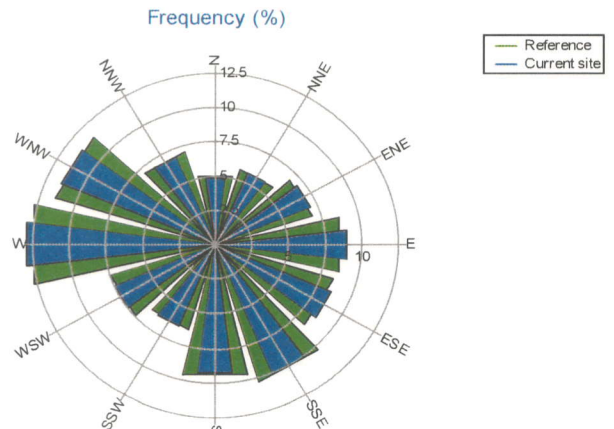
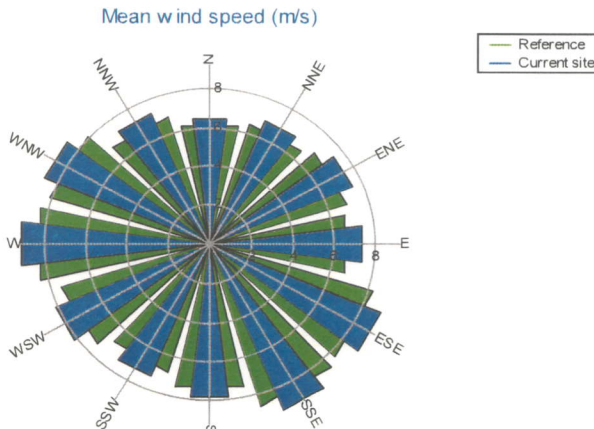
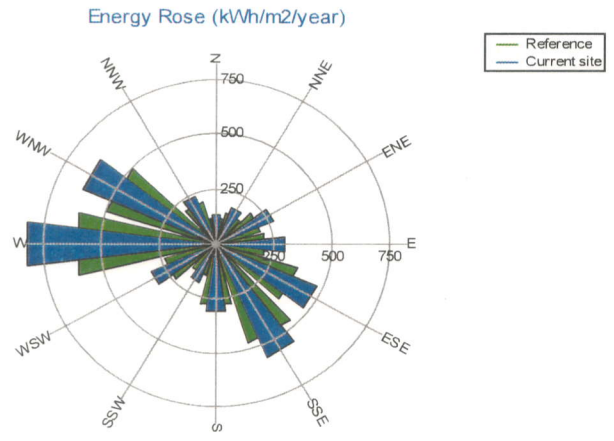
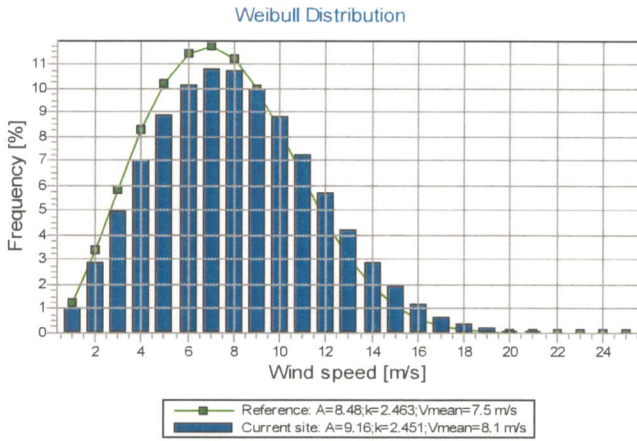
UTM WGS 84 Zone: 14 East: 442,927 North: 5,160,485

**Wind statistics**

US 45.72 m Napoleon Wind 08-2001 to 09-2006 BR 1\_0-Update-5yrs.wws

**Weibull Data**

Sector	Current site				Reference: Roughness class 1			
	A- parameter [m/s]	Wind speed [m/s]	k- parameter	Frequency [%]	A- parameter [m/s]	k- parameter	Frequency [%]	
0 N	7.35	6.51	2.002	4.9	7.02	2.002	5.1	
1 NNE	7.82	6.93	2.080	5.6	7.32	2.080	5.7	
2 ENE	8.50	7.53	2.260	7.1	7.80	2.258	7.0	
3 E	8.34	7.40	2.498	9.0	7.56	2.504	8.8	
4 ESE	10.13	9.01	2.725	8.6	9.32	2.710	8.4	
5 SSE	10.28	9.19	3.045	10.1	9.63	3.046	10.3	
6 S	8.78	7.87	3.287	9.3	8.35	3.292	9.6	
7 SSW	8.21	7.32	2.932	6.4	7.61	2.889	6.4	
8 WSW	9.12	8.12	2.740	7.6	8.37	2.740	7.4	
9 W	10.34	9.17	2.459	13.0	9.41	2.457	12.7	
10 WNW	9.80	8.68	2.369	11.4	9.07	2.375	11.4	
11 NNW	8.22	7.28	2.287	7.0	7.72	2.286	7.2	
All	9.16	8.12	2.451	100.0	8.48	2.463	100.0	



Project:

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Note 2: The Windstatistic chosen is regarded to be representative for the long-term wind conditions at the site.

