

# Businessplan for a wind farm

Tanja Schiffer,  
Tom Arndt,  
Veronika Ehrlich

# Company data:

- Name: Ventus Moneta Ltd. Wind Farm
- Corporate form: Private company limited by shares
- Location: Northern Germany
- Logo:



# Project background:

- Solving the rising energy demand
- Finding alternatives for fossil fuels
  - Reducing CO<sub>2</sub> emissions
- Wind turbines as an option for renewable energy supply
  - Wind power as an inexpensive source of electricity
- Usable with grid connection and in off-grid systems

## Basic concept:

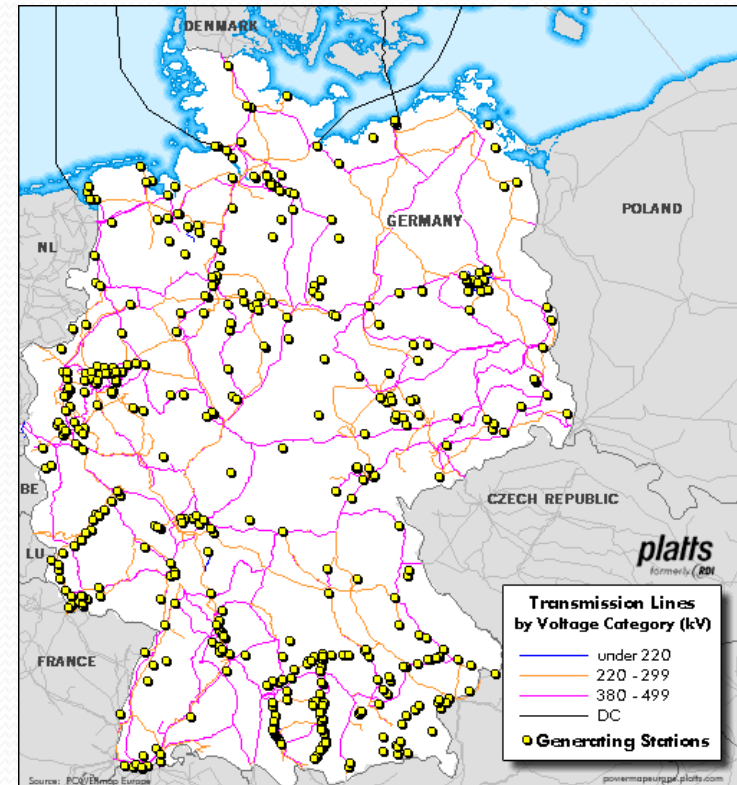
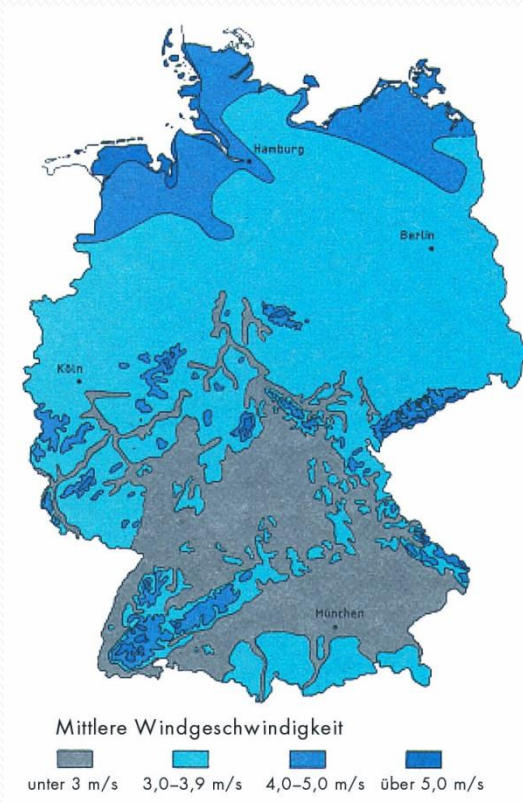
- Searching for a location with good wind conditions
  - Market analysis
- Acquisition of wind turbines
  - Energy generation
  - Testing and analysis: sound, shadow and visibility
- Calculation of costs
- Sale of the energy and feeding into the grid

