The Republic of The Gambia
Office of the President, Energy Division

Renewable Energy Study for The Gambia

FEASIBILITY STUDY
Small Scale Wind Park

FINAL

Prepared by

Lahmeyer International GmbH

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LAHMEYER INTERNATIONAL

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Abbreviations

AfDB	African Development Bank
a.g.l.	Above ground level
a.s.l.	Above sea level
FL 600	Wind Turbine Type „Fuhrländer, 600 kW“
GBA	Greater Banjul Area
GCAA	Gambia Civil Aviation Authority
GREC	Gambia Renewable Energy Centre
GTA	Gambia Tourism Authority
kWh	Kilowatt Hour
IEC	International Electrotechnical Commission
LI	Lahmeyer International GmbH
LTC	Long Term Correlation
MW	Megawatt
NAWEC	National Water and Electricity Company Ltd.
NCEP	National Centre for Environmental Prediction
O&M	Operation and Maintenance
PoE	Probability of Exceedance
RD	Rotor Diameter
RMS	Root Mean Square
TDA	Tourism Development Area
UTM	Universal Transversal Mercator projection
WAsP	Wind Atlas Analysis and Application Program
WEC	Wind Energy Converter
WT	Wind Turbine
WWA	World Wind Atlas

Measures and Currencies

Currency Equivalents of Gambian Dalasi (D)

Exchange rate	2000	2001	2002	2003	2004	2005	2006
US dollar (US$)	14.9	16.9	23.4	31.0	29.5	27.5	29.0

Measures and Units

1 kW	=	kilowatt	= 1,000 watts (W)
1 kJ	=	kilojoule	= 1,000 Joules (J)
1 MW	=	Megawatt	= 1,000 kilowatts (kW)
1 kWh	=	kilowatt-hour	= 1,000 watt-hours
			= 3,600 kilojoules

1 Executive Summary

Lahmeyer International has been contracted by the Government of The Gambia, Office of the President, Energy Division, under funding of AfDB, to provide consulting services for the "Renewable Energy Study for The Gambia". One part of the services comprises the preparation of feasibility studies for selected priority projects.

Within this report a feasibility study is elaborated for a small scale wind park in GBA, called "Tujereng Wind Park" which shall be implemented in two phases. Together with the client it was decided that this wind park, grid connected near the western Atlantic coast, should be one of the selected projects.

The selected wind park site in the South of Tujereng has basically favourable conditions for implementing a wind farm. There are no villages or other main exclusion areas near the site, the terrain is flat without any large obstacle and a transmission line exists at the main road nearby. This transmission line shall be used to connect the wind park to the grid. According to a grid study, a negative impact on the power grid can be excluded.

According to local information no suitable crane for the erection of the wind turbines is available in The Gambia. This crane must be mobilized from a foreign country.

For the estimation of the long-term annual energy yield, the international standard software WindPRO was applied. The calculations of the energy production have been performed for two different wind turbine types and for the two implementation phases.

The results of the gross Energy P50 values are displayed below in the Tables below:

Table 1-1 : Summary of the Energy Production for 3xFL600 Wind Turbine

Phase I: 3 WTG 1800 kW
FL 600-600kW

Gross production	**2,097**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**1,943**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,943	[MWh/a]		50%	1,943	1,080
Uncertainty (Standard Dev.)	14.5%			75%	1,753	974
Standard Deviation	282	[MWh/a]		90%	1,582	879
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,943	[MWh/a]		50%	1,943	1,080
Uncertainty (Standard Dev.)	9.1%			75%	1,824	1,013
Standard Deviation	177	[MWh/a]		90%	1,717	954

Table 1-2: Summary of the Energy Production for 6xFL600 Wind Turbine

Phase II: 6 WTG 3600 kW
FL 600-600kW

Gross production	**3,858**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**3,576**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	3,576	[MWh/a]		50%	3,576	993
Uncertainty (Standard Dev.)	14.5%			75%	3,226	896
Standard Deviation	519	[MWh/a]		90%	2,910	808
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	3,576	[MWh/a]		50%	3,576	993
Uncertainty (Standard Dev.)	9.1%			75%	3,356	932
Standard Deviation	326	[MWh/a]		90%	3,158	877

Table 1-3: Summary of the Energy Production for 3xV47 Wind Turbine

Phase I: 3 WTG 1980 kW
V47-660kW

Gross production	**1,631**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**1,512**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,512	[MWh/a]		50%	1,512	764
Uncertainty (Standard Dev.)	14.5%			75%	1,364	689
Standard Deviation	220	[MWh/a]		90%	1,231	621
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,512	[MWh/a]		50%	1,512	764
Uncertainty (Standard Dev.)	9.1%			75%	1,419	717
Standard Deviation	138	[MWh/a]		90%	1,335	674

Table 1-4: Summary of the Energy Production for 6xV47 Wind Turbine

Phase II: 6 WTG 3960 kW
V47-660kW

Gross production	**3,036**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**2,814**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	2,814	[MWh/a]		50%	2,814	711
Uncertainty (Standard Dev.)	14.5%			75%	2,538	641
Standard Deviation	409	[MWh/a]		90%	2,290	578
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	2,814	[MWh/a]		50%	2,814	711
Uncertainty (Standard Dev.)	9.1%			75%	2,641	667
Standard Deviation	256	[MWh/a]		90%	2,485	628

Four Scenarios have been considered in the financial analysis of the wind park:

Scenario I – 3 WT-FL600 (new)

Scenario II – Scenario I + additional 3 WT-FL600 (new)

Scenario III – 3 WT-Vestas V47 (repowered)

Scenario IV – Scenario III + additional 3 WT-Vestas V47 (repowered)

The parameters and assumptions, upon which the financial assessment is calculated, are:

- Inflation rate: 3% per annum.
- Depreciation: all capital expenditures are depreciated over a 20 year period with straight-line method.
- Construction timeframe: 12 months (and start operation January 2008)
- Taxes: it is assumed that this pilot project will be operated within the portfolio of the government of the Gambia, income taxes and import duties have been waived.
- Financing structure: Government grant of 10% of the total investment costs. 70% are assumed to be granted by the African Development Bank and the residual financing component of 20% is taken over also by AfDB under soft conditions (5.00% per annum, loan term of 12 years, grace period 12 months)
- Discount rate: 10%
- Revenues: electricity sales per annum at 14 US$ ct / kWh.

Project's financial feasibility has been evaluated with the financial internal rate of return (FIRR), minimum Debt Service Coverage Ratio (DSCR) and the Net Present Value (NPV) with the following results:

CASES	Scenario I	Scenario II	Scenario III	Scenario IV
$IRR_{post\ tax}$ (P75)	7.8 %	7.4 %	11.4 %	12.2 %
Min. DSCR	1.94x	1.83x	2.69x	3.34x
NPV – Mill EUR	-0.49	-1.10	0.16	0.47
Investment Specific Costs	1.929 EUR/MW	1.852 EUR/MW	969 EUR/MW	892 EUR/MW

Since the NPV of the project is positive in Scenario III and Scenario IV, it is worth to realise the project under the assumed financing conditions. Scenario III assesses the installation of 3 Vestas V47 wind turbines, whereas Scenario IV assesses Scenario III and the addition of 3 further used Vestas wind turbines with required investments of **1.74 and 1.47 Mio Euro,** respectively.

Results can even be improved, for example through a slightly higher sales tariff and increase of capital subsidies / equity injection into the project. Further, and in part due to the assumption of existence of subsidies on capital, the project in all four scenarios does not suffer in cash flow liquidity since the minimum Debt Service Coverage ratio is above the borderline of 1.20x in all scenarios.

2 Introduction

Under funding of AfDB Lahmeyer International has been contracted by the Government of The Gambia, Office of the President, Energy Division, to provide consulting services for the "Renewable Energy Study for The Gambia".

The study purpose is to develop and promote the use of renewable sources of energy in The Gambia, with particular emphasis on rural areas. In addition, the study is meant to assist the Gambian authorities in preparing projects that will provide sufficient energy to the population. Feasibility studies should be prepared for selected priority projects.

This report forms part of the results of the second phase. A feasibility study was conducted for a small scale wind park in GBA, called "Tujereng Wind Park". Together with the client it was decided that this wind park, connected to the grid near the western Atlantic coast, should be one of the selected projects.

During the next stage, tender documents will be elaborated for this priority project to be implemented in the medium term.

2.1 Scope of work

This feasibility study is divided into the following:

- Description of site and input data
- Wind data analyses and interpretation
- Brief presentation of the used simulation model and calculation methods
- Long-term correlation of the wind conditions near/at the selected area
- Micro-Siting of the wind farm layout plus one alternative layout
- Energy prediction for the two wind park layouts, incl. losses and uncertainties
- All technical, electrical and social aspects to be considered like grid connection, access roads, environmental and other impacts
- Cost assessment for all alternatives of wind parks
- Economical and financial evaluation of alternatives

3 Site Conditions

Wind data and conditions at a specific site are closely connected with the physical conditions of the terrain such as topography and land use. Therefore, describing the site and the surrounding environment is extremely important.

3.1 Site Description

The foreseen wind park site is located in the western coastal area, in the district of Kombo South, GBA, approximately two Kilometres to the South of Tujereng village, see also Figure 3-1. A 30 kV transmission line runs along the nearby road connecting Tujereng with the village of Sanyang.

The altitude of the site ranges from 15 m to 25 m a.s.l. The whole area is relatively flat with no abrupt changes of elevation, which is typical for the whole of The Gambia. The highest elevation in The Gambia is said to be 53 m a.s.l. only.

Over 60 % of The Gambian territory is bush, in the sense of land not in active agricultural use. This includes forests, savannah, fallow lands and mangroves. The selected wind park area is not inhabited and has no forests. The terrain is grassland with some bushes and trees scattered around. Roughness class is estimated to be approximately 1.0.

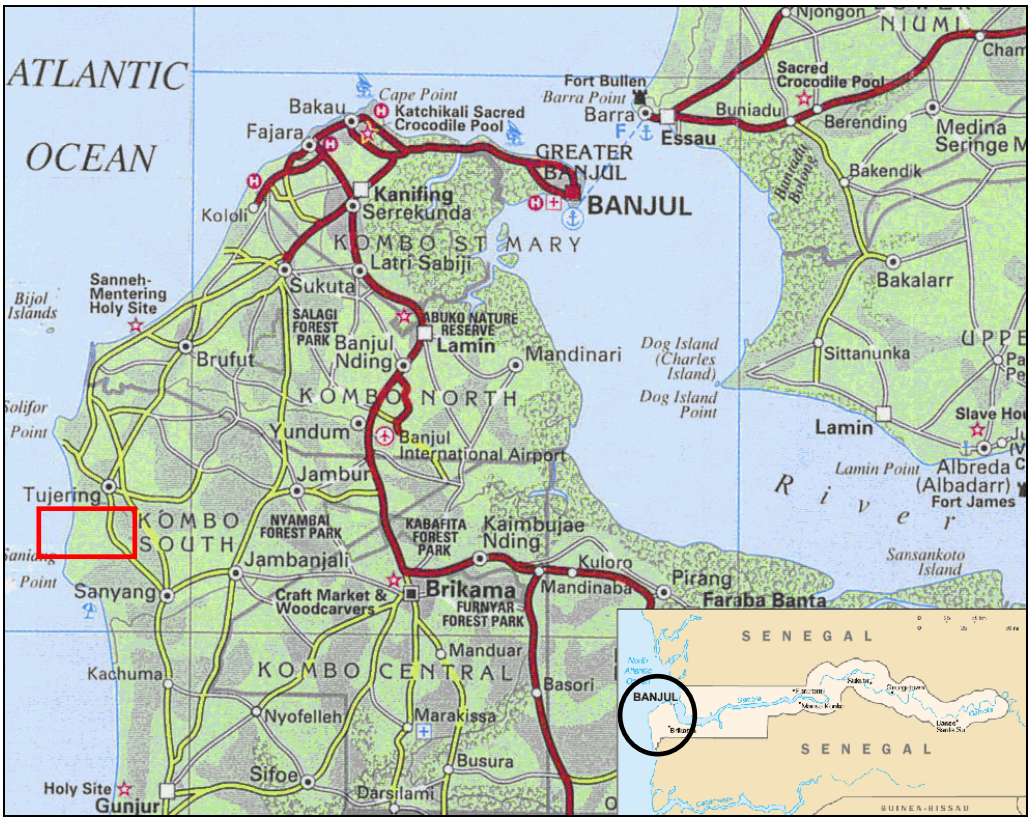

Figure 3-1: Tujereng Wind Park within GBA

3.2 Climatic Conditions

The Gambia is well known for having one of the most favourable climatic conditions in all of West Africa, which are relatively homogeneous all over the country.

It possesses a tropical climate ("sudano sahelian") with a dry period from November to May and a rainy season from June to October. Near the coast the rainy season lasts longer and the rainfall is heavier, diminishing eastward. At Yundum, district Kombo North, the average annual rainfall is about 51 inches (1,300 millimetres) and the mean monthly temperature is 77° F (25° C).

Due to the dry wind called 'Harmattan' which blows from November to May, The Gambia has a very comfortable winter, free from rain and with sunshine every day. Temperatures vary from 20 to 30 °C during this period. Temperatures in Banjul and Kombo are moderated by the Atlantic Ocean with less seasonal and daily variability in daytime temperatures.

The relative humidity is high, reducing from December to April, when the north-eastern Harmattan wind is blowing. During the dry season, the relative humidity is about 68 % along the coast but generally above 70 % throughout the wet season. An analysis of the historical climate data (1951-1990) of The Gambia indicates a slight warming and about 25-30 % decrease in rainfall during this period.

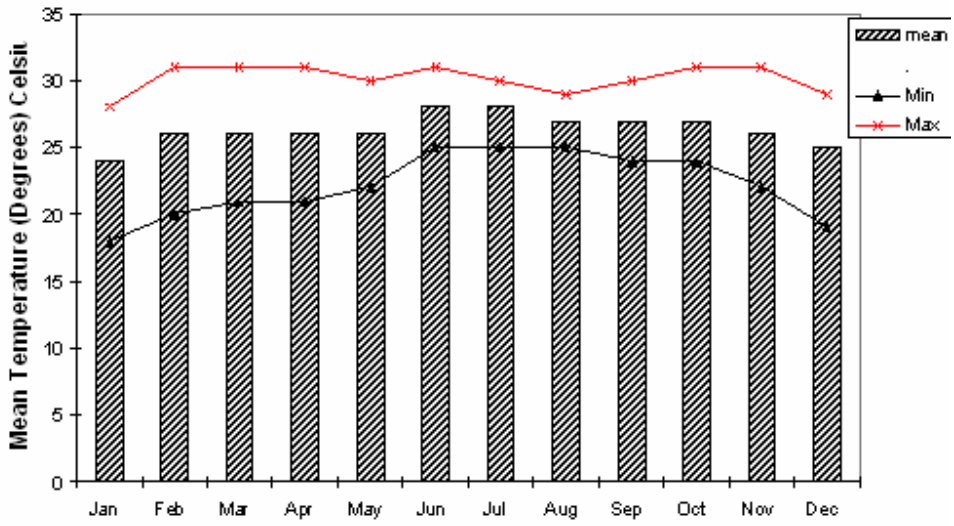

Figure 3-2: Average mean, min. and max. monthly temperature in Banjul

For the energy yield calculations, an average temperature of 24 °C at hub height was used which results in an average annual air density of 1.174 kg/m³.

Information from the surrounding terrain is taken from LI's world wide data base, from the impressions during the site visit in July 2006 as well as from satellite images.

3.3 Site Characteristics

The selected wind park site in the South of Tujereng has basically favourable conditions for implementing a wind farm. There are no villages or other main exclusion areas near the site, the terrain is flat without any large obstacle and a transmission line is located along the main road nearby. The orography is not complex, i.e. application of a mesoscalic calculation model instead of WAsP to predict the wind conditions is not required.

The necessary area for the proposed wind park site is approximately 0.25 km² in total. The net area which is necessary for the foundations, access roads and crane pads will only be a small fraction of the total area. In future, the remaining space between the wind turbines could be utilised as before, e.g. for agricultural use.

3.3.1 Ground and Soil Conditions

During the site investigation, a visual inspection of the soil conditions was performed. The ground was defined to be suitable for bearing heavy loads and for wind park installation. The soil is of sand loam surfaces with sandy clay loam sub soils with underlying gravel and/or sandy parent material. The static water table is around 10.7 m below ground level.

However, since the ground may be partly sandy at the site and due to the location's proximity to the coast, a detailed soil study, to be performed by the Contractor of the wind turbines at a later stage of the project development, is strongly recommended in order to evaluate the necessity of piling foundations.

The outcome of this investigation should be the values of the static soil bearing capacity, the dynamic modulus of the soil at planned foundation level, and the groundwater level. These values determine the design of the foundation according to the requirements of The Gambian standards and the requirements of the operation of the turbines.

3.3.2 Other Aspects – technical, environmental, legal, safety

In general, all important aspects were considered within this feasibility study. However, the following steps towards a successful wind park project development and also realisation at later stage should be assessed in detail and elaborated, if applicable:

- Soil condition: a detailed study will be necessary as mentioned above. Further investigations are required by the turbine manufacturer or EPC-contractor.
- Ownership of the land: According to available local information, the selected plots of land for the wind park site are governmental owned and can be used for this project. Based on client's information the land is leased to NAWEC and NAWEC will sub-lease it to the operator of the wind park, if the operator is not NAWEC itself.
- Available Crane Capacities: according to local information no suitable crane for the erection of the wind turbines is available in The Gambia. This crane must be mobilized from a foreign country. At a later stage further investigation will be necessary: details such as daily costs, transportation costs to the site, and the availability during the foreseen erection period depend on detailed negotiations with the crane owner.
- Minimum distances to transmission line: the distance of the wind turbines to the existing 30 kV transmission line is similar to the distance to the main road, approximately 500 m. Problems are not expected.
- Air corridor of the Banjul International Airport (also called Yundum Int.): the airport is located approximately 14 km to the Southwest of Banjul and managed by the governmental owned Gambia Civil Aviation Authority (GCAA). The distance to the airport is more than 15 km. The wind park is outside the flight path (NW-SE) and perpendicular to the runway/airstrip. However, according to GCAA aviation lights should be installed on every wind turbine for safety purposes regarding small planes flying over the area during site missions.
- Earthquakes: The Gambia is located in a region of very low seismic activity, see *Figure 3-3*. No information about historical earthquakes was available. As a result, no problems are foreseen.
- Harbour Terminal: the wind turbines will arrive in several sections (tower sections, nacelle, rotor blades) at international Banjul Harbour and will be discharged and transported to the

site. As large containers are unloaded from container vessels in Banjul harbour, no problems are expected regarding discharging of the wind turbines. The maximum load of the Oyster Creek Bridge between Banjul and Serekunda, however, has to be determined for the turbines' transport to the wind park site.

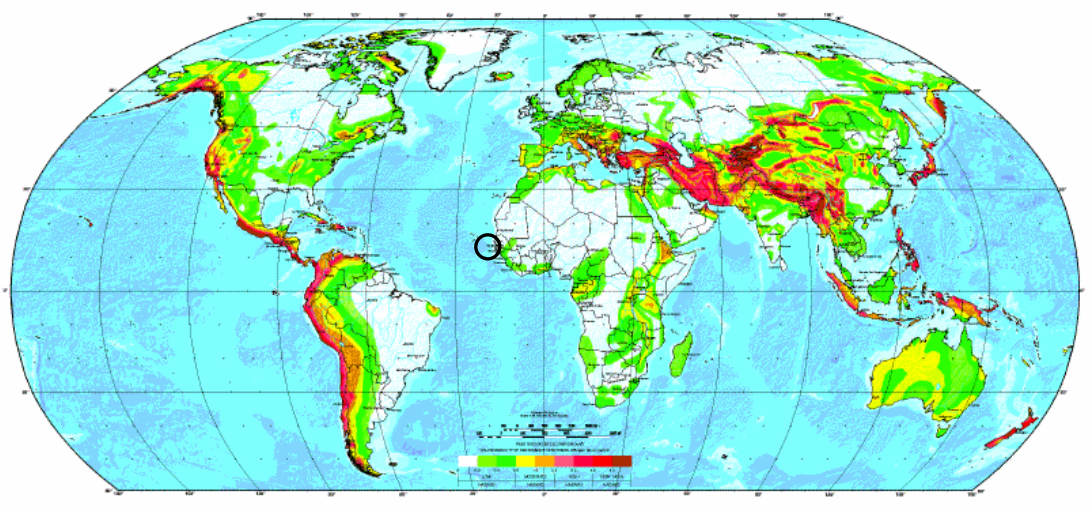

Figure 3-3: Global Seismic Hazard Map

4 Wind Resources

The wind data analysis is based on the measured wind data at GREC Station No.8 near the village of Jambanjelly, approximately 7 km to the east of the wind park site. For the energy calculation of the wind park, station No.1 near Kanuma was also partially considered as it is located near the coast. In addition, long term data was applied in order to calculate the long-term wind conditions of a “normal wind year” in this region, see further description in 4.2.3 “Long Term Correlation”.

4.1 Measurement System

In order to make an accurate measurement of wind resources, a reliable and industrially proven monitoring system was installed in the vicinity of the selected wind park site.

The wind monitoring station consists of the following devices: anemometer, wind vane, pyranometer (for diffuse and global solar radiation), data logger, solar panel, battery, tower and sensor support hardware. The basic sensors measure horizontal wind speed and wind direction. At Jambanjelly Station (GREC 08), two cup anemometers are installed at 10 m and 30 m height with one wind vane at 30 m. The data logger is the central electronic unit which records and stores wind data. The energy supply is from solar panels and batteries.

Accuracy and reliability of the monitoring station are essential for a successful wind measurement campaign and further wind park development. All components (sensors, cabling and data logger) must minimise any inaccuracy in the measurement. The installed anemometers are calibrated according to the internationally accepted MEASNET standard which presents the current ´state of the art´ technology. These anemometers fulfil the demands of precision and linearity. Slope and offset for each sensor are applied in the Downloading Software EOL2020 according to the slope and offset parameters determined in the calibration protocols. As a result the measured data of this measurement is reliable with very low uncertainty.

4.1.1 Sensors and Data Logger

The wind speed was measured with individually calibrated cup anemometers of the type VECTOR A100L2 which are at present one of the best quality equipments having the so called “Class 1 Performance” according to the IEC and MEASNET standards.

The logger equipment was provided by KINTECH, Kinematic Technology, Zaragoza, Spain. The data logger EOL2020 monitors wind speed, wind direction, solar radiation, and temperature. All these parameters are measured every two seconds. The recording will be used for further calculations and logged as ten-minute averages together with standard deviation and maximum and minimum wind speed.

The following sensors are installed at Jambanjelly measuring mast:

Table 4-1 Technical Specifications of the Sensors on the measurement towers

	10m	**30m**
Anemometer	Vector A100L2/PC	Vector A100L2/PC
Serial / Rotor / Certificate	8536/W8B/051618	8531/W7W/051632
Slope / Offset	0.04982 / 0.206	0.05018 / 0.186
Wind Vane	n.a.	Ornytion 207
Serial No.	n.a.	207040049
Temperature Sensor	Serial 307010	
Pyranometer, global	Type CM3	
Pyranometer, diffuse	Type CM6b	
Shadow Ring	Type CM121	

4.1.2 Measuring Mast

The measuring mast is a lattice mast shown in the following two figures, manufactured by GTTI, the Gambia Technical Training Institute according to the guidelines of the IEC 61400-121 Power Performance Measurement of Grid connected wind turbines.

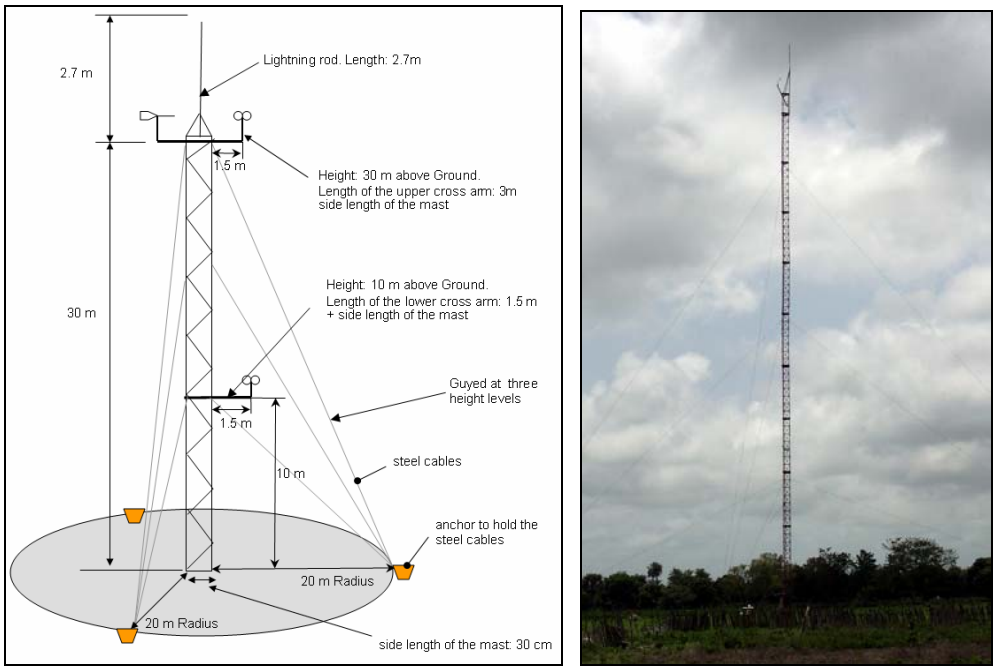

Figure 4-1: Measuring Mast Design and Photo of Mast at Jambanjelly

The main information on the measurement station at Jambanjelly, such as coordinates and measurement starting point, can be seen in the following table:

Table 4-2 : Main information regarding the measurement tower at Jambanjelly

Name	Jambanjelly	
Shortcut	GREC 08	
System, Zone	UTM WGS 84, Zone 28	Geographical, WGS 84
Coordinates	14.691.37N - 0.312.704 E	13°17'00.61N – 16°43'44.08E
Elevation	31 m a.s.l.	
Start of Measurement	07.07.2005 15:00	
End of Measurement	Ongoing	
End of Data Evaluation	09.07.2006 14:00	

4.2 Wind Data at Jambanjelly

One year of wind data is available at GREC 08. However, problems may occur, e.g. due to lightning strikes resulting in data loss and therefore in a lower data recovery rate lower than 100 %. The data recovery rate is defined as the quotient of the number of recorded measured data and the maximum possible number of measurement data in the respective measurement period.

At station GREC 08 a data inconsistency of a few days has been identified in October 2005, which is regarded as a download problem. However, with 97.2 % the data recovery rate is still very good. In order to complete the data set, wind data from the neighbouring station GREC 07 was correlated and applied to the missing data of GREC 08. The data recovery rate including these reconstructed data is 100 % and the data set is suitable for wind energy production estimation.

4.2.1 Measured Values

The complete detailed analysis of the measured wind data is given in the WindPRO METEO DATA REPORT in the Annex of this report.

Main characteristics of the measurement and measured values:

Start of measuring period:	07.07.2005 15:00 h
End of measuring period (data evaluation):	09.07.2006 14:00 h
Exact measured heights:	10.25 m and 30.25 m
Resolution:	10 minute mean values
Number of valid values:	52,810
Data recovery rate (original):	97.2 %
Data recovery rate (incl. reconstruction):	100 %

Measured wind speed and wind shear:

Mean wind speed at 10 m height:	2.65 m/s (long term 2.60 m/s)
Mean wind speed at 30 m height:	3.60 m/s (long term 3.53 m/s)
Maximum wind speed at 30 m height for 2 seconds:	20.8 m/s;
Maximum wind speed at 50 m height for 10 minutes:	15.9 m/s;

The measured and correlated wind speed of 3.6 m/s at 30 m height can be regarded as moderate.

The mean wind shear is 0.28, which is regarded as high. Comparing the wind data at 10 m and 30 m height results in wind shear values of between 0.21 – 0.45, depending of the wind direction sector. The wind shear in NW direction, where nearly half of the wind comes from, is approximately 0.22. This is within the usual normal tolerance, see also Table 4-3 below.

The theory applied to estimate wind shear profiles is valid until 80 m height. Therefore for the Wind Park Project at Tujereng with wind turbines below 80 m hub height the wind shear model can be applied.

The following characteristic should also be mentioned:

Mean Temperature: 24 °C

4.2.2 Frequency Distribution and Diurnal Wind Speed Pattern

The average wind speeds and the frequency distribution of the measurement at GREC 08 are presented in the following table.

The two main wind directions NW and NE are clearly noticeable and typical for the coastal region.

Table 4-3: Overview of Frequency Distribution

GREC08		**Wind Speed**	**Frequency**	**Wind shear**
Sector		[m/s]	[%]	[-]
mean		*3.60*	*100.00*	*0.28*
0	N	3.70	8.04	0.28
1	NNE	3.76	**8.64**	0.45
2	ENE	4.19	**10.29**	0.39
3	E	4.39	8.27	0.30
4	ESE	3.99	4.28	0.26
5	SSE	2.57	2.48	0.36
6	S	2.42	2.82	0.31
7	SSW	2.73	3.20	0.35
8	WSW	3.41	7.43	0.24
9	W	3.30	**11.01**	0.22
10	WNW	3.56	**16.57**	0.21
11	NNW	3.47	**16.98**	0.25

In the following figure, the diurnal wind speed and wind direction pattern is shown for the measurement station.

It indicates a maximum value for the wind speed during the afternoon hours due to thermal influences. At the same time, the wind direction turns from NE to NW direction. Both the diurnal wind direction and wind speed trends do not influence the feeding of the wind energy into the grid nor the grid stability due to the large network capacity of more than 30 MW.

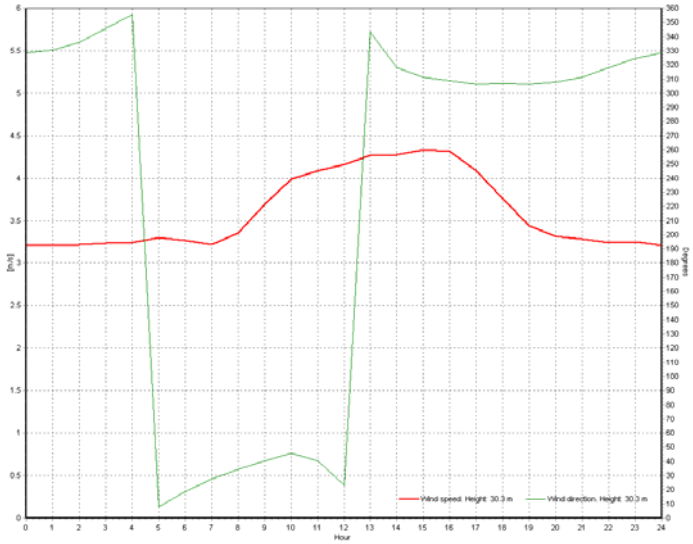

Figure 4-2: Diurnal Pattern of Wind Speed and Direction

4.2.3 Long Term Correlation

For the determination of the annual fluctuation, the 20-year-long-term wind data available from the World Wind Atlas (WWA) were used. The WWA data set is the result of numerical weather predictions based on several measurements at the surface as well as in the higher atmosphere coming from the NCEP, National Centre for Environmental Prediction, USA. These data are independent of local influences such as obstacles or vegetation, which can decrease the long-term reliability of surface measurements.

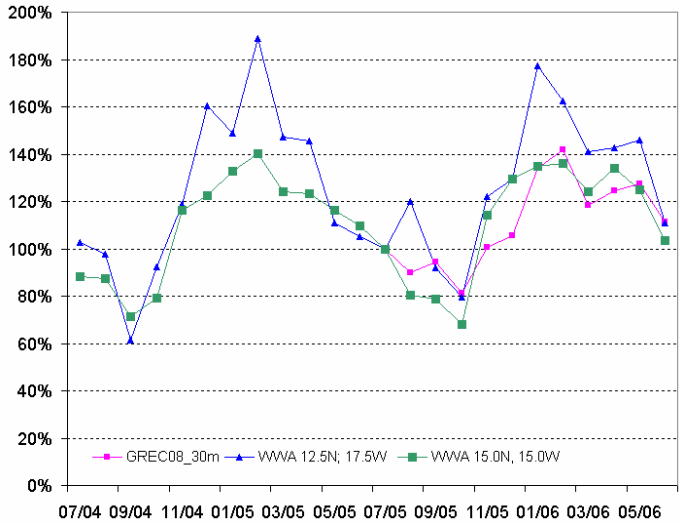

Figure 4-3: Visualisation of the Yearly Wind Speed Trend

Figure 4-3 shows exemplarily the yearly trend of the wind with higher wind speeds from January until May and lower wind speed from June to December. This trend is represented for the last two years by the nearest and representative WWA Data Base Points 12.5 N-17.5 W, located in the ocean south of The Gambia and 15.0 N-15.0 W, in the northern part of The Gambia.

For these two WWA points a successful correlation is given for GREC 08 station. The correlation of the 12 month measurements of GREC 08 and the simultaneous 50 m WWA data set from the

two WWA points is high, with correlation coefficients of R^2 = 79.5 % and R^2 = 83.0 % respectively, see also Figure 4-4 below. The distance to the measurement station is 121 km in SW direction for the WWA point 12.5N-17.5W and 260 km in NE direction for 15.0N-15.0W.

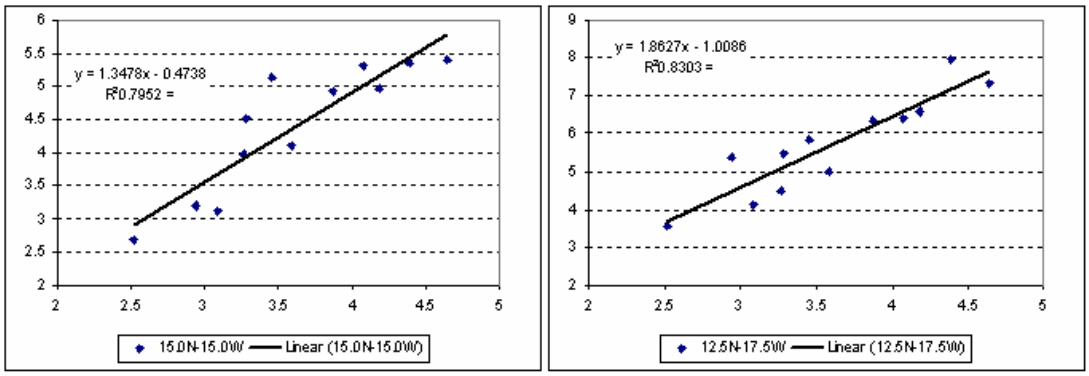

Figure 4-4 : Correlation between WWA and Wind Measurement GREC 08

The correlation procedure using the MCP Wind Index Method (Measure Correlate Predict) indicates that the measured reference period from 07/2005 until 06/2006 was approximately 2 % higher than the 20-year mean wind speed. Thus, the GREC 08 dataset is overestimating the real wind potential by approximately 2 %. Therefore a correction factor of 0.98 at the raw measured wind speed data set was applied to perform the energy yield estimation:

Mean wind speed at 30m height: 3.60 m/s measured, 3.53 m/s correlated

Regarding the long-term deviation of the regional annual mean value of the wind speed at site it is expected, according to the WWA data base, that the mean value differs by approximately 4.0 % in terms of standard deviation.

Table 4-4 : Methodology for Long Term Correlation with WWA Data

	Monthly mean wind speeds in m/s at 50m			
Month	**12.5N17.5W**	**15.0N15.0W**		
07/1986	4.2	4.3		
08/1986	3.6	3.7		
09/1986	3.3	3.2		
10/1986	3.0	3.0		
11/1986	5.9	4.4		
12/1986	6.6	4.8		
01/1987	6.4	4.3		
02/1987	6.4	4.7		
03/1987	6.4	4.9		
04/1987	5.3	4.2		
05/1987	5.2	4.3		
06/1987	4.6	4.7		
07/1987	3.5	4.3		
08/1987	4.0	3.9		
09/1987	3.1	3.0		
⋮	⋮	⋮		
01/2005	6.7	5.3		
02/2005	8.5	5.6		
03/2005	6.6	4.9		
04/2005	6.6	4.9		
05/2005	5.0	4.6	Wind Speed at 30m	
06/2005	4.7	4.3	**GREC 08 Recovery**	
07/2005	4.5	4.0	3.2	82%
08/2005	5.4	3.2	2.9	100%
09/2005	4.1	3.1	3.1	100%
10/2005	3.6	2.7	2.7	100%
11/2005	5.5	4.5	3.3	100%
12/2005	5.8	5.1	3.5	100%
01/2006	8.0	5.3	4.4	100%
02/2006	7.3	5.4	4.7	100%
03/2006	6.3	4.9	3.8	100%
04/2006	6.4	5.3	4.1	100%
05/2006	6.6	5.0	4.1	100%
06/2006	5.1	4.1	3.7	100%
Overall mean wind speed	**5.5**	**4.4**		
Mean wind speed measured period	**5.7**	**4.4**	**3.60**	
Correlation Coefficient	83.0%	79.5%		
Short term / long term	1.04	1.00		
Correction Factor	**0.98**		0.98	
Expected mean wind speed at GREC_08 for the long term period:			**3.53 m/s**	

4.2.4 IEC Wind Class

Wind turbines are subjected to environmental conditions which may affect their mechanical stress, durability and operation. To ensure an appropriate level of safety and reliability, the environmental parameters must be taken into account during the selection of appropriate wind turbines.

The environmental conditions may be subdivided into normal and extreme external conditions. The normal conditions generally concern long-term structural loading and operating conditions, while the extreme external conditions represent the rare, but potentially critical, external conditions such as short-term gusts. Wind turbines are grouped into classes according to IEC 61400 1, Rev 3 depending to their ability to withstand defined wind conditions. These classes are characterised by the 10-min average value of the extreme wind speed with a transgression probability once every 50 years and by the long-term annual mean wind speed at hub height criteria (required by Rev. 2 of IEC 61400 1 but no longer used by Rev. 3), the sub classes A, B and C (the latter implemented by the latest edition of the norm, Rev.3) refer to the turbulence intensity at a wind speed of 15 m/s at hub height.

Table 4-5: IEC Wind Turbine Classification

WT classes	I	II	III
V_{ref} [m/s]	50.0	42.5	37.5
A_{I15}	0.18	0.18	0.18
B_{I15}	0.16	0.16	0.16
C_{I15}	0.12	0.12	0.12

The figures given in the table are the maximum values for the respective wind classes, whereas:

Vref 50-year 10-minute averaged extreme wind speed

A designates the sub-class for higher turbulence characteristics

B designates the sub-class for medium turbulence characteristics

C designates the sub-class for lower turbulence characteristics

I15 characteristic value of the turbulence intensity at 15 m/s

Vref is determined by applying the corresponding WindPro software tool (using a fitted Gumbel-distribution, a statistical distribution function) based on the wind measurement data.

According to IEC 61400 the wind speed is extrapolated to hub height using the following equation:

$$V(h) = V(ref) \times \left(\frac{H(h)}{H(ref)} \right)^{\alpha} \quad (1)$$

With:

V(h) wind speed at height h

v(ref) reference wind speed

H(h) target Height h (e.g. hub height of the wind turbine)

H(ref) reference Height

α power law (wind shear) exponent

The wind shear exponent α is connected to the terrain roughness on site and is defined to be 0.28 for the measurement GREC 08.

This leads to the following results for the 50-year 10-minute averaged extreme wind speed at the hub height of the wind turbines of 75 m above ground level:

Table 4-6: Calculated 50-year Extreme Wind Speed

GREC 08		
V(75m)	**Uncertainty**	**Turbulence**
26 m/s	+/- 2.3 m/s	11.6 %

Additional attention should be turned to the site's turbulence.

The Turbulence is a parameter which causes stress and fatigue to several components of a wind turbine: blades, bearings and gearbox, among others. A possible indicator of turbulence for siting purposes is the standard deviation of the wind speed, calculated from the measured wind speed data. Normalising this value with the average wind speed results in the turbulence intensity. This value allows for an overall assessment of a site's turbulence.