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**PARK - Park power curve**

Calculation: 20080625-Siemens 2.3-93-80-368MW User WDC

Wind speed [m/s]	Power														
	Free WTGs [kW]	Park WTGs [kW]	N [kW]	NNE [kW]	ENE [kW]	E [kW]	ESE [kW]	SSE [kW]	S [kW]	SSW [kW]	WSW [kW]	W [kW]	WNW [kW]	NNW [kW]	
0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3.5	5,013	4,282	4,078	4,257	4,271	4,393	4,387	4,248	4,082	4,225	4,270	4,326	4,372	4,340	
4.5	18,896	14,874	13,620	14,679	14,866	15,499	15,491	14,660	13,649	14,513	14,841	15,231	15,439	15,107	
5.5	41,031	33,300	30,776	32,895	33,286	34,553	34,540	32,909	30,807	32,577	33,281	33,984	34,415	33,807	
6.5	72,653	59,939	55,848	59,285	59,899	61,989	61,959	59,310	55,898	58,770	59,912	61,009	61,746	60,793	
7.5	115,381	95,535	89,183	94,533	95,481	98,707	98,662	94,553	89,273	93,734	95,484	97,209	98,344	96,839	
8.5	170,758	141,721	132,450	140,280	141,635	146,350	146,288	140,291	132,576	139,104	141,649	144,147	145,806	143,647	
9.5	237,247	199,694	186,913	197,784	199,725	205,911	205,864	197,844	187,059	196,144	199,603	203,087	205,266	202,323	
10.5	299,632	265,909	252,761	264,360	265,978	272,180	272,185	264,360	252,754	262,431	265,687	268,877	271,422	269,439	
11.5	338,690	320,273	311,548	319,628	320,704	323,999	324,205	319,584	311,597	318,071	320,185	321,767	323,791	323,117	
12.5	357,075	350,995	348,280	350,872	351,210	352,119	352,248	350,850	348,281	350,334	351,049	351,224	352,080	351,999	
13.5	364,871	362,881	362,148	362,824	362,915	363,214	363,227	362,825	362,150	362,684	362,875	362,979	363,182	363,129	
14.5	367,600	367,399	367,276	367,401	367,410	367,449	367,452	367,395	367,280	367,363	367,391	367,398	367,447	367,467	
15.5	367,920	367,892	367,879	367,891	367,892	367,898	367,898	367,891	367,879	367,888	367,892	367,894	367,897	367,896	
16.5	368,000	367,999	367,998	367,999	367,999	367,999	368,000	367,999	367,998	367,999	367,999	367,999	367,999	368,000	
17.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
18.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
19.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
20.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
21.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
22.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
23.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
24.5	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	368,000	
25.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
26.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
27.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
29.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

**Description:**

The park power curve is similar to a WTG power curve, meaning that when a given wind speed appears in front of the park with same speed in the entire wind farm area (before influence from the park), the output from the park can be found in the park power curve. Another way to say this: The park power curve includes array losses, but do NOT include terrain given variations in the wind speed over the park area.

Measuring a park power curve is not as simple as measuring a WTG power curve due to the fact that the park power curve depends on the wind direction and that the same wind speed normally will not appear for the entire park area at the same time (only in very flat non-complex terrain). The idea with this version of the park power curve is not to use it for validation based on measurements. This would require at least 2 measurement masts at two sides of the park, unless only a few direction sectors should be tested, AND non complex terrain (normally only useable off shore). Another park power curve version for complex terrain is available in WindPRO.

**The park power curve can be used for:**

- Forecast systems, based on more rough (approximated) wind data, the park power curve would be an efficient way to make the connection from wind speed (and direction) to power.
- Construction of duration curves, telling how often a given power output will appear, the park power curve can be used together with the average wind distribution for the Wind farm area in hub height. The average wind distribution can eventually be obtained based on the Weibull parameters for each WTG position. These are found at print menu. >Result to file< in the >Park result< which can be saved to file or copied to clipboard and pasted in Excel.
- Calculation of wind energy index based on the PARK production (see below).
- Estimation of the expected PARK production for an existing wind farm based on wind measurements at minimum 2 measurement masts at two sides of wind farm. The masts must be used for obtaining the free wind speed. The free wind speed is used in the simulation of expected energy production with the PARK power curve. This procedure will only work suitable in non complex terrains. For complex terrain another park power curve calculation is available in WindPRO (PPV-model).

**Note:**

From the >Result to file< the >Wind Speeds Inside Wind farm< is also available. These can (e.g. via Excel) be used for extracting the wake induced reductions in measured wind speed.