# Project management:

task field	duration	Jan.	Feb.	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Company foundation	one month	█											
finding shareholder	three month	█	█	█									
bank credit	two month		█	█									
licenses	one month			█									
searching a location	two month		█	█									
tests (sound, shadow, visibility)	two month			█	█								
acquisition of the land	one month				█								
building of infrastructure (roads)	two month					█	█						
transport	two month							█	█				
installation of wind power plants (foundation, grid connection)	three month									█	█	█	
commissioning	one month												█

# Location:

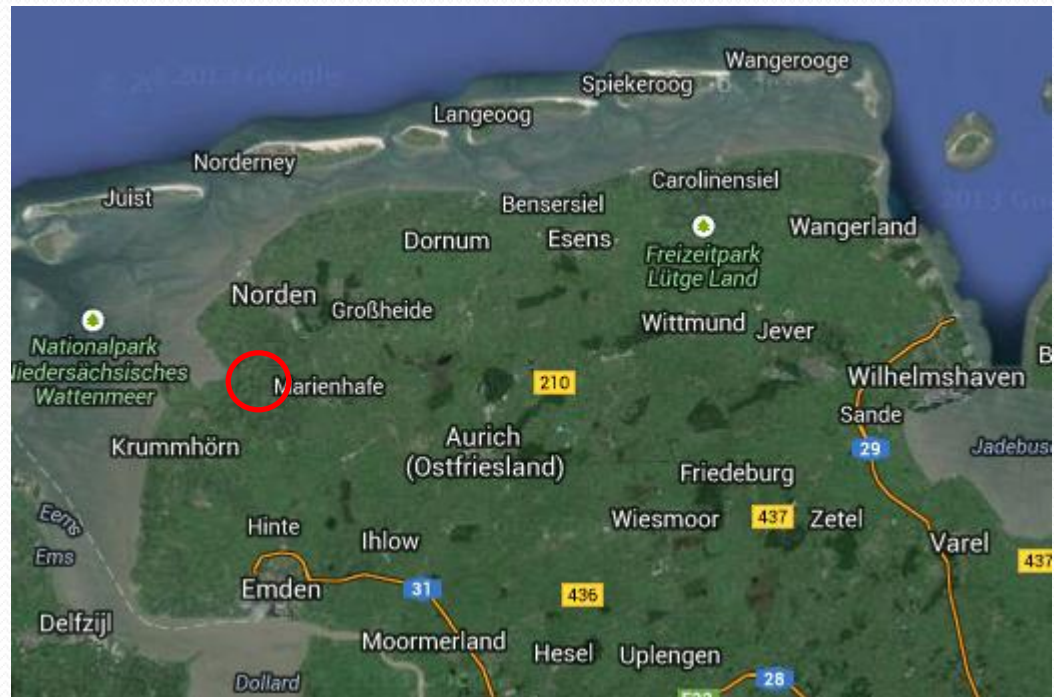
- General: highest wind-speed at coastal areas or hills