The standard deviation is a statistical measure describing the deviation of the data points in a set from the average value (in this case, the standard deviation is the average of the 20 standard deviations based on subsets of 15 speed values for 30 seconds intervals from the measured wind speed). The turbulence intensity at V=15 m/s is calculated to 15.5 % for the GREC 08 station. The same value will be assumed for the wind park site whose surrounding is similar to the surrounding of GREC 08. However, it has to be noted, that for a proper wind park development, a high quality wind measurement station within the wind park area is essential for further planning, and that the expressiveness of the turbulence intensity is quite limited as the site is a low wind speed site and only very few measured wind speeds were measured with 15 m/s.

The finding of these calculations leads to the preliminary result of the GREC 08 and Tujereng Wind Park site to be classified as IEC wind class III b.

A more detailed calculation of the effective turbulences according to IEC may be necessary at later stage after involving the manufacturer of the selected turbine type, who has to guarantee the functionality and life-time of his wind turbine for the specific site.

4.2.5 Uncertainty Evaluation

Meteorology is based on probability and thus cannot be 100 % accurate in every instance. The wind measurement at Jambanjelly in combination with the long term correlation is adequate for the wind speed evaluation and an energy production prediction. Nevertheless, several sources of uncertainties are identified and quantified for the particular measurement campaign which is used in this study.

The following determination of uncertainty is restricted to the measured and long-term correlated wind data of the measurement GREC 08:

Table 4-7: Single Uncertainties of Wind Speed Evaluation on Site

Measurement	**MNO1**
Calibration	0.5%
Type of Anemometer	0.6%
Mounting	0.5%
Total (wind speed related)	**0.9%**
Elaborations	
Measurement	0.9%
Adjustment (internal)	0.3%
Long-term correlation	1.5%
Total	**1.8%**
Prediction horizon	
1-year wind deviation	4.0%
10-year wind deviation	1.3%
Uncertainties	
Total 1-year period	**4.4%**
Total 10-year period	**2.2%**

Uncertainty in terms of standard deviation of wind speed:

1. **Calibration 0.5 %:** The sensors were calibrated according to internationally accepted and state-of-the-art MEASNET standard.
2. **Type of Anemometer 0.6 %:** The installed Vector anemometers are of type “First Class” which means maximum quality, high performance, and state-of-the-art.
3. **Mounting 0.5 %:** The sensors were installed according to IEC guidelines. Dimensions of mast, boom length, etc. are according to IEC. An uncertainty of 0.5 % was estimated.

The total uncertainty caused by the measurement is calculated to 0.9 % which can be regarded as low.

Uncertainty of further data evaluation:

1) **Internal adjustment 0.3 %:** Some missing data in October were reconstructed, for this a slight uncertainty of 0.3 % was applied.
2) **Long-term correlation 1.5 %:** A long-term correlation was performed using a 20 year data base from WWA. The correlation coefficients are high, so the uncertainty for the LTC can be regarded as moderate.

The uncertainty caused by further data evaluation, including the measurement process, is calculated to 1.8 % wind speed related.

Uncertainty of prediction period:

As already mentioned in chapter 4.2.3 Long Term Correlation, the 1-year wind deviation is determined with 4.0 % in terms of standard deviation, wind speed related and based on the regional wind data, the 10-year block of wind deviation is consequently calculated to 1.3 %, also wind speed related.

The total uncertainty for the wind measurement results to 4.4 % for a 1-year period and to 2.2 % for a 10-year period, see also Table 4-7 above.

4.3 Summary and Results of Wind Speed Evaluation

For the measured wind data of GREC 08, a long term correlation based on the monthly indices coming from regional long term measurements from the WWA was performed. The finding of this correlation is that the 12 months measurement period represents about 2 % more wind speed than the long term mean wind speed. Therefore the measured values were multiplied by a factor of 0.98 in order to represent a long term mean value of a “normal wind year” in that region. The final long-term correlated, MEASNET conform mean wind speed at 30 m height is determined to be 3.53 m/s, which is very moderate and on the lower limit of suitability for wind generation purpose.

Probability of Exceedance

The probability of exceedance (PoE) describes how confident a calculated result is. Therefore the gross wind speed is elaborated to represent the wind conditions of a long term period. Every single elaboration has its own determined uncertainty. The gross wind speed result is probable in 50 % of all cases (PoE 50). PoE 50 is regarded as a risky wind speed statement. Frequently used PoE levels in the wind energy sector are 75 % and 90 %. The deviation of the PoE 75 and PoE 90 are closely connected with the uncertainties determined in the previous chapter.

The following determination of probability of exceedance (PoE) is restricted to the measured, long-term correlated and adjusted wind data.

Table 4-8: Resulting Wind Speeds for several PoE Levels

1-year period					Wind speed
				PoE	[m/s]
Estimated Wind Speed at 30m	3.5	[m/s]		50%	3.53
Uncertainty	4.4%			75%	3.43
Standard Deviation	0.2	[m/s]		90%	3.33

10-year period					Wind speed
				PoE	[m/s]
Estimated Wind Speed at 30m	3.5	[m/s]		50%	3.53
Uncertainty	2.2%			75%	3.48
Standard Deviation	0.1	[m/s]		90%	3.43

4.4 Wind Resource Map

To facilitate the siting of wind turbines, a land-covering wind resource map is helpful. The WAsP wind resource map shown below contains the final basic input data, i.e. terrain, roughness, and obstacles in the investigated area including the GREC 08 measurement. It presents the calculated wind speed at 75 m a.g.l. including the long-term adjustment.

In general the validity of the resource map is restricted to a radius of 3-4 km around the measurement mast. As the terrain in the region is not complex at all, the validity was extended to the Tujereng wind park area. Due to the low surface variation (topography and roughness) the wind speed varies only little.

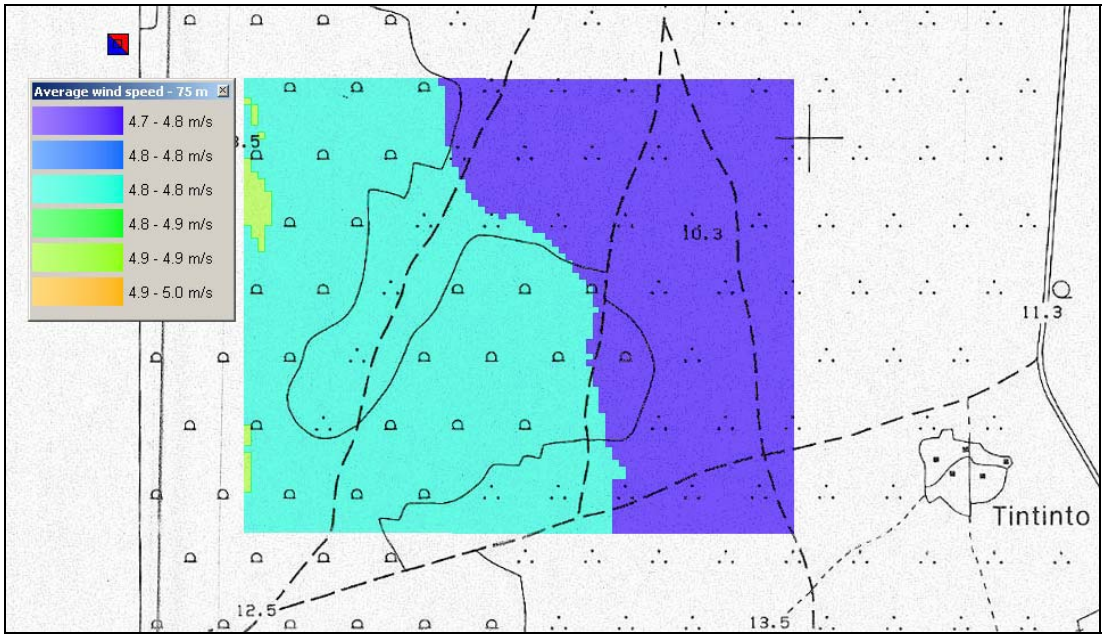

Figure 4-5: Resource Map for Tujereng Wind Park Area

5 Technical Layout of the Wind Park

In this section, the technical layout of the wind park will be described. The wind park size is determined to accommodate 3.5 – 4.0 MW and is dealt with in two stages: First stage with 3 wind turbines (Phase I) and second stage with 3 additional turbines. In order to improve the economics and the comparability between different turbine types, two turbine manufacturers and new, as well as re-powered wind turbines, are considered for the Tujereng wind park.

The wind park will be connected to the existing NAWEC 33kV grid and will therefore be treated as a “grid connected” wind farm.

The micro-siting was performed using the long term experience of LI in international wind projects using the wind industry standard wind farm planning software WindPRO.

5.1 Selection of Wind Turbines

5.1.1 Determination of the Optimal Size

The selection of a suitable wind turbine type for the wind energy application in The Gambia depends on several criteria, such as:

- Transportation of the turbine to the foreseen site
- Available space on site
- Orographical conditions on site which may prevent an installation of larger turbines in the MW range
- Local experiences with regular operation and maintenance of wind turbines
- Energy Yield
- Grid conditions for connecting the turbines to the existing grid

Wind turbines in the multi Megawatt range require a high level of maintenance - to be performed by experts from the turbine manufacturers - compared with proven technology of turbines in the range of less than one MW. In addition, experiences from the past have shown, that almost all wind turbine manufacturers have reservations offering turbines in MW class for development countries or countries that are just entering the wind energy market.

In case of The Gambia, the discussed project will be the first wind park project to be implemented in the country. It is therefore strongly recommended to start with medium sized proven wind turbine types.

A turbine capacity of around 600 kW was selected for the site. This selection has several reasons and advantages compared to larger sized wind turbines:

- Operation and regular Maintenance (O&M) can be performed by local experts; therefore a higher availability can be expected.
- A reduction of the costs for transportation (e.g. turbines in the recommended range usually require approximately 4-5 trucks, whereas wind turbines in the MW-range requires 9 trucks or even more).
- Investigations into the transport logistic (roads, harbour) have shown that it is possible to transport wind turbines of this size. For bigger turbines, a detailed road survey has to be performed.

- Delivery time for turbines in the MW range is expected to be very long at the moment. Several manufacturers are not able to deliver any turbines in the MW range in 2007 and 2008.

For these reasons it has been decided to focus on wind turbines in the 600 kW range. According to local information the necessary crane is not available in The Gambia but has to be brought in from one of the neighbouring countries.

For this project, the following turbine types were selected:

- Fuhrländer FL600, 600 kW (new)
- Vestas V47, 660 kW (used / re-powered)

Two scenarios will be considered in two different stages:

3) Layout 1 using three new FL600 wind turbines and later on (Phase II) three additional FL600 turbines
4) Second Scenario: Same Layout 1 also in two Phases but with Vestas V47 wind turbines which are available on the market as re-powered wind turbines. This will have a significant influence on the project's economics as the investment cost will be much lower than the FL600 layout. Vestas does not produce new V47 wind turbines anymore but it should be mentioned that, according to official information from Vestas, new spare parts are offered also in future for the turbines already under operation.

Apart from the two turbine types mentioned above, additional turbines in the same range are rarely available. The Spanish manufacturer Ecotecnia offers a 640 kW turbine (Ecotecnia 44) and the Indian manufacturer Suzlon Energy Ltd. has the S52 600 kW on the Indian market, which however, is not released for the international market.

5.1.2 Tower Height

Normally wind speeds increase with height above ground level. For this reason higher turbine towers will result in higher annual energy production. The counteracting effect is the additional investment cost for the tower and the foundation. In addition, the available crane capacities are a further limiting factor, especially in a country such as The Gambia, where large cranes are difficult to find.

In the case of the Tujereng wind park site the turbine tower height of 75 m for the FL600 turbine and 76 m for the re-powered V47 turbine were chosen with regards to the moderate and low wind condition on site. The relatively higher costs for towers, transport, foundation and the erection compared to lower hub heights should be compensated by the additional energy yield of the higher turbine height.

These towers are of normal height for turbines up to 1 MW and will be available for the proposed wind turbine types.

Based on our information, no sufficient crane capacity is available in The Gambia at present. Therefore, additional costs for the crane mobilisation from outside of The Gambia have been integrated into the cost assessment and furthermore in the financial model.

In the following Table the main data for the two wind turbines is shown. In order to be able to compare the energy yield a hub height of 75 m was used for both turbine types.

Table 5-1: Main Data of Selected Wind Turbines

	Fuhrländer FL600	Vestas V47
Nominal Power	600 kW	660 KW
Control System	pitch	pitch
Rotor Diameter	50 m	47 m
Cut-in / Cutt-off Wind Speed	3 / 20 m/s	4 / 25 m
Rated Wind Speed	10.8 m/s	15.0 m/s
Hub Height	50 / 75 m	55 / 60 / 65 / 76 m

5.2 Wind Park Layout

The optimised wind park layout for the Tujereng wind park site is shown in the following two maps. More detailed information and the exact turbine coordinates are given in the Energy Calculation Report, attached in the Annex.

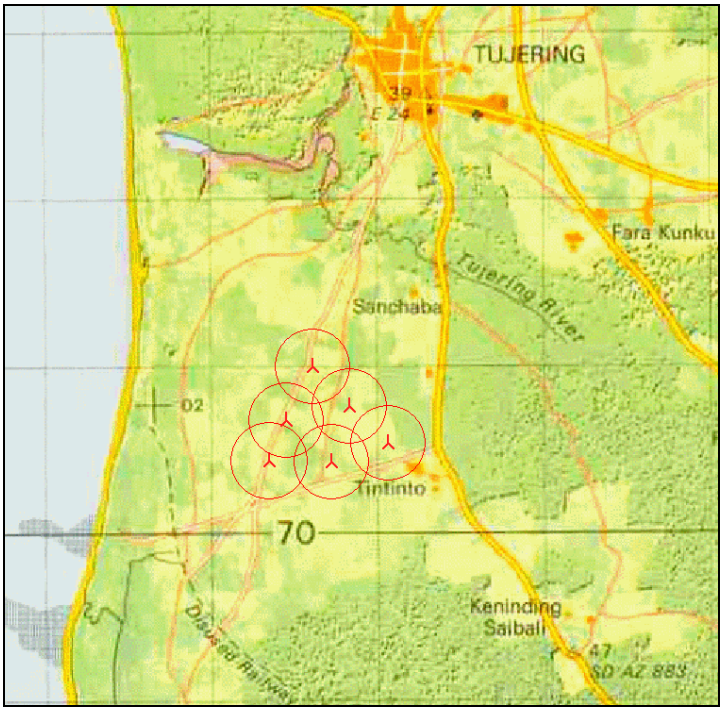

Figure 5-1: Overview of the Park Layout within Tujereng Area

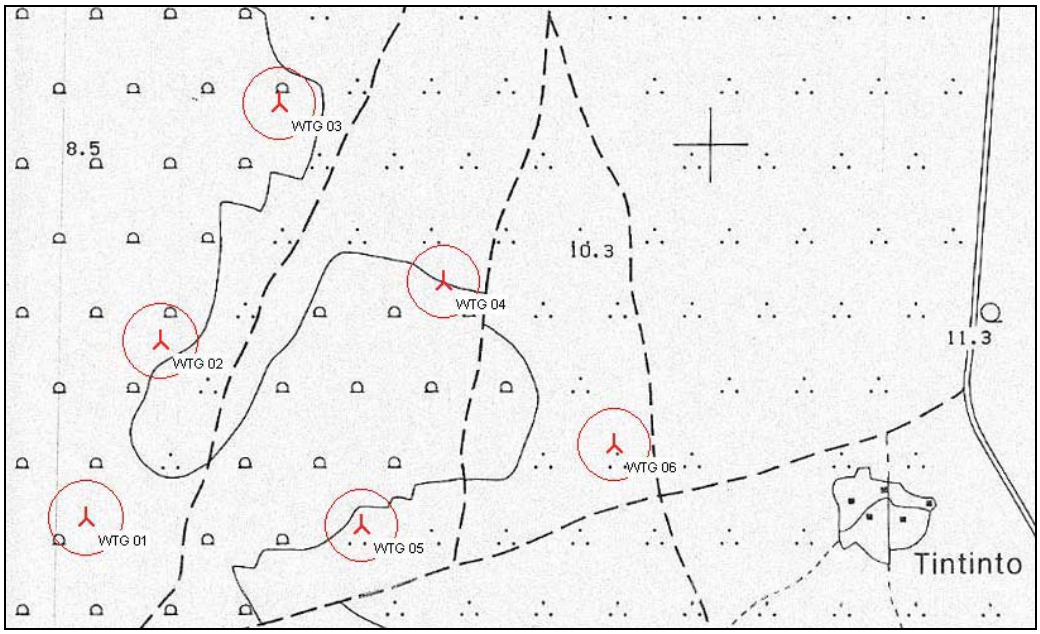

Figure 5-2: Detailed Layout of the Wind Park

5.2.1 Turbine Distances

Within a wind park each wind turbine reduces the wind speed behind it itself as it absorbs part of the wind's kinetic energy, converting it into electricity. Thus, ideally the space between the turbines should be as large as possible in the prevailing wind directions. However, considering the costs for grid connection and internal road access, the turbines should be installed close together.

For this site the layout takes into consideration the technical requirements regarding minimal distances between the turbines in order to minimise the interaction of the turbines (wake effects and turbulence) which do not only decrease the energy output but may also have an influence on the turbines' lifetime:

- 5 x RD (rotor diameter) in main wind direction and
- 3-5 x RD perpendicular to the main wind direction.

Table 5-2: Distances of Wind Turbines

	Fuhrländer FL600	Vestas V47
Rotor Diameter (RD)	50 m	47 m
Perpendicular to Main Wind	5 x RD	5 x RD
minimal Distance required	250 m	235 m
minimal Distance in Park	260 m	260 m

Furthermore the turbines are located near existing roads which facilitates the access to the site.

6 Energy Production Estimate

The calculation of the wind resources on-site and the corresponding energy production are based on the processed wind data collected from the measurement masts at Jambanjelly (GREC 08) and to a certain degree at Kanuma (GREC 01) with the energy yield estimation carried out by applying the WindPRO and WAsP software packages. Both programs are designed to supplement each other and therefore create an effective simulation tool.

6.1 Applied Software and Input Parameters

The WindPRO philosophy is object orientated projecting. A wind park project consists of a number of objects, whereby the wind turbines are key elements. Objects are: wind turbines, wind monitoring stations, local obstacles, exclusion areas, etc. Some of the objects directly determine the wind energy, others focus on the environmental aspects and yet some others can also influence the feasibility of the project. The characteristics of the objects are combined with the terrain data such as the surface roughness maps and the height level contours and serve as basic input data for the energy calculation, which is performed with WAsP, the WindPRO integrated meteorological simulation model.

WAsP is a software program for predicting the wind climate and the energy yield of wind turbines. The predictions are based on measured wind data taking into consideration the influences of the surrounding terrain on the wind flow (topography, surface description, obstacles).

For the energy yield calculation as well as for the wind prediction analyses within this study, a WAsP / WindPRO model was generated using a digital terrain model in a radius of 20 km around the centre of the site. A digitised roughness map has been evaluated for the same radius. In a radius of approximately 1 km all major obstacles were considered in the model.

The orographical terrain data has been gathered from the SRTM -Shuttle Radar Topography Mission data base which is provided by the US Geological Survey. The mission has scanned the earth's surface between 60° latitude north and 54° latitude south, with a resolution of 90 x 90 m. The data in between these points were interpolated using the WindPRO software to obtain the topographical model of the wind park area.

Data on the roughness classification for the nearer proximity of the wind farm site is derived from data obtained from LI's data base, impressions during the site visit as well as from satellite photos of the region. It has to be noted that the roughness class is a defined value which can not be measured directly. The roughness length describes the height where the wind speed with a logarithmic wind profile becomes theoretically zero. The higher the surface friction, the higher the roughness length is.

6.2 Power Curve and Air Density

The Power Curve of a wind turbine is an important parameter, describing the relation between the wind speed on site and the respective electrical energy output. Power curves and ct-values, a parameter for the calculation of the wake effect, of the turbines under consideration are given in the Energy Calculation Report attached in the Annex and are applied for the energy calculation. The parameters are as follows in Table 6-1:

Table 6-1: Power Curves Applied in WindPRO

Fuhrländer FL600 - 600kW			Vestas V47 - 660kW		
v [m/s]	P [kW]	ct	v [m/s]	P [kW]	ct
1	0	0	1	0	0
2	0	0	2	0	0
3	5	0.154	3	0	0
4	26	0.338	4	5.3	0.078
5	60.9	0.405	5	44.9	0.338
6	115.8	0.446	6	95.4	0.416
7	189.9	0.46	7	161	0.442
8	289.6	0.47	8	242	0.445
9	410.7	0.468	9	334	0.431
10	518.8	0.431	10	426	0.401
11	593.8	0.371	11	511	0.361
12	604.8	0.291	12	577	0.314
13	615.3	0.233	13	620	0.266
14	613.7	0.186	14	644	0.221
15	613	0.151	15	654	0.182
16	612.5	0.124	16	658	0.151
17	612.7	0.104	17	660	0.126
18	610	0.087	18	660	0.106
19	610	0.074	19	660	0.091
20	610	0.063	20	660	0.078
21	0	0	21	660	0.067
22	0	0	22	660	0.058
23	0	0	23	660	0.051
24	0	0	24	660	0.045
25	0	0	25	660	0.04

Remarks:

- the air density for both power curves is 1.225 m³/kg
- FL600 power curve was measured in 09/2003
- Vestas power curve is calculated and based on technical specification No. 943111.R4, dated 31.07.2001

During the calculation of the energy yield, the power curves are adapted to the air density of each individual turbine location at hub height, with the transformed power curves for the average air density at the selected sites to be found in the Energy Calculation Report attached in the Annex.

The air density at the site is calculated by the WindPRO model for each individual wind turbine according to the site conditions, hub height and the annual average temperature.

6.3 Losses and Uncertainties

Meteorological phenomena can only be predicted to a certain limited degree. As a consequence it is not possible to make an exact forecast of the wind conditions even if long-term reference data (which only represents the past) is used.

Furthermore, data collection and data processing is always afflicted with errors and inaccuracies as also every mathematical or physical model used to describe and predict real procedures. To compensate these inaccuracies in modelling approach and basic input data, it is advisable to use factors of safety to adjust, or discount the final outputs.

Two blocks determine the factors of safety: losses and uncertainties.

6.3.1 Losses

Losses occur throughout the whole energy transformation from the rotor blade (kinetic energy of the wind) to the substation (electrical energy). The losses are multiplied to the total amount of 7.3 % reduction of the calculated energy yield, see also the following table:

Table 6-2: Losses for Energy Calculation

Losses	
Unavailability (Park)	3.0%
Electrical Losses	2.0%
Rotor blade degradation	0.5%
Cut out wind speed hysteresis	0.0%
Grid unavailabilty	2.0%
Total losses	**7.3%**

- **Unavailability 3.0 %:** Average unavailability of the wind turbines in a wind park: Estimated value for wind park projects with more than 5 WEC. It can not be expected that all WEC have full availability during a year. The minimum single WEC annual availability is expected to be 95 %, which at the same time is also guarantied by most turbine manufacturers.
- **Electrical Losses 2.0 %:** The grid connection to the 33 kV line will be near the wind park. However, 2.0 % internal losses can not be avoided. This value was approximately calculated according to the park layout, the transformers and the cables used as well as the energy output.
- **Rotor blade degradation 0.5 %:** A slight decrease in energy production can be expected due to rotor blade degradation.
- **Grid unavailability 2.0 %:** According to the NAWEC, a stable grid is expected at the coastal line, but short term grid failures / blackouts happened in the past and can be expected

Hysteresis loss of a turbine can occur within the upper range of wind speed limit, i.e. higher than 20 m/s for the FL600 turbine (25 m/s for the V47). Due to the low wind regime the production in the upper part of the power curve can be neglected and losses due to the hysteresis of the WEC are not considered.

- **Park Efficiency:** The calculation of the losses resulting from the wake effects between the turbines was performed using the “PARK” module which is part of the WindPRO software. It calculates automatically the array losses of the individual wind turbine caused by all other wind park turbines. The calculated gross energy is already reduced by this value.

6.3.2 Uncertainties

Uncertainties cover the inaccuracy of the data processing from the measurement, the internal data processing and the long-term prediction. A percentage value describes the standard deviation of scattering results around the expected real value. To consider the theoretical cubic relation of wind speed and energy, the uncertainties in wind speed have been transformed towards the energy level by applying the power curve of the wind turbine and the wind conditions on site, described by the Weibull-Parameters. The following uncertainties have been considered:

The following uncertainties have been considered:

- **Uncertainty in the wind data:** A description of all uncertainties, referring to the wind data, is given in section 4.2.5 Uncertainty Evaluation. As result the total uncertainty results to 4.4 % for a 1-year period and to 2.2 % for a 10-year period.

In addition to this, uncertainties of modelling and mathematical algorithms for calculation of the energy yield have to be determined, which comprise of the following parameters:

- **Flow Modelling 4.0 %:** The WAsP software is a proven tool used in the wind industry for more than 15 years. As every model, also WAsP has limitations and uncertainties mainly due to simplifications, which have been done in order to handle the calculations on desktop computers in an acceptable time frame. The park area as well as the region is classified as flat terrain, and an uncertainty on the mathematical method can be estimated to be 4.0 % in terms of standard deviation.
- **Wake Modelling 1.0 %:** As the final layout of the park is relatively simple and not complex or dense, an uncertainty of 1.0 % was estimated for the wake modelling.
- **Power Curve 5.0 %:** Due to the non-linear relation of mean wind speed, energy output and the environmental conditions this uncertainty has to be taken into account. Normally, the turbine supplier gives a guarantee of 95 % of the energy values.

To calculate the total uncertainty all single uncertainties can be considered as stochastically independent and the commonly used way of estimating the joint uncertainty of independent (un-correlated) uncertainties is to calculate the RMS value.

Transferring the wind speed related uncertainty to the energy generation uncertainty, the overall uncertainty of a wind energy generation calculation results in 14.5 % for a 1-year period and 9.1 % for a 10-year period. This will be reflected in the energy calculations.

Table 6-3: Uncertainties of Modelling and Power Curve

Masurement	GREC08	typical range
Calibration	0.5%	0.5% - 3.0 %
Type of Anemometer	0.6%	0.5% - 4.0 %
Mounting	0.5%	0.2% - 3.0 %
Total (wind speed related)	**0.9%**	**0.7 % - 5.8 %**

Elaborations	GREC08	
Measurement	0.9%	
Adjustment (internal)	0.3%	
Long-term correlation	1.5%	
Total	1.8%	Wind speed related
Total	5.0%	Energy related

Prediction horizon	Wind speed related	Energy related
1-year wind deviation	4.0%	12.0%
10-year wind deviation	1.3%	4.0%
Modelling		
Flow modelling (mean value)		4.0%
Wake modelling (mean value)		1.0%
Power curve (mean value)		5.0%
Total Uncertainty (1-year)		**14.5%**
Total Uncertainty (10-year)		**9.1%**

6.4 Results of Energy Calculation

For the two park scenarios with the FL600 and V47 turbine at 75 m hub height, the energy production was calculated taking into account all losses, park efficiencies and uncertainties mentioned above. The energy calculations are performed with WindPRO / WAsP. The results are displayed in the tables below and show specific data for the different Probability of Exceedance (PoE) values.

The consideration of uncertainties is an important step for the risk assessment of the project. From the calculated annual gross energy and from the total uncertainty for the energy level the probability of exceedance (PoE) for certain energy yields can be calculated by statistical methods. Applying a Gauss process for the statistic analysis, the calculated annual gross energy can be understood as the mean annual energy yield having the highest rate of probability of all single results. The uncertainty can be understood as the standard deviation of the expected results around the most probable event. Besides the defined uncertainties for wind conditions, calculation model and power curve, also the losses should be considered too as constant factors, in order to achieve the corresponding net value of the energy yield. The frequently used PoE levels are 50 %, 75 % and 90 %. The deviation of the PoE 75 % and PoE 90 % are closely related to the uncertainties of the elaboration process determined in the previous sections.

An example is shown in the following figure:

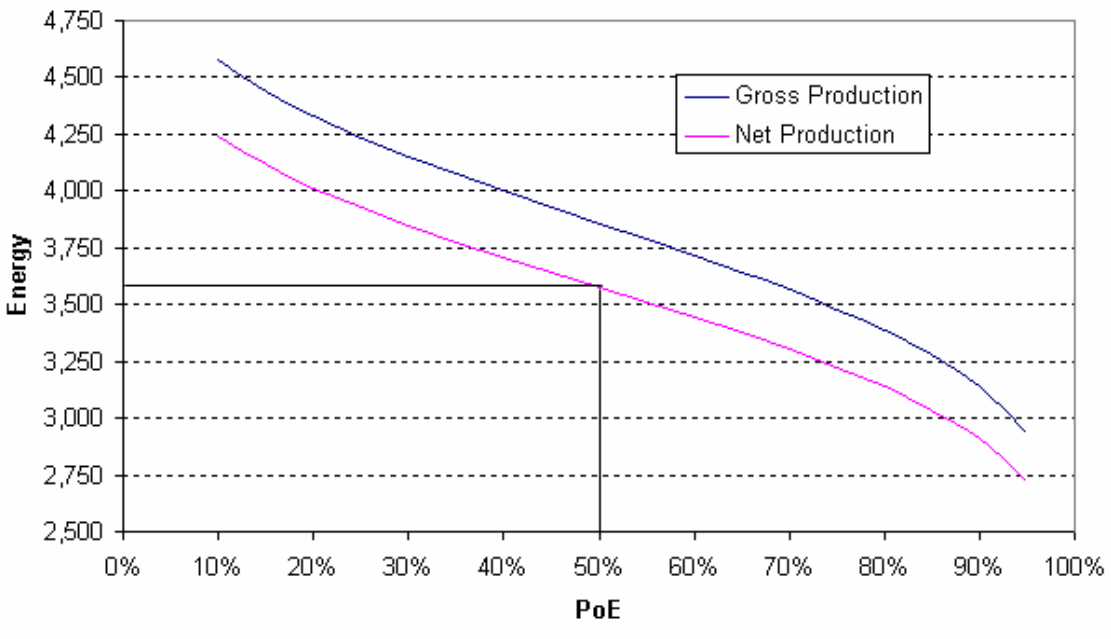

Figure 6-1: Probability of Exceedance for FL600 Turbine

The result is presented for three different levels of PoE at hub height. The following tables show the projected energy net production for a one-year period and a ten year period and demonstrate confidence levels at PoE 50%, 60% and 75%.

In addition the full load hours per year are presented, which describe the equivalent operating hours if a wind energy converter would generate only at nominal capacity. The used nominal capacity is provided by the manufacturer and was given as with 600 kW for the Fuhrländer FL600 and as 660 kW for the Vestas V47 turbine.

Table 6-4: Summary of the Energy Production for 3xFL600 Wind Turbine

Phase I: 3 WTG 1800 kW
FL 600-600kW

Gross production	**2,097**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**1,943**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,943	[MWh/a]		50%	1,943	1,080
Uncertainty (Standard Dev.)	14.5%			75%	1,753	974
Standard Deviation	282	[MWh/a]		90%	1,582	879
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,943	[MWh/a]		50%	1,943	1,080
Uncertainty (Standard Dev.)	9.1%			75%	1,824	1,013
Standard Deviation	177	[MWh/a]		90%	1,717	954

Table 6-5: Summary of the Energy Production for 6xFL600 Wind Turbine

Phase II: 6 WTG 3600 kW
FL 600-600kW

Gross production	**3,858**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**3,576**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	3,576	[MWh/a]		50%	3,576	993
Uncertainty (Standard Dev.)	14.5%			75%	3,226	896
Standard Deviation	519	[MWh/a]		90%	2,910	808
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	3,576	[MWh/a]		50%	3,576	993
Uncertainty (Standard Dev.)	9.1%			75%	3,356	932
Standard Deviation	326	[MWh/a]		90%	3,158	877

Table 6-6: Summary of the Energy Production for 3xV47 Wind Turbine

Phase I: 3 WTG 1980 kW
V47-660kW

Gross production	**1,631**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**1,512**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,512	[MWh/a]		50%	1,512	764
Uncertainty (Standard Dev.)	14.5%			75%	1,364	689
Standard Deviation	220	[MWh/a]		90%	1,231	621
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	1,512	[MWh/a]		50%	1,512	764
Uncertainty (Standard Dev.)	9.1%			75%	1,419	717
Standard Deviation	138	[MWh/a]		90%	1,335	674

Table 6-7: Summary of the Energy Production for 6xV47 Wind Turbine

Phase II: 6 WTG 3960 kW
V47-660kW

Gross production	**3,036**	**[MWh/a]**
Unavailability	3.0%	
Electrical Losses	2.0%	
Rotor blade degradation	0.5%	
Cut out wind speed hysteresis	0.0%	
Grid unavailabilty	2.0%	
Total	**7.3%**	
Net production	**2,814**	**[MWh/a]**

1-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	2,814	[MWh/a]		50%	2,814	711
Uncertainty (Standard Dev.)	14.5%			75%	2,538	641
Standard Deviation	409	[MWh/a]		90%	2,290	578
10-year period					Net production	Full Load
				PoE	[MWh/a]	hours / years
Net production	2,814	[MWh/a]		50%	2,814	711
Uncertainty (Standard Dev.)	9.1%			75%	2,641	667
Standard Deviation	256	[MWh/a]		90%	2,485	628

7 Road Access

7.1 Road Access to the Site

In general the main roads in GBA are in good condition and no severe problems are expected. However, in the next project stage, the exact route of the trucks from the harbour to the wind park site should be defined and examined.

The axle loads of the trucks carrying the turbine nacelles and the towers do not exceed 12 tons, and are within the limits that the foreseen roads should bear.

For the transportation of the turbines to the site a maximum slope of 10 % of the road access is acceptable. Based on several site visits the existing slope from the harbour to the site is less than 10 % as the whole area is relatively flat. Therefore, no obstacle for transportation to the site is expected. Figure 7-1 shows the proposed routes from the harbour to the wind park site. Alternatively, the western road along the coast is also suitable for transportation of the wind turbines. Deeper investigation will result in the most feasible route for the trucks.

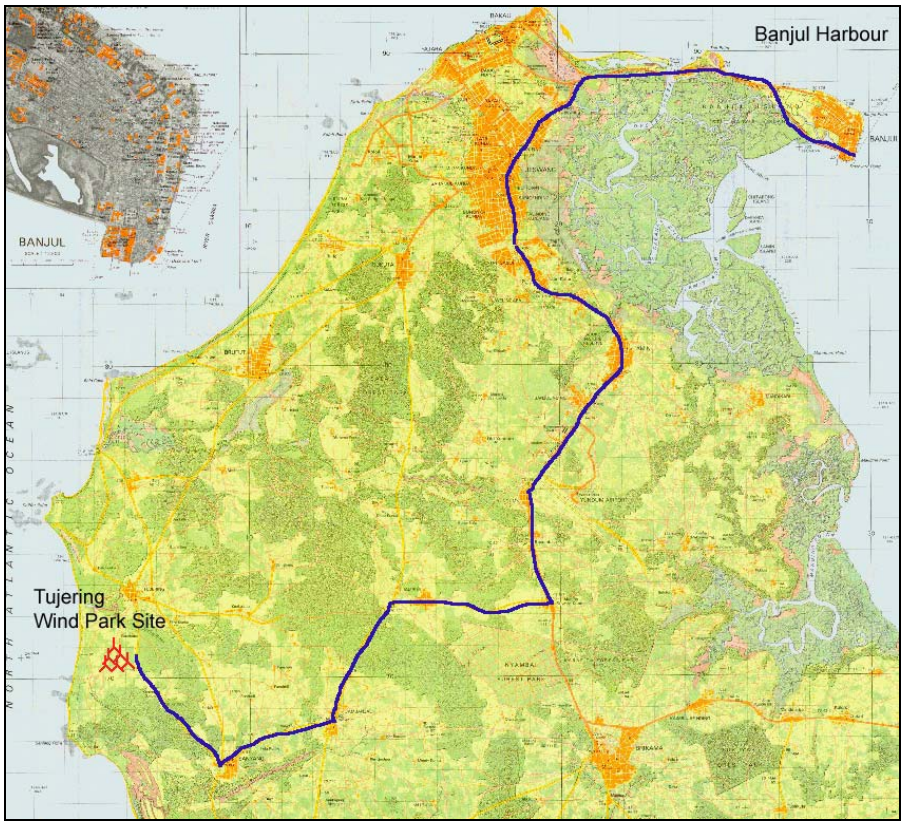

Figure 7-1: Proposed Access to the Wind Park Site

The total distance between the wind park site and the harbour was estimated to be 40 km. In the following table the general transport dimensions are listed for the Fuhrländer FL600 wind turbine.

Table 7-1: Transport Dimensions for the FL600 - 75 m hub height

Component	Packing	Length	Width	Height	net weight	Volume
		m	m	m	ca. kg	m³
Foundation ring						
Nacelle		6,00	3,00	3,55	25.000	63,90
Rotor hub	Hub - dummy	4,70	3,06	2,94	7.000	42,20
Converter Cabinet	included in 20ft Container				800	0,00
Rotor blade	Only if required	24,30	2,40	2,40	2.300	139,97
Rotor blade	Only if required	24,30	2,40	2,40	2.300	139,97
Rotor blade	Only if required	24,30	2,40	2,40	2.300	139,97
Material, Converter, Oil..	20 ft container	13,20	2,40	2,50		79,20

Tower	part I	part II	part III
Diameter - Bottom	4,300m	3,666m	2,854m
Diameter - Top	3,666m	2,854m	1,950m
Length	19,7m	25,2m	28,0m
weight	52,9 to	36,33 to.	20,3 to.

7.2 Internal Wind Park Roads

The access roads have been preliminary designed and can be seen at the wind park layout in the map below. Most of the internal roads already exist and only need to be reinforced for the heavy loads of the truck (blue coloured). However, the direct connection to each single turbine (pink colour) for the wind park construction must be newly built.

The exact length taken into consideration is approximately:

- 2,400 m for the already existing road (blue), and
- 520 m for the direct access to the turbines (pink)

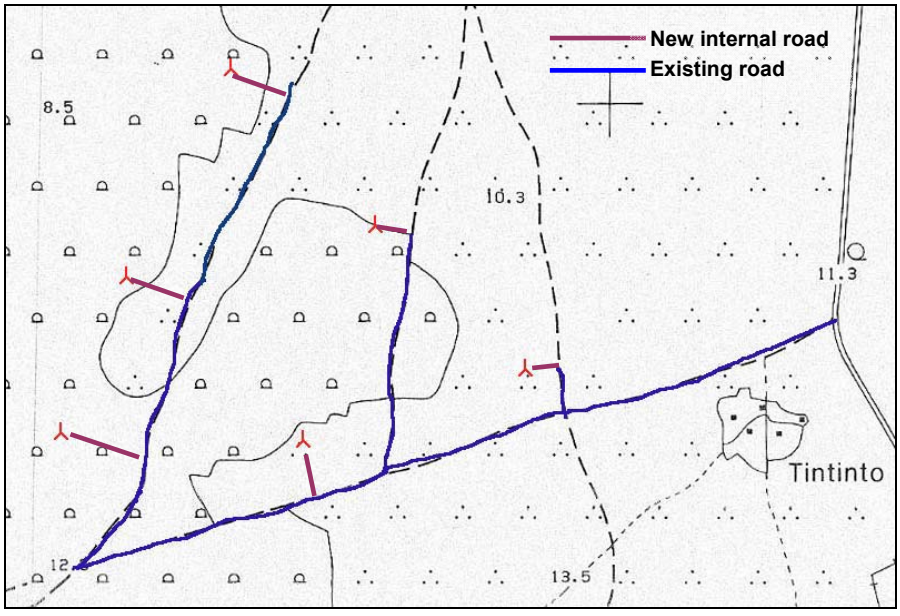

Figure 7-2: Internal Roads within the Wind Park

7.3 Available Crane Capacities

For the erection of the wind turbines it is necessary to hire available cranes in a foreign country. As a first result of the investigations performed by LI concerning available crane capacities in The Gambia, it may be concluded that there is only the possibility of hiring the smaller sized supporting crane. The investigations have also shown that the required 400 t main crane is not available. This crane must be mobilized from a foreign country, e.g. Senegal or Nigeria. Further details such as daily costs, transportation costs to the site, and the availability during the foreseen erection period depend on detailed negotiations with crane owners.