# Location:

- Chosen location:  
East Friesland,  
near Emden



-> blue areas: high-energy-potential without restrictions

# Guaranteed market price for wind energy per kWh:

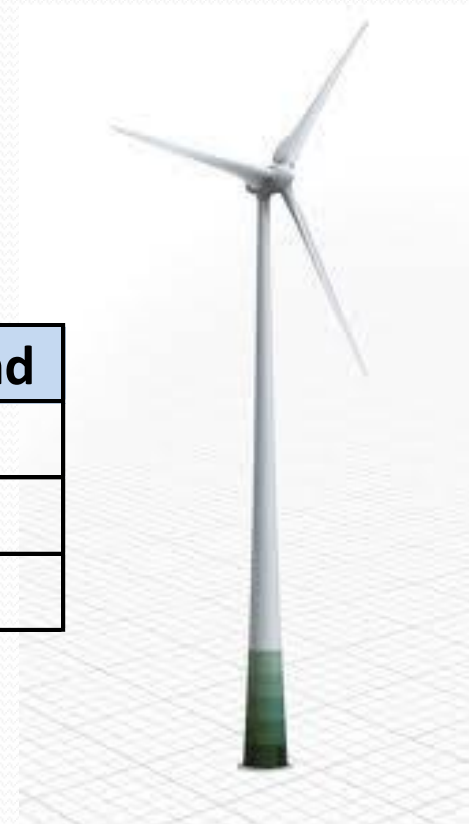
Year	Basic prize	Bonus	Market prize
1	0,0492 €	0,0920 €	0,1412 €
2	0,0492 €	0,0920 €	0,1412 €
3	0,0492 €	0,0920 €	0,1412 €
4	0,0492 €	0,0920 €	0,1412 €
5	0,0492 €	0,0920 €	0,1412 €
6	0,0492 €	0,0911 €	0,1403 €
7	0,0492 €	0,0902 €	0,1394 €
8	0,0492 €	0,0893 €	0,1385 €
9	0,0492 €	0,0884 €	0,1376 €
10	0,0492 €	0,0875 €	0,1367 €
<b>Average for 10 years</b>			<b>0,1398 €</b>



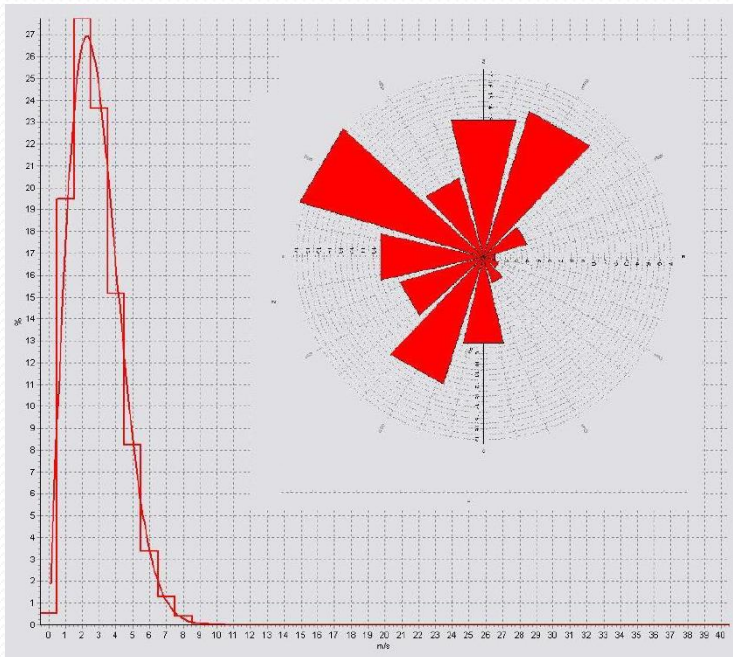
# Wind power plants:

- The bigger the plants the higher the profit
- Newest technology (German product)
- Producer close to location of wind farm
- Decision:

Producer	<b>Enercon GmbH in Aurich, East Friesland</b>
Type	Enercon E-70 with 2 MW
Size of wind farm	10 plants
Installed capacity	20 MW



# Result of simulation:



- Full load hours: 1500 h/a
- Installed capacity: 20 MW
- Energy output: 30.000.000 kWh/a
- Market prize of 0,1398 €/kWh
- **Revenue: 4.194.000,00 €/a**
- As it could look like in East Friesland



## Calculation of the investments and depreciation costs:

Description	Amounts of investment	Depreciation rate in years	Depreciation in €/article
Property (5 ha)	68.500,00 €	0	- €
additional expenses (5% taxes and 3% other costs)	5.480,00 €	0	- €
<b>Sum of purchased land</b>	<b>73.980,00 €</b>		<b>- €</b>
<b>Exterior installations:</b>			
roads, fence, lighth	100.000,00 €	20	5.000,00 €
transport	200.000,00 €	20	10.000,00 €
foundation	3.750.000,00 €	20	187.500,00 €
construction	3.750.000,00 €	20	187.500,00 €
commissioning	3.750.000,00 €	20	187.500,00 €
grid connection	5.000.000,00 €	20	250.000,00 €
<b>Total of exterior installations</b>	<b>7.500.000,00 €</b>		<b>375.000,00 €</b>
<b>Machinery:</b>			
wind turbines (10)	10.000.000,00 €	10	1.000.000,00 €
<b>Total of machinery</b>	<b>10.000.000,00 €</b>		<b>1.000.000,00 €</b>
<b>Engineering:</b>			
expenditures/planning	50.000,00 €	10	5.000,00 €
licenses	50.000,00 €	10	5.000,00 €
<b>Total of engineering</b>	<b>100.000,00 €</b>		<b>10.000,00 €</b>
<b>Vehicles:</b>			
passenger cars (3)	150.000,00 €	5	30.000,00 €
<b>Total of vehicles</b>	<b>150.000,00 €</b>		<b>30.000,00 €</b>