8 Internal Wind Park Cabling

8.1 Cabling Concept

The radial feeder concept will be applied for the wind park at Tujereng, being a more economical option than a ring feeder. Only a one way cable is necessary for each area. In case of a wind turbine or transformer fault, the corresponding device will be disconnected and the remaining wind turbines stay connected to a feeder and continue producing power. The main disadvantage of this concept is the low reliability in case of a cable section fault (short circuit). The whole feeder will then be disconnected for the time period of the repairing works. The principle scheme of the radial concept is shown in the following *Figure 8-1*.

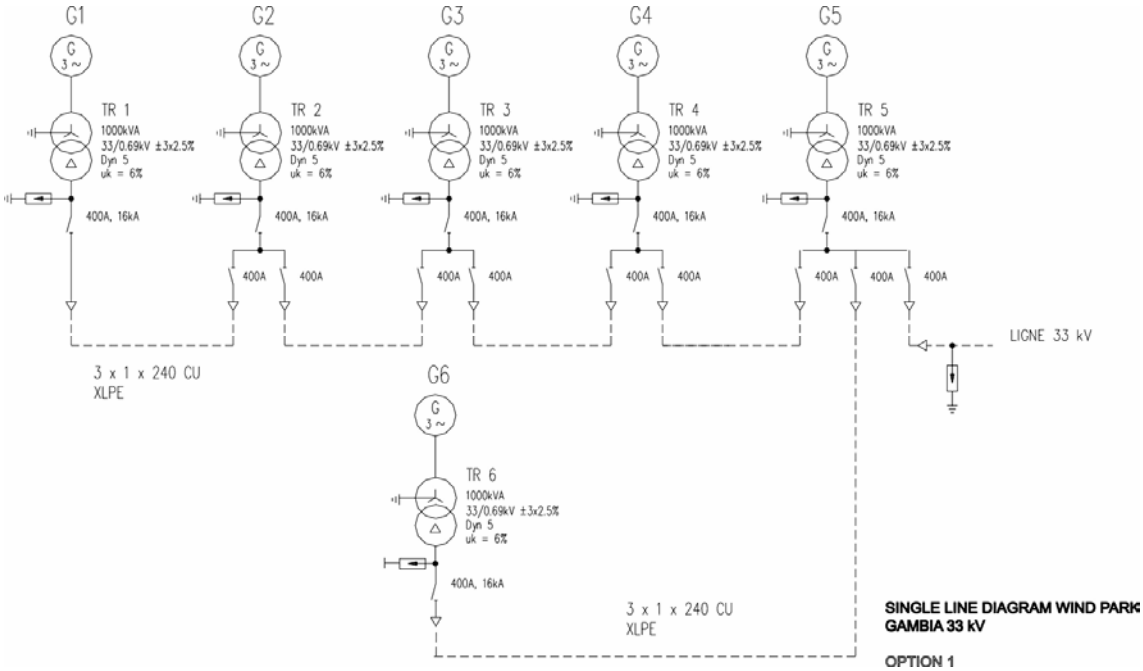

Figure 8-1: Preliminary Radial Concept for the Tujereng Wind Park

Considering the area and the economical aspect of the proposed wind park, the radial feeder is a reliable option for connecting all turbines in one line. The experience with wind parks in the last years shows, that due to the very low error rate of ground cables, the connection via radial feeders is an economical solution.

8.2 Cable Type

The internal cable connection of the wind turbines is realised by a 33 kV underground XLPE copper cable. The 33 kV is one of the standard medium voltage level used in The Gambia. Underground cables are generally the most suitable option in wind parks as trucks and cranes need free space for operation.

Since the voltage level of the wind turbine generator is 690 V, at the base of each wind turbine, a transformer steps-up the voltage to the 33 kV for internal park transmission. This transformer will

be for 50 Hz operation with available tap changers for voltage regulation. The Vector groups will conform to the norms for 33 kV operation.

The selection of the optimal cable type depends on both the arrangement and grouping of wind turbines (number and power of turbines) and also the choice of feeder concept. All wind turbines are grouped into one single group, with a power capacity of 3.60 MW for the FL600 and 3.96 MW for the V47 turbine (considering 6 wind turbines at the end of Phase II).

The selection of the optimal cable type is standard cable cross sections used according to wind turbine specification with respect to its thermal and mechanical stress. Considering load factor, operating temperature, climatic and operational factors, the suitable cable cross section is chosen based on the standard local cable characteristics, which is, according to information from NAWEC, 240mm² for the Copper conductor.

Due to the selected radial feeder for internal cabling concept, the cable sections shall be designed to transfer an installed power of maximum 3.60 MW and 3.96 MW respectively.

8.2.1 Switching Station

The switching station is located directly at the existing 33 kV transmission line near the road between Tujereng and Sanyang.

The switchgear to link the wind turbines to the grid should be the same as what is currently in use in The Gambia. A Fluair 400 Merlin Gerin medium voltage equipment is currently the standard switchgear in use:

The associated switchgear and transformers shall conform to the existing NAWEC standards and shall also meet international standards, namely IEC, BS, DIN VDE, IEE and ISO.

General characteristics of the switchgear are as follows:

Rated Insulation Level	36 kV
Power frequency withstand voltage	70 kV
Lightning impulse withstand voltage	170 kV
Short time withstand current	31.5kA / 3s
Short time withstand current	40kA / 1s
Bus bar Maximum rated normal current	2,500 A
Circuit Breaker Max. rated normal current	1,250 A
Earthing switch short time withstand current	31.5kA/1s

9 Grid Connection

9.1 Present NAWEC Network

The existing network consists of a transmission and distribution system fed from Kotu Power Station, which houses 32 Megawatts capacity of available Power (3 x 6 MW Deutz Engines, 1 x 6 MW B&W Engine, 2 x 3 MW Mir lees Blackstone Engines and 2 x 1.1 MW Mitsubishi Engines). All Generators are Heavy fuel prime movers except for Generator No.1 and the 2 Mitsubishi Engines.

The network is interconnected via a 33 kV transmission line and 11 kV feeders to transmit the power across the Greater Banjul Area. All generators at Kotu Power Station are synchronised to a common bus bar (11kV, 50Hz, 2500A, 20kA/s). The Power Station is sub divided into 3 stations, namely Kotu A (G1, G3 & G4), Kotu B (G6), and Kotu D (G7 & G8).

A New Dispatch Centre at Kotu Power Station with state of the art protection switchgear (Merlin Gerin) Collects the Power from all three stations via under ground cable (11kV, XLPE, Copper HN33S23, 3x1x300mm/Phase). The Dispatch Centre steps up the voltage to 33 kV via 3 x 16 MVA Transformers from which a total of 57 km of overhead line are connected serving the Greater Banjul Area through four 33 kV Substations:

a) Wellingara 10 MVA Transformer
b) Medina 5 MVA
c) Mile 2 – 10 MVA
d) Mile 5 - 5 MVA

The Dispatch Centre operates 2 Bus Bars, one 11 kV Bus Bar with a capacity of 2,500 Amps and one 33 kV Bus Bar with a capacity of 1,250 Amps. All Bus Bars operate at a frequency of 50 Hz and have a Short Circuit Interruption Capacity of 20 kA per Second.

The System is backed with Capacitor Banks for Reactive Power Compensation at various points in the network. Kotu Power Station houses a 2,400 kVar Capacitor Bank. Wellingara and Mile 2 Substations each have 1,200 kVar Capacitor Banks connected on the 11 kV Bus bars

A New Power Station in Brikama, which is presently under construction, is expected to generate additional 18 MW after commissioning. This will bring the total capacity in the region to approximately 50 MW.

9.2 Grid Integration Concept

Different potential grid integration concepts have been examined. In order to conceptualise installation capacity of nearly 4.00 MW, transmission on the medium voltage level (33 kV) was considered for the distance between the wind park and the 33 kV transmission line.

The most practical concept for grid connection is the connection to the existing grid described above. The capacity of 3.60 MW and 3.96 MW respectively is technically possible, within the existing grid. This option is favourable for technical as well as economical reasons. The study also indicates that a negative impact on the power quality of the Gambian power grid can be excluded.

Presently the load on the 33 kV coastal lines can approach 14 MW with the least being 6 MW depending on system configuration. The coastal line has a capacity of 21 MW; this means

connecting the wind turbines to the grid at Tujereng will be possible without causing any problems in regards to the capacity of the system.

The permissible voltage variations on the medium voltage line are +/-10 % for voltage fluctuations and +/- 2 % for frequency variations. The voltage level for the medium voltage network is 33 kV, actual voltage readings at the dispatch centre average 33.1 kV. The permissible fluctuation gives a range of 29.7 kV to 36.3 kV for the medium voltage line. The permissible frequency range is from 49 Hz to 51.3 Hz.

10 Cost Assessment

The itemised specification of investment costs are described in the tables below. They are divided into both scenarios 1. with the Fuhrländer and 2. the Vestas turbine and also into both realisation phases I and II.

10.1 Investment Cost of Fuhrländer FL600 Wind Turbine

Table 10-1: Total Investment Cost for 3 Fuhrländer FL600 - Phase I

000	Total Cost of Non-Balance of Plant Items	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
	WTG + Blades+Tower (FOB); incl. Errection	3	item	**814,000**	**2,442,000**
	Installation, Commissioning	3	item	**0**	**0**
	Transport costs Europe --> WF Tujering	3	item	**80,000**	**240,000**
	TOTAL Cost of Non-Balance of Plant Items				**2,682,000**
	Price per kW / Share			**1.49**	**77.22%**

000 Balance of Plant

100	Engineering/Design	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
105	Survey/Property maps for max. 2 sites	1	Item	2,000	2,000
110	Geotechnical studies	3	Item	500	1,500
120	Site road design (topographic serving for road)	1	Item	500	500
130	Substation/Control Room design	1	Item	1,000	1,000
150	Permitting/Studies	1	Item	5,000	5,000
180	Consultancy Services (local)	1	Item	5,000	5,000
190	Consultancy Services (international)	1	Item	10,000	10,000
	TOTAL Engineering			8,333	**25,000**

200	Civil work	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
215	Public Road Works	1	Item	10,000	10,000
230	Internal new road 4,5m	300	m	40	12,000
231	Internal exist. road 4.5m	2000	m	20	40,000
236	Crane places	2100	m²	20	42,000
240	Mobilization of Crane	1	Item	50,000	50,000
242	Crane for errection (1x 400 to, 1x 160 to)	3	Item	15,000	45,000
245	Foundations for WTG's	3	Item	25,000	75,000
250	Transformer Foundations	3	Item	500	1,500
	TOTAL Civil work				**275,500**

300	Electrical	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
305	MV cable, 33kV, 240mm², XLPE, copper conductor	2600	m	34	88,400
306	Transformer 0,69/33 kV-1000 kVA	3	Item	26,300	78,900
310	Supply LWL cable (remote control)	2600	m	10	26,000
315	UGC Tranches	2600	m	10	26,000
335	Install earth cable in tranche, galvanised steel strip	2600	m	1	2,600
337	Install fiber optics cable in tranche	2600	m	1	2,600
349	LV Terminations	8	Item	222	1,776
350	MV terminations at transformers	6	Item	400	2,400
355	Earth connections to foundations	3	Item	250	750
360	Earthing to tower bases	3	Item	300	900
365	Earthing to transformer bases	3	Item	100	300
370	Testing installed 33kV cables	1	Item	5,000	5,000
375	Fiber optics connection + tests	1	Item	8,000	8,000
380	Contingency	1	Item	10,000	10,000
	TOTAL Electrical				**253,626**

400	Switchstation	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
405	Civilworks to Switchstation	1	Item	10,000	10,000
410	Switchgear (Voltage 36 kV)	1	Item	35,000	35,000
420	Circuit breaker (three phase, Cubicle Merlin Gerin 36 kV)	2	Item	10,000	20,000
430	Disconnecter (three phase)	9	Item	417	3,753
440	Lighting arresters	3	Item	375	1,125
450	Metering, maximum demand	1	Item	560	560
460	Voltage Transformer, Current Transformer, etc.	1	Item	5,000	5,000
470	Contingency	1	Item	10,000	10,000
	TOTAL Switchstation				**85,438**

500	Transmission Line	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
505	OHL Almenec	0.05	km	36,000	1,800
510	Construct Line (Almelec, 148mm², XLPE)	0.05	km	3,000	150
511	Section Switch, 33 kV	1	Item	3,000	3,000
515	Pole, 33kV Galvanised steel, 710 daN	2	Item	1,250	2,500
516	Insulators, Lightning Arrestors, Eye & Ball Assembly, etc.	all incl.	Item	5,000	5,000
940	Contingency	1	Item	5,000	5,000
	TOTAL Transmission Line				**15,650**

600	Contingencies	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
610	Construction Contingency per WTG	3	Item	10,000	30,000

Total Cost of Balance of Plant Items		**685,214**
Price per kW /share	**1**	**19.73%**

700	Project Management & Construction Supervisio	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
710	int. Project managment	1	LS	40,000	40,000
	local Project Management			6,000	6,000
	TOTAL Management & Supervision			**15,333**	**46,000**
					1.32%

800	Miscellaneous				
811	Expenses	1	LS	20,000	20,000
815	Customer Training	2	Item	20,000	40,000
	TOTAL Miscellaneous			**20,000**	**60,000**
					1.73%

WTG + Blades+Tower (FOB); incl. Errection	**70.31%**	**2,442,000**
Transport costs for WTG + Blades	**6.91%**	**240,000**
Total Balance of Plant Items	**19.73%**	**685,214**
TOTAL Management & Supervision	**1.32%**	**46,000**
Total Miscellaneous	**1.73%**	**60,000**
	100.00%	

Total Project Cost, excluding local tax, etc.	**3,473,214**

Table 10-2: Total Investment Cost for 3 add. Fuhrländer FL600 - Phase II

000	Total Cost of Non-Balance of Plant Items	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
	WTG + Blades+Tower (FOB); incl. Errection	3	item	**814,000**	**2,442,000**
	Installation, Commissioning	3	item	**0**	**0**
	Transport costs Europe --> WF Tujering	3	item	**80,000**	**240,000**
	TOTAL Cost of Non-Balance of Plant Items				**2,682,000**
	Price per kW / Share			**1.49**	**83.89%**

000 Balance of Plant

100	Engineering/Design	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
105	Survey/Property maps for max. 2 sites	1	Item	2,000	2,000
110	Geotechnical studies	3	Item	500	1,500
120	Site road design (topographic serving for road)	1	Item	500	500
130	Substation/Control Room design	1	Item	1,000	1,000
150	Permitting/Studies	1	Item	5,000	5,000
180	Consultancy Services (local)	1	Item	5,000	5,000
190	Consultancy Services (international)	1	Item	10,000	10,000
	TOTAL Engineering			8,333	**25,000**

200	Civil work	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
215	Public Road Works	1	Item	10,000	10,000
230	Internal new road 4,5m	300	m	40	12,000
231	Internal exist. road 4.5m	400	m	20	8,000
236	Crane places	2100	m²	20	42,000
240	Mobilization of Crane	1	Item	50,000	50,000
242	Crane for errection (1x 400 to, 1x 160 to)	3	Item	15,000	45,000
245	Foundations for WTG's	3	Item	25,000	75,000
250	Transformer Foundations	3	Item	500	1,500
	TOTAL Civil work				**243,500**

300	Electrical	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
305	MV cable, 33kV, 240mm², XLPE, copper conductor	600	m	34	20,400
306	Transformer 0,69/33 kV-1000 kVA	3	Item	26,300	78,900
310	Supply LWL cable (remote control)	600	m	10	6,000
315	UGC Tranches	600	m	10	6,000
335	Install earth cable in tranche, galvanised steel strip	600	m	1	600
337	Install fiber optics cable in tranche	600	m	1	600
349	LV Terminations	8	Item	222	1,776
350	MV terminations at transformers	6	Item	400	2,400
355	Earth connections to foundations	3	Item	250	750
360	Earthing to tower bases	3	Item	300	900
365	Earthing to transformer bases	3	Item	100	300
370	Testing installed 33kV cables	1	Item	5,000	5,000
375	Fiber optics connection + tests	1	Item	8,000	8,000
380	Contingency	1	Item	10,000	10,000
	TOTAL Electrical				**141,626**

400	Switchstation	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
430	Disconnecter (three phase)	2	Item	417	834
470	Contingency	1	Item	5,000	5,000
	TOTAL Switchstation				**5,834**

500	Transmission Line	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
	TOTAL Transmission Line				**0**

600	Contingencies	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
610	Construction Contingency per WTG	3	Item	5,000	15,000

Total Cost of Balance of Plant Items			**430,960**
Price per kW /share		**1**	**13.48%**

700	Project Management & Construction Supervisic	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
710	int. Project managment	1	LS	20,000	20,000
	local Project Management			4,000	4,000
	TOTAL Management & Supervision			**8,000**	**24,000**
					0.75%

800	Miscellaneous				
811	Expenses	1	LS	20,000	20,000
815	Customer Training	2	Item	20,000	40,000
	TOTAL Miscellaneous			**20,000**	**60,000**
					1.88%

WTG + Blades+Tower (FOB); incl. Errection	**76.39%**	**2,442,000**
Transport costs for WTG + Blades	**7.51%**	**240,000**
Total Balance of Plant Items	**13.48%**	**430,960**
TOTAL Management & Supervision	**0.75%**	**24,000**
Total Miscellaneous	**1.88%**	**60,000**
	100.00%	

Total Project Cost, excluding local tax, etc.	**3,196,960**

10.2 Investment Cost of Vestas V47 Wind Turbine

Table 10-3: Total Investment Cost for 3 Vestas V47 - Phase I

000	Total Cost of Non-Balance of Plant Items	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
	WTG + Blades+Tower (FOB); incl. Errection	3	item	**237,600**	**712,800**
	Installation, Commissioning	3	item	**0**	**0**
	Transport costs Europe --> WF Tujering	3	item	**80,000**	**240,000**
	TOTAL Cost of Non-Balance of Plant Items				**952,800**
	Price per kW / Share			**0.48**	**54.63%**

000 Balance of Plant

100	Engineering/Design	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
105	Survey/Property maps for max. 2 sites	1	Item	2,000	2,000
110	Geotechnical studies	3	Item	500	1,500
120	Site road design (topographic serving for road)	1	Item	500	500
130	Substation/Control Room design	1	Item	1,000	1,000
150	Permitting/Studies	1	Item	5,000	5,000
180	Consultancy Services (local)	1	Item	5,000	5,000
190	Consultancy Services (international)	1	Item	10,000	10,000
	TOTAL Engineering			8,333	**25,000**

200	Civil work	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
215	Public Road Works	1	Item	10,000	10,000
230	Internal new road 4,5m	300	m	40	12,000
231	Internal exist. road 4.5m	2000	m	20	40,000
236	Crane places	2100	m²	20	42,000
240	Mobilization of Crane	1	Item	50,000	50,000
242	Crane for errection (1x 400 to, 1x 160 to)	3	Item	15,000	45,000
245	Foundations for WTG's	3	Item	25,000	75,000
250	Transformer Foundations	3	Item	500	1,500
	TOTAL Civil work				**275,500**

300	Electrical	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
305	MV cable, 33kV, 240mm², XLPE, copper conductor	2600	m	34	88,400
306	Transformer 0,69/33 kV-1000 kVA	3	Item	26,300	78,900
310	Supply LWL cable (remote control)	2600	m	10	26,000
315	UGC Tranches	2600	m	10	26,000
335	Install earth cable in tranche, galvanised steel strip	2600	m	1	2,600
337	Install fiber optics cable in tranche	2600	m	1	2,600
349	LV Terminations	8	Item	222	1,776
350	MV terminations at transformers	6	Item	400	2,400
355	Earth connections to foundations	3	Item	250	750
360	Earthing to tower bases	3	Item	300	900
365	Earthing to transformer bases	3	Item	100	300
370	Testing installed 33kV cables	1	Item	5,000	5,000
375	Fiber optics connection + tests	1	Item	8,000	8,000
380	Contingency	1	Item	10,000	10,000
	TOTAL Electrical				**253,626**

400	Switchstation	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
405	Civilworks to Switchstation	1	Item	10,000	10,000
410	Switchgear (Voltage 36 kV)	1	Item	35,000	35,000
420	Circuit breaker (three phase, Cubicle Merlin Gerin 36 kV)	2	Item	10,000	20,000
430	Disconnecter (three phase)	9	Item	417	3,753
440	Lighting arresters	3	Item	375	1,125
450	Metering, maximum demand	1	Item	560	560
460	Voltage Transformer, Current Transformer, etc.	1	Item	5,000	5,000
470	Contingency	1	Item	10,000	10,000
	TOTAL Switchstation				**85,438**

500	Transmission Line	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
505	OHL Almenec	0.05	km	36,000	1,800
510	Construct Line (Almelec, 148mm², XLPE)	0.05	km	3,000	150
511	Section Switch, 33 kV	1	Item	3,000	3,000
515	Pole, 33kV Galvanised steel, 710 daN	2	Item	1,250	2,500
516	Insulators, Lightning Arrestors, Eye & Ball Assembly, etc.	all incl.	Item	5,000	5,000
940	Contingency	1	Item	5,000	5,000
	TOTAL Transmission Line				**15,650**

600	Contingencies	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
610	Construction Contingency per WTG	3	Item	10,000	30,000

Total Cost of Balance of Plant Items		**685,214**
Price per kW /share	1	**39.29%**

700	Project Management & Construction Supervisic	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
710	int. Project managment	1	LS	40,000	40,000
	local Project Management			6,000	6,000
	TOTAL Management & Supervision			**15,333**	**46,000**
					2.64%

800	Miscellaneous				
811	Expenses	1	LS	20,000	20,000
815	Customer Training	2	Item	20,000	40,000
	TOTAL Miscellaneous			**20,000**	**60,000**
					3.44%

WTG + Blades+Tower (FOB); incl. Errection	**40.87%**	**712,800**
Transport costs for WTG + Blades	**13.76%**	**240,000**
Total Balance of Plant Items	**39.29%**	**685,214**
TOTAL Management & Supervision	**2.64%**	**46,000**
Total Miscellaneous	**3.44%**	**60,000**
	100.00%	

Total Project Cost, excluding local tax, etc.	**1,744,014**

Table 10-4: Total Investment Cost for 3 add. Vestas V47 - Phase II

000	Total Cost of Non-Balance of Plant Items	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
	WTG + Blades+Tower (FOB); incl. Errection	3	item	**237,600**	**712,800**
	Installation, Commissioning	3	item	**0**	**0**
	Transport costs Europe --> WF Tujering	3	item	**80,000**	**240,000**
	TOTAL Cost of Non-Balance of Plant Items				**952,800**
	Price per kW / Share			**0.48**	**64.92%**

000 Balance of Plant

100	Engineering/Design	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
105	Survey/Property maps for max. 2 sites	1	Item	2,000	2,000
110	Geotechnical studies	3	Item	500	1,500
120	Site road design (topographic serving for road)	1	Item	500	500
130	Substation/Control Room design	1	Item	1,000	1,000
150	Permitting/Studies	1	Item	5,000	5,000
180	Consultancy Services (local)	1	Item	5,000	5,000
190	Consultancy Services (international)	1	Item	10,000	10,000
	TOTAL Engineering			8,333	**25,000**

200	Civil work	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
215	Public Road Works	1	Item	10,000	10,000
230	Internal new road 4,5m	300	m	40	12,000
231	Internal exist. road 4.5m	400	m	20	8,000
236	Crane places	2100	m²	20	42,000
240	Mobilization of Crane	1	Item	50,000	50,000
242	Crane for errection (1x 400 to, 1x 160 to)	3	Item	15,000	45,000
245	Foundations for WTG's	3	Item	25,000	75,000
250	Transformer Foundations	3	Item	500	1,500
	TOTAL Civil work				**243,500**

300	Electrical	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
305	MV cable, 33kV, 240mm², XLPE, copper conductor	600	m	34	20,400
306	Transformer 0,69/33 kV-1000 kVA	3	Item	26,300	78,900
310	Supply LWL cable (remote control)	600	m	10	6,000
315	UGC Tranches	600	m	10	6,000
335	Install earth cable in tranche, galvanised steel strip	600	m	1	600
337	Install fiber optics cable in tranche	600	m	1	600
349	LV Terminations	8	Item	222	1,776
350	MV terminations at transformers	6	Item	400	2,400
355	Earth connections to foundations	3	Item	250	750
360	Earthing to tower bases	3	Item	300	900
365	Earthing to transformer bases	3	Item	100	300
370	Testing installed 33kV cables	1	Item	5,000	5,000
375	Fiber optics connection + tests	1	Item	8,000	8,000
380	Contingency	1	Item	10,000	10,000
	TOTAL Electrical				**141,626**

400	Switchstation	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
430	Disconnecter (three phase)	2	Item	417	834
470	Contingency	1	Item	5,000	5,000
	TOTAL Switchstation				**5,834**
500	**Transmission Line**	**Quantity**	**Unit**	**Unit cost (Euro)**	**Total Cost (Euro)**
	TOTAL Transmission Line				**0**

600	Contingencies	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
610	Construction Contingency per WTG	3	Item	5,000	15,000

Total Cost of Balance of Plant Items		**430,960**
Price per kW /share	**1**	**29.36%**

700	Project Management & Construction Supervisic	Quantity	Unit	Unit cost (Euro)	Total Cost (Euro)
710	int. Project managment	1	LS	20,000	20,000
	local Project Management			4,000	4,000
	TOTAL Management & Supervision			**8,000**	**24,000**
					1.64%

800	Miscellaneous				
811	Expenses	1	LS	20,000	20,000
815	Customer Training	2	Item	20,000	40,000
	TOTAL Miscellaneous			**20,000**	**60,000**
					4.09%

WTG + Blades+Tower (FOB); incl. Errection	**48.56%**	**712,800**
Transport costs for WTG + Blades	**16.35%**	**240,000**
Total Balance of Plant Items	**29.36%**	**430,960**
TOTAL Management & Supervision	**1.64%**	**24,000**
Total Miscellaneous	**4.09%**	**60,000**
	100.00%	

Total Project Cost, excluding local tax, etc.	**1,467,760**

10.3 Potential for Local Input

For the potential local input to the project realisation a tender process will be established in order to find the best company for the whole grid connection works as well as for the internal cabling of the wind park.

Apart from this, there are some additional tasks which may be done by local staff and Gambian companies such as:

- construction of internal wind park roads
- cabling trenches
- construction of foundations (can be done with local materials and local staff according to international standard)

An additional and extensive possible local input could be the erection of the wind turbines using lattice towers instead of tubular steel towers. Some manufacturers of wind turbines are offering lattice towers as an option besides tubular towers. The production of lattice towers by manufacturing the needed profiles in The Gambia could increase the local input considerably. In order to consider this option for the next project stage, it is necessary to negotiate with the manufacturers of lattice towers directly regarding their conditions for local production in The Gambia.

10.4 Operation and Maintenance Cost

The estimates for Operation and Maintenance (O&M) have been modelled based on the experience of Lahmeyer International in Feasibility Study and Due Diligence projects which are calculated through a model developed by our technical engineers for this purpose.

The O&M costs include repairs, maintenance, spare parts, insurance costs, personnel costs for wind park management and maintenance and electricity consumption. In detail:

1. Planned Maintenance
    a) Personnel Costs
    b) Consumable Costs
2. Unscheduled Repair
    a) Personnel Costs
    b) Replacement Part Costs

For the Tujereng wind park three applicable O&M costs were used, which correspond to different stages of the project.

The cost estimates, which are related to the wind turbine cost, and the years over which they are to apply as follows:

Table 10-5 : O&M Cost Estimates for the different scenarios

	New Wind Turbines	Repowered Wind Turbines
1-2 year	2.5%	6.0%
3-10 year	4.0%	6.0%
11-20 year	6.0%	8.0%

10.5 Warranty and Training

Currently, no well experienced wind energy experts in the field of wind turbine technology are available in The Gambia. The training measures have to be organised by the manufacturer on-site in order to train the local experts with basic knowledge on wind energy. Beforehand, a detailed training seminar at the wind turbine factory should take place for the local experts.

During these training seminars the staff should be trained in order to fulfil the high quality of maintenance with the main goal being to shorten the reaction time in case of failures of the wind turbines.

According to LI's experience, the following experts for the operation of the wind park are required.

- One Wind Park Manager (responsible for the park),
- One Commercial Wind Park Manager (responsible for the park),
- One electrical engineer and one mechanical engineer

Normally, the manufacturers are obligated to arrange a constant presence for a minimum of 2 years during the warranty period for training of local operational staff in maintenance and repair measures.

Based on LI's experiences in the African Continent (e.g. from wind energy projects in Nigeria, Mali, Djibouti and Ethiopia) most manufacturers are not interested to establish their own separate service teams on the site even during the warranty period. This is mainly due to the small project size and due to the large distances between the factories in Europe and the project site. In addition, the tendering process of these former projects indicated that most manufacturers are not willing to offer a warranty period for the wind turbines which is essential to ensure the expected lifetime of 20 years. It is therefore essential that a large share of the maintenance (e.g. regular maintenance) will be performed by local teams which must be trained by the turbine manufacturers.

To improve the attractiveness of the African continent, political discussion between the Governments of Djibouti and Ethiopia and some turbine manufacturers have been initiated recently with the main goal being to utilize synergies between the planned projects (Ethiopia: 80 MW in the first stage; Djibouti 30 MW). It is recommended that the Government of The Gambia (e.g. through the Energy Division and/or NAWEC) takes part in these discussions in order to benefit in the future. The costs for these additional meetings are already included in the investment cost under "Customer Training".

11 Financial Analysis

11.1 Methodology & Main Assumptions

This financial analysis is intended to clarify whether or not the wind farm project is financially feasible for the hereunder described parameters.

The main difference between a financial analysis and an economic analysis is that, in the financial analysis, the wind farm is viewed as an enterprise and in the economic analysis the wind farm is evaluated from the point of view of the whole economy of the country. In the financial analysis, the wind farm operating company has to take in enough money, by feeding electricity into the existing grid, to cover its operating costs, interest payments, loan payments and distribution of dividends to equity investors. The object of consideration is the commercial, or microeconomic.

Four Scenarios have been considered in the financial analysis of the wind park. Scenario I assesses the project economics when installing 3 wind turbines (WT) model FL600. Scenario II considers the Scenario I and the addition of 3 WT of the same type, i.e., in total 6 WT FL600. Scenario III calculates the financial results when installing 3 WT Vestas V47 repowered. Finally, Scenario IV considers Scenario III and the addition of 3 WT Vestas V47. A summary of the Scenarios is stated below:

Scenario I – 3 WT-FL600

Scenario II – Scenario I + additional 3 WT-FL600

Scenario III – 3 WT-Vestas V47 (repowered)

Scenario IV – Scenario III + additional 3 WT-Vestas V47

The parameters and assumptions, upon which the financial assessment is calculated, are elaborated below. These parameter and assumption values are used to calculate a “Base Case” for each scenario.

Project’s financial feasibility has been evaluated with the financial internal rate of return (FIRR), minimum Debt Service Coverage Ratio (DSCR) and the Net Present Value (NPV).

11.1.1 Inflation Rate

An inflation of 3% per annum has been considered for the O&M costs of the wind park, whereas a 2 % annual inflation increase has been calculated in power revenues (based on sales tariff of USD 0.14/kWh)1.

11.1.2 Rate of Exchange

Within the frame of the financial analysis the following official average interbank exchange rates for the period February 1st, 2006 to July 31st, 2006 were applied.

[1] Identical assumptions as in previous studies elaborated by Lahmeyer International within the framework of this study, i.e., the “Renewable Energy Study for The Gambia” of 2006.

Table 11-1 : Exchange rate assumptions

Commodity Currency	Rate	Average value for the period
USD	1	01.02.2006 to 31.07.2006
GMD	28.924	01.02.2006 to 31.07.2006
Euro (€)	0.8048	01.02.2006 to 31.07.2006

11.1.3 Depreciation Rate

All capital expenditures regarding the project were depreciated over a 20 year period, i.e. equivalent to the concession duration. The straight-line method was used for depreciation, and it was assumed that all depreciable items have a residual value of zero.

11.1.4 Construction & Concession Period

The Wind Park project construction timeframe is planned to comprise 12 months (and start operation January 2008). It includes the construction of infrastructure, erection, installation, and commissioning of the wind turbines. Commercial operations would thus commence in 2008. In the analysis an operating period of 20 years is assumed. A linear disbursement of funds during the construction period and a concession period of 20 years was adopted.

11.1.5 Applicable Taxes

As it is assumed that this pilot project will be operated within the portfolio of the government of the Gambia, income taxes have been waived. Import duties were waived in the financial analysis, under the same argumentation.

Consequently, and for the purpose of the calculations presented in this feasibility study, no related tax estimations are considered.

11.1.6 Investment Costs

A detail of the Investment Costs for each Scenario has been presented in Section 10 (Cost Assessment).

11.1.7 Operation & Maintenance Costs

The O&M costs include repairs, maintenance, major overhaul costs of all equipment, spare parts, insurance costs, O&M reserve, personnel costs for wind park management and maintenance and electricity consumption.

The range of the costs is determined by the changing lifetime of the components and their prices which can not be predicted exactly. Furthermore the way of operating the wind park can have an influence on the expected costs which can also be only estimated for future times. In addition, the size of the machines and the operating time under full load is expected to have an influence on the maintenance costs. The LI-O&M cost estimation model takes these uncertainties into account, giving an expected range of maintenance costs.

As stated in Section 10.4, in Scenario I and II, the following O&M costs have been considered:

- An annual 2.5% of the total investment costs for the first 2 operational years. From operational year 3 to 10, the O&M costs are estimated at an annual 4% of the total

investment costs. Afterwards, an amount representing 6% of the total investment costs has been assumed.

In Scenario III and Scenario IV, the following O&M costs have been considered:

- An annual 6% of the total investment costs for the first 10 operational years. Afterwards, an annual amount representing 8% of the total investment costs has been assumed.

During the elaboration of this study, the question about which tasks should remain with the manufacturer and whether constant presence of the manufacturer in the Gambia is necessary has raised. According to Consultant's experience, a constant presence is not essential in wind parks with an installed capacity of approximately 4 MW.

11.1.8 Project Financing Structure

Based on assumption of the Renewable Energy Study elaborated in April 2006 by Lahmeyer International, a possible financing structure with which the required funds could be raised, has been devised. As such, the financing structure is to be interpreted as preliminary only and subject to optimisation.

It is assumed that the financing for this pilot project will strongly financially be supported by the African Development Bank and partly also by the government of The Gambia. This insinuates a grant of 70% of the total investment costs made available by the AfDB and further 10% by the government. The residual financing component of 20% is taken over also by the African Development Bank under soft conditions. The equity participation of this project is assumed to be zero.

11.1.9 Loan terms and Conditions

The following reference interest rates were used in the financial analysis:

- During the construction period: 5.00% per annum;
- During the repayment period: 5.00% per annum.

Furthermore, given the status and significance of this pilot project, it was assumed that up-front and commitment fees would be waived. It must be highlighted that the terms and conditions related to the debt finance are indicative only and shall need to be revised in collaboration with the donor, taking into consideration several factors, including for example the donor's perception of project risks as well as the general environment prevailing in the international debt markets.

Interest during construction (IDC) was calculated using the reference interest rate during the construction period. The amount of IDC will generally depend upon:

- the draw down of funds during the construction period;
- the duration of the construction period;
- the debt / equity ratio; and
- The reference interest rate.

A loan term of 12 years was assumed. Estimates regarding the loan terms and conditions are summarised in the Table below.

Table 11-2 : Debt finance terms and conditions

Item	Value
Reference interest rate, construction	**5.00% p.a.**
Reference interest rate, repayment	**5.00% p.a.**
Grace period	**12 months**
Repayment period	**12 years**

11.1.10 Weighted Average Cost of Capital (WACC)

The weighted average cost of capital for the pilot project is derived using the following assumptions:

- income tax 0.00%;
- debt / equity ratio 100.00%;
- reference interest rate 5.00% (construction)
- Reference interest rate 5.00% (repayment).

In the absence of equity finance and given the assumption that corporate income tax has been waived, the weighted average cost of capital is thus calculated as the weighted average margin between the reference rates used during the construction and repayment periods. Considering the project assumption, a WACC of 5.00% was derived.

Despite of a 5% WACC and in order to facilitate the comparison between the financial analysis of the wind park and SHS program, the same **discount rate of 10%** was used in the calculation of project Net Present Value (NPV).

11.1.11 Revenues

Project revenues have been defined as electricity sales. Electricity sales per annum are defined as the net amount of electricity generated and connected to the grid multiplied by 75% of the current electricity generation costs (avoided costs of electricity generation) (as per USD ct/kWh) as indicated in the following formula:

Wind Power generation (Base Case: P75)	**x**	**75% of avoided costs**
[kWh/year]	**x**	**[14 USDct/kWh] i.e. [11.6 EURct/kWh]**

Avoided costs of electricity generation are based on current diesel generation costs[2]. In the base case, the estimated wind power generation (P75) for each wind park scenario is as follows:

Table 11-3 : Annual Energy Generation

Scenario I	Scenario II	Scenario III	Scenario IV
1,943 MWh/a	3,576 MWh/a	1,512 MWh/a	2,814 MWh/a

The energy potential – as measured by gross production – is given in the "Base Case" using the 75 % probability of exceedance. Gross production for probability of exceedance levels 50 % is also stated as "optimistic" scenario. Gross production for probability of exceedance levels 90 % is also stated as "pessimistic" scenario.

The significance of such a pilot project for the Gambia, as well as the importance of the integration of renewable energy projects in the region from a more general point of view, is not negligible. It is exactly for this reason that successful implementation and commercial operation will be important.

11.2 Results

Results of the Financial Assessment for the Base Case are summarized below. Since the registration of the project as a Clean Development Mechanism (CDM) is, at the time of writing this study, not possible in Gambia, the Base Case was calculated without the potential CDM-cash flows. Two different kinds of wind turbines and four different scenarios were considered in the analysis.

Table 11-4: Base Case Results

CASES	Scenario I	Scenario II	Scenario III	Scenario IV
$IRR_{post\ tax}$ (P75)	7.8 %	7.4 %	11.4 %	12.2 %
Min. DSCR	1.94x	1.83x	2.69x	3.34x
NPV – Mill EUR	-0.49	-1.10	0.16	0.47
Investment Specific Costs	1.929 EUR/MW	1.852 EUR/MW	969 EUR/MW	892 EUR/MW

The DSCR is defined as the ratio of the cash flow from operations in period n, to total long-term debt service in period n.

The NPV was calculated using a discount rate of 10 % (as indicated in section 11.1.10).

Cash flow from operations is defined as net income plus depreciation plus interest expense; whilst total long-term debt service is defined as interest plus capital repayments.

The positive NPV in the Scenario III and Scenario IV above indicate that the project is justified in an economic sense in both scenarios. The NPV of the cash flow from operations is higher than zero.

[2] Identical assumptions as in previous studies elaborated by Lahmeyer International within the framework of this study, i.e., the "Renewable Energy Study for The Gambia" of 2006.

The results of the financial model have been presented in pro-forma financial statements. Annual asset and liquidity positions are reflected in the Balance Sheet, Profit and Loss Accounts and Cash Flow Statement, giving an overview of the profitability and capital structure of the project. These basic financial statements are described briefly in turn.

11.2.1 Profit and Loss Accounts

The Profit and Loss Account is used to compute the net earnings or deficit of the project arising each year. The Profit and Loss Account shows the revenues, operational expenses, financial activities and taxes and dividend distribution of the project.