## Calculation of the total investment and depreciation costs:

Investment goods	Investment expenditures	Depreciation in years	Depriciation costs
Property	73.980,00 €	0	- €
Exterior installations	7.500.000,00 €	20	375.000,00 €
Machinery	10.000.000,00 €	10	1.000.000,00 €
Engineering	100.000,00 €	10	10.000,00 €
Vehicles	150.000,00 €	5	30.000,00 €
Unexpected	1.500.000,00 €	0	- €
Circulating capital	50.000,00 €	0	- €
<b>Total Investment</b>	<b>19.373.980,00 €</b>	<b>Total depreciation costs</b>	<b>1.415.000,00 €</b>



# Calculation of the labour costs:

Personal in cost centre	Number	Personnel direct costs
administration	3	750.000,00 €
operational management	5	300.000,00 €
<b>Total of labour costs</b>		<b>1.050.000,00 €</b>

- Administration:
  - Tanja Schiffer
  - Veronika Ehrlich
  - Tom Arndt
- Operational management deals with the technical and the economic aspects of the wind farm (maintenance, service etc.)



# Calculation of the service costs:


Description	Costs
insurance	50.000,00 €
maintenance	400.000,00 €
<b>Total of service costs</b>	<b>450.000,00 €</b>





# Total of investment and financing:

<b>Total investment</b>	<b>19.373.980,00 €</b>
own capital funds (40%)	7.749.592,00 €
outside financing (60%)	11.624.388,00 €



<b>Bank loan</b>
7,00% interest
10 years running time

## Private company limited by shares

Number of shareholders	20
Shareholders equity	387.479,60 €



# Interest paid on debt:

Years	Balance of dept	Interest rate (%)	Interest costs paid p.a.	Repayment
1	11.624.388,00 €	7	813.707,16 €	1.162.438,80 €
2	10.461.949,20 €	7	732.336,44 €	1.162.438,80 €
3	9.299.510,40 €	7	650.965,73 €	1.162.438,80 €
4	8.137.071,60 €	7	569.595,01 €	1.162.438,80 €
5	6.974.632,80 €	7	488.224,30 €	1.162.438,80 €
6	5.812.194,00 €	7	406.853,58 €	1.162.438,80 €
7	4.649.755,20 €	7	325.482,86 €	1.162.438,80 €
8	3.487.316,40 €	7	244.112,15 €	1.162.438,80 €
9	2.324.877,60 €	7	162.741,43 €	1.162.438,80 €
10	1.162.438,80 €	7	81.370,72 €	1.162.438,80 €
<b>Total interest paid</b>			<b>4.475.389,38 €</b>	
<b>Total repayment</b>				<b>11.624.388,00 €</b>

# Self costs for the first 10 years:

	1. Year/per kWh	1. Year	2. Year	3. Year	4. Year	5. Year
Utilization of capacity (%)	100	100	100	100	100	100
Quantity produced kWh	30.000.000	30.000.000	30.000.000	30.000.000	30.000.000	30.000.000
<b>Costs</b>	<b>cost per kWh</b>	<b>costs per year</b>	<b>costs per year</b>	<b>costs per year</b>	<b>costs per year</b>	<b>costs per year</b>
Depreciation costs	0,0472	1.415.000,00	1.415.000,00	1.415.000,00	1.415.000,00	1.415.000,00
Financing costs	0,0271	813.707,16	732.336,44	650.965,73	569.595,01	488.224,30
Labour costs	0,0350	1.050.000,00	1.050.000,00	1.050.000,00	1.050.000,00	1.050.000,00
Service costs	0,0150	450.000,00	450.000,00	450.000,00	450.000,00	450.000,00
<b>Sum of costs</b>		<b>3.728.707,16</b>	<b>3.647.336,44</b>	<b>3.565.965,73</b>	<b>3.484.595,01</b>	<b>3.403.224,30</b>
<b>Self costs per kWh</b>	<b>0,1243</b>	<b>0,1243</b>	<b>0,1216</b>	<b>0,1189</b>	<b>0,1162</b>	<b>0,1134</b>