11.2.2 Balance Sheet

The Balance Sheet shows the accumulated assets – the wealth – of the project and how this wealth is financed.

11.2.3 Cash Flow

To assist with the financial planning and the assurance of liquidity of the project company, a cash flow schedule, showing all sources and applications of funds, has been prepared.

A printout of all financial statements has been provided in the ANNEX A Financial Statements.

11.3 Recommendations

Since the NPV of the project is positive in Scenario III and Scenario IV, it is worth to realise the project under the assumed financing conditions. Scenario III assesses the installation of 3 Vestas V47 wind turbines, whereas Scenario IV assesses Scenario III and the addition of 3 further used Vestas wind turbines.

11.4 Conclusions

The Base Case results indicate that the project is financially feasible in Scenario III and Scenario IV. The NPV is positive, and thus, above its critical values (considering a discount rate of 10 %). Results can even be improved, for example through:

- a slightly higher sales tariff;
- and increase of capital subsidies / equity injection into the project.

Further, and in part due to the assumption of existence of subsidies on capital, the project in all four scenarios does not suffer in cash flow liquidity since the minimum Debt Service Coverage ratio is above the borderline of 1.20x in all scenarios.

12 Environmental Assessment

In this chapter the following environmental aspects will be investigated:

a) Noise Emission

b) Shadow Impact

Tourism Development Area

Most of the coastal area is declared by the Gambia Tourism Authority (GTA) as Tourism Development Area (TDA), which means that unauthorised encroachment is prohibited.

Inquiries have shown that also the wind park area in the south of Tujereng is within this TDA. But, in case the plans – here the installation of the wind park Tujereng – are of public interest, the definition does not become active.

Therefore no problems are expected regarding the location of the wind park within the TDA.

Figure 12-1: Tourism Development Areas at the Coast

12.1 Noise Impact

The target of the noise assessment is to investigate the potential noise impact of the wind turbine operation on sensitive areas in the vicinity of the wind farm. The advisable distance between residential houses and the proposed wind park site depends on a variety of factors including local topography, eventually background noise and the size of wind farm development. Official demands with regard to noise limit values for the operation of a wind park in The Gambia are not specified. Therefore a prediction of the sound produced by the proposed wind farm in the surrounding area and an optimisation of the micro-siting was made in accordance to the German noise limit regulations.

The calculation method is specified in ISO 9612-2 and implemented in the WindPRO software used for the estimation of the noise effects. The sound emission data used in the calculation and the sound power level of the turbine is based on information given by the turbine manufacturers.

The following figure shows the results of the noise calculation. The results do not show any conflict in terms of noise level. The general boundary levels of 45 dB(A) for the noise emissions during the night are not exceeded for Tintinto village, which is located in the East of the wind park. With approximately 350 m WEC No. 03 of Project Phase II is located nearest to the village. This is regarded as sufficient considering the wind conditions at site. More than 98 % of the winds are below 9 m/s and the WindPRO tool calculates the noise with 95 % of rated power, which is reached with 10.8 m/s for the Fuhrländer and 15 m/s for the Vestas wind turbine. No problems regarding noise impact are expected.

The detailed results are attached in the Annex.

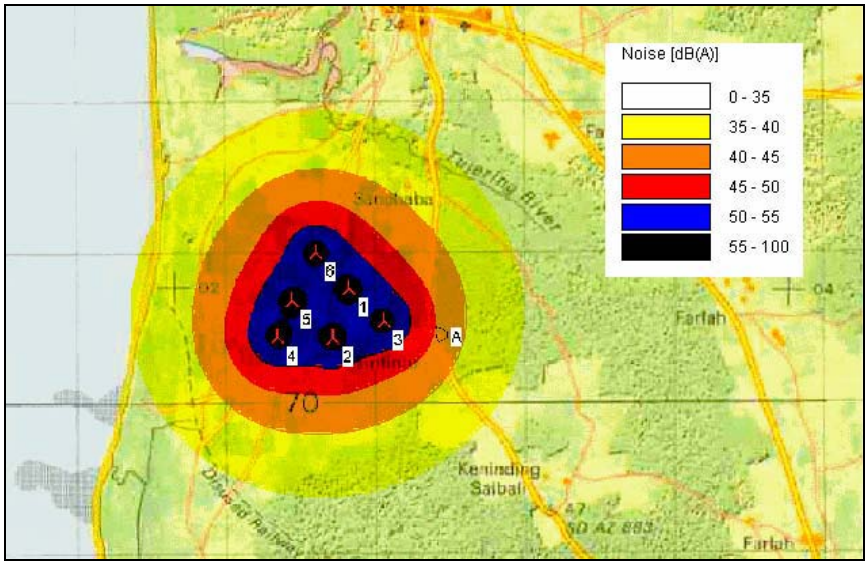

Figure 12-2: Noise Impact at the Wind Park Site

12.2 Shadow Impact

When the sun is just above the horizon, the shadows of the wind turbine generators can be long and could move across an inhabited house (window) for a short period of time. If this happens for longer period, it may cause stress to the inhabitants.

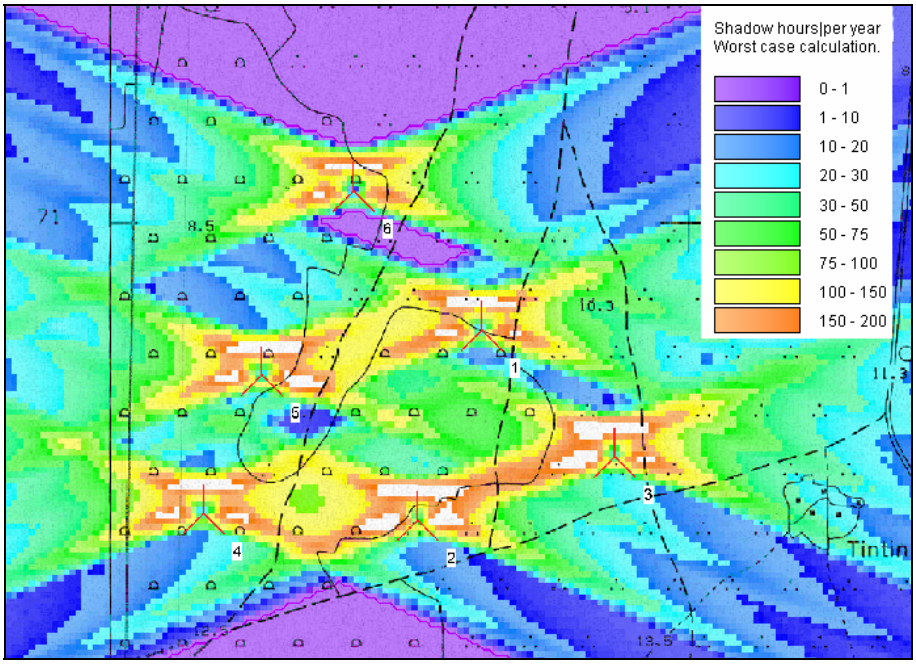

Figure 12-3: Shadow Impact at the Wind Park Site

The exact position and time period of shadow can be calculated very accurately for each location, taking into account the structure of topography and the movements of the sun. Official Boundary levels do not exist for the shadow flicker effect. In Germany, a commonly accepted value is the

maximum of 30 hours shadow caused by the wind turbines per year, and 30 minutes shadow per day.

The WindPRO software has been used for the calculation of the shadow impact. There is no exceedance of the limits for the wind park scenarios.

The estimations are carried out for the “worst case”, i.e. that the sun is always shining, 365 days per year. The detailed results of the shadow impact are given in the Annex.

The figure above shows the shadow impact for the Vestas V47 layout with 76 m hub height.

No problems are expected regarding the Shadow Impact.

13 Appendix

13.1 WindPRO - Meteo Report GREC 08 at 30m

Project:
Project_Gambia_240203

Description:
Data from file(s)
E:\240-xxx\240203_re_study_gambia\06_results\069_weatherstations\ordered data_for wind\meteo_station_8 v3 corr july 2006.txt

Licensed user:
Lahmeyer Int. Ing.Gesellschaft
Friedberger Straße 173
DE-61118 Bad Vilbel
+49-6101-55-1784

Calculated:
31.07.2006 18:48/

Meteo data report, height: 30.3 m

Name of meteo object: GREC08_098

Data from: 07.07.2005 15:00 Data to: 09.07.2006 14:00 Observations: 52811 Observations per day: 36 Recovery rate: 400%

day	07.05	08.05	09.05	10.05	11.05	12.05	01.06	02.06	03.06	04.06	05.06	06.06	07.06	08.06
1		(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	
2		(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	
3		(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	
4		(144)	(144)	(144)	(127)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	
5		(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	
6		(144)	(136)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	
7	(51)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	
8	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(143)	(144)	(144)	(144)	
9	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(85)	
10	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
11	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
12	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
13	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
14	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
15	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
16	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
17	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
18	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
19	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
20	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
21	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
22	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
23	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
24	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
25	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
26	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
27	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
28	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)	(144)		
29	(144)	(144)	(144)	(144)	(144)	(144)	(144)		(144)	(144)	(144)	(144)		
30	(144)	(141)	(144)	(144)	(144)	(144)	(144)		(144)	(144)	(144)	(144)		
31	(144)	(144)		(144)		(144)	(144)		(144)		(144)			
%	(400)	(400)	(399)	(400)	(398)	(400)	(400)	(400)	(400)	(400)	(400)	(400)	(111)	(0)

Project:
Project_Gambia_240203

Description:
Data from file(s)
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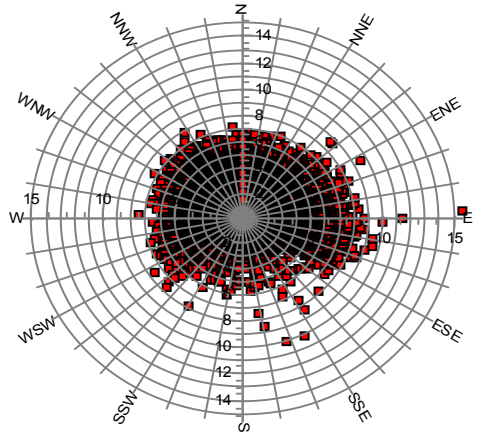
Calculated:
31.07.2006 18:48/

Meteo data report, height: 30.3 m

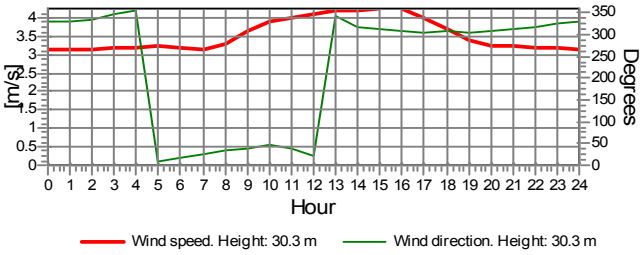
Name of meteo object: GREC08_098

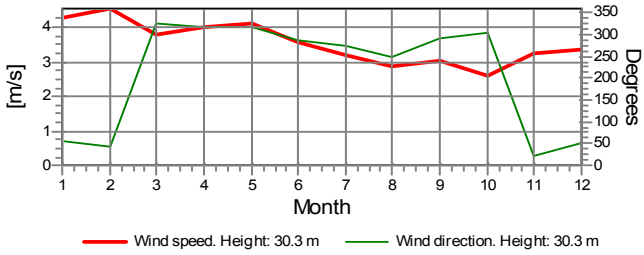


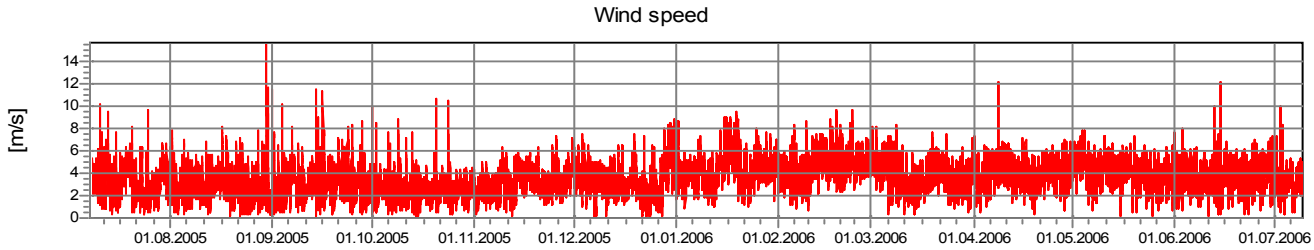
Wind speed [m/s]

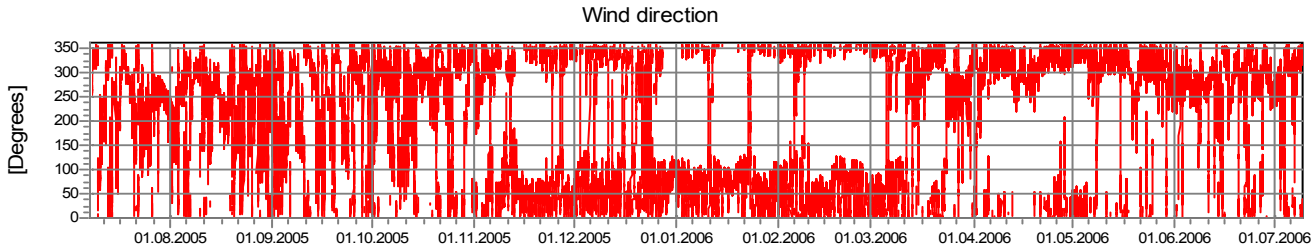
Monthly mean values of wind speed in m/s

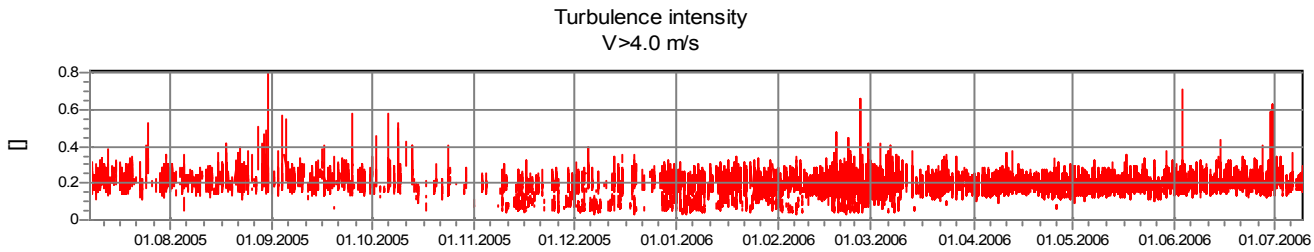
Month	2005	2006	mean	mean of months
Jan		4.3	4.3	4.3
Feb		4.5	4.5	4.5
Mar		3.8	3.8	3.8
Apr		4.0	4.0	4.0
May		4.1	4.1	4.1
Jun		3.6	3.6	3.6
Jul	3.2	3.3	3.2	3.2
Aug	2.9		2.9	2.9
Sep	3.0		3.0	3.0
Oct	2.6		2.6	2.6
Nov	3.2		3.2	3.2
Dec	3.4		3.4	3.4
mean, all data	3.0	4.0	3.5	
mean of months	3.0	3.9		3.6











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Project_Gambia_240203

Description:
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+49-6101-55-1784

Calculated:
31.07.2006 18:48/

Meteo data report, height: 30.3 m

Name of meteo object: GREC08_098

Frequency

Wind speed	Sum	N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW
0.00 - 0.49	167	9	12	5	14	18	17	27	12	13	13	16	11
0.50 - 1.49	2,592	150	168	166	156	163	220	278	261	262	271	280	217
1.50 - 2.49	9,104	529	560	492	431	407	524	612	576	823	1,255	1,421	1,474
2.50 - 3.49	15,142	1,248	1,228	1,123	748	441	379	386	456	1,117	1,971	2,807	3,238
3.50 - 4.49	13,256	1,410	1,588	1,562	1,109	430	100	116	233	908	1,361	2,226	2,213
4.50 - 5.49	8,484	674	755	1,387	1,012	357	28	46	100	549	737	1,558	1,281
5.50 - 6.49	2,969	192	218	497	499	242	19	12	34	202	180	397	477
6.50 - 7.49	781	31	30	161	251	123	7	10	11	43	21	42	51
7.50 - 8.49	235	1	4	37	116	54	7	0	4	6	3	0	3
8.50 - 9.49	49	0	0	4	19	19	3	3	1	0	0	0	0
9.50 - 10.49	17	1	0	1	7	5	3	0	0	0	0	0	0
10.50 - 11.49	9	0	0	1	6	2	0	0	0	0	0	0	0
11.50 - 12.49	5	0	0	0	0	1	2	0	0	0	0	2	0
12.50 - 13.49	0	0	0	0	0	0	0	0	0	0	0	0	0
13.50 - 14.49	0	0	0	0	0	0	0	0	0	0	0	0	0
14.50 - 15.49	0	0	0	0	0	0	0	0	0	0	0	0	0
15.50 - 16.49	1	0	0	0	1	0	0	0	0	0	0	0	0
Sum	52,811	4,245	4,563	5,436	4,369	2,262	1,309	1,490	1,688	3,923	5,812	8,749	8,965

Turbulence

Wind speed	Sum	N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW
0.00 - 0.49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.50 - 1.49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1.50 - 2.49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.50 - 3.49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.50 - 4.49	0.178	0.177	0.131	0.123	0.156	0.214	0.236	0.247	0.230	0.223	0.209	0.201	0.192
4.50 - 5.49	0.185	0.189	0.153	0.139	0.180	0.222	0.252	0.243	0.247	0.222	0.206	0.196	0.195
5.50 - 6.49	0.196	0.184	0.179	0.184	0.205	0.223	0.320	0.285	0.248	0.224	0.190	0.185	0.187
6.50 - 7.49	0.205	0.178	0.194	0.188	0.212	0.222	0.277	0.274	0.221	0.237	0.188	0.181	0.178
7.50 - 8.49	0.210	0.172	0.220	0.201	0.207	0.222	0.259		0.254	0.214	0.158		0.128
8.50 - 9.49	0.219			0.190	0.205	0.207	0.261	0.356	0.267				
9.50 - 10.49	0.233	0.319		0.152	0.231	0.210	0.272						
10.50 - 11.49	0.221			0.159	0.224	0.244							
11.50 - 12.49	0.220					0.278	0.244					0.167	
12.50 - 13.49													
13.50 - 14.49													
14.50 - 15.49													
15.50 - 16.49	0.273				0.273								
Sum	0.186	0.183	0.148	0.146	0.184	0.220	0.261	0.255	0.239	0.223	0.205	0.196	0.192

Project:
Project_Gambia_240203

Description:
Data from file(s)
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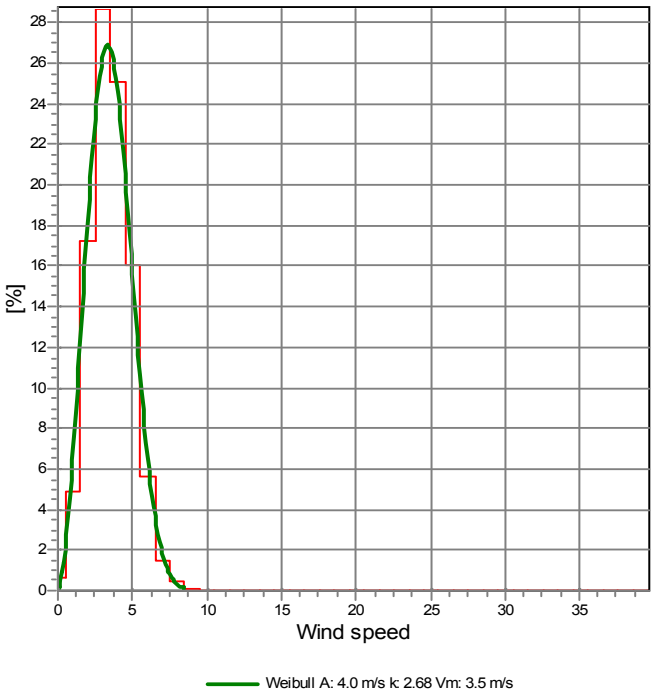
Calculated:
31.07.2006 18:48/

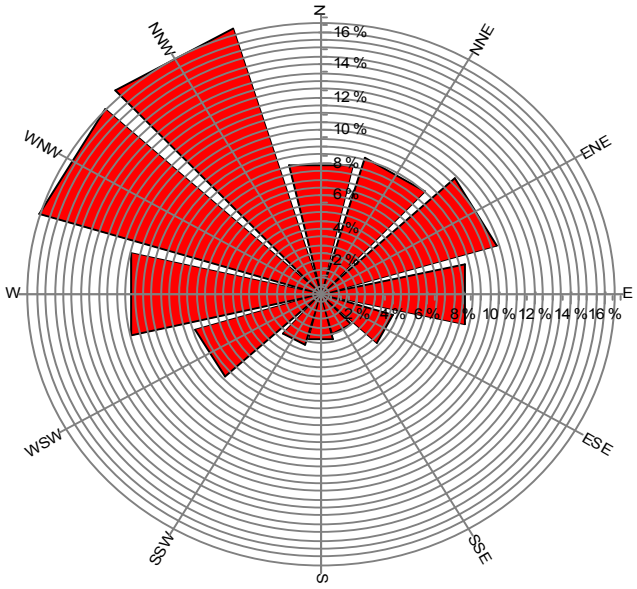
Meteo data report, height: 30.3 m

Name of meteo object: GREC08_098

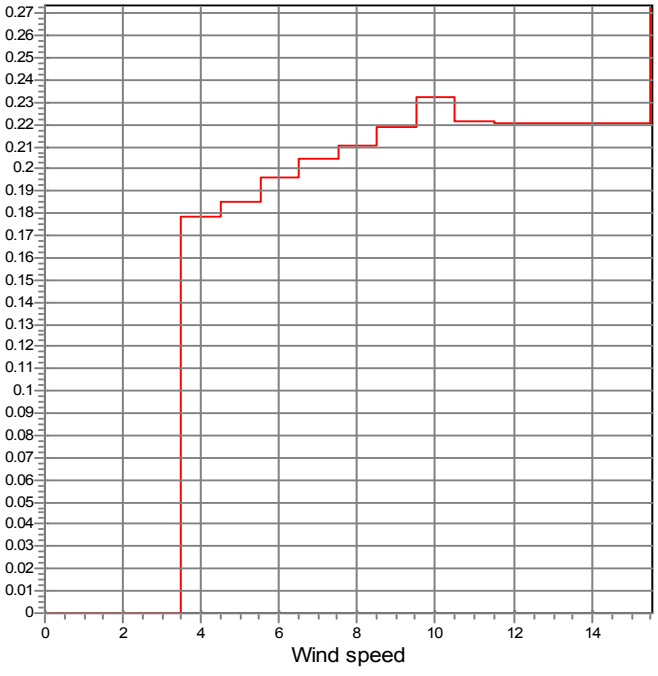
Frequency



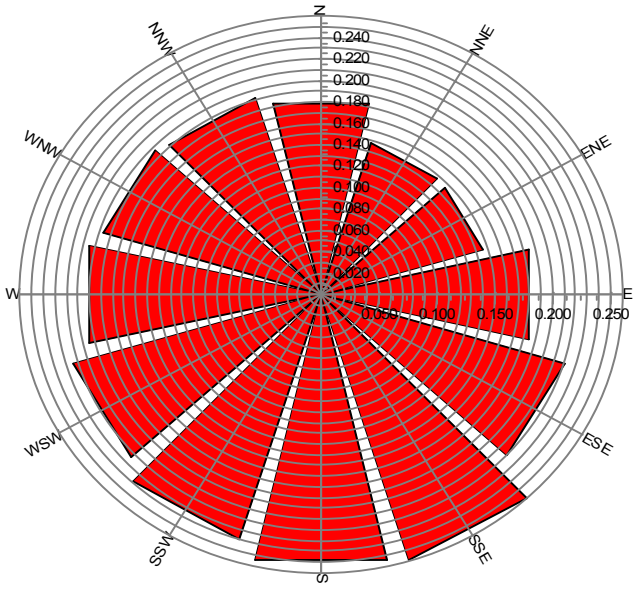
Frequency



Turbulence
V>4.0 m/s



Turbulence
V>4.0 m/s



Project:
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Description:
Data from file(s)
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Friedberger Straße 173
DE-61118 Bad Vilbel
+49-6101-55-1784

Calculated:
31.07.2006 18:48/

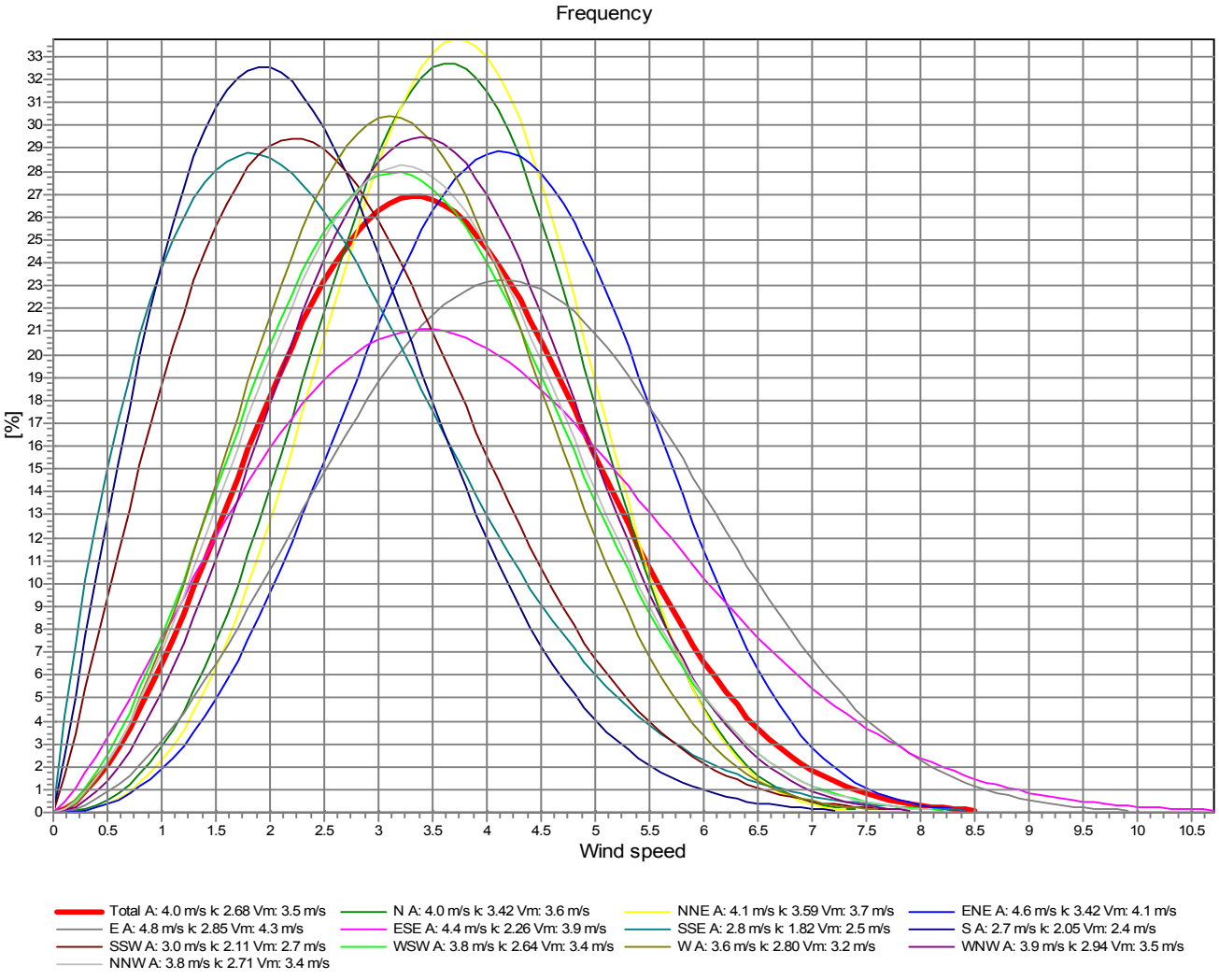
Meteo data report, height: 30.3 m

Name of meteo object: GREC08_098

Weibull Data

k-parameter correction: 0.0080/m

Sector	A- parameter [m/s]	Mean wind speed [m/s]	k- parameter	Frequency	Frequency [%]	Wind shear
0-N	4.04	3.63	3.424	8.04	8.0	0.28
1-NNE	4.09	3.68	3.594	8.64	8.6	0.45
2-ENE	4.57	4.10	3.416	10.29	10.3	0.39
3-E	4.84	4.31	2.850	8.27	8.3	0.30
4-ESE	4.43	3.92	2.257	4.28	4.3	0.27
5-SSE	2.82	2.50	1.821	2.48	2.5	0.35
6-S	2.67	2.37	2.046	2.82	2.8	0.31
7-SSW	3.02	2.67	2.105	3.20	3.2	0.35
8-WSW	3.78	3.36	2.640	7.43	7.4	0.24
9-W	3.64	3.24	2.797	11.01	11.0	0.23
10-WNW	3.91	3.49	2.936	16.57	16.6	0.21
11-NNW	3.82	3.39	2.707	16.98	17.0	0.25
mean	3.97	3.53	2.679	100.00	100.0	0.28



13.2 WindPRO - Energy Production Calculation

13.2.1 Energy Production - Phase I: 3x Fuhrländer FL600

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Fuhrländer 600, Total Capacity: 1800 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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08.08.2006 19:31 / 1
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Calculated:
01.08.2006 16:10/2.5.4.68

PARK - Main Result

Calculation: FL 600 Phase I

Wake Model N.O. Jensen (EMD) : 2005

Calculation Settings

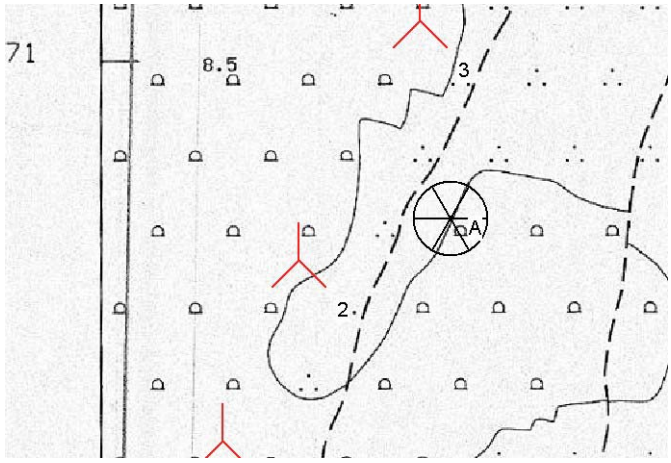
Air density calculation mode	Individual per WTG
Result for WTG at hub altitude	1.175 kg/m3 to 1.176 kg/m3
Hub altitude above sea level (asl)	91.8 m to 97.4 m
Annual mean temperature at hub alt.	23.9 ºC to 23.9 ºC
Pressure at WTGs	1,002.0 hPa to 1,002.6 hPa

Wake Model Parameters

From angle	[°]	180.0	Other
To angle	[°]	180.0	-
Wake Decay Constant		0.075	0.075

Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098.wws	7,387	84



Scale 1:10,000
New WTG Site Data

Key results for height 50.0 m above ground level

Terrain UTM WGS84 Zone: 28

	East	North	Name of wind distribution	Type	Wind energy [kWh/m2]	Mean wind speed [m/s]	Equivalent roughness
A	305,632	1,470,866	WP Tujering	WAsP (2.5.4.68)	622	4.4	0.8

Calculated Annual Energy for Wind Farm

WTG combination	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean WTG energy [MWh]	Capacity Factor for Result [%]	Capacity Factor for Result-10.0% [%]
Wind farm	2,096.8	1,887.1	97.8	698.9	13.3	12.0

Calculated Annual Energy for each of 3 new WTG's with total 1.8 MW rated power

	Terrain	WTG type Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	Circle radius [m]	Power curve Creator	Name	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean wind speed [m/s]
1	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	708.0	637	97.0	4.9
2	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	698.6	629	97.0	4.8
3	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	690.1	621	99.6	4.8

WTG siting

UTM WGS84 Zone: 28

	East	North	Z [m]	Row data/Description
1 New	305,332	1,470,570	22	WTG 01
2 New	305,432	1,470,810	20	WTG 02
3 New	305,592	1,471,130	17	WTG 03

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Fuhrländer 600, Total Capacity: 1800 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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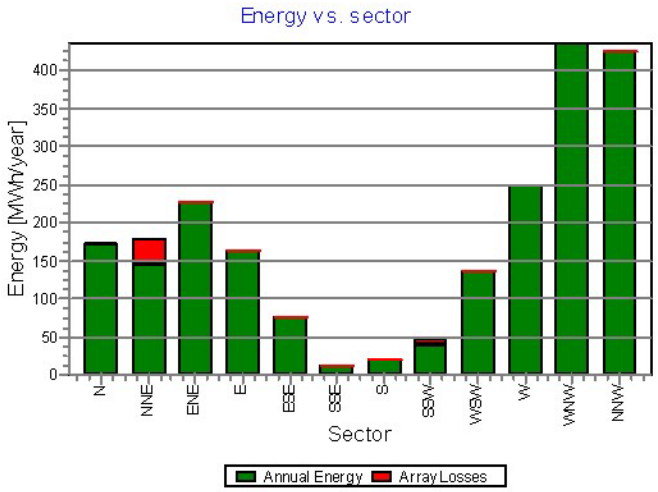
Calculated:
01.08.2006 16:10/2.5.4.68

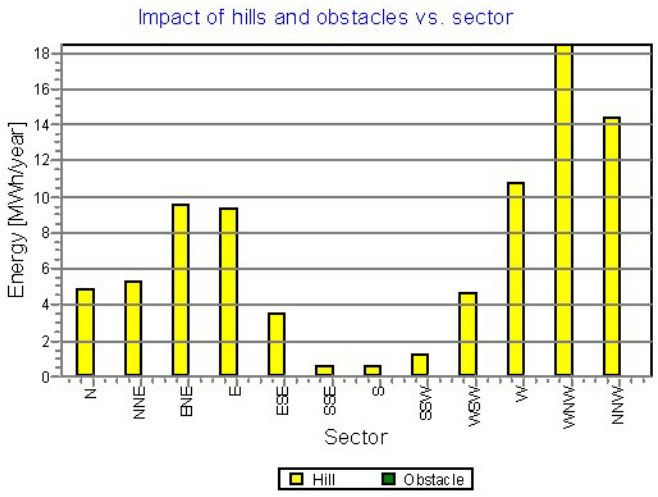
PARK - Production Analysis

Calculation: FL 600 Phase I **WTG:** All new WTG's, Air density 1.175 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]	169.5	173.2	216.7	154.9	71.7	12.2	18.9	45.6	132.6	238.1	416.1	410.5	2,060.0
+Increase due to hills	[MWh]	4.8	5.3	9.6	9.3	3.5	0.6	0.6	1.3	4.7	10.8	18.5	14.4	83.5
-Decrease due to array losses	[MWh]	3.3	34.9	0.0	0.0	0.0	0.0	0.3	8.2	0.0	0.0	0.0	0.0	46.7
Resulting energy	**[MWh]**	**171.1**	**143.6**	**226.3**	**164.2**	**75.2**	**12.8**	**19.2**	**38.7**	**137.3**	**248.9**	**434.6**	**424.9**	**2,096.8**
Specific energy	[kWh/m2]													356
Specific energy	[kWh/kW]													1,165
Increase due to hills	[%]	2.9	3.1	4.4	6.0	4.9	5.1	3.2	2.8	3.5	4.5	4.4	3.5	4.1
Decrease due to array losses	[%]	1.9	19.6	0.0	0.0	0.0	0.0	1.5	17.4	0.0	0.0	0.0	0.0	2.2
Utilization	[%]	42.9	35.3	44.4	44.1	43.5	37.3	38.4	34.9	43.6	44.0	44.5	44.6	43.1
Operational	[Hours/year]	745	732	806	618	325	199	224	294	599	967	1,444	1,347	8,301
Full Load Equivalent	[Hours/year]	95	80	126	91	42	7	11	22	76	138	241	236	1,165





Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Fuhrländer 600, Total Capacity: 1800 kW
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PARK - Power Curve Analysis

Calculation: FL 600 Phase I **WTG:** 1 - FUHRLÄNDER FL 600 600 50.0 !O! Man. 07-2004, Hub height: 75.0 m

Name: Man. 07-2004
Source: Manufacturer

Source/Date	Created by	Created	Edited	Stop wind speed [m/s]	Power control	CT curve type
29.07.2004	EMD	11.08.2003	20.10.2004	20.0	Pitch	User defined

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]	905	1,400	1,916	2,404	2,804	3,162
WTG 01	[MWh]	1,014	1,554	2,072	2,518	2,865	3,105
Check value	[%]	-11	-10	-8	-5	-2	2

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^2) 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

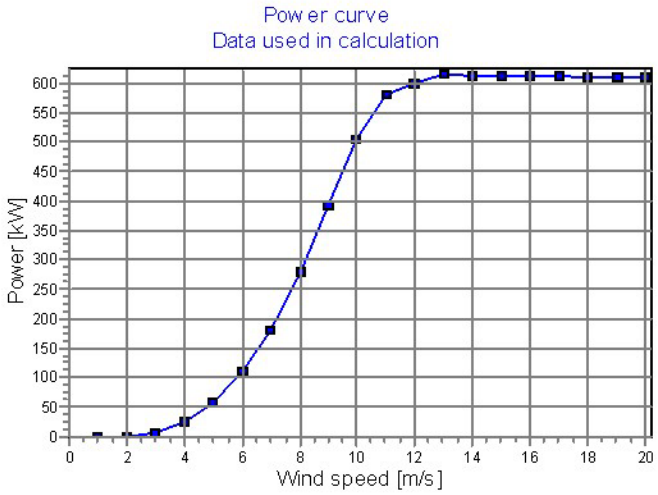
Original data from Windcat, Air density: 1.225 kg/m3

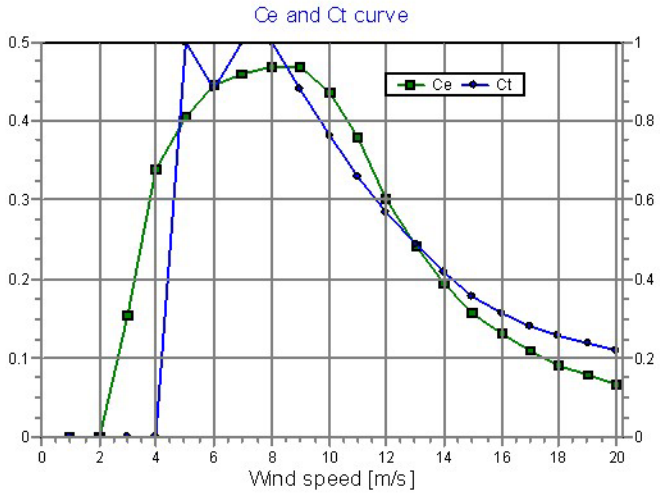
Wind speed [m/s]	Power [kW]	Ce	Wind speed [m/s]	Ct curve
1.0	0.0	0.00	3.0	0.00
2.0	0.0	0.00	4.0	0.00
3.0	5.0	0.15	5.0	1.07
4.0	26.0	0.34	6.0	0.88
5.0	60.9	0.41	7.0	1.14
6.0	115.8	0.45	8.0	1.01
7.0	189.9	0.46	9.0	0.88
8.0	289.6	0.47	10.0	0.76
9.0	410.7	0.47	11.0	0.66
10.0	518.8	0.44	12.0	0.57
11.0	593.8	0.38	13.0	0.49
12.0	604.8	0.30	14.0	0.41
13.0	615.3	0.24	15.0	0.36
14.0	613.7	0.19	16.0	0.31
15.0	613.0	0.16	17.0	0.28
16.0	612.5	0.13	18.0	0.25
17.0	612.7	0.11	19.0	0.24
18.0	610.0	0.09	20.0	0.22
19.0	610.0	0.08	21.0	0.21
20.0	610.0	0.07	22.0	0.19
			23.0	0.18
			24.0	0.17
			25.0	0.17

Power, Efficiency and energy vs. wind speed

Data used in calculation, Air density: 1.175 kg/m3

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	1.1	1.1	0.2
3.0	4.8	0.15	2.50- 3.50	11.7	12.8	1.8
4.0	24.9	0.34	3.50- 4.50	47.6	60.4	8.5
5.0	58.4	0.41	4.50- 5.50	109.1	169.5	23.9
6.0	111.1	0.45	5.50- 6.50	162.5	332.0	46.9
7.0	182.2	0.46	6.50- 7.50	166.3	498.3	70.4
8.0	277.8	0.47	7.50- 8.50	119.7	618.0	87.3
9.0	394.2	0.47	8.50- 9.50	61.2	679.2	95.9
10.0	503.1	0.44	9.50-10.50	22.1	701.3	99.1
11.0	581.9	0.38	10.50-11.50	5.6	706.9	99.8
12.0	598.7	0.30	11.50-12.50	1.0	707.9	100.0
13.0	615.3	0.24	12.50-13.50	0.1	708.0	100.0
14.0	613.7	0.19	13.50-14.50	0.0	708.0	100.0
15.0	613.0	0.16	14.50-15.50	0.0	708.0	100.0
16.0	612.5	0.13	15.50-16.50	0.0	708.0	100.0
17.0	612.7	0.11	16.50-17.50	0.0	708.0	100.0
18.0	610.0	0.09	17.50-18.50	0.0	708.0	100.0
19.0	610.0	0.08	18.50-19.50	0.0	708.0	100.0
20.0	610.0	0.07	19.50-20.50	0.0	708.0	100.0





Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Fuhrländer 600, Total Capacity: 1800 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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PARK - Wind Data Analysis

Calculation: FL 600 Phase I **Wind data:** A - WP Tujering; Hub height: 50.0

Site Coordinates
UTM WGS 84 Zone: 28 East: 305,632 North: 1,470,866

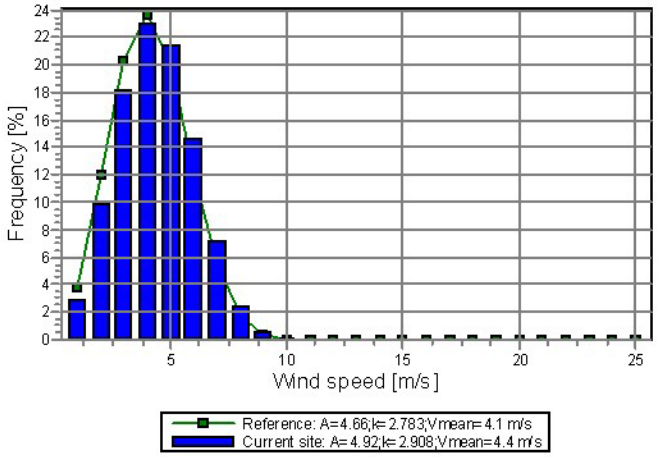
Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098.wws	7,387	84

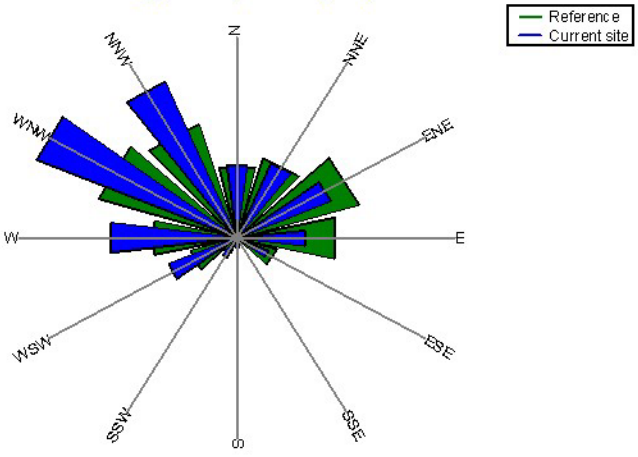
Weibull Data

	Current site				Reference: Roughness class 1		
Sector	A-parameter [m/s]	Wind speed [m/s]	k-parameter	Frequency [%]	A-parameter [m/s]	k-parameter	Frequency [%]
0 N	4.78	4.30	3.561	9.2	4.87	3.492	8.4
1 NNE	4.99	4.50	3.561	9.0	5.10	3.616	8.7
2 ENE	5.05	4.53	3.291	9.7	5.45	3.351	9.7
3 E	4.78	4.25	2.803	7.3	5.39	2.871	7.5
4 ESE	4.51	3.99	2.311	3.9	4.80	2.374	3.9
5 SSE	2.98	2.65	1.979	2.4	3.28	2.042	2.3
6 S	3.24	2.87	2.264	2.7	3.25	2.232	2.7
7 SSW	4.08	3.62	2.428	3.6	3.68	2.316	3.6
8 WSW	4.89	4.35	2.768	7.3	4.16	2.643	7.6
9 W	5.06	4.52	2.955	11.6	4.32	2.779	11.9
10 WNW	5.37	4.81	3.193	17.1	4.60	3.027	17.6
11 NNW	5.16	4.61	3.135	16.2	4.57	2.922	15.9
All	4.92	4.39	2.908	100.0	4.66	2.783	100.0

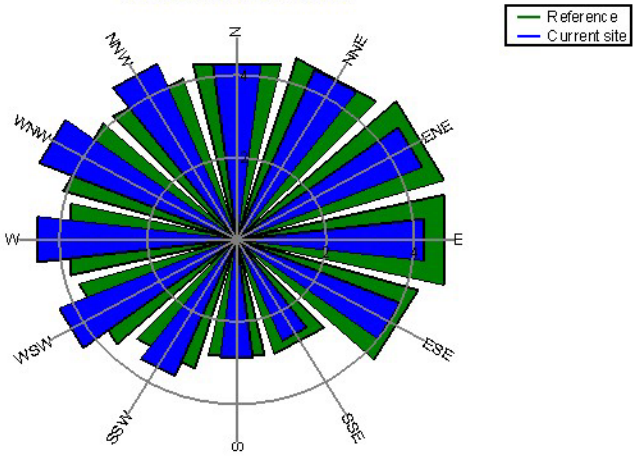
Weibull Distribution



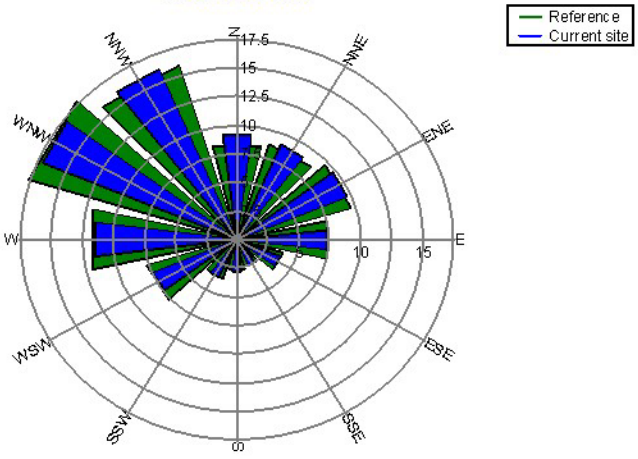
Energy Rose (kWh/m2/year)



Mean wind speed (m/s)



Frequency (%)



Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Fuhrländer 600, Total Capacity: 1800 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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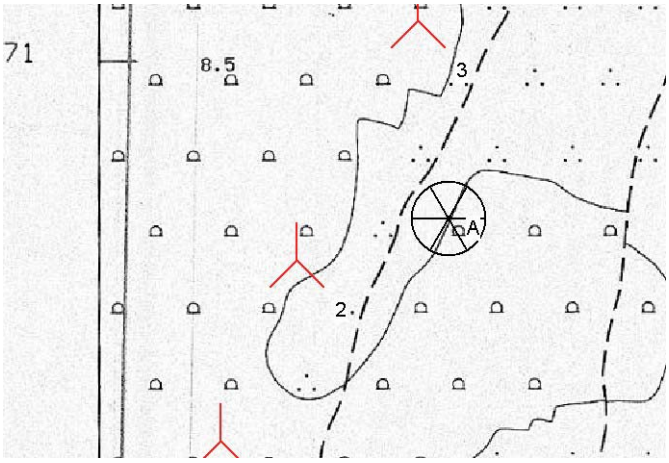
PARK - WTG distances

Calculation: FL 600 Phase I

WTG distances

	Z	Nearest WTG	Z	Horizontal distance	Distance in rotor diameters
	[m]		[m]	[m]	
1	22	2	20	260	5.2
2	20	1	22	260	5.2
3	17	2	20	358	7.2



Scale 1:10,000

New WTG Site Data

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
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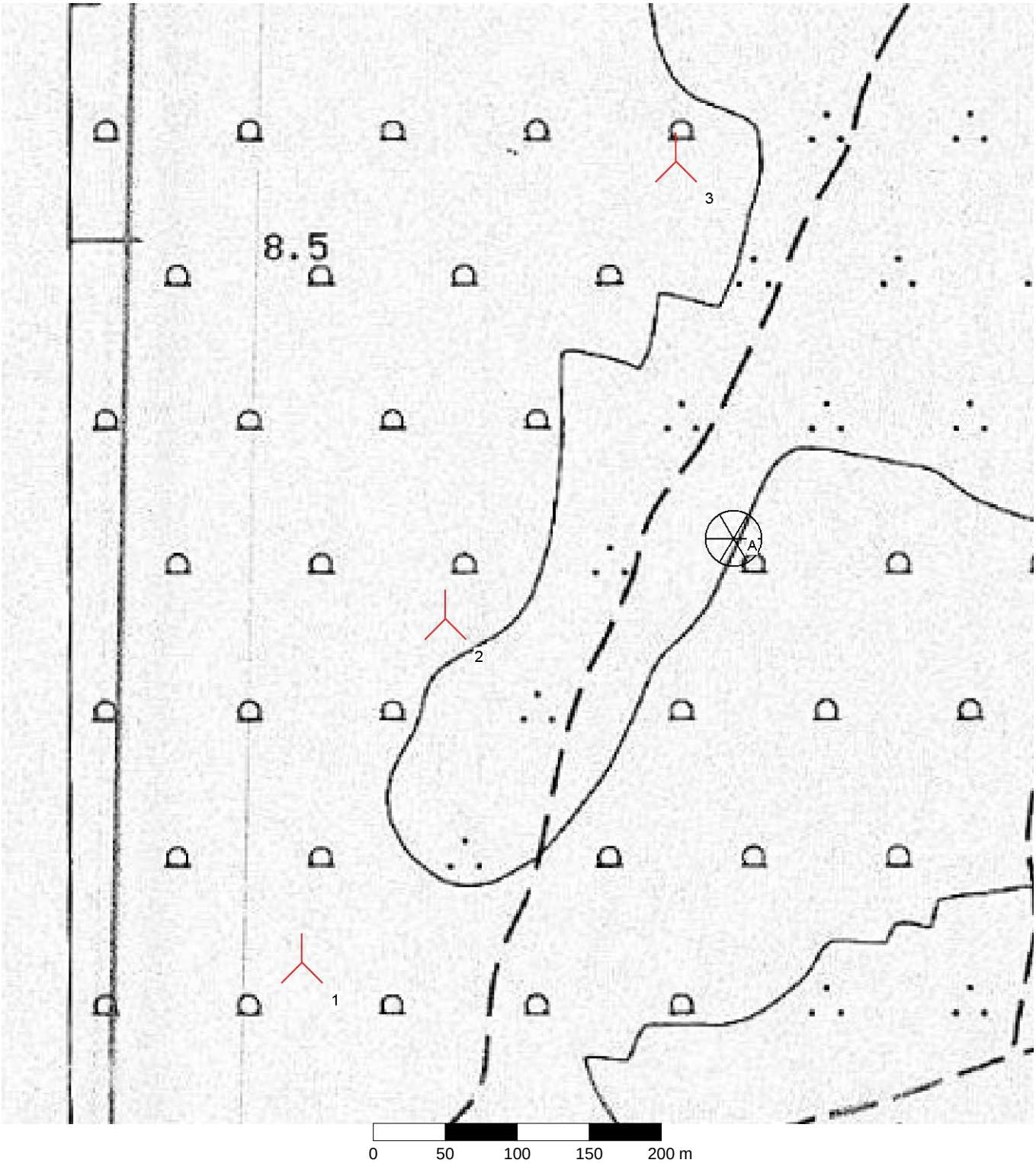
PARK - Tujering_10k

Calculation: FL 600 Phase I **File:** tujering_10k.bmi



Map: tujering_10k , Print scale 1:4,000, Map center UTM WGS 84 Zone: 28 East: 305,482 North: 1,470,850

New WTG Site Data

13.2.2 Energy Production - Phase II: 6x Fuhrländer FL600

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Fuhrländer 600, Total Capacity: 3600 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
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PARK - Main Result

Calculation: FL 600 Phase II

Wake Model N.O. Jensen (EMD) : 2005

Calculation Settings

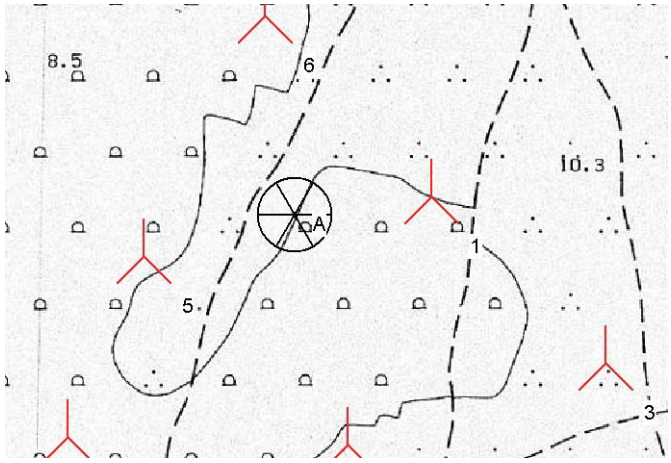
Air density calculation mode	Individual per WTG
Result for WTG at hub altitude	1.175 kg/m3 to 1.176 kg/m3
Hub altitude above sea level (asl)	91.8 m to 97.4 m
Annual mean temperature at hub alt.	23.9 ºC to 23.9 ºC
Pressure at WTGs	1,002.0 hPa to 1,002.6 hPa

Wake Model Parameters

From angle	[°]	180.0	Other
To angle	[°]	180.0	-
Wake Decay Constant		0.075	0.075

Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098.wws	7,387	84



Scale 1:10,000
New WTG Site Data

Key results for height 50.0 m above ground level

Terrain UTM WGS84 Zone: 28

	East	North	Name of wind distribution	Type	Wind energy [kWh/m2]	Mean wind speed [m/s]	Equivalent roughness
A	305,632	1,470,866	WP Tujering	WAsP (2.5.4.68)	622	4.4	0.8

Calculated Annual Energy for Wind Farm

WTG combination	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean WTG energy [MWh]	Capacity Factor for Result [%]	Capacity Factor for Result-10.0% [%]
Wind farm	3,857.7	3,471.9	91.8	642.9	12.2	11.0

Calculated Annual Energy for each of 6 new WTG's with total 3.6 MW rated power

	Terrain	WTG type Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	Circle radius [m]	Power curve Creator	Name	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean wind speed [m/s]
1	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	616.6	555	89.7	4.8
2	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	594.7	535	85.4	4.8
3	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	606.6	546	90.0	4.7
4	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	679.0	611	93.0	4.9
5	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	674.1	607	93.6	4.8
6	A	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	230.0	EMD	Man. 07-2004	686.9	618	99.1	4.8

WTG siting

UTM WGS84 Zone: 28

	East	North	Z [m]	Row data/Description
1 New	305,812	1,470,890	19	WTG 04
2 New	305,702	1,470,560	20	WTG 05
3 New	306,042	1,470,670	20	WTG 06
4 New	305,332	1,470,570	22	WTG 01
5 New	305,432	1,470,810	20	WTG 02
6 New	305,592	1,471,130	17	WTG 03

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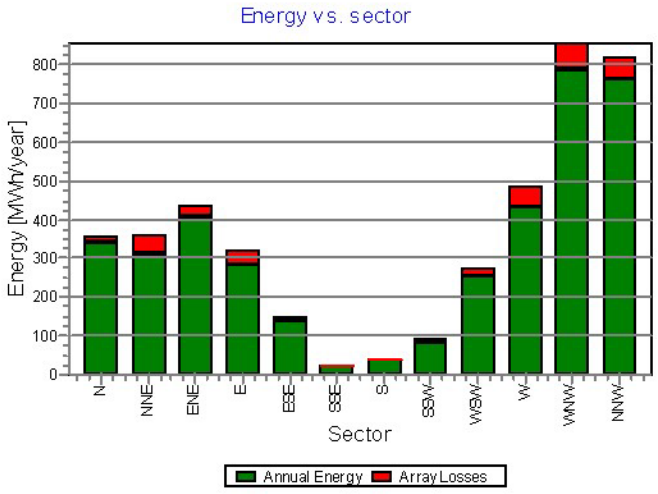
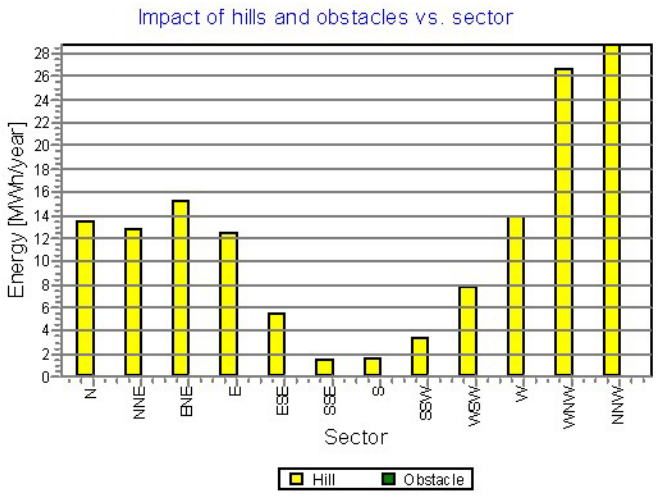
PARK - Production Analysis

Calculation: FL 600 Phase II **WTG:** All new WTG's, Air density 1.175 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]	340.3	346.4	421.7	308.9	142.6	24.3	36.4	88.7	265.0	469.6	826.4	788.5	4,058.7
+Increase due to hills	[MWh]	13.4	12.8	15.2	12.5	5.6	1.5	1.6	3.4	7.7	13.8	26.6	28.8	142.9
-Decrease due to array losses	[MWh]	15.0	47.0	29.7	36.3	11.3	1.4	1.2	10.9	17.4	50.5	67.0	56.2	343.9
Resulting energy	**[MWh]**	**338.7**	**312.1**	**407.2**	**285.1**	**136.9**	**24.5**	**36.8**	**81.1**	**255.3**	**432.9**	**786.1**	**761.1**	**3,857.7**
Specific energy	[kWh/m2]													327
Specific energy	[kWh/kW]													1,072
Increase due to hills	[%]	3.9	3.7	3.6	4.0	3.9	6.2	4.4	3.8	2.9	2.9	3.2	3.7	3.5
Decrease due to array losses	[%]	4.2	13.1	6.8	11.3	7.6	5.3	3.2	11.9	6.4	10.4	7.9	6.9	8.2
Utilization	[%]	41.9	38.1	41.3	39.1	40.1	35.4	37.5	37.1	40.8	39.4	41.0	41.5	40.4
Operational	[Hours/year]	749	735	803	612	324	200	226	296	600	962	1,437	1,350	8,294
Full Load Equivalent	[Hours/year]	94	87	113	79	38	7	10	23	71	120	218	211	1,072





Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Fuhrländer 600, Total Capacity: 3600 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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PARK - Power Curve Analysis

Calculation: FL 600 Phase II **WTG:** 1 - FUHRLÄNDER FL 600 600 50.0 !O! Man. 07-2004, Hub height: 75.0 m

Name: Man. 07-2004
Source: Manufacturer

Source/Date	Created by	Created	Edited	Stop wind speed [m/s]	Power control	CT curve type
29.07.2004	EMD	11.08.2003	20.10.2004	20.0	Pitch	User defined

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]	905	1,400	1,916	2,404	2,804	3,162
WTG 04	[MWh]	1,014	1,554	2,072	2,518	2,865	3,105
Check value	[%]	-11	-10	-8	-5	-2	2

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^2) 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

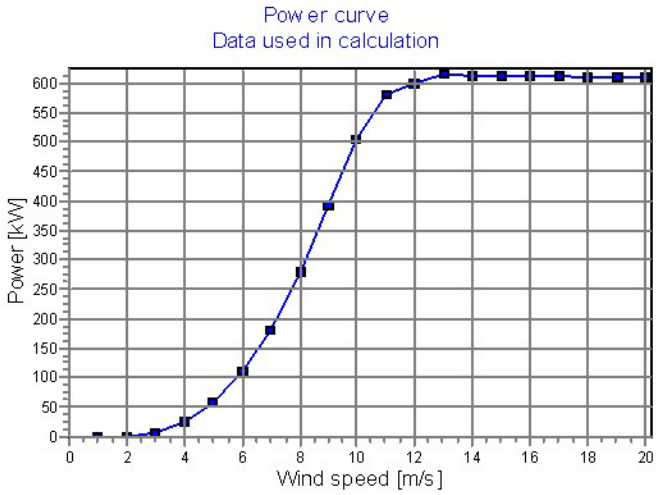
Original data from Windcat, Air density: 1.225 kg/m3

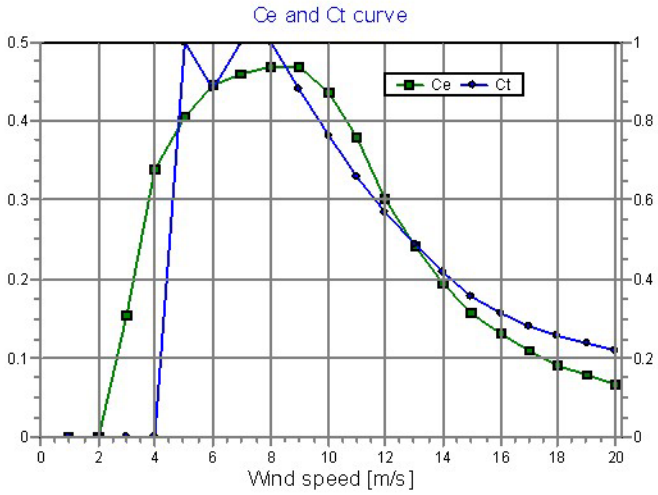
Wind speed [m/s]	Power [kW]	Ce	Wind speed [m/s]	Ct curve
1.0	0.0	0.00	3.0	0.00
2.0	0.0	0.00	4.0	0.00
3.0	5.0	0.15	5.0	1.07
4.0	26.0	0.34	6.0	0.88
5.0	60.9	0.41	7.0	1.14
6.0	115.8	0.45	8.0	1.01
7.0	189.9	0.46	9.0	0.88
8.0	289.6	0.47	10.0	0.76
9.0	410.7	0.47	11.0	0.66
10.0	518.8	0.44	12.0	0.57
11.0	593.8	0.38	13.0	0.49
12.0	604.8	0.30	14.0	0.41
13.0	615.3	0.24	15.0	0.36
14.0	613.7	0.19	16.0	0.31
15.0	613.0	0.16	17.0	0.28
16.0	612.5	0.13	18.0	0.25
17.0	612.7	0.11	19.0	0.24
18.0	610.0	0.09	20.0	0.22
19.0	610.0	0.08	21.0	0.21
20.0	610.0	0.07	22.0	0.19
			23.0	0.18
			24.0	0.17
			25.0	0.17

Power, Efficiency and energy vs. wind speed

Data used in calculation, Air density: 1.176 kg/m3

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	1.0	1.0	0.2
3.0	4.8	0.15	2.50- 3.50	11.3	12.3	2.0
4.0	25.0	0.34	3.50- 4.50	45.2	57.5	9.3
5.0	58.4	0.41	4.50- 5.50	101.7	159.2	25.8
6.0	111.1	0.45	5.50- 6.50	147.5	306.7	49.7
7.0	182.2	0.46	6.50- 7.50	145.2	451.8	73.3
8.0	277.9	0.47	7.50- 8.50	98.8	550.6	89.3
9.0	394.3	0.47	8.50- 9.50	46.7	597.4	96.9
10.0	503.3	0.44	9.50-10.50	15.2	612.6	99.4
11.0	581.9	0.38	10.50-11.50	3.4	616.0	99.9
12.0	598.8	0.30	11.50-12.50	0.5	616.5	100.0
13.0	615.3	0.24	12.50-13.50	0.1	616.6	100.0
14.0	613.7	0.19	13.50-14.50	0.0	616.6	100.0
15.0	613.0	0.16	14.50-15.50	0.0	616.6	100.0
16.0	612.5	0.13	15.50-16.50	0.0	616.6	100.0
17.0	612.7	0.11	16.50-17.50	0.0	616.6	100.0
18.0	610.0	0.09	17.50-18.50	0.0	616.6	100.0
19.0	610.0	0.08	18.50-19.50	0.0	616.6	100.0
20.0	610.0	0.07	19.50-20.50	0.0	616.6	100.0





Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Fuhrländer 600, Total Capacity: 3600 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
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PARK - Wind Data Analysis

Calculation: FL 600 Phase II **Wind data:** A - WP Tujering; Hub height: 50.0

Site Coordinates
UTM WGS 84 Zone: 28 East: 305,632 North: 1,470,866

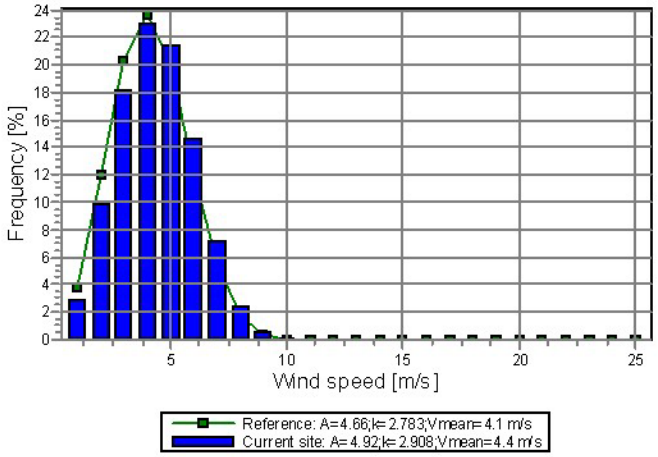
Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098.wws	7,387	84

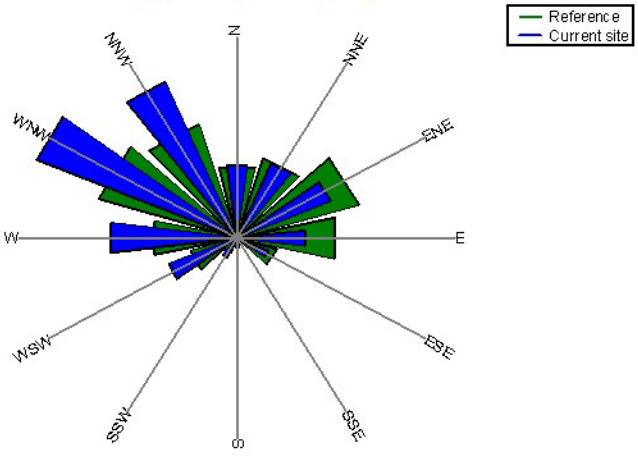
Weibull Data

Sector	Current site A-parameter [m/s]	Wind speed [m/s]	k-parameter	Frequency [%]	Reference: Roughness class 1 A-parameter [m/s]	k-parameter	Frequency [%]
0 N	4.78	4.30	3.561	9.2	4.87	3.492	8.4
1 NNE	4.99	4.50	3.561	9.0	5.10	3.616	8.7
2 ENE	5.05	4.53	3.291	9.7	5.45	3.351	9.7
3 E	4.78	4.25	2.803	7.3	5.39	2.871	7.5
4 ESE	4.51	3.99	2.311	3.9	4.80	2.374	3.9
5 SSE	2.98	2.65	1.979	2.4	3.28	2.042	2.3
6 S	3.24	2.87	2.264	2.7	3.25	2.232	2.7
7 SSW	4.08	3.62	2.428	3.6	3.68	2.316	3.6
8 WSW	4.89	4.35	2.768	7.3	4.16	2.643	7.6
9 W	5.06	4.52	2.955	11.6	4.32	2.779	11.9
10 WNW	5.37	4.81	3.193	17.1	4.60	3.027	17.6
11 NNW	5.16	4.61	3.135	16.2	4.57	2.922	15.9
All	4.92	4.39	2.908	100.0	4.66	2.783	100.0

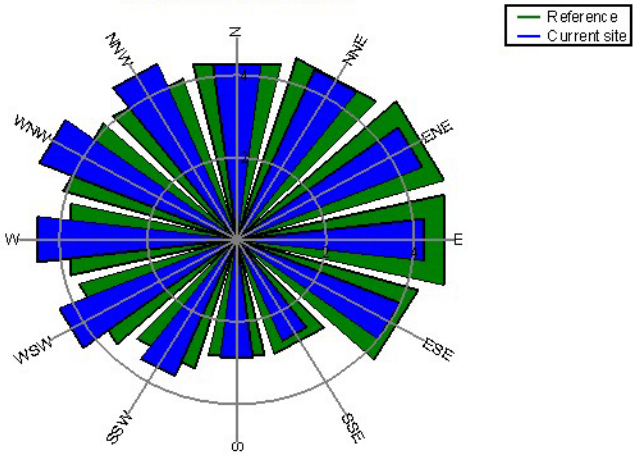
Weibull Distribution



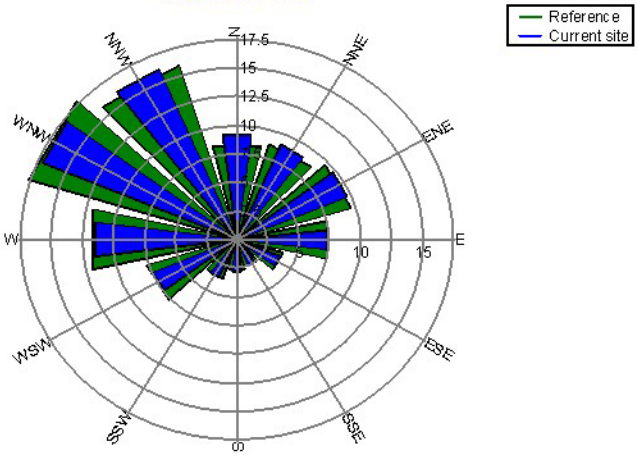
Energy Rose (kWh/m2/year)



Mean wind speed (m/s)



Frequency (%)



Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Fuhrländer 600, Total Capacity: 3600 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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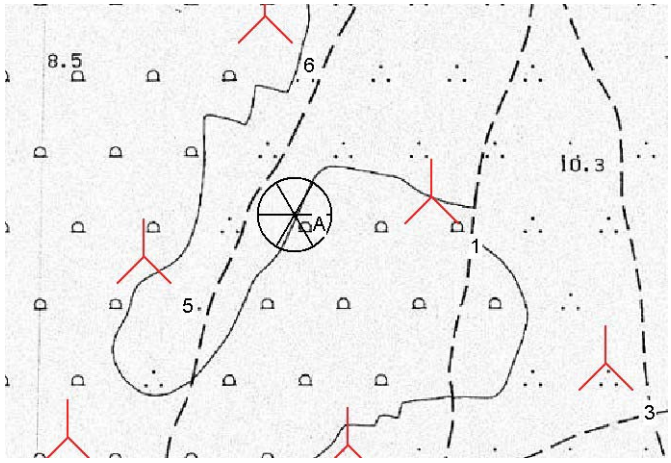
PARK - WTG distances

Calculation: FL 600 Phase II

WTG distances

	Z [m]	Nearest WTG	Z [m]	Horizontal distance [m]	Distance in rotor diameters
1	19	3	20	318	6.4
2	20	1	19	348	7.0
3	20	1	19	318	6.4
4	22	5	20	260	5.2
5	20	4	22	260	5.2
6	17	1	19	326	6.5



Scale 1:10,000

New WTG Site Data

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Fuhrländer 600, Total Capacity: 3600 kW
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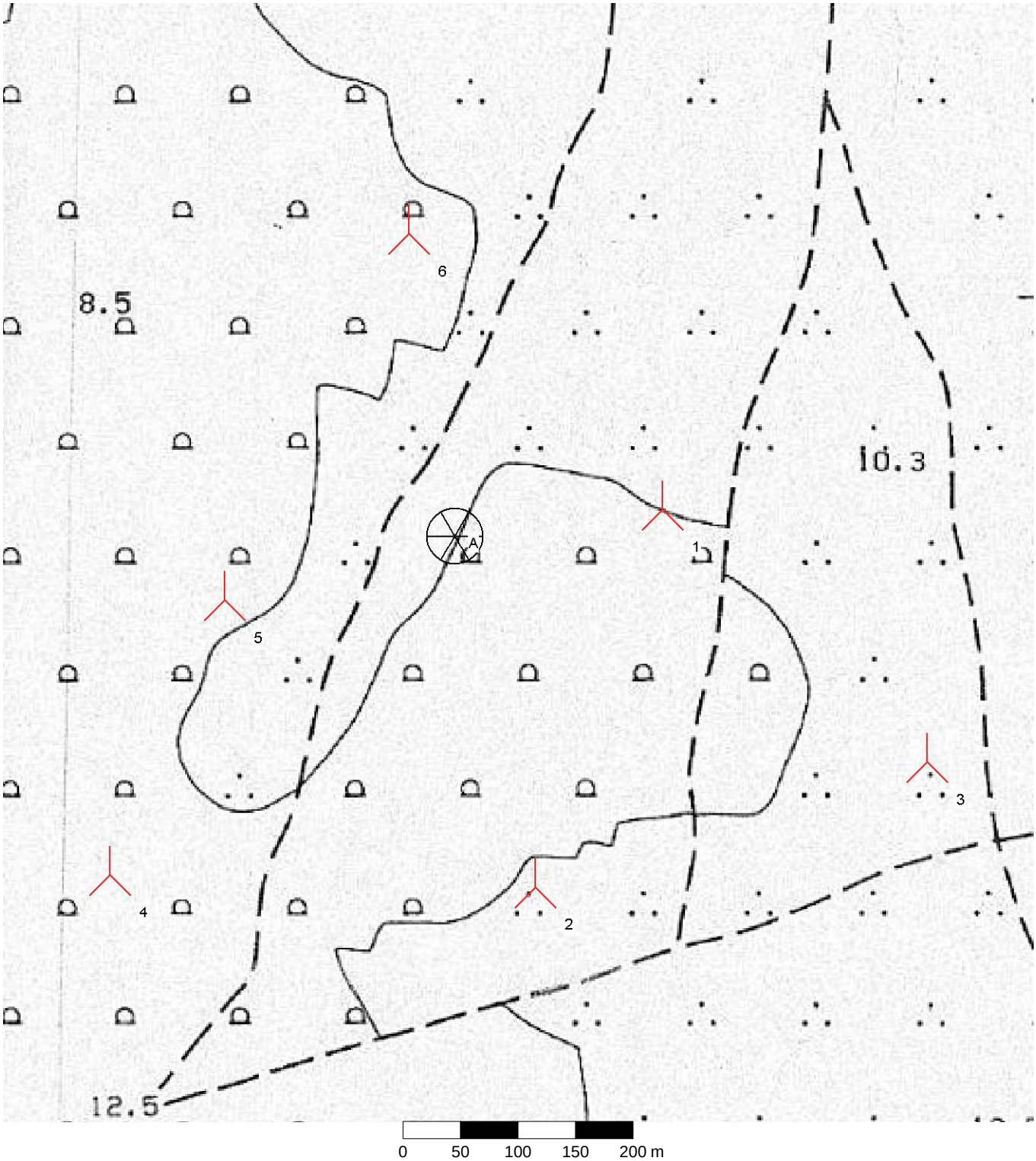
PARK - Tujering_10k

Calculation: FL 600 Phase II **File:** tujering_10k.bmi



Map: tujering_10k , Print scale 1:5,000, Map center UTM WGS 84 Zone: 28 East: 305,687 North: 1,470,845

New WTG Site Data

13.2.3 Energy Production - Phase I: 3x Vestas V47

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Vestas V47, Total Capacity: 1980 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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PARK - Main Result

Calculation: V47 Phase I

Wake Model N.O. Jensen (EMD) : 2005

Calculation Settings

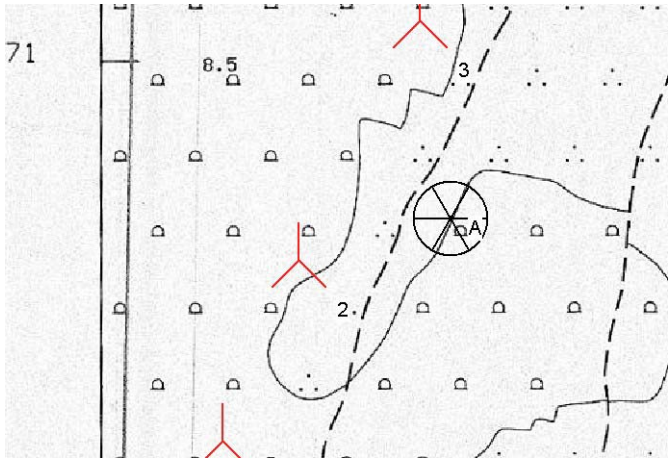
Air density calculation mode	Individual per WTG
Result for WTG at hub altitude	1.175 kg/m3 to 1.176 kg/m3
Hub altitude above sea level (asl)	92.8 m to 98.4 m
Annual mean temperature at hub alt.	23.8 ºC to 23.9 ºC
Pressure at WTGs	1,001.9 hPa to 1,002.5 hPa

Wake Model Parameters

From angle	[°]	180.0	Other
To angle	[°]	180.0	-
Wake Decay Constant		0.075	0.075

Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098_pdev.wws	7,387	84



Scale 1:10,000
New WTG Site Data

Key results for height 50.0 m above ground level

Terrain UTM WGS84 Zone: 28

	East	North	Name of wind distribution	Type	Wind energy [kWh/m2]	Mean wind speed [m/s]	Equivalent roughness
A	305,632	1,470,866	WP Tujering	WAsP (2.5.4.68)	622	4.4	0.8

Calculated Annual Energy for Wind Farm

WTG combination	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean WTG energy [MWh]	Capacity Factor for Result [%]	Capacity Factor for Result-10.0% [%]
Wind farm	1,631.2	1,468.1	97.9	543.7	9.4	8.5

Calculated Annual Energy for each of 3 new WTG's with total 2.0 MW rated power

	Terrain	WTG type Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	Circle radius [m]	Power curve Creator	Name	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean wind speed [m/s]
1	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	551.0	496	97.0	4.9
2	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	546.0	491	97.4	4.9
3	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	534.2	481	99.5	4.8

WTG siting

UTM WGS84 Zone: 28

	East	North	Z [m]	Row data/Description
1 New	305,332	1,470,570	22	WTG 01
2 New	305,432	1,470,810	20	WTG 02
3 New	305,592	1,471,130	17	WTG 03

Project:
Project_Gambia_240203

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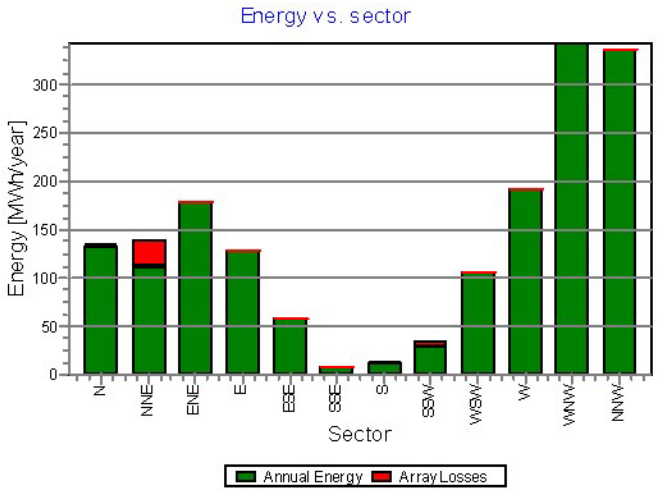
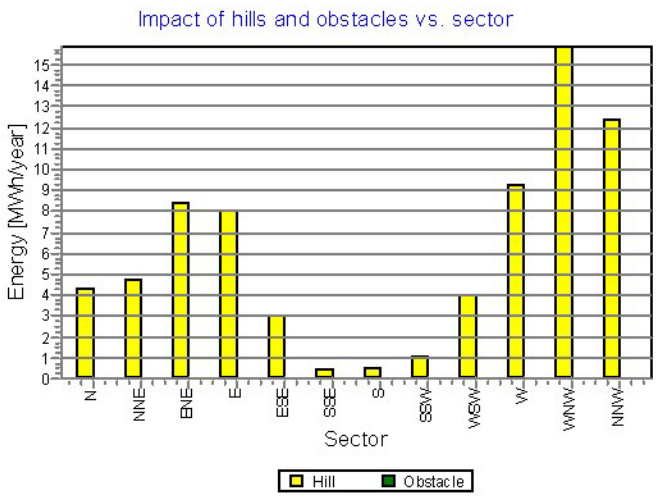
PARK - Production Analysis

Calculation: V47 Phase I **WTG:** All new WTG's, Air density 1.175 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]	129.9	132.9	169.3	120.1	55.0	7.2	12.1	33.2	100.8	183.0	325.6	324.1	1,593.1
+Increase due to hills	[MWh]	4.3	4.7	8.4	8.1	3.0	0.5	0.5	1.1	4.0	9.3	15.9	12.4	72.2
-Decrease due to array losses	[MWh]	1.9	25.8	0.0	0.0	0.0	0.0	0.2	6.2	0.0	0.0	0.0	0.0	34.2
Resulting energy	**[MWh]**	**132.3**	**111.7**	**177.7**	**128.2**	**58.0**	**7.7**	**12.4**	**28.1**	**104.9**	**192.3**	**341.5**	**336.5**	**1,631.2**
Specific energy	[kWh/m2]													313
Specific energy	[kWh/kW]													824
Increase due to hills	[%]	3.3	3.6	5.0	6.7	5.5	6.8	4.2	3.3	4.0	5.1	4.9	3.8	4.5
Decrease due to array losses	[%]	1.4	18.8	0.0	0.0	0.0	0.0	1.7	18.1	0.0	0.0	0.0	0.0	2.1
Utilization	[%]	37.0	30.8	39.1	38.6	37.6	25.1	27.6	28.4	37.5	38.3	39.4	39.7	37.7
Operational	[Hours/year]	660	648	714	547	288	177	198	260	530	856	1,279	1,193	7,350
Full Load Equivalent	[Hours/year]	67	56	90	65	29	4	6	14	53	97	172	170	824





Project:
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PARK - Power Curve Analysis

Calculation: V47 Phase I **WTG:** 1 - VESTAS V47 660-200 47.0 !O! Man. 07-2001, Hub height: 76.0 m

Name: Man. 07-2001
Source: Manufacturer

Source/Date	Created by	Created	Edited	Stop wind speed [m/s]	Power control	CT curve type
24.08.2000	EMD	17.11.2000	30.09.2002	25.0	Pitch	User defined

Power curve is calculated and based on technical specification no. 943111.R4 dated 31-07-2001. Please contact Vestas for information on the latest power curve.