	6. Year	7. Year	8. Year	9. Year	10. Year
Utilization of capacity (%)	100	100	100	100	100
Quantity produced kWh	30.000.000	30.000.000	30.000.000	30.000.000	30.000.000
<b>Costs</b>	<b>costs per year</b>	<b>costs per year</b>	<b>costs per year</b>	<b>costs per year</b>	<b>costs per year</b>
Depreciation costs	1.415.000,00	1.415.000,00	1.415.000,00	1.415.000,00	1.415.000,00
Financing costs	406.853,58	325.482,86	244.112,15	162.741,43	81.370,72
Labour costs	1.050.000,00	1.050.000,00	1.050.000,00	1.050.000,00	1.050.000,00
Service costs	450.000,00	450.000,00	450.000,00	450.000,00	450.000,00
<b>Sum of costs</b>	<b>3.321.853,58</b>	<b>3.240.482,86</b>	<b>3.159.112,15</b>	<b>3.077.741,43</b>	<b>2.996.370,72</b>
<b>Self costs per kWh</b>	<b>0,1107</b>	<b>0,1080</b>	<b>0,1053</b>	<b>0,1026</b>	<b>0,0999</b>

Prize per kWh
<b>0,1384 €</b>

# Computation of cash-flow for 10 years:

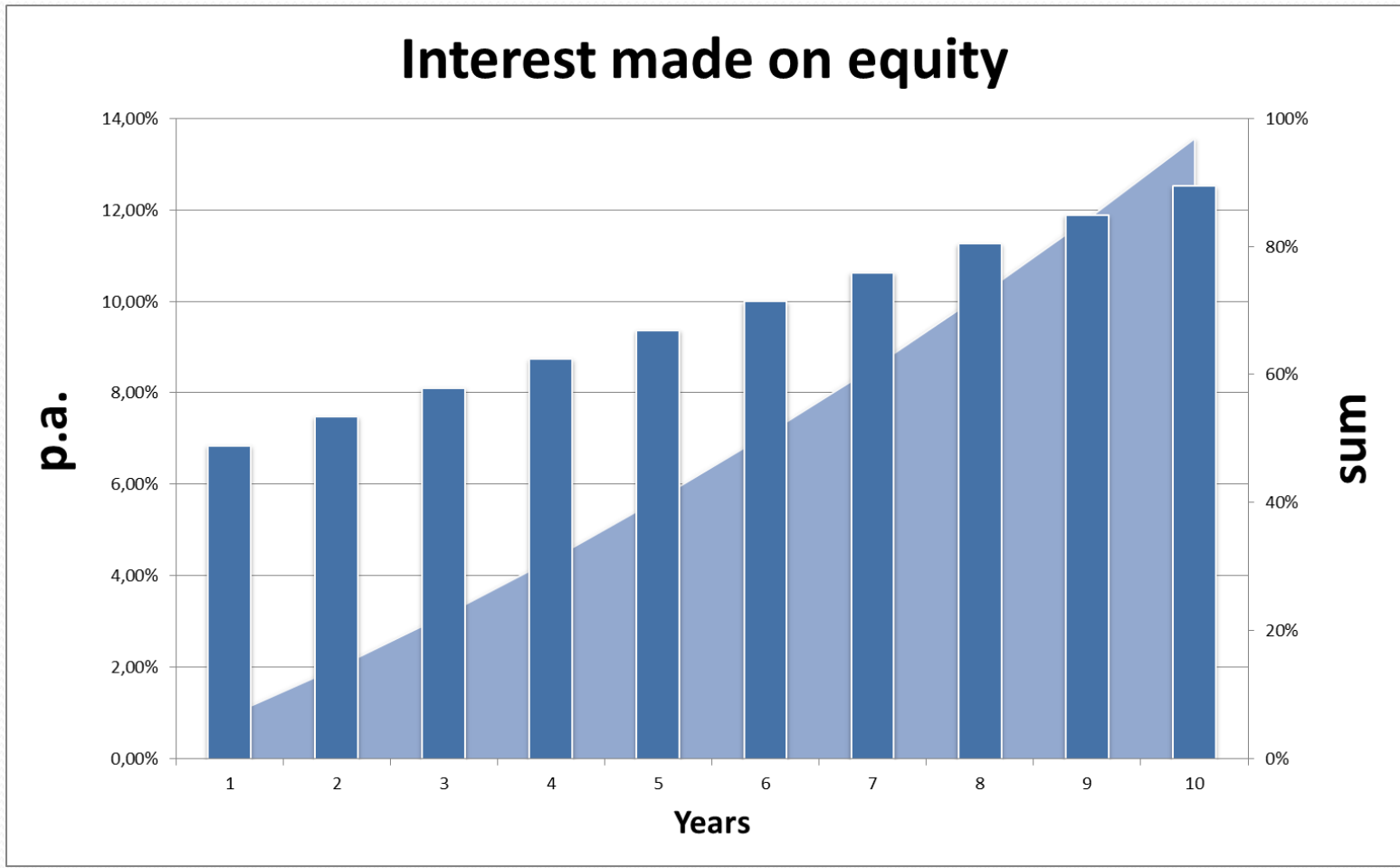
	1. Year	2. Year	3. Year	4. Year	5. Year
<b>Revenue</b>	4.194.000	4.194.000	4.194.000	4.194.000	4.194.000
Depreciation costs	1.415.000	1.415.000	1.415.000	1.415.000	1.415.000
Financing costs	813.707	732.336	650.966	569.595	488.224
Labour costs	1.050.000	1.050.000	1.050.000	1.050.000	1.050.000
Service costs	450.000	450.000	450.000	450.000	450.000
Loss carried forward	-	-	-	-	-
<b>Profit before taxes</b>	465.293	546.664	628.034	709.405	790.776
Taxes (40%)	186.117	218.665	251.214	283.762	316.310