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]	855	1,368	1,876	2,350	2,781	3,163
WTG 01	[MWh]	822	1,317	1,824	2,303	2,727	3,083
Check value	[%]	4	4	3	2	2	3

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^2) 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

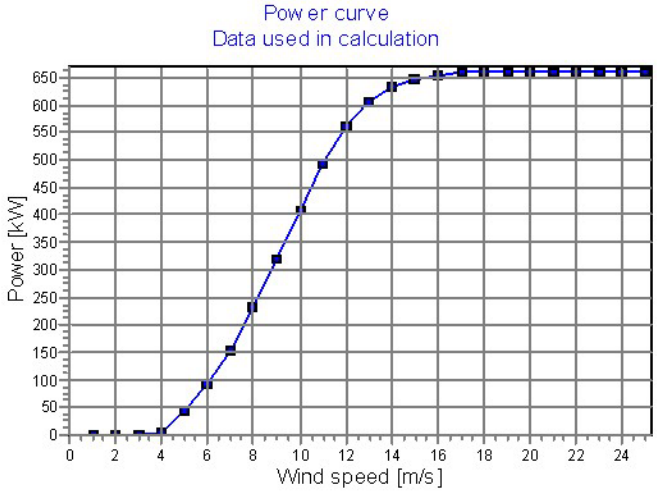
Original data from Windcat, Air density: 1.225 kg/m3

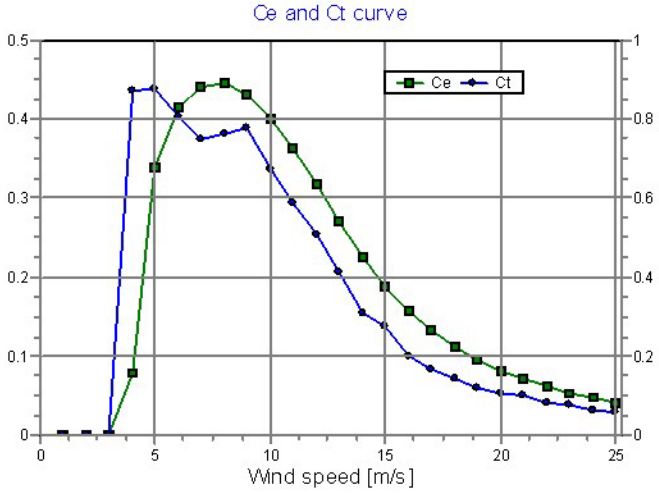
Wind speed [m/s]	Power [kW]	Ce	Wind speed [m/s]	Ct curve
4.0	5.3	0.08	3.0	0.00
5.0	44.9	0.34	4.0	0.87
6.0	95.4	0.42	5.0	0.88
7.0	161.0	0.44	6.0	0.81
8.0	242.0	0.44	7.0	0.75
9.0	334.0	0.43	8.0	0.76
10.0	426.0	0.40	9.0	0.78
11.0	511.0	0.36	10.0	0.68
12.0	577.0	0.32	11.0	0.59
13.0	620.0	0.27	12.0	0.51
14.0	644.0	0.23	13.0	0.41
15.0	654.0	0.19	14.0	0.31
16.0	658.0	0.16	15.0	0.28
17.0	660.0	0.13	16.0	0.20
18.0	660.0	0.11	17.0	0.17
19.0	660.0	0.09	18.0	0.14
20.0	660.0	0.08	19.0	0.12
21.0	660.0	0.07	20.0	0.10
22.0	660.0	0.06	21.0	0.10
23.0	660.0	0.05	22.0	0.08
24.0	660.0	0.05	23.0	0.08
25.0	660.0	0.04	24.0	0.06
			25.0	0.05

Power, Efficiency and energy vs. wind speed

Data used in calculation, Air density: 1.175 kg/m3

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	0.0	0.0	0.0
4.0	5.1	0.08	3.50- 4.50	21.3	21.3	3.9
5.0	43.1	0.34	4.50- 5.50	78.6	99.9	18.1
6.0	91.5	0.42	5.50- 6.50	133.5	233.4	42.4
7.0	154.4	0.44	6.50- 7.50	140.8	374.2	67.9
8.0	232.1	0.44	7.50- 8.50	101.2	475.4	86.3
9.0	320.4	0.43	8.50- 9.50	51.2	526.6	95.6
10.0	408.7	0.40	9.50-10.50	18.5	545.1	98.9
11.0	492.9	0.36	10.50-11.50	4.8	550.0	99.8
12.0	559.9	0.32	11.50-12.50	0.9	550.9	100.0
13.0	605.3	0.27	12.50-13.50	0.1	551.0	100.0
14.0	632.6	0.23	13.50-14.50	0.0	551.0	100.0
15.0	646.3	0.19	14.50-15.50	0.0	551.0	100.0
16.0	654.1	0.16	15.50-16.50	0.0	551.0	100.0
17.0	660.0	0.13	16.50-17.50	0.0	551.0	100.0
18.0	660.0	0.11	17.50-18.50	0.0	551.0	100.0
19.0	660.0	0.09	18.50-19.50	0.0	551.0	100.0
20.0	660.0	0.08	19.50-20.50	0.0	551.0	100.0
21.0	660.0	0.07	20.50-21.50	0.0	551.0	100.0
22.0	660.0	0.06	21.50-22.50	0.0	551.0	100.0
23.0	660.0	0.05	22.50-23.50	0.0	551.0	100.0
24.0	660.0	0.05	23.50-24.50	0.0	551.0	100.0
25.0	660.0	0.04	24.50-25.50	0.0	551.0	100.0





Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Vestas V47, Total Capacity: 1980 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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PARK - Wind Data Analysis

Calculation: V47 Phase I **Wind data:** A - WP Tujering; Hub height: 50.0

Site Coordinates
UTM WGS 84 Zone: 28 East: 305,632 North: 1,470,866

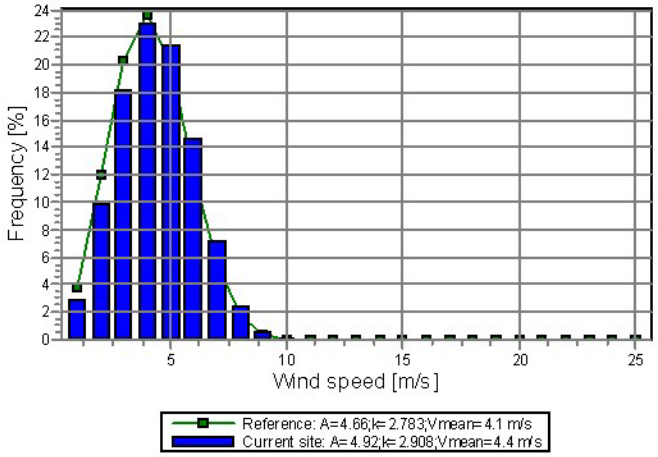
Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098_pdev.wws	7,387	84

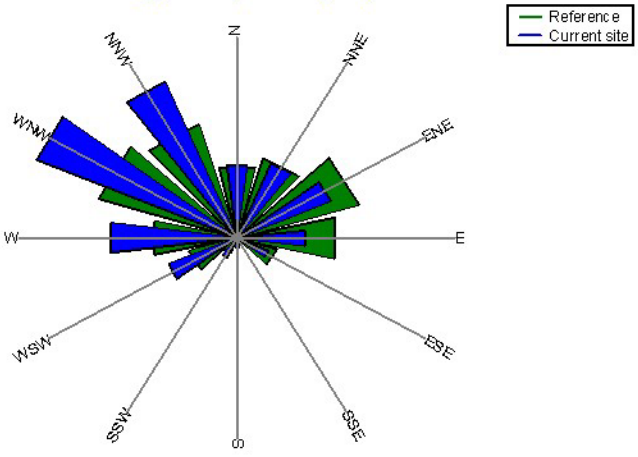
Weibull Data

	Current site				Reference: Roughness class 1		
Sector	A-parameter [m/s]	Wind speed [m/s]	k-parameter	Frequency [%]	A-parameter [m/s]	k-parameter	Frequency [%]
0 N	4.78	4.30	3.561	9.2	4.87	3.492	8.4
1 NNE	4.99	4.50	3.561	9.0	5.10	3.616	8.7
2 ENE	5.05	4.53	3.291	9.7	5.45	3.351	9.7
3 E	4.78	4.25	2.803	7.3	5.39	2.871	7.5
4 ESE	4.51	3.99	2.311	3.9	4.80	2.374	3.9
5 SSE	2.98	2.65	1.979	2.4	3.28	2.042	2.3
6 S	3.24	2.87	2.264	2.7	3.25	2.232	2.7
7 SSW	4.08	3.62	2.428	3.6	3.68	2.316	3.6
8 WSW	4.89	4.35	2.768	7.3	4.16	2.643	7.6
9 W	5.06	4.52	2.955	11.5	4.32	2.779	11.9
10 WNW	5.37	4.81	3.193	17.1	4.60	3.027	17.6
11 NNW	5.16	4.61	3.135	16.2	4.57	2.922	15.9
All	4.92	4.39	2.908	100.0	4.66	2.783	100.0

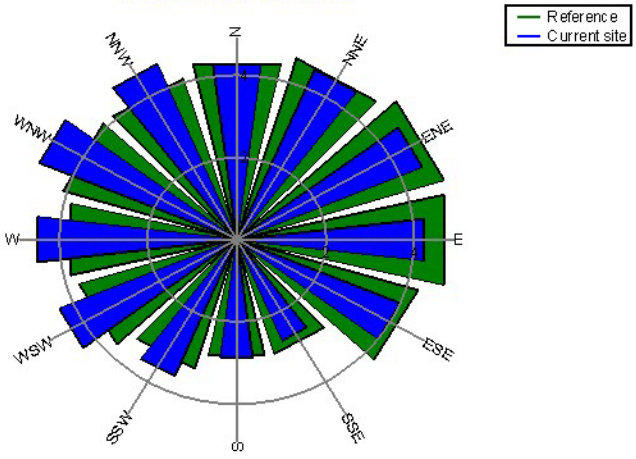
Weibull Distribution



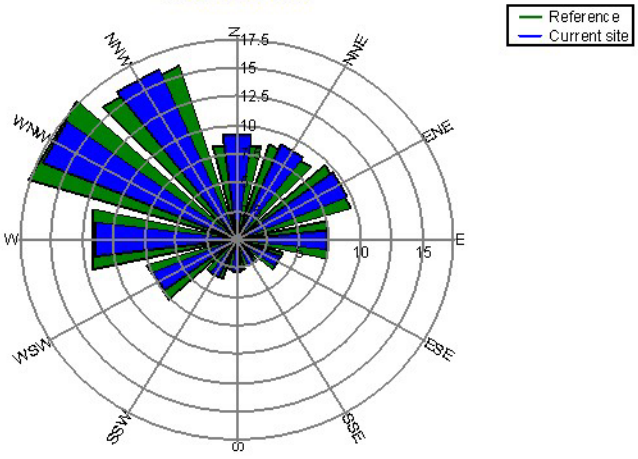
Energy Rose (kWh/m2/year)



Mean wind speed (m/s)



Frequency (%)



Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
3 x Vestas V47, Total Capacity: 1980 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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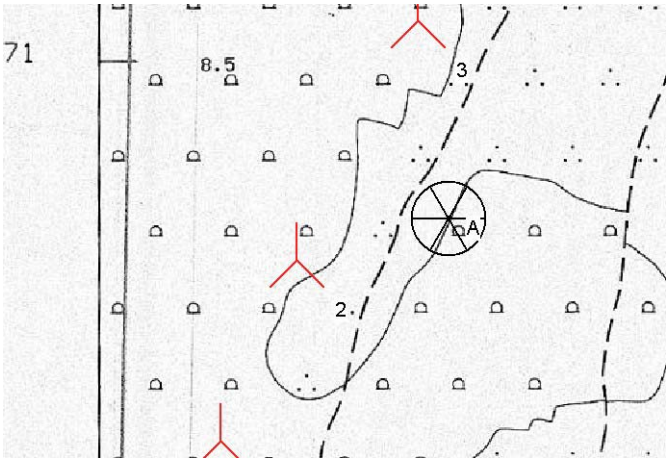
PARK - WTG distances

Calculation: V47 Phase I

WTG distances

	Z [m]	Nearest WTG	Z [m]	Horizontal distance [m]	Distance in rotor diameters
1	22	2	20	260	5.5
2	20	1	22	260	5.5
3	17	2	20	358	7.6



Scale 1:10,000

New WTG Site Data

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
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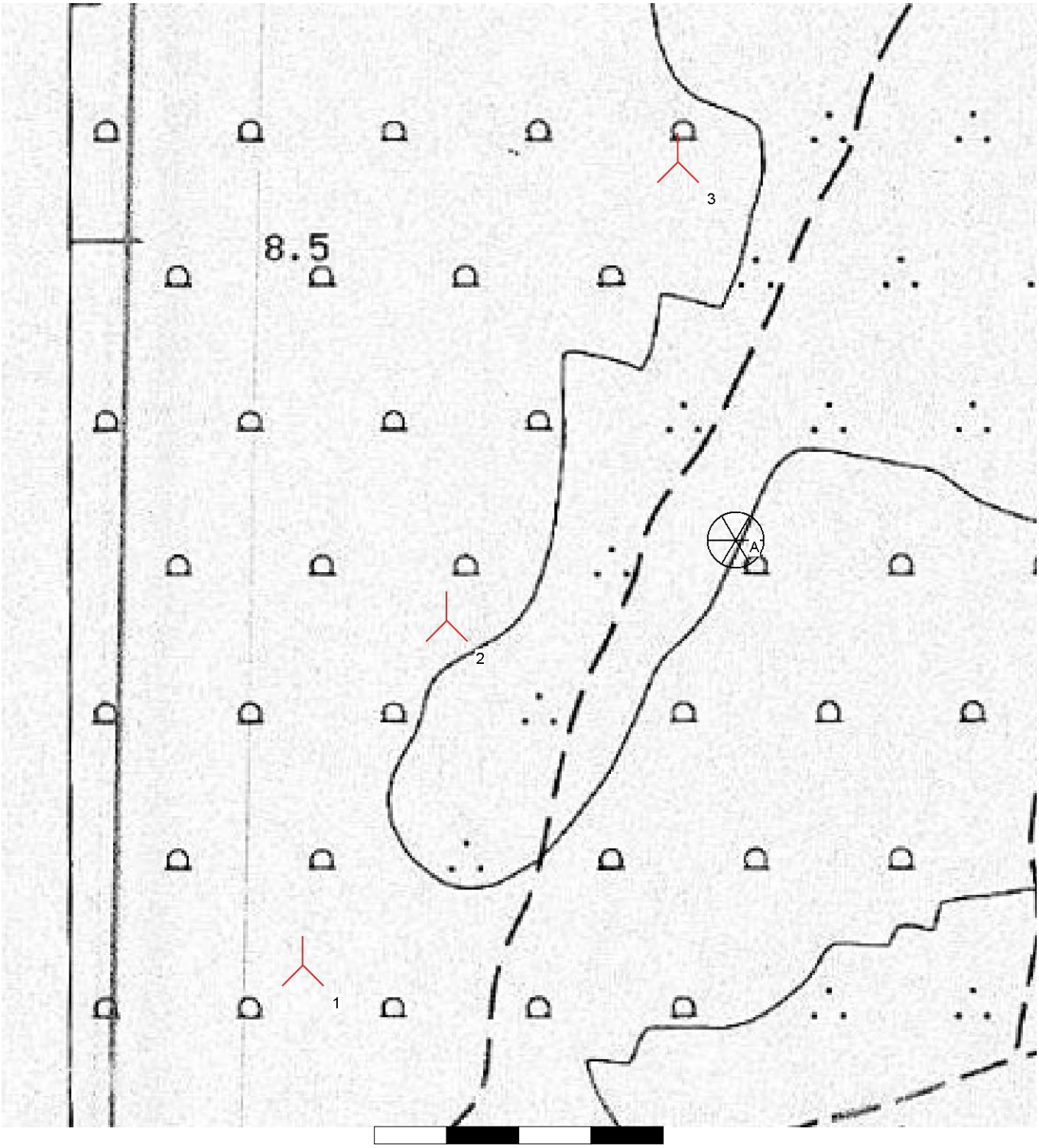
PARK - Tujering_10k

Calculation: V47 Phase I **File:** tujering_10k.bmi



0 50 100 150 200 m

Map: tujering_10k , Print scale 1:4,000, Map center UTM WGS 84 Zone: 28 East: 305,482 North: 1,470,850

New WTG Site Data

13.2.4 Energy Production - Phase II: 6x Vestas V47

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Vestas V47, Total Capacity: 3960 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
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PARK - Main Result

Calculation: V47 Phase II

Wake Model N.O. Jensen (EMD) : 2005

Calculation Settings

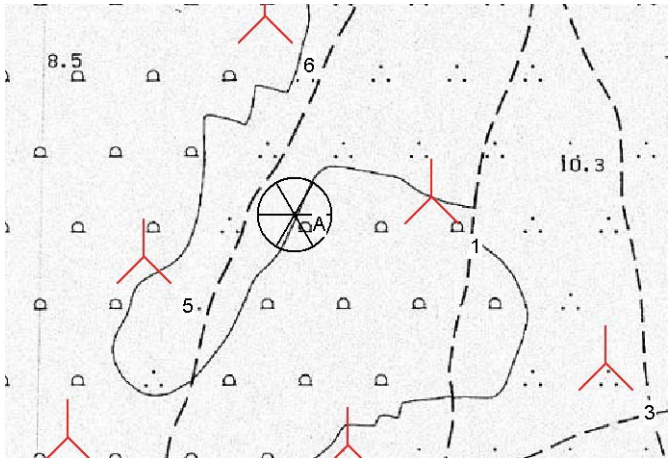
Air density calculation mode	Individual per WTG
Result for WTG at hub altitude	1.175 kg/m3 to 1.176 kg/m3
Hub altitude above sea level (asl)	92.8 m to 98.4 m
Annual mean temperature at hub alt.	23.8 ºC to 23.9 ºC
Pressure at WTGs	1,001.9 hPa to 1,002.5 hPa

Wake Model Parameters

From angle	[°]	180.0	Other
To angle	[°]	180.0	-
Wake Decay Constant		0.075	0.075

Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098_pdev.wws	7,387	84



Scale 1:10,000
New WTG Site Data

Key results for height 50.0 m above ground level

Terrain UTM WGS84 Zone: 28

	East	North	Name of wind distribution	Type	Wind energy [kWh/m2]	Mean wind speed [m/s]	Equivalent roughness
A	305,632	1,470,866	WP Tujering	WAsP (2.5.4.68)	622	4.4	0.8

Calculated Annual Energy for Wind Farm

WTG combination	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean WTG energy [MWh]	Capacity Factor for Result [%]	Capacity Factor for Result-10.0% [%]
Wind farm	3,035.5	2,732.0	93.2	505.9	8.7	7.9

Calculated Annual Energy for each of 6 new WTG's with total 4.0 MW rated power

	Terrain	WTG type Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	Circle radius [m]	Power curve Creator	Name	Annual Energy Result [MWh]	Annual Energy Result-10.0% [MWh]	Park Efficiency [%]	Mean wind speed [m/s]
1	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	487.9	439	91.7	4.8
2	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	476.8	429	88.3	4.8
3	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	475.0	427	91.2	4.8
4	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	533.5	480	93.9	4.9
5	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	530.9	478	94.7	4.9
6	A	Yes	VESTAS	V47	660/200	47.0	76.0	230.0	EMD	Man. 07-2001	531.5	478	99.0	4.8

WTG siting

UTM WGS84 Zone: 28

	East	North	Z [m]	Row data/Description
1 New	305,812	1,470,890	19	WTG 04
2 New	305,702	1,470,560	20	WTG 05
3 New	306,042	1,470,670	20	WTG 06
4 New	305,332	1,470,570	22	WTG 01
5 New	305,432	1,470,810	20	WTG 02
6 New	305,592	1,471,130	17	WTG 03

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Vestas V47, Total Capacity: 3960 kW
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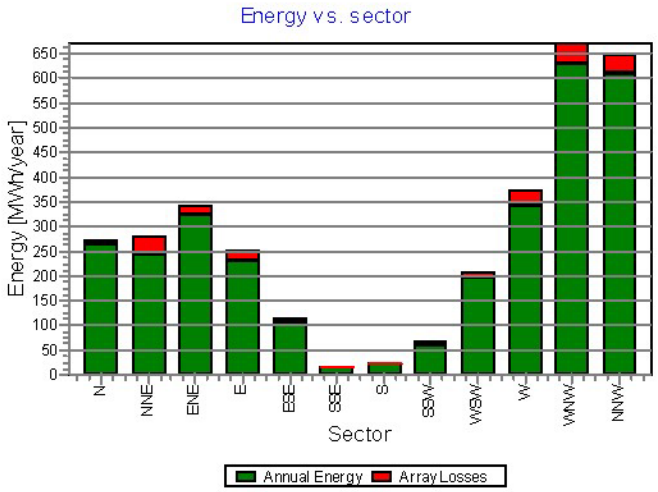
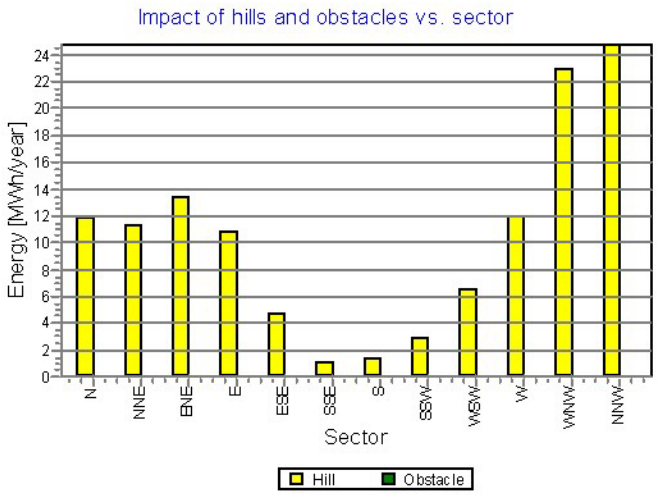
PARK - Production Analysis

Calculation: V47 Phase II **WTG:** All new WTG's, Air density 1.175 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]	260.4	265.4	328.4	239.8	109.2	14.4	22.9	64.2	201.5	360.4	646.6	620.7	3,133.9
+Increase due to hills	[MWh]	11.8	11.3	13.4	10.8	4.8	1.2	1.3	2.9	6.6	12.0	22.9	24.8	123.7
-Decrease due to array losses	[MWh]	9.3	33.8	18.2	22.2	7.4	1.3	1.0	8.2	11.0	31.4	42.3	36.2	222.1
Resulting energy	**[MWh]**	**262.9**	**242.9**	**323.6**	**228.4**	**106.6**	**14.3**	**23.2**	**58.9**	**197.1**	**340.9**	**627.3**	**609.3**	**3,035.5**
Specific energy	[kWh/m2]													292
Specific energy	[kWh/kW]													767
Increase due to hills	[%]	4.5	4.2	4.1	4.5	4.4	8.2	5.8	4.5	3.3	3.3	3.5	4.0	3.9
Decrease due to array losses	[%]	3.4	12.2	5.3	8.8	6.5	8.1	4.0	12.2	5.3	8.4	6.3	5.6	6.8
Utilization	[%]	36.4	33.3	36.8	35.1	35.0	23.2	26.5	30.2	35.5	34.9	36.9	37.2	35.7
Operational	[Hours/year]	662	650	709	541	287	177	200	262	530	849	1,270	1,193	7,329
Full Load Equivalent	[Hours/year]	66	61	82	58	27	4	6	15	50	86	158	154	767





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Project_Gambia_240203

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Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Vestas V47, Total Capacity: 3960 kW
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PARK - Power Curve Analysis

Calculation: V47 Phase II **WTG:** 1 - VESTAS V47 660-200 47.0 !O! Man. 07-2001, Hub height: 76.0 m

Name: Man. 07-2001
Source: Manufacturer

Source/Date	Created by	Created	Edited	Stop wind speed [m/s]	Power control	CT curve type
24.08.2000	EMD	17.11.2000	30.09.2002	25.0	Pitch	User defined

Power curve is calculated and based on technical specification no. 943111.R4 dated 31-07-2001. Please contact Vestas for information on the latest power curve.

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]	855	1,368	1,876	2,350	2,781	3,163
WTG 04	[MWh]	822	1,317	1,824	2,303	2,727	3,083
Check value	[%]	4	4	3	2	2	3

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^2) 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

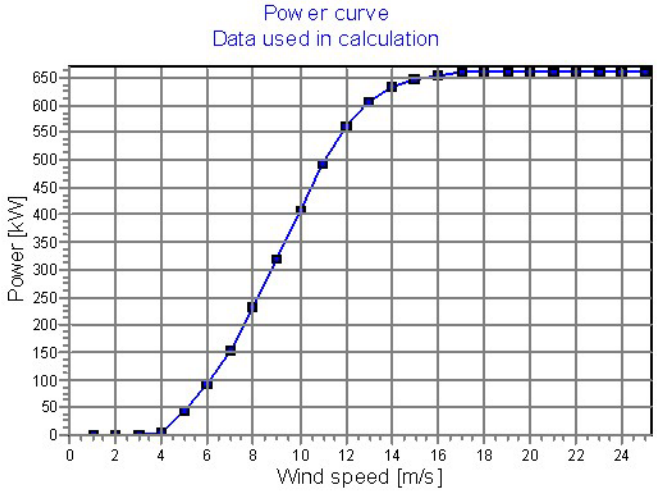
Original data from Windcat, Air density: 1.225 kg/m3

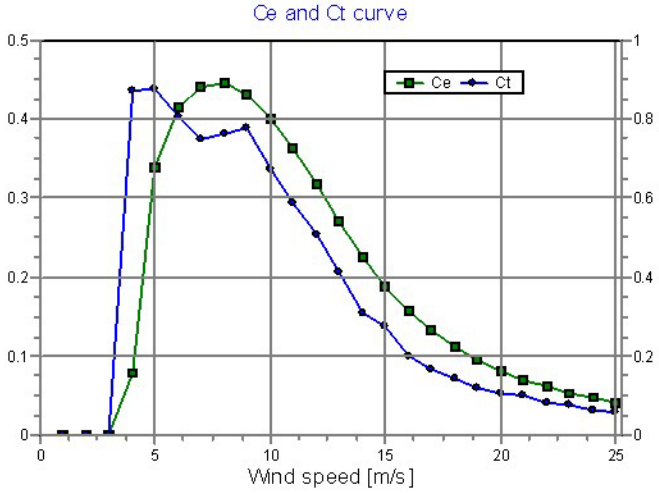
Wind speed [m/s]	Power [kW]	Ce	Wind speed [m/s]	Ct curve
4.0	5.3	0.08	3.0	0.00
5.0	44.9	0.34	4.0	0.87
6.0	95.4	0.42	5.0	0.88
7.0	161.0	0.44	6.0	0.81
8.0	242.0	0.44	7.0	0.75
9.0	334.0	0.43	8.0	0.76
10.0	426.0	0.40	9.0	0.78
11.0	511.0	0.36	10.0	0.68
12.0	577.0	0.32	11.0	0.59
13.0	620.0	0.27	12.0	0.51
14.0	644.0	0.23	13.0	0.41
15.0	654.0	0.19	14.0	0.31
16.0	658.0	0.16	15.0	0.28
17.0	660.0	0.13	16.0	0.20
18.0	660.0	0.11	17.0	0.17
19.0	660.0	0.09	18.0	0.14
20.0	660.0	0.08	19.0	0.12
21.0	660.0	0.07	20.0	0.10
22.0	660.0	0.06	21.0	0.10
23.0	660.0	0.05	22.0	0.08
24.0	660.0	0.05	23.0	0.08
25.0	660.0	0.04	24.0	0.06
			25.0	0.05

Power, Efficiency and energy vs. wind speed

Data used in calculation, Air density: 1.175 kg/m3

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	0.0	0.0	0.0
4.0	5.1	0.08	3.50- 4.50	20.6	20.6	4.2
5.0	43.1	0.34	4.50- 5.50	74.8	95.4	19.6
6.0	91.5	0.42	5.50- 6.50	124.0	219.4	45.0
7.0	154.5	0.44	6.50- 7.50	125.9	345.3	70.8
8.0	232.2	0.44	7.50- 8.50	85.7	431.0	88.3
9.0	320.5	0.43	8.50- 9.50	40.1	471.1	96.6
10.0	408.8	0.40	9.50-10.50	13.1	484.3	99.3
11.0	493.0	0.36	10.50-11.50	3.0	487.3	99.9
12.0	560.1	0.32	11.50-12.50	0.5	487.8	100.0
13.0	605.4	0.27	12.50-13.50	0.1	487.9	100.0
14.0	632.7	0.23	13.50-14.50	0.0	487.9	100.0
15.0	646.3	0.19	14.50-15.50	0.0	487.9	100.0
16.0	654.1	0.16	15.50-16.50	0.0	487.9	100.0
17.0	660.0	0.13	16.50-17.50	0.0	487.9	100.0
18.0	660.0	0.11	17.50-18.50	0.0	487.9	100.0
19.0	660.0	0.09	18.50-19.50	0.0	487.9	100.0
20.0	660.0	0.08	19.50-20.50	0.0	487.9	100.0
21.0	660.0	0.07	20.50-21.50	0.0	487.9	100.0
22.0	660.0	0.06	21.50-22.50	0.0	487.9	100.0
23.0	660.0	0.05	22.50-23.50	0.0	487.9	100.0
24.0	660.0	0.05	23.50-24.50	0.0	487.9	100.0
25.0	660.0	0.04	24.50-25.50	0.0	487.9	100.0





Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Vestas V47, Total Capacity: 3960 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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Calculated:
04.08.2006 12:00/2.5.4.68

PARK - Wind Data Analysis

Calculation: V47 Phase II **Wind data:** A - WP Tujering; Hub height: 50.0

Site Coordinates
UTM WGS 84 Zone: 28 East: 305,632 North: 1,470,866

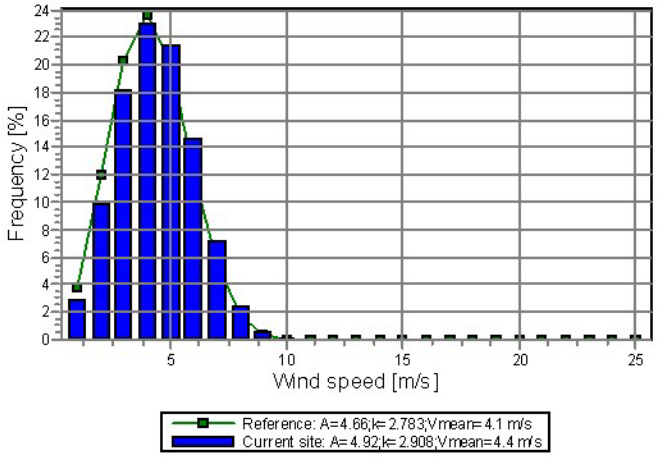
Wind data

Wind statistics	Distance [km]	Weight [%]
GM 30.00 m GREC01_098.wws	38,923	16
GM 30.25 m GREC08_098_pdev.wws	7,387	84

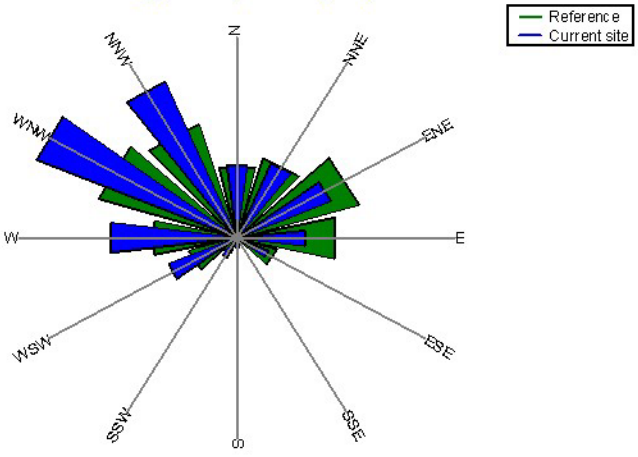
Weibull Data

	Current site				Reference: Roughness class 1		
Sector	A-parameter [m/s]	Wind speed [m/s]	k-parameter	Frequency [%]	A-parameter [m/s]	k-parameter	Frequency [%]
0 N	4.78	4.30	3.561	9.2	4.87	3.492	8.4
1 NNE	4.99	4.50	3.561	9.0	5.10	3.616	8.7
2 ENE	5.05	4.53	3.291	9.7	5.45	3.351	9.7
3 E	4.78	4.25	2.803	7.3	5.39	2.871	7.5
4 ESE	4.51	3.99	2.311	3.9	4.80	2.374	3.9
5 SSE	2.98	2.65	1.979	2.4	3.28	2.042	2.3
6 S	3.24	2.87	2.264	2.7	3.25	2.232	2.7
7 SSW	4.08	3.62	2.428	3.6	3.68	2.316	3.6
8 WSW	4.89	4.35	2.768	7.3	4.16	2.643	7.6
9 W	5.06	4.52	2.955	11.5	4.32	2.779	11.9
10 WNW	5.37	4.81	3.193	17.1	4.60	3.027	17.6
11 NNW	5.16	4.61	3.135	16.2	4.57	2.922	15.9
All	4.92	4.39	2.908	100.0	4.66	2.783	100.0

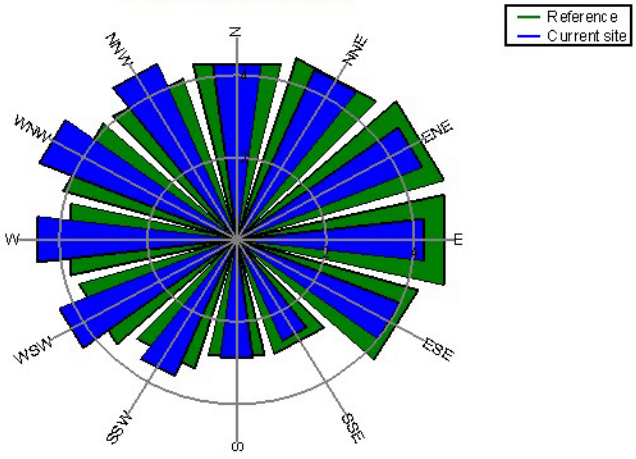
Weibull Distribution



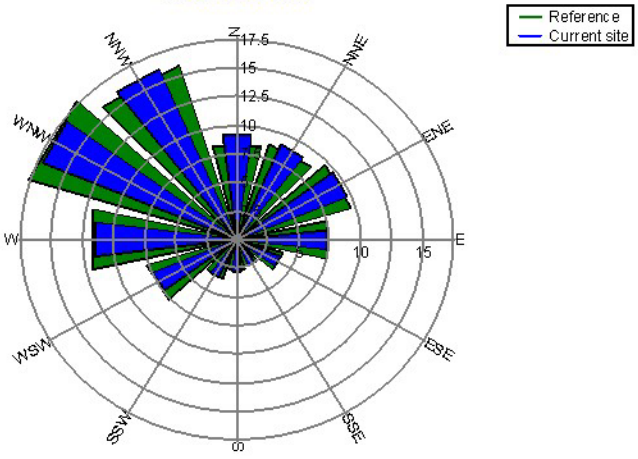
Energy Rose (kWh/m2/year)



Mean wind speed (m/s)



Frequency (%)



Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Vestas V47, Total Capacity: 3960 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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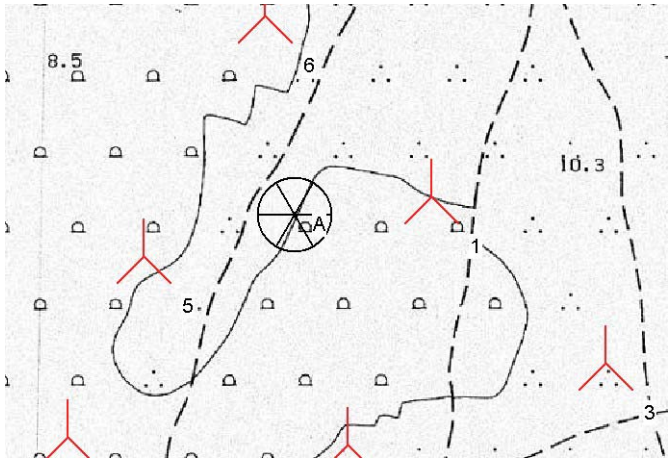
PARK - WTG distances

Calculation: V47 Phase II

WTG distances

	Z [m]	Nearest WTG	Z [m]	Horizontal distance [m]	Distance in rotor diameters
1	19	3	20	318	6.8
2	20	1	19	348	7.4
3	20	1	19	318	6.8
4	22	5	20	260	5.5
5	20	4	22	260	5.5
6	17	1	19	326	6.9



Scale 1:10,000

New WTG Site Data

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen
Energy Calculation for Tujering Wind Park
6 x Vestas V47, Total Capacity: 3960 kW
based on 12 months of measurement from 07.2005-06.2006 from two stations: Grec01 and Grec08.
Wind Statistic weighted according to distances. Wind Data are long-term correlated.

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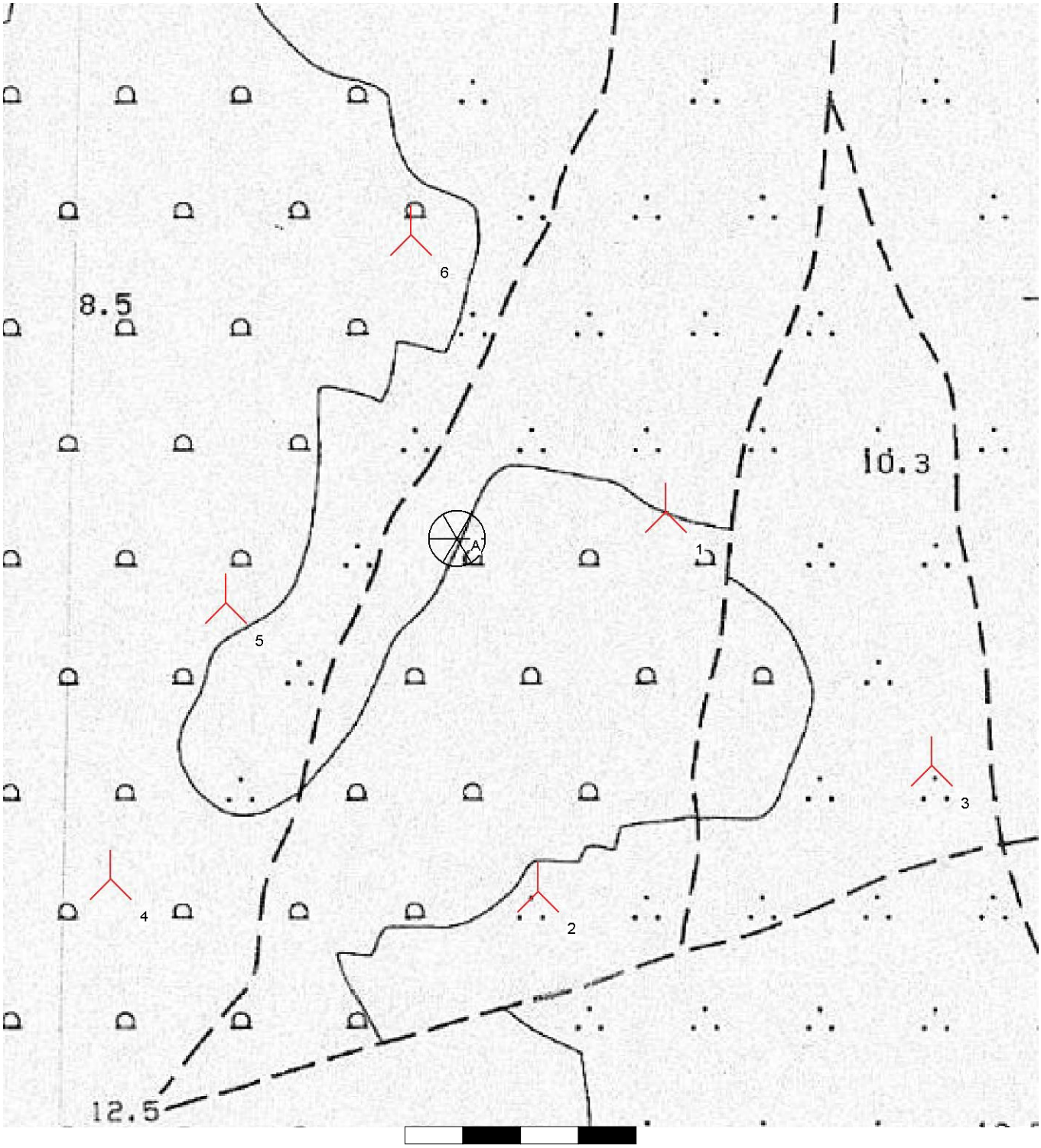
PARK - Tujering_10k

Calculation: V47 Phase II **File:** tujering_10k.bmi



Map: tujering_10k , Print scale 1:5,000, Map center UTM WGS 84 Zone: 28 East: 305,687 North: 1,470,845

New WTG Site Data

13.3 WindPRO - Noise Impact Calculation

13.3.1 Noise Impact - 6x Fuhrländer FL600

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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Calculated:
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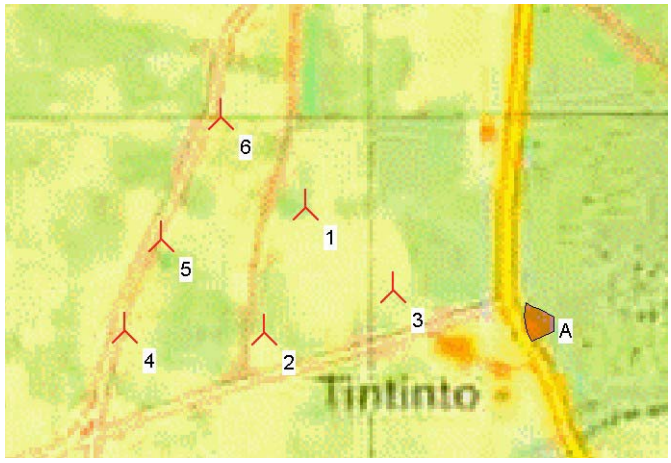
DECIBEL - Main Result

Calculation: Tujering WP - 6x Fuhrländer FL600

ISO 9613-2

The calculation is based on the international norm "ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors"

Wind speed in 10 m height: 10.0 m/s
Meteorological correction factor, C0: 0.0 dB



Scale 1:20,000

New WTG Noise sensitive area

WTGs

	UTM WGS84 Zone: 28				WTG type							Noise data						
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Circle radius	Creator	Name	Wind speed	Status	Hub height	LwA,ref	Pure tones
			[m]					[kW]	[m]	[m]	[m]			[m/s]		[m]	[dB(A)]	
1	305,812	1,470,890	19	WTG 04	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	50.0	EMD	Man. 07-2004	10.0	Von Gefälle	75.0	103.2	0 dB *)
2	305,702	1,470,560	20	WTG 05	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	50.0	EMD	Man. 07-2004	10.0	Von Gefälle	75.0	103.2	0 dB *)
3	306,042	1,470,670	20	WTG 06	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	50.0	EMD	Man. 07-2004	10.0	Von Gefälle	75.0	103.2	0 dB *)
4	305,332	1,470,570	22	WTG 01	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	50.0	EMD	Man. 07-2004	10.0	Von Gefälle	75.0	103.2	0 dB *)
5	305,432	1,470,810	20	WTG 02	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	50.0	EMD	Man. 07-2004	10.0	Von Gefälle	75.0	103.2	0 dB *)
6	305,592	1,471,130	17	WTG 03	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	50.0	EMD	Man. 07-2004	10.0	Von Gefälle	75.0	103.2	0 dB *)

***)Notice: One or more noise data for this WTG is generic or input by user**

Calculation Results

Sound Level

Noise sensitive area		UTM WGS84 Zone: 28				Demands		Sound Level	Demands fulfilled ?		
No.	Name	East	North	Z [m]	Imission height [m]	Noise [dB(A)]	Distance [m]	From WTGs [dB(A)]	Noise	Distance	All
A	Tintinto	306,389	1,470,609	20	5.0	45.0	300	44.5	Yes	Yes	Yes

Distances (m)

WTG	A
1	637
2	687
3	353
4	1056
5	978
6	944

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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Calculated:
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DECIBEL - Detailed results

Calculation: Tujering WP - 6x Fuhrländer FL600 **Noise calculation model:** ISO 9613-2 Deutschland 10.0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A Tintinto

WTG					95% rated power									
No.	Distance [m]	Sound distance [m]	Mean height [m]	Visible	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	642	646	41.5	Yes	**35.21**	103.2	3.00	67.21	1.23	2.56	0.00	0.00	70.99	0.00
2	689	693	41.3	Yes	**34.35**	103.2	3.00	67.81	1.32	2.72	0.00	0.00	71.85	0.00
3	353	360	42.2	Yes	**42.77**	103.2	2.99	62.12	0.68	0.62	0.00	0.00	63.42	0.00
4	1,058	1,061	41.9	Yes	**29.25**	103.2	3.01	71.51	2.02	3.44	0.00	0.00	76.96	0.00
5	978	981	40.9	Yes	**30.15**	103.2	3.01	70.83	1.86	3.36	0.00	0.00	76.05	0.00
6	953	955	41.4	Yes	**30.49**	103.2	3.01	70.60	1.81	3.30	0.00	0.00	75.71	0.00

Sum 44.46

Project:
Project_Gambia_240203

Description:
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Calculated:
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DECIBEL - Assumptions for noise calculation

Calculation: Tujering WP - 6x Fuhrländer FL600 **Noise calculation model:** ISO 9613-2 Deutschland 10.0 m/s

Noise calculation model:
ISO 9613-2 Deutschland
Wind speed:
95% rated power else 10.0 m/s
Ground attenuation:
Alternative
Meteorological coefficient, C0:
0.0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
5.0 m Allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)
Octave data not required
Air absorption: 1.9 dB/km

WTG: FUHRLÄNDER FL 600 600 50.0 !O!
Schall: Man. 07-2004

Source	Source/Date	Creator	Edited
Manufacturer (Memo)	29.07.1994	EMD	20.10.2004 13:58

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones
Von Gefälle	75.0	10.0	103.2	No

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Description:
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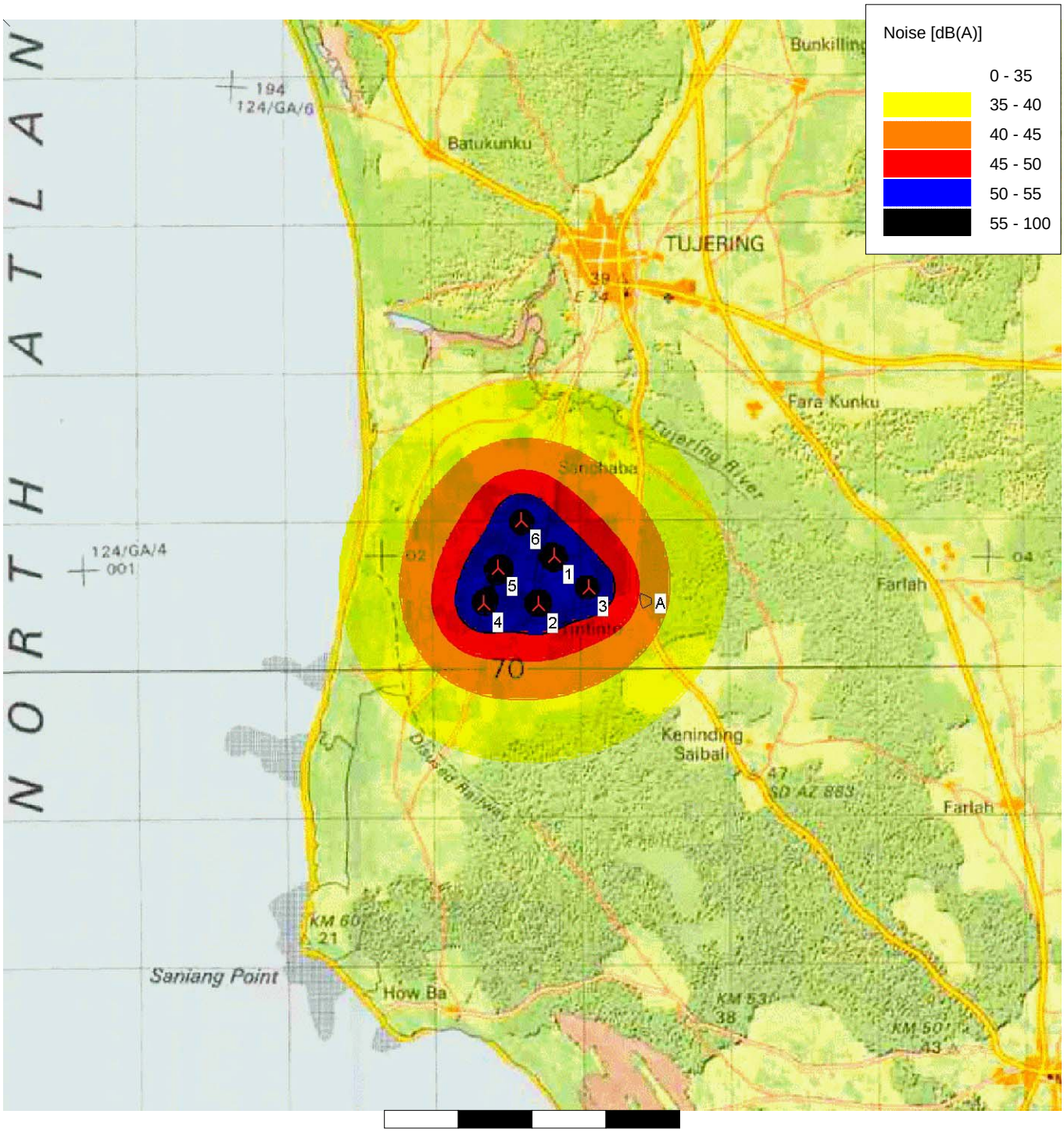
DECIBEL - Banjul_50k

Calculation: Tujering WP - 6x Fuhrländer FL600 **File:** Banjul_50k.bmi



Map: Banjul_50k , Print scale 1:40,000, Map center UTM WGS 84 Zone: 28 Ost: 305,687 Nord: 1,470,845
Noise calculation model: ISO 9613-2 Deutschland. Wind speed: 95% rated power else 10.0 m/s

New WTG
Noise sensitive area
Height above sea level from active line object
35.0 dB(A) 40.0 dB(A) 45.0 dB(A) 50.0 dB(A) 55.0 dB(A)

13.3.2 Noise Impact - 6x Vestas V47

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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Calculated:
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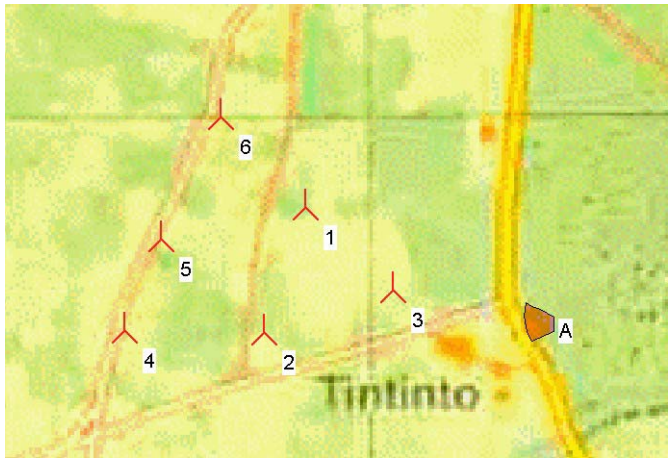
DECIBEL - Main Result

Calculation: Tujering WP - 6x Vestas V47

ISO 9613-2

The calculation is based on the international norm "ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors"

Wind speed in 10 m height: 10.0 m/s
Meteorological correction factor, C0: 0.0 dB



Scale 1:20,000

New WTG Noise sensitive area

WTGs

	UTM WGS84 Zone: 28				WTG type							Noise data						
	East	North	Z	Row data/Description	Valid	Manufact.	Type	Power	Diam.	Height	Circle radius	Creator	Name	Wind speed	Status	Hub height	LwA,ref	Pure tones
			[m]					[kW]	[m]	[m]	[m]			[m/s]		[m]	[dB(A)]	
1	305,812	1,470,890	19	WTG 04	Yes	VESTAS	V47	660/200	47.0	76.0	50.0	EMD	Man. 07-2001 8m/s	10.0	Von Gefälle	76.0	102.0	0 dB *)
2	305,702	1,470,560	20	WTG 05	Yes	VESTAS	V47	660/200	47.0	76.0	50.0	EMD	Man. 07-2001 8m/s	10.0	Von Gefälle	76.0	102.0	0 dB *)
3	306,042	1,470,670	20	WTG 06	Yes	VESTAS	V47	660/200	47.0	76.0	50.0	EMD	Man. 07-2001 8m/s	10.0	Von Gefälle	76.0	102.0	0 dB *)
4	305,332	1,470,570	22	WTG 01	Yes	VESTAS	V47	660/200	47.0	76.0	50.0	EMD	Man. 07-2001 8m/s	10.0	Von Gefälle	76.0	102.0	0 dB *)
5	305,432	1,470,810	20	WTG 02	Yes	VESTAS	V47	660/200	47.0	76.0	50.0	EMD	Man. 07-2001 8m/s	10.0	Von Gefälle	76.0	102.0	0 dB *)
6	305,592	1,471,130	17	WTG 03	Yes	VESTAS	V47	660/200	47.0	76.0	50.0	EMD	Man. 07-2001 8m/s	10.0	Von Gefälle	76.0	102.0	0 dB *)

***)Notice: One or more noise data for this WTG is generic or input by user**

Calculation Results

Sound Level

Noise sensitive area		UTM WGS84 Zone: 28				Demands		Sound Level	Demands fulfilled ?		
No.	Name	East	North	Z [m]	Imission height [m]	Noise [dB(A)]	Distance [m]	From WTGs [dB(A)]	Noise	Distance	All
A	Tintinto	306,389	1,470,609	20	5.0	45.0	300	43.3	Yes	Yes	Yes

Distances (m)

WTG	A
1	637
2	687
3	353
4	1056
5	978
6	944

Project:
Project_Gambia_240203

Description:
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Calculated:
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DECIBEL - Detailed results

Calculation: Tujering WP - 6x Vestas V47 **Noise calculation model:** ISO 9613-2 Deutschland 10.0 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A Tintinto

WTG					95% rated power									
No.	Distance [m]	Sound distance [m]	Mean height [m]	Visible	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	642	646	42.0	Yes	**34.04**	102.0	3.00	67.21	1.23	2.53	0.00	0.00	70.97	0.00
2	689	693	41.8	Yes	**33.18**	102.0	3.00	67.81	1.32	2.70	0.00	0.00	71.83	0.00
3	353	360	42.7	Yes	**41.61**	102.0	2.99	62.12	0.68	0.57	0.00	0.00	63.38	0.00
4	1,058	1,061	42.4	Yes	**28.06**	102.0	3.01	71.51	2.02	3.42	0.00	0.00	76.95	0.00
5	978	981	41.4	Yes	**28.97**	102.0	3.01	70.83	1.86	3.34	0.00	0.00	76.04	0.00
6	953	955	41.9	Yes	**29.31**	102.0	3.01	70.60	1.81	3.28	0.00	0.00	75.70	0.00

Sum 43.30

Project:
Project_Gambia_240203

Description:
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Calculated:
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DECIBEL - Assumptions for noise calculation

Calculation: Tujering WP - 6x Vestas V47 **Noise calculation model:** ISO 9613-2 Deutschland 10.0 m/s

Noise calculation model:
ISO 9613-2 Deutschland
Wind speed:
95% rated power else 10.0 m/s
Ground attenuation:
Alternative
Meteorological coefficient, C0:
0.0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
5.0 m Allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)
Octave data not required
Air absorption: 1.9 dB/km

WTG: VESTAS V47 660-200 47.0 !O!
Schall: Man. 07-2001 8m/s

Source	Source/Date	Creator	Edited
Manufacturer	31.07.2001	EMD	30.09.2002 14:53

Based on technical specifications no. 943111.R4.

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones
Von Gefälle	76.0	10.0	102.0	No

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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Calculated:
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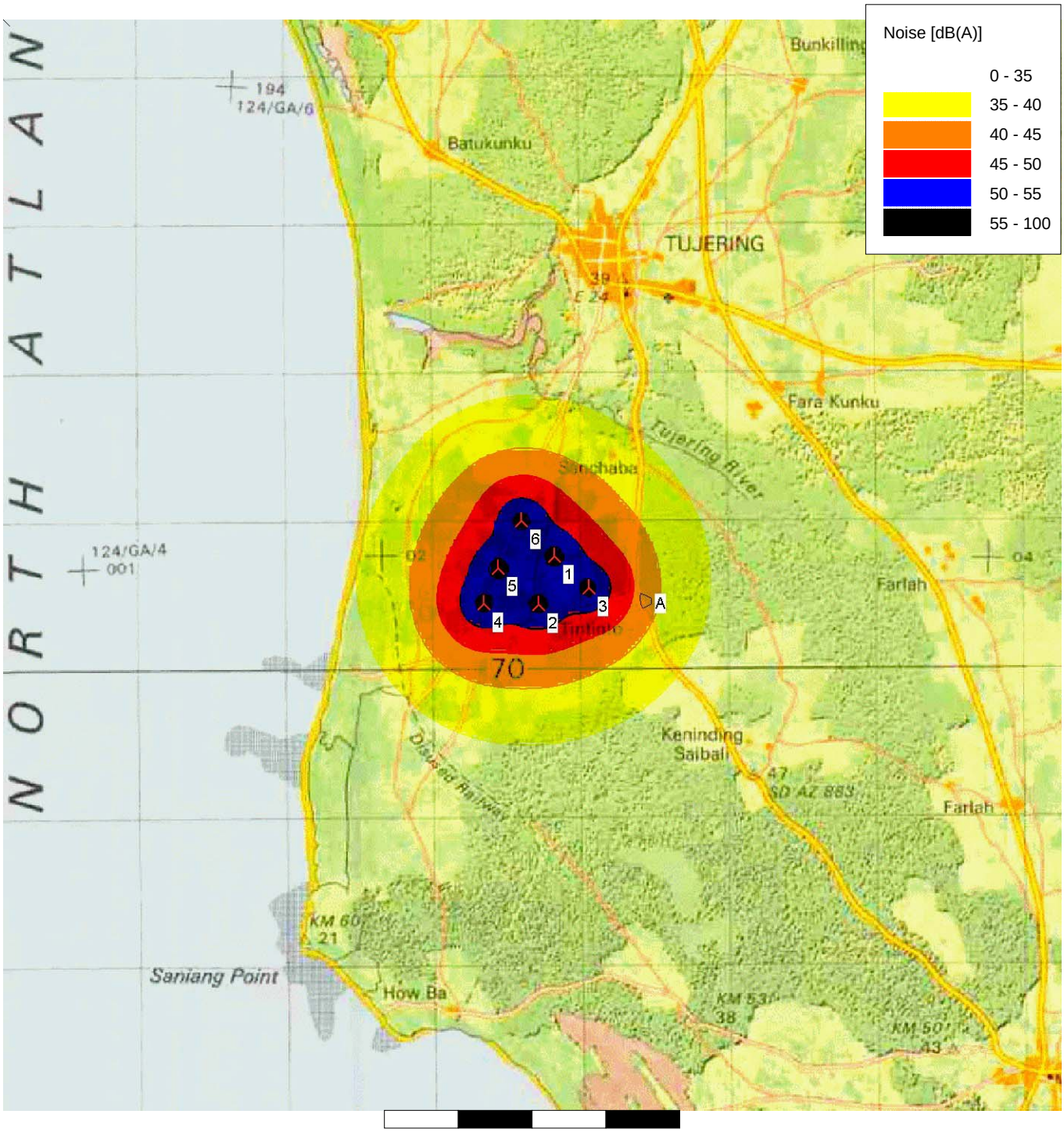
DECIBEL - Banjul_50k

Calculation: Tujering WP - 6x Vestas V47 **File:** Banjul_50k.bmi



Map: Banjul_50k , Print scale 1:40,000, Map center UTM WGS 84 Zone: 28 Ost: 305,687 Nord: 1,470,845
Noise calculation model: ISO 9613-2 Deutschland. Wind speed: 95% rated power else 10.0 m/s

New WTG
Noise sensitive area
Height above sea level from active line object
35.0 dB(A)
40.0 dB(A)
45.0 dB(A)
50.0 dB(A)
55.0 dB(A)

13.4 WindPRO - Shadow Impact Calculation

13.4.1 Shadow Impact - 6x Fuhrländer FL600

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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Licensed user:
Lahmeyer Int. Ing.Gesellschaft
Friedberger Straße 173
DE-61118 Bad Vilbel
+49-6101-55-1784

Calculated:
08.08.2006 19:58/2.5.4.68

SHADOW - Main Result

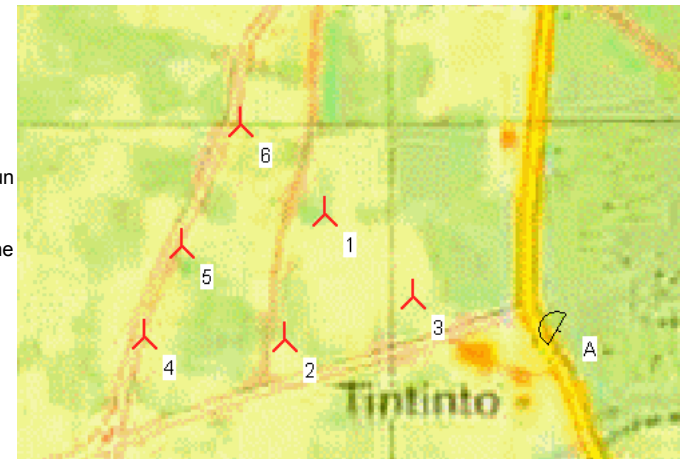
Calculation: Tujering - 6x FL600

Assumptions for shadow calculations

Maximum distance for influence	No limit
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

The calculated times are "worst case" given by the following assumptions:
The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

To avoid flicker from WTGs not visible a ZVI calculation is performed before the flicker calculation. The ZVI calculation is based on the following assumptions
Height contours used: Height Contours: h_tujering_40km.map (3)
Obstacles used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:20,000
New WTG
Shadow receptor

WTGs

	East	North	Z [m]	Row data/Description	Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	RPM [RPM]
	UTM WGS84 Zone: 28				**WTG type**						
1	305,812	1,470,890	19	WTG 04	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	25.0
2	305,702	1,470,560	20	WTG 05	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	25.0
3	306,042	1,470,670	20	WTG 06	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	25.0
4	305,332	1,470,570	22	WTG 01	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	25.0
5	305,432	1,470,810	20	WTG 02	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	25.0
6	305,592	1,471,130	17	WTG 03	Yes	FUHRLÄNDER	FL 600	600	50.0	75.0	25.0

Shadow receptor-Input

No.	Name	East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
		UTM WGS84 Zone: 28								
A	Tintinto	306,423	1,470,580	20	1.0	1.0	1.0	-60.8	90.0	Fixed direction

Calculation Results

Shadow receptor

No.	Name	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
		Shadow, worst case		
A	Tintinto	0:00	0	0:00

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]
1	WTG 04	0:00
2	WTG 05	0:00
3	WTG 06	0:00
4	WTG 01	0:00
5	WTG 02	0:00
6	WTG 03	0:00

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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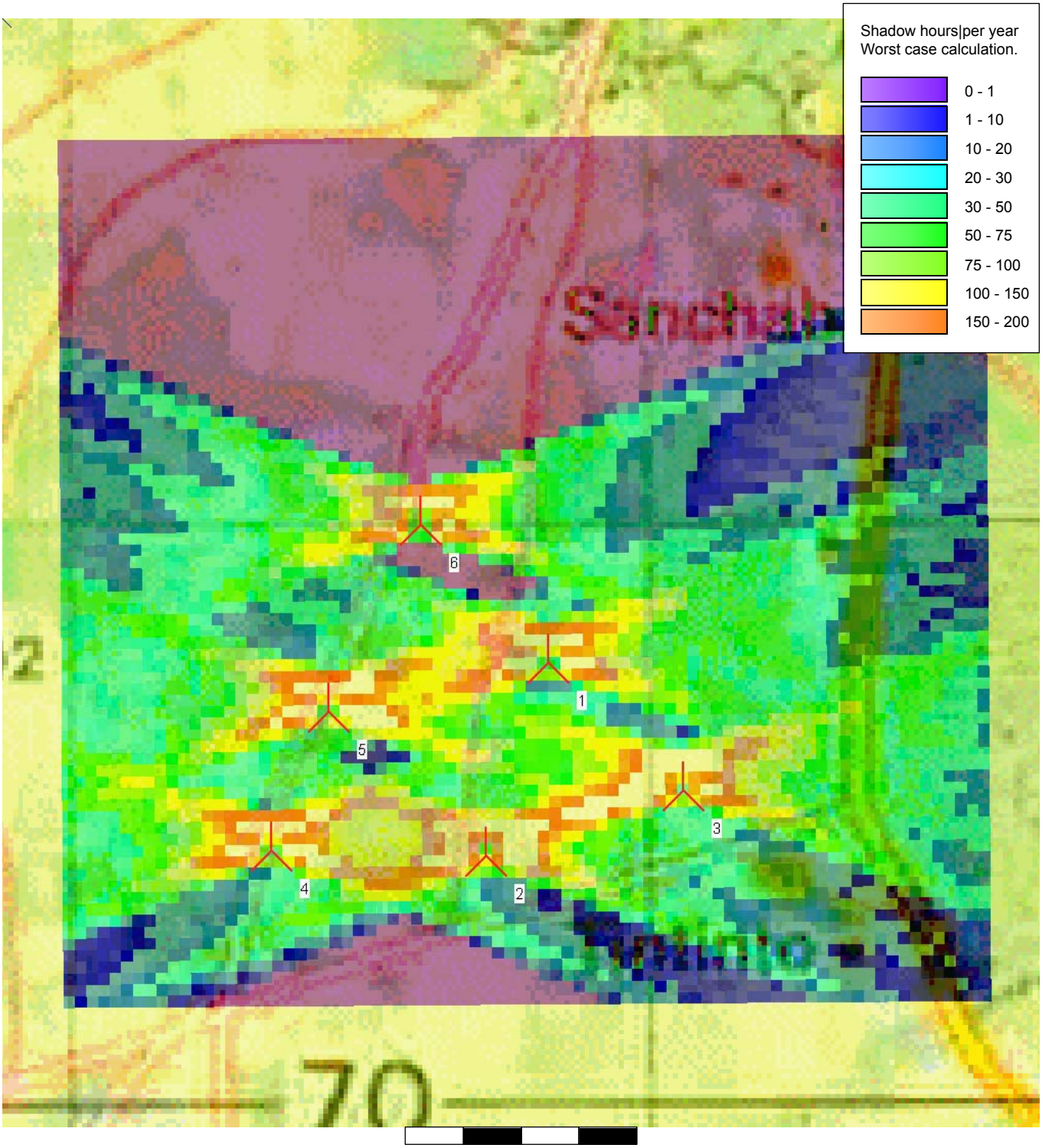
Friedberger Straße 173
DE-61118 Bad Vilbel
+49-6101-55-1784

Calculated:
08.08.2006 19:58/2.5.4.68

SHADOW - Banjul_50k

Calculation: Tujering - 6x FL600 **File:** Banjul_50k.bmi



Map: Banjul_50k , Print scale 1:10,000, Map center UTM WGS 84 Zone: 28 East: 305,772 North: 1,471,048

New WTG

13.4.2 Shadow Impact - 6x Vestas V47

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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08.08.2006 19:46 / 1

Licensed user:
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Friedberger Straße 173
DE-61118 Bad Vilbel
+49-6101-55-1784

Calculated:
08.08.2006 18:49/2.5.4.68

SHADOW - Main Result

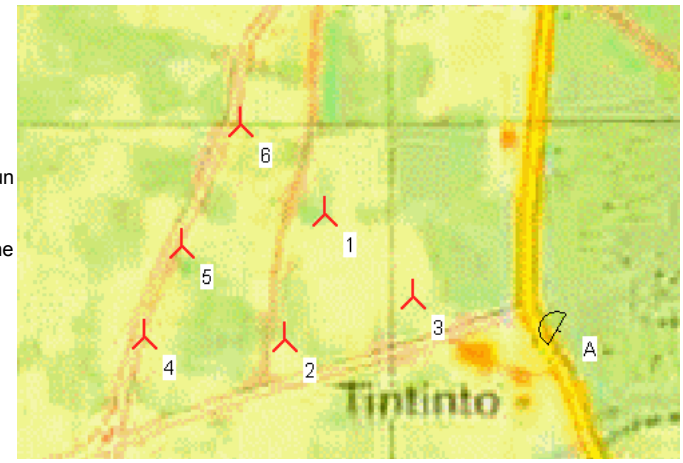
Calculation: Tujering - 6x Vestas V47

Assumptions for shadow calculations

Maximum distance for influence	No limit
Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

To avoid flicker from WTGs not visible a ZVI calculation is performed before the flicker calculation. The ZVI calculation is based on the following assumptions
Height contours used: Height Contours: h_tujering_40km.map (3)
Obstacles used in calculation
Eye height: 1.5 m
Grid resolution: 10 m



Scale 1:20,000

New WTG Shadow receptor

WTGs

	UTM WGS84 Zone: 28 East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type	Power [kW]	Diam. [m]	Height [m]	RPM [RPM]
1	305,812	1,470,890	19	WTG 04	Yes	VESTAS	V47	660/200	47.0	76.0	26.0
2	305,702	1,470,560	20	WTG 05	Yes	VESTAS	V47	660/200	47.0	76.0	26.0
3	306,042	1,470,670	20	WTG 06	Yes	VESTAS	V47	660/200	47.0	76.0	26.0
4	305,332	1,470,570	22	WTG 01	Yes	VESTAS	V47	660/200	47.0	76.0	26.0
5	305,432	1,470,810	20	WTG 02	Yes	VESTAS	V47	660/200	47.0	76.0	26.0
6	305,592	1,471,130	17	WTG 03	Yes	VESTAS	V47	660/200	47.0	76.0	26.0

Shadow receptor-Input

No.	Name	UTM WGS84 Zone: 28 East	North	Z [m]	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
A	Tintinto	306,423	1,470,580	20	1.0	1.0	1.0	-60.8	90.0	Fixed direction

Calculation Results

Shadow receptor

No.	Name	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	Tintinto	0:00	0	0:00

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]
1	WTG 04	0:00
2	WTG 05	0:00
3	WTG 06	0:00
4	WTG 01	0:00
5	WTG 02	0:00
6	WTG 03	0:00

Project:
Project_Gambia_240203

Description:
Gambia_240203_Windstationen

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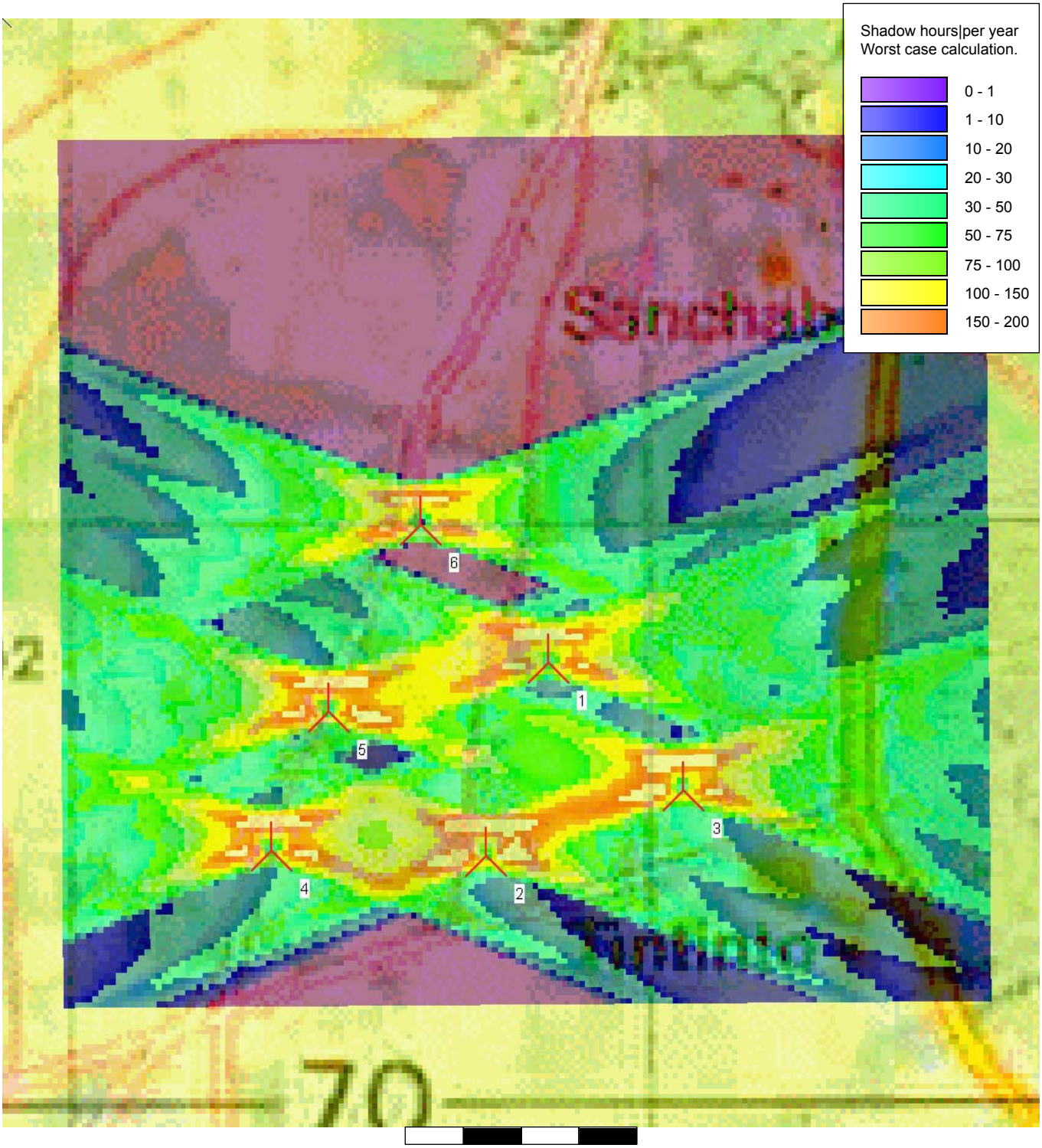
08.08.2006 19:46 / 2

Licensed user:
Lahmeyer Int. Ing.Gesellschaft
Friedberger Straße 173
DE-61118 Bad Vilbel
+49-6101-55-1784

Calculated:
08.08.2006 18:49/2.5.4.68

SHADOW - Banjul_50k

Calculation: Tujering - 6x Vestas V47 **File:** Banjul_50k.bmi



Map: Banjul_50k , Print scale 1:10,000, Map center UTM WGS 84 Zone: 28 East: 305,772 North: 1,471,048

New WTG

13.5 Financial Analysis

Table 13-1 : P&L Account for Scenario I (3 Fuhrlaender WT)