<b>Profit after taxes</b>	279.176	327.998	376.821	425.643	474.465
Cash-flow	1.694.176	1.742.998	1.791.821	1.840.643	1.889.465
<b>Repayment credit</b>	1.162.439 €	1.162.439 €	1.162.439 €	1.162.439 €	1.162.439 €
Dividend	531.737 €	580.559 €	629.382 €	678.204 €	727.027 €

	6. Year	7. Year	8. Year	9. Year	10. Year
<b>Revenue</b>	4.194.000	4.194.000	4.194.000	4.194.000	4.194.000
Depreciation costs	1.415.000	1.415.000	1.415.000	1.415.000	1.415.000
Financing costs	406.854	325.483	244.112	162.741	81.371
Labour costs	1.050.000	1.050.000	1.050.000	1.050.000	1.050.000
Service costs	450.000	450.000	450.000	450.000	450.000
Loss carried forward	-	-	-	-	-
<b>Profit before taxes</b>	872.146	953.517	1.034.888	1.116.259	1.197.629
Taxes (40%)	348.859	381.407	413.955	446.503	479.052
<b>Profit after taxes</b>	523.288	572.110	620.933	669.755	718.578
Cash-flow	1.938.288	1.987.110	2.035.933	2.084.755	2.133.578
<b>Repayment credit</b>	1.162.439 €	1.162.439 €	1.162.439 €	1.162.439 €	1.162.439 €
Dividend	775.849 €	824.671 €	873.494 €	922.316 €	971.139 €

**Total dividend**

**7.514.378 €**

## Interest made on equity



## Conclusion:

- Total of investments is high!
- Finding 20 shareholders each investing more than 350.000€
- Necessity of know-how of the technology and the planning!
- Wind power is profitable and a safe investment if the wind speed at the selected location is high!