Profit and Loss Account (figures in mill. EUR)	2007	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-years)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Gross Operating Income		0.09	0.09	0.09	0.10	0.10	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.12
Sales Revenues		0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17
Cost of Sales		0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Depreciation		0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Interest Expense			0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00																		
Cash Account Interest																																										
Debt Service Interest			0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00																		
Gross Income/Loss before Tax(semi-annual)		0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Gross Income/Loss (annual)			-0.01		-0.02		-0.02		-0.03		-0.02		-0.01		0.00		0.01		0.01		0.01		0.00		0.01		0.01		0.02		0.02		0.03		0.04		0.04		0.05		0.06
Pre-Reserve Taxable Income		0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.06	-0.07	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10	-0.10	-0.09	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Transfer to O&M Reserve																																										
Loss Carried Forward					-0.01		-0.03		-0.06		-0.08		-0.09		-0.10		-0.10																										
Taxable Income																				0.01		0.01				0.01		0.01		0.02		0.02		0.03		0.04		0.04		0.05		0.06
Income Tax																																										
Net Income after Tax (semi-annual)		0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Net Income after Tax (annual)			-0.01		-0.02		-0.02		-0.03		-0.02		-0.01		0.00		0.01		0.01		0.01		0.00		0.01		0.01		0.02		0.02		0.03		0.04		0.04		0.05		0.06
Change in Debt Service Account																																										
Net Income minus DSR plus retained Earnings			-0.01		-0.02		-0.04		-0.07		-0.09		-0.10		-0.10		-0.09		1.89		1.77		1.65		1.66		1.42		1.25		1.08		0.91		0.75		0.58		0.41		0.25
Available Cash			-2.66		-2.56		-2.47		-2.39		-2.30		-2.20		-2.09		-1.97		0.12		0.12		0.11		0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Gross Dividend																	-1.97		0.12		0.12				0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Dividend Withholding Tax																																										
Net Dividends																	-1.97		0.12		0.12				0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Retained Earning minus DSR end of period		0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.06	-0.07	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10	-0.10	1.88	1.88	1.77	1.78	1.66	1.65	1.65	1.65	1.40	1.41	1.23	1.24	1.06	1.07	0.88	0.90	0.71	0.73	0.54	0.56	0.37	0.39	0.19	0.22	0.00
Retained Earnings/Loss in Period		0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	1.98	0.01	-0.12	0.01	-0.12	0.00	0.00	0.00	-0.25	0.01	-0.18	0.01	-0.18	0.01	-0.18	0.01	-0.19	0.02	-0.19	0.02	-0.19	0.02	-0.20	0.03	-0.22
Retained Earnings/Loss End of Period		0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.06	-0.07	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10	-0.10	1.88	1.88	1.77	1.78	1.66	1.65	1.65	1.65	1.40	1.41	1.23	1.24	1.06	1.07	0.88	0.90	0.71	0.73	0.54	0.56	0.37	0.39	0.19	0.22	0.00

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Table 13-2 : Balance Sheet for Scenario I (3 Fuhrlaender WT)

Balance Sheet																																										
(figures in mill. EUR)	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-years)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Fixed Assets	1.74	3.47	3.39	3.30	3.21	3.13	3.04	2.95	2.86	2.78	2.69	2.60	2.52	2.43	2.34	2.26	2.17	2.08	2.00	1.91	1.82	1.74	1.65	1.56	1.48	1.39	1.30	1.22	1.13	1.04	0.95	0.87	0.78	0.69	0.61	0.52	0.43	0.35	0.26	0.17	0.09	
Gross Fixed Assets	1.74	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47	3.47
Accumulated Depreciation			0.09	0.17	0.26	0.35	0.43	0.52	0.61	0.69	0.78	0.87	0.95	1.04	1.13	1.22	1.30	1.39	1.48	1.56	1.65	1.74	1.82	1.91	2.00	2.08	2.17	2.26	2.34	2.43	2.52	2.60	2.69	2.78	2.86	2.95	3.04	3.13	3.21	3.30	3.39	3.47
Current Assets			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-1.95	0.08	0.15	0.09	0.14	0.08	0.13	0.19	0.28	0.12	0.21	0.12	0.22	0.12	0.22	0.13	0.23	0.13	0.24	0.13	0.24	0.14	0.25	0.14	0.25
Working Capital																																										
Accounts Receivable			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
Cash																			0.06		0.07		0.05	0.11	0.16		0.09		0.09		0.10		0.10		0.10		0.11		0.11		0.11	
O&M Reserve																																										
Debt Service Reserve																																										
Liquid Funds (Provision for Tax & Div.)																		-1.97		0.12		0.12				0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Total Assets	1.74	3.47	3.40	3.32	3.23	3.14	3.06	2.97	2.88	2.80	2.71	2.62	2.54	2.45	2.37	2.28	2.19	0.13	2.08	2.06	1.91	1.88	1.72	1.69	1.66	1.67	1.42	1.42	1.25	1.26	1.08	1.09	0.91	0.92	0.74	0.76	0.57	0.59	0.40	0.42	0.23	0.25
Equity and Liabilities																																										
Equity																																										
O&M Reserve																																										
Retained Earnings/Loss			0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.06	-0.07	-0.08	-0.09	-0.09	-0.10	-0.10	-0.10	-0.10	1.88	1.88	1.77	1.78	1.66	1.65	1.65	1.65	1.40	1.41	1.23	1.24	1.06	1.07	0.88	0.90	0.71	0.73	0.54	0.56	0.37	0.39	0.19	0.22	0.00
Long-Term Debt	0.35	0.70	0.70	0.66	0.63	0.60	0.57	0.54	0.51	0.47	0.44	0.41	0.38	0.35	0.32	0.28	0.25	0.22	0.19	0.16	0.13	0.09	0.06	0.03																		
Current Liabilities	1.39	2.78	2.70	2.66	2.61	2.57	2.52	2.48	2.44	2.39	2.35	2.30	2.25	2.20	2.15	2.09	2.04	-1.97	0.01	0.13	0.01	0.13	0.01	0.01	0.01	0.26	0.01	0.19	0.01	0.20	0.01	0.21	0.01	0.21	0.01	0.22	0.01	0.22	0.01	0.23	0.01	0.25
Accounts Payable			0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Contingency Loan	1.39	2.78	2.70	2.66	2.61	2.56	2.51	2.47	2.43	2.39	2.34	2.30	2.25	2.20	2.14	2.09	2.03																									
Income Tax																																										
Gross Dividends																		-1.97		0.12		0.12				0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Total Equity and Liabilities	1.74	3.47	3.40	3.32	3.23	3.14	3.06	2.97	2.88	2.80	2.71	2.62	2.54	2.45	2.37	2.28	2.19	0.13	2.08	2.06	1.91	1.88	1.72	1.69	1.66	1.67	1.42	1.42	1.25	1.26	1.08	1.09	0.91	0.92	0.74	0.76	0.57	0.59	0.40	0.42	0.23	0.25

Table 13-3: Project Cash Flow for Scenario I (3 Fuhrlaender WT)

Project Cash Flow (figures in mill. EUR) Period		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Operating Year				1		2		3		4		5		6		7		8		9	
Cash Inflow	0.35	0.35	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14
Sales Revenues			0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14
Interest on Positive Cash Account																					
Equity Injections																					
Loan Disbursements	0.35	0.35																			
Cash Outflow	1.74	1.74	0.02	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	-1.90	0.07	0.20	0.07
Investment	1.74	1.74																			
Plant & Equipment in mill.EUR	1.74	1.74																			
CDM upfront costs																					
Financing Fee		0.00																			
Capitalized Interest																					
Cost of Sales			0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Debt Service				0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Interest on Negative Cash Account																					
Interest on Loan				0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Interest Withholding Tax																					
Loan Repayment				0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Offshore credit repayment																					
Corporate Income Tax																					
Net Cash Flow	-1.39	-1.39	0.09	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07
Cash Account (semi-annual)	-1.39	-2.78	-2.69	-2.64	-2.59	-2.55	-2.50	-2.46	-2.42	-2.37	-2.33	-2.28	-2.23	-2.18	-2.13	-2.07	-2.02	-1.96	-1.89	-1.83	-1.77
Cash Account (annual)				-2.64		-2.55		-2.46		-2.37		-2.28		-2.18		-2.07		-1.96		-1.83	
Change in Working Capital			0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change in O&M Reserve																					
Net Cash Flow after Reserves	-1.39	-1.39	0.08	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07
Cash Account after Reserves (semi-annual)	-1.39	-2.78	-2.70	-2.66	-2.61	-2.56	-2.51	-2.47	-2.43	-2.39	-2.34	-2.30	-2.25	-2.20	-2.14	-2.09	-2.03	-1.97	-1.91	-1.85	-1.78
Cash Account (annual)				-2.66		-2.56		-2.47		-2.39		-2.30		-2.20		-2.09		-1.97		-1.85	
Cash Available for Debt Service Reserve	-1.39	-2.78	-2.70	-2.66	-2.61	-2.56	-2.51	-2.47	-2.43	-2.39	-2.34	-2.30	-2.25	-2.20	-2.14	-2.09	-2.03	-1.97	0.06	0.12	0.07
Debt Service				0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Debt Service Coverage Ratio				1.90	1.96	2.02	2.07	1.85	1.91	1.97	2.04	2.10	2.17	2.24	2.32	2.40	2.48	2.57	2.66	2.75	2.85
Check																					
Net Income afterTax			0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Cash Flow available for Dividends				-2.66		-2.56		-2.47		-2.39		-2.30		-2.20		-2.09		-1.97		0.12	
Gross Dividend																		-1.97		0.12	
Dividend Withholding Tax																					
Net Dividends																		-1.97		0.12	
Net Cash Flow	-1.39	-1.39	0.09	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	2.03	0.06	-0.06	0.07
Cash Account (semi-annual)	-1.39	-2.78	-2.69	-2.64	-2.59	-2.55	-2.50	-2.46	-2.42	-2.37	-2.33	-2.28	-2.23	-2.18	-2.13	-2.07	-2.02	0.02	0.08	0.02	0.08
Cash Account (annual)		-2.78		-2.64		-2.55		-2.46		-2.37		-2.28		-2.18		-2.07		0.02		0.02	
Net Cash Flow represented by:																					
Change in Debt Service Account																					
Change in Working Capital			0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change in O&M Reserve																					
Change in Cash	-1.39	-1.39	0.08	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	2.03	0.06	-0.06	0.07
Cash Account Represented by																					
Debt Service Account																					
Working Capital			0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
O&M Reserve																					
Cash	-1.39	-2.78	-2.70	-2.66	-2.61	-2.56	-2.51	-2.47	-2.43	-2.39	-2.34	-2.30	-2.25	-2.20	-2.14	-2.09	-2.03		0.06		0.07
Negative cash check OK																		0.00	0.00	0.00	0.00
Basis for interest on positive cash account	-1.39	-2.78	-2.70	-2.66	-2.61	-2.56	-2.51	-2.47	-2.43	-2.39	-2.34	-2.30	-2.25	-2.20	-2.14	-2.09	-2.03		0.06		0.07

Project Cash Flow (figures in mill. EUR) Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year	10		11		12		13		14		15		16		17		18		19		20
Cash Inflow	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17
Sales Revenues	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17
Interest on Positive Cash Account																					
Equity Injections																					
Loan Disbursements																					
Cash Outflow	0.21	0.09	0.09	0.08	0.31	0.05	0.24	0.05	0.24	0.05	0.25	0.05	0.26	0.05	0.26	0.05	0.27	0.05	0.27	0.05	0.30
Investment																					
Plant & Equipment in mill.EUR																					
CDM upfront costs																					
Financing Fee																					
Capitalized Interest																					
Cost of Sales	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Debt Service	0.03	0.03	0.03	0.03																	
Interest on Negative Cash Account																					
Interest on Loan	0.00	0.00	0.00	0.00																	
Interest Withholding Tax																					
Loan Repayment	0.03	0.03	0.03	0.03																	
Offshore credit repayment																					
Corporate Income Tax																					
Net Cash Flow	0.05	0.05	0.05	0.06	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.12
Cash Account (semi-annual)	-1.71	-1.66	-1.61	-1.55	-1.46	-1.37	-1.27	-1.18	-1.08	-0.98	-0.88	-0.78	-0.68	-0.58	-0.47	-0.36	-0.25	-0.14	-0.03	0.08	
Cash Account (annual)	-1.71		-1.61		-1.46		-1.27		-1.08		-0.88		-0.68		-0.47		-0.25		-0.03		
Change in Working Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
Change in O&M Reserve																					
Net Cash Flow after Reserves	0.05	0.05	0.05	0.06	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.13
Cash Account after Reserves (semi-annual)	-1.73	-1.68	-1.62	-1.56	-1.47	-1.38	-1.29	-1.19	-1.10	-1.00	-0.90	-0.80	-0.70	-0.59	-0.49	-0.38	-0.27	-0.16	-0.05	0.06	
Cash Account (annual)	-1.73		-1.62		-1.47		-1.29		-1.10		-0.90		-0.70		-0.49		-0.27		-0.05		
Cash Available for Debt Service Reserve	0.12	0.05	0.11	0.16	0.25	0.09	0.19	0.09	0.19	0.10	0.20	0.10	0.20	0.10	0.21	0.11	0.22	0.11	0.22	0.11	0.25
Debt Service	0.03	0.03	0.03	0.03																	
Debt Service Coverage Ratio	2.45	2.55	2.65	2.76																	
Check																					
Net Income afterTax	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Cash Flow available for Dividends	0.12		0.11		0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Gross Dividend	0.12				0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Dividend Withholding Tax																					
Net Dividends	0.12				0.25		0.19		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Net Cash Flow	-0.07	0.05	0.05	0.06	-0.16	0.09	-0.09	0.10	-0.09	0.10	-0.10	0.10	-0.10	0.10	-0.10	0.11	-0.11	0.11	-0.11	0.11	-0.13
Cash Account (semi-annual)	0.01	0.07	0.12	0.18	0.01	0.11	0.02	0.11	0.02	0.11	0.02	0.12	0.02	0.12	0.02	0.12	0.02	0.13	0.02	0.13	0.00
Cash Account (annual)	0.01		0.12		0.01		0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.00
Net Cash Flow represented by:																					
Change in Debt Service Account																					
Change in Working Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
Change in O&M Reserve																					
Change in Cash	-0.07	0.05	0.05	0.06	-0.16	0.09	-0.09	0.09	-0.09	0.10	-0.10	0.10	-0.10	0.10	-0.10	0.11	-0.11	0.11	-0.11	0.11	-0.11
Cash Account Represented by																					
Debt Service Account																					
Working Capital	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
O&M Reserve																					
Cash		0.05	0.11	0.16		0.09		0.09		0.10		0.10		0.10		0.11		0.11		0.11	
Negative cash check OK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Basis for interest on positive cash account		0.05	0.11	0.16		0.09		0.09		0.10		0.10		0.10		0.11		0.11		0.11	

Table 13-4: Financial Ratios for Scenario I (3 Fuhrlaender WT)

Financial Ratios (figures in mill. EUR) Period			1	2	3	4	5	6	7	8	9	10	11	12	13
Operating Year					1		2		3		4		5		6
Investment		-1.74	-1.74												
Operating Income				0.09	0.09	0.09	0.10	0.10	0.08	0.09	0.09	0.09	0.09	0.09	0.09
Net Cash Flow before Financing		-1.74	-1.74	0.09	0.09	0.09	0.10	0.10	0.08	0.09	0.09	0.09	0.09	0.09	0.09
Operating IRR	#NUM!														
Net Present Value Mio. EUR	(1.74)														
Depreciation				0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Interest Expense					0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Debt Service Reserve															
Net Pre-Tax Cash Flow		-1.74	-1.74	0.18	0.16	0.16	0.17	0.17	0.16	0.16	0.16	0.16	0.17	0.17	0.17
Tax															
Net Post-Tax Cash Flow		-1.74	-1.74	0.18	0.16	0.16	0.17	0.17	0.16	0.16	0.16	0.16	0.17	0.17	0.17
Post-Tax IRR	7.8%														
Net Present Value Mio. EUR	(0.49)														
Investment		-1.74	-1.74												
Financing Fee			0.00												
Working Capital															
Capitalized Interest															
Capital Requirements		-1.74	-1.74												
Loan Drawdown		0.35	0.35												
Equity Paid-In/Return of Capital															
Dividend															
Equity Cash Flow															
Equity Cash Flow w/o Equity Reimbursement															
ROE		-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROE w/o Equity Reimb.															
Equity Balance															
Payback in Year	20														
Loan Disbursements		-0.35	-0.35												
Financing Fee			0.00												
Debt Service					0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04
Financing Cash Flow		-0.35	-0.35		0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04
Return on Financing	4.40%										-23.3%	-18.5%	-14.5%	-11.3%	-8.6%
Operating Income				0.09	0.19	0.19	0.19	0.19	0.18	0.17	0.17	0.18	0.18	0.18	0.18
Balance Debt Service Account															
Subtotal				0.09	0.19	0.19	0.19	0.19	0.18	0.17	0.17	0.18	0.18	0.18	0.18
Repayment					0.03	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Interest (excl. Witholding Tax)					0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02
Min. Debt Service					0.05	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08
Debt Service Coverage Ratio	1.94x	-	-	-	3.78	-	1.99	-	1.96	-	1.94	-	2.07	-	2.21
DSCR incl. Debt Serv. Res.	.40x	-	-	-	0.40	-	1.99	-	1.96	-	1.94	-	2.07	-	2.21

Period	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Operating Year		7		8		9		10		11		12		13
Investment														
Operating Income	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Net Cash Flow before Financing	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Depreciation	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Interest Expense	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00			
Net Pre-Tax Cash Flow	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.18	0.18	0.18	0.18
Net Post-Tax Cash Flow	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.18	0.18	0.18	0.18
Dividend				-1.97		0.12		0.12				0.25		0.19
Equity Cash Flow				-1.97		0.12		0.12				0.25		0.19
Equity Cash Flow w/o Equity Reimbursement				*-1.97*		*0.12*		*0.12*				*0.25*		*0.19*
ROE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity Balance				-1.97	-1.97	-1.85	-1.85	-1.73	-1.73	-1.73	-1.73	-1.47	-1.47	-1.29
Debt Service	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03			
Financing Cash Flow	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03			
Return on Financing	-6.3%	-4.4%	-2.8%	-1.4%	-0.2%	0.9%	1.8%	2.6%	3.3%	3.9%	4.4%	4.4%	4.4%	4.4%
Operating Income	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.19	0.17	0.17	0.18	0.18	0.18	0.19
Subtotal	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.19	0.17	0.17	0.18	0.18	0.18	0.19
Repayment	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.03		
Interest (excl. Witholding Tax)	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00		
Min. Debt Service	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.03		
Debt Service Coverage Ratio	-	2.36	-	2.52	-	2.70	-	2.65	-	2.60	-	5.56	-	-
DSCR incl. Debt Serv. Res.	-	2.36	-	2.52	-	2.70	-	2.65						

Period	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year		14		15		16		17		18		19		20
Operating Income	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.12
Net Cash Flow before Financing	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.12
Depreciation	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Net Pre-Tax Cash Flow	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20
Net Post-Tax Cash Flow	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20
Dividend		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Equity Cash Flow		0.19		0.20		0.20		0.21		0.22		0.22		0.25
Equity Cash Flow w/o Equity Reimbursement		*0.19*		*0.20*		*0.20*		*0.21*		*0.22*		*0.22*		*0.25*
ROE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity Balance	-1.29	-1.10	-1.10	-0.90	-0.90	-0.70	-0.70	-0.49	-0.49	-0.27	-0.27	-0.05	-0.05	0.20
Return on Financing	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Operating Income	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.21	0.22	0.22	0.22	0.23	0.23
Subtotal	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.21	0.22	0.22	0.22	0.23	0.23
Debt Service Coverage Ratio	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 13-5: P&L Account Scenario II (6 Fuhrländer WT)

Profit and Loss Account (figures in mill. EUR)	2007	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-years)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year			1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Gross Operating Income		0.17	0.17	0.17	0.17	0.18	0.15	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21
Sales Revenues		0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.31	0.31
Cost of Sales		0.04	0.04	0.04	0.04	0.04	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Depreciation		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Interest Expense			0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00																	
Cash Account Interest																																									
Debt Service Interest			0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00																	
Gross Income/Loss before Tax(semi-annual)		0.00	-0.03	-0.03	-0.02	-0.02	-0.04	-0.04	-0.03	-0.03	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	0.00	0.00	0.01	0.01	-0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04
Gross Income/Loss (annual)			-0.03		-0.05		-0.06		-0.07		-0.06		-0.04		-0.02		-0.01		0.01		-0.01		-0.03		-0.01		0.00		0.01		0.02		0.03		0.04		0.06		0.07		0.08
Pre-Reserve Taxable Income		0.00	-0.03	-0.06	-0.08	-0.10	-0.14	-0.18	-0.21	-0.24	-0.26	-0.29	-0.30	-0.32	-0.33	-0.33	-0.34	-0.34	-0.33	0.01	-0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04
Transfer to O&M Reserve																																									
Loss Carried Forward					-0.06		-0.10		-0.18		-0.24		-0.29		-0.32		-0.33		-0.34																						
Taxable Income																											0.00		0.01		0.02		0.03		0.04		0.06		0.07		0.08
Income Tax																																									
Net Income after Tax (semi-annual)		0.00	-0.03	-0.03	-0.02	-0.02	-0.04	-0.04	-0.03	-0.03	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	0.00	0.00	0.01	0.01	-0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04
Net Income after Tax (annual)			-0.03		-0.05		-0.06		-0.07		-0.06		-0.04		-0.02		-0.01		0.01		-0.01		-0.03		-0.01		0.00		0.01		0.02		0.03		0.04		0.06		0.07		0.08
Change in Debt Service Account																																									
Net Income minus DSR plus retained Earnings			-0.03		-0.08		-0.14		-0.21		-0.26		-0.30		-0.33		-0.34		-0.33		3.38		3.36		3.34		3.35		2.37		2.05		1.73		1.41		1.09		0.77		0.45
Available Cash			-5.12		-4.96		-4.80		-4.66		-4.50		-4.33		-4.15		-3.94		-3.73		0.21		0.39		0.65		0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Gross Dividend																			-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Dividend Withholding Tax																																									
Net Dividends																			-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Retained Earning minus DSR end of period		0.00	-0.03	-0.06	-0.08	-0.10	-0.14	-0.18	-0.21	-0.24	-0.26	-0.29	-0.30	-0.32	-0.33	-0.33	-0.34	-0.34	3.39	3.40	3.38	3.37	3.36	3.35	3.34	3.34	2.36	2.37	2.03	2.04	1.70	1.71	1.36	1.39	1.03	1.06	0.70	0.73	0.37	0.41	0.00
Retained Earnings/Loss in Period		0.00	-0.03	-0.03	-0.02	-0.02	-0.04	-0.04	-0.03	-0.03	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	0.00	0.00	3.73	0.01	-0.02	-0.02	-0.01	-0.01	0.00	0.00	-0.98	0.00	-0.34	0.01	-0.34	0.02	-0.35	0.02	-0.35	0.03	-0.36	0.03	-0.36	0.04	-0.41
Retained Earnings/Loss End of Period		0.00	-0.03	-0.06	-0.08	-0.10	-0.14	-0.18	-0.21	-0.24	-0.26	-0.29	-0.30	-0.32	-0.33	-0.33	-0.34	-0.34	3.39	3.40	3.38	3.37	3.36	3.35	3.34	3.34	2.36	2.37	2.03	2.04	1.70	1.71	1.36	1.39	1.03	1.06	0.70	0.73	0.37	0.41	0.00

Table 13-6: Balance Sheet Scenario II (6 x Fuhrlaender WT)

Balance Sheet (figures in mill. EUR)	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-years)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Fixed Assets	3.33	6.67	6.50	6.34	6.17	6.00	5.84	5.67	5.50	5.34	5.17	5.00	4.84	4.67	4.50	4.34	4.17	4.00	3.84	3.67	3.50	3.33	3.17	3.00	2.83	2.67	2.50	2.33	2.17	2.00	1.83	1.67	1.50	1.33	1.17	1.00	0.83	0.67	0.50	0.33	0.17	
Gross Fixed Assets	3.33	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67	6.67
Accumulated Depreciation			0.17	0.33	0.50	0.67	0.83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.83	3.00	3.17	3.33	3.50	3.67	3.84	4.00	4.17	4.34	4.50	4.67	4.84	5.00	5.17	5.34	5.50	5.67	5.84	6.00	6.17	6.34	6.50	6.67
Current Assets			0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-3.68	0.16	0.25	0.34	0.43	0.53	0.69	0.86	1.03	0.22	0.39	0.22	0.40	0.23	0.41	0.23	0.42	0.24	0.44	0.25	0.45	0.25	0.45
Working Capital																																										
Accounts Receivable			0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Cash																					0.11	0.21	0.30	0.39	0.49	0.65	0.82		0.17		0.18		0.18		0.19		0.19		0.20		0.20		
O&M Reserve																																										
Debt Service Reserve																																										
Liquid Funds (Provision for Tax & Div.)																				-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Total Assets	3.33	6.67	6.54	6.37	6.20	6.04	5.87	5.71	5.54	5.37	5.21	5.04	4.87	4.71	4.54	4.37	4.21	4.04	3.88	-0.02	3.66	3.58	3.51	3.43	3.36	3.36	3.36	3.36	2.38	2.39	2.06	2.07	1.73	1.75	1.40	1.43	1.07	1.10	0.75	0.78	0.42	0.45
Equity and Liabilities																																										
Equity																																										
O&M Reserve																																										
Retained Earnings/Loss			0.00	-0.03	-0.06	-0.08	-0.10	-0.14	-0.18	-0.21	-0.24	-0.26	-0.29	-0.30	-0.32	-0.33	-0.33	-0.34	-0.34	3.39	3.40	3.38	3.37	3.36	3.35	3.34	3.34	2.36	2.37	2.03	2.04	1.70	1.71	1.36	1.39	1.03	1.06	0.70	0.73	0.37	0.41	0.00
Long-Term Debt	0.67	1.33	1.33	1.27	1.21	1.15	1.09	1.03	0.97	0.91	0.85	0.79	0.73	0.67	0.61	0.55	0.49	0.42	0.36	0.30	0.24	0.18	0.12	0.06																		
Current Liabilities	2.67	5.33	5.20	5.13	5.05	4.96	4.88	4.81	4.74	4.67	4.60	4.52	4.43	4.34	4.25	4.16	4.06	3.95	3.85	-3.71	0.01	0.02	0.02	0.02	0.02	0.02	0.02	1.00	0.02	0.36	0.02	0.37	0.02	0.38	0.02	0.39	0.02	0.40	0.02	0.42	0.02	0.45
Accounts Payable			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
Contingency Loan	2.67	5.33	5.19	5.12	5.04	4.96	4.87	4.80	4.73	4.66	4.58	4.50	4.42	4.33	4.24	4.15	4.05	3.94	3.84																								
Income Tax																																										
Gross Dividends																				-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Total Equity and Liabilities	3.33	6.67	6.54	6.37	6.20	6.04	5.87	5.71	5.54	5.37	5.21	5.04	4.87	4.71	4.54	4.37	4.21	4.04	3.88	-0.02	3.66	3.58	3.51	3.43	3.36	3.36	3.36	3.36	2.38	2.39	2.06	2.07	1.73	1.75	1.40	1.43	1.07	1.10	0.75	0.78	0.42	0.45

Table 13-7: Project Cash Flow for Scenario II (6 Fuhrlaender WT)

Project Cash Flow (figures in mill. EUR)																																											
Period		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**
Operating Year				**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**		**11**		**12**		**13**		**14**		**15**		**16**		**17**		**18**		**19**		**20**
Cash Inflow	0.67	0.67	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.31	0.31
Sales Revenues			0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.31	0.31
Interest on Positive Cash Account																																										
Equity Injections																																										
Loan Disbursements	0.67	0.67																																								
Cash Outflow	3.33	3.34	0.04	0.14	0.13	0.13	0.13	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	-3.59	0.13	0.17	0.17	0.16	0.16	0.10	0.10	1.08	0.10	0.44	0.10	0.45	0.10	0.47	0.10	0.48	0.10	0.49	0.10	0.50	0.10	0.55
Investment	3.33	3.34																																								
Plant & Equipment in mill.EUR	3.33	3.33																																								
CDM upfront costs																																									
Financing Fee		0.00																																							
Capitalized Interest																																									
Cost of Sales			0.04	0.04	0.04	0.04	0.04	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Debt Service				0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06																		
Interest on Negative Cash Account																																										
Interest on Loan				0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00																		
Interest Withholding Tax																																										
Loan Repayment				0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06																		
Offshore credit repayment																																										
Corporate Income Tax																																										
Net Cash Flow	-2.67	-2.67	0.17	0.08	0.08	0.08	0.09	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.12	0.09	0.09	0.09	0.10	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21
Cash Account (semi-annual)	-2.67	-5.33	-5.17	-5.09	-5.01	-4.93	-4.84	-4.78	-4.71	-4.63	-4.56	-4.48	-4.39	-4.31	-4.21	-4.12	-4.02	-3.91	-3.81	-3.70	-3.58	-3.49	-3.40	-3.31	-3.21	-3.05	-2.88	-2.71	-2.54	-2.37	-2.19	-2.01	-1.83	-1.65	-1.46	-1.27	-1.08	-0.88	-0.68	-0.48	-0.27	
Cash Account (annual)				-5.09		-4.93		-4.78		-4.63		-4.48		-4.31		-4.12		-3.91		-3.70		-3.49		-3.31		-3.05		-2.71		-2.37		-2.01		-1.65		-1.27		-0.88		-0.48		
Change in Working Capital			0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
Change in O&M Reserve																																										
Net Cash Flow after Reserves	-2.67	-2.67	0.14	0.08	0.08	0.08	0.09	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.09	0.09	0.09	0.10	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.24
Cash Account after Reserves (semi-annual)	-2.67	-5.33	-5.19	-5.12	-5.04	-4.96	-4.87	-4.80	-4.73	-4.66	-4.58	-4.50	-4.42	-4.33	-4.24	-4.15	-4.05	-3.94	-3.84	-3.73	-3.61	-3.52	-3.43	-3.34	-3.24	-3.08	-2.91	-2.74	-2.57	-2.40	-2.22	-2.04	-1.86	-1.68	-1.49	-1.30	-1.11	-0.91	-0.71	-0.51	-0.31	
Cash Account (annual)				-5.12		-4.96		-4.80		-4.66		-4.50		-4.33		-4.15		-3.94		-3.73		-3.52		-3.34		-3.08		-2.74		-2.40		-2.04		-1.68		-1.30		-0.91		-0.51		
Cash Available for Debt Service Reserve	-2.67	-5.33	-5.19	-5.12	-5.04	-4.96	-4.87	-4.80	-4.73	-4.66	-4.58	-4.50	-4.42	-4.33	-4.24	-4.15	-4.05	-3.94	-3.84	-3.73	0.11	0.21	0.30	0.39	0.49	0.65	0.82	0.98	0.17	0.34	0.18	0.35	0.18	0.37	0.19	0.38	0.19	0.39	0.20	0.40	0.20	0.45
Debt Service				0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06																		
Debt Service Coverage Ratio				1.81	1.86	1.91	1.97	1.74	1.80	1.86	1.92	1.98	2.05	2.12	2.19	2.26	2.34	2.42	2.51	2.60	2.69	2.29	2.38	2.48	2.58																		
Check																																										
Net Income afterTax			0.00	-0.03	-0.03	-0.02	-0.02	-0.04	-0.04	-0.03	-0.03	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	0.00	0.00	0.01	0.01	-0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04
Cash Flow available for Dividends				-5.12		-4.96		-4.80		-4.66		-4.50		-4.33		-4.15		-3.94		-3.73		0.21		0.39		0.65		0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Gross Dividend																				-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Dividend Withholding Tax																																										
Net Dividends																				-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Net Cash Flow	-2.67	-2.67	0.17	0.08	0.08	0.08	0.09	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.11	3.84	0.12	0.09	0.09	0.09	0.10	0.16	0.17	-0.81	0.17	-0.17	0.18	-0.18	0.18	-0.18	0.19	-0.19	0.19	-0.19	0.20	-0.20	0.21	-0.24
Cash Account (semi-annual)	-2.67	-5.33	-5.17	-5.09	-5.01	-4.93	-4.84	-4.78	-4.71	-4.63	-4.56	-4.48	-4.39	-4.31	-4.21	-4.12	-4.02	-3.91	-3.81	0.03	0.15	0.23	0.32	0.42	0.51	0.68	0.84	0.03	0.20	0.03	0.20	0.03	0.21	0.03	0.22	0.03	0.22	0.03	0.23	0.03	0.24	0.00
Cash Account (annual)		-5.33		-5.09		-4.93		-4.78		-4.63		-4.48		-4.31		-4.12		-3.91		0.03		0.23		0.42		0.68		0.03		0.03		0.03		0.03		0.03		0.03		0.03		0.00
Net Cash Flow represented by:																																										
Change in Debt Service Account																																										
Change in Working Capital			0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
Change in O&M Reserve																																										
Change in Cash	-2.67	-2.67	0.14	0.08	0.08	0.08	0.09	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.11	3.84	0.11	0.09	0.09	0.09	0.10	0.16	0.17	-0.82	0.17	-0.17	0.18	-0.18	0.18	-0.18	0.19	-0.19	0.19	-0.19	0.20	-0.20	0.20	-0.20
Cash Account Represented by																																										
Debt Service Account																																										
Working Capital			0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
O&M Reserve																																										
Cash	-2.67	-5.33	-5.19	-5.12	-5.04	-4.96	-4.87	-4.80	-4.73	-4.66	-4.58	-4.50	-4.42	-4.33	-4.24	-4.15	-4.05	-3.94	-3.84		0.11	0.21	0.30	0.39	0.49	0.65	0.82		0.17		0.18		0.18		0.19		0.19		0.20		0.20	
Basis for interest on positive cash account	-2.67	-5.33	-5.19	-5.12	-5.04	-4.96	-4.87	-4.80	-4.73	-4.66	-4.58	-4.50	-4.42	-4.33	-4.24	-4.15	-4.05	-3.94	-3.84		0.11	0.21	0.30	0.39	0.49	0.65	0.82		0.17		0.18		0.18		0.19		0.19		0.20		0.20	

Table 13-8: Financial Ratios for Scenario II (6 Fuhrlaender WT)

Financial Ratios (figures in mill. EUR) **Period**			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year					1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Investment		-3.33	-3.33																																								
Operating Income				0.17	0.17	0.17	0.17	0.18	0.15	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21
Net Cash Flow before Financing		-3.33	-3.33	0.17	0.17	0.17	0.17	0.18	0.15	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21
Operating IRR	#NUM!																																										
Net Present Value Mio. EUR	(3.51)																																										
Depreciation				0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Interest Expense					0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00																	
Debt Service Reserve																																											
Net Pre-Tax Cash Flow		-3.33	-3.33	0.33	0.30	0.31	0.31	0.31	0.29	0.30	0.30	0.30	0.31	0.31	0.32	0.32	0.32	0.33	0.33	0.33	0.34	0.34	0.31	0.32	0.32	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.37	0.37	0.37	0.37
Tax																																											
Net Post-Tax Cash Flow		-3.33	-3.33	0.33	0.30	0.31	0.31	0.31	0.29	0.30	0.30	0.30	0.31	0.31	0.32	0.32	0.32	0.33	0.33	0.33	0.34	0.34	0.31	0.32	0.32	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.35	0.35	0.35	0.35	0.36	0.36	0.36	0.37	0.37	0.37	0.37
Post-Tax IRR	7.4%																																										
Net Present Value Mio. EUR	(1.10)																																										
Investment		-3.33	-3.33																																								
Financing Fee			0.00																																								
Working Capital																																											
Capitalized Interest																																											
Capital Requirements		-3.33	-3.34																																								
Loan Drawdown		0.67	0.67																																								
Equity Paid-In/Return of Capital																																											
Dividend																					-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Equity Cash Flow																					-3.73								0.98		0.34		0.35		0.37		0.38		0.39		0.40		0.45
Equity Cash Flow w/o Equity Reimbursement																					*-3.73*								*0.98*		*0.34*		*0.35*		*0.37*		*0.38*		*0.39*		*0.40*		*0.45*
ROE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROE w/o Equity Reimb.																																											
Equity Balance																					-3.73	-3.73	-3.73	-3.73	-3.73	-3.73	-3.73	-3.73	-2.74	-2.74	-2.40	-2.40	-2.04	-2.04	-1.68	-1.68	-1.30	-1.30	-0.91	-0.91	-0.51	-0.51	-0.07
Payback in Year	35																																										
Loan Disbursements		-0.67	-0.67																																								
Financing Fee			0.00																																								
Debt Service					0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06																	
Financing Cash Flow		-0.67	-0.67		0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06																	
Return on Financing	4.39%										-23.4%	-18.5%	-14.5%	-11.3%	-8.6%	-6.3%	-4.4%	-2.8%	-1.4%	-0.2%	0.9%	1.8%	2.6%	3.2%	3.9%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Operating Income				0.17	0.34	0.34	0.35	0.35	0.33	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.34	0.35	0.35	0.36	0.36	0.36	0.34	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.34	0.35	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.40	0.40	0.41	0.41
Balance Debt Service Account																																											
Subtotal				0.17	0.34	0.34	0.35	0.35	0.33	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.34	0.35	0.35	0.36	0.36	0.36	0.34	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.34	0.35	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.40	0.40	0.41	0.41
Repayment					0.06	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.06																
Interest (excl. Witholding Tax)					0.03	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.00																
Min. Debt Service					0.09	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.06																
Debt Service Coverage Ratio	1.83x	-	-	-	3.59	-	1.89	-	1.86	-	1.83	-	1.95	-	2.08	-	2.22	-	2.38	-	2.55	-	2.49	-	2.43	-	5.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DSCR incl. Debt Serv. Res.	.43x	-	-	-	0.43	-	1.89	-	1.86	-	1.83	-	1.95	-	2.08	-	2.22	-	2.38	-	2.55	-	2.49																				

Table 13-9: P&L Account Scenario III (3 x V47 used Vestas WT)

Profit and Loss Account (figures in mill. EUR)	2007	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-annual)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Gross Operating Income		0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10
Sales Revenues		0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13
Cost of Sales		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Depreciation		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Interest Expense			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00																	
Cash Account Interest																																										
Debt Service Interest			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00																	
Gross Income/Loss before Tax(semi-annual)		0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05
Gross Income/Loss (annual)			0.03		0.03		0.03		0.04		0.04		0.05		0.05		0.06		0.06		0.06		0.06		0.06		0.07		0.07		0.08		0.08		0.09		0.09		0.10		0.10
Pre-Reserve Taxable Income		0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05
Transfer to O&M Reserve																																										
Loss Carried Forward																																										
Taxable Income			0.03		0.03		0.03		0.04		0.04		0.05		0.05		0.06		0.06		0.06		0.06		0.06		0.07		0.07		0.08		0.08		0.09		0.09		0.10		0.10
Income Tax																																										
Net Income after Tax (semi-annual)		0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05
Net Income after Tax (annual)			0.03		0.03		0.03		0.04		0.04		0.05		0.05		0.06		0.06		0.06		0.06		0.06		0.07		0.07		0.08		0.08		0.09		0.09		0.10		0.10
Gross Dividend			-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12		0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Dividend Withholding Tax																																										
Net Dividends			-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12		0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Retained Earning minus DSR end of period		0.02	1.33	1.35	1.28	1.29	1.22	1.24	1.17	1.19	1.11	1.14	1.06	1.08	1.00	1.03	0.95	0.98	0.89	0.93	0.84	0.86	0.78	0.81	0.71	0.74	0.62	0.66	0.54	0.58	0.45	0.49	0.36	0.41	0.28	0.32	0.19	0.24	0.10	0.15	
Retained Earnings/Loss in Period		0.02	1.32	0.01	-0.07	0.01	-0.07	0.02	-0.07	0.02	-0.08	0.02	-0.08	0.03	-0.08	0.03	-0.08	0.03	-0.09	0.03	-0.09	0.03	-0.08	0.03	-0.10	0.03	-0.12	0.04	-0.12	0.04	-0.13	0.04	-0.13	0.04	-0.13	0.05	-0.13	0.05	-0.13	0.05	-0.15
Retained Earnings/Loss End of Period		0.02	1.33	1.35	1.28	1.29	1.22	1.24	1.17	1.19	1.11	1.14	1.06	1.08	1.00	1.03	0.95	0.98	0.89	0.93	0.84	0.86	0.78	0.81	0.71	0.74	0.62	0.66	0.54	0.58	0.45	0.49	0.36	0.41	0.28	0.32	0.19	0.24	0.10	0.15	0.00	

Table 13-10: Balance Sheet Scenario III (3 x V47 used Vestas WT)

Balance Sheet (figures in mill. EUR)	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-annual)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Fixed Assets	0.87	1.75	1.70	1.66	1.61	1.57	1.53	1.48	1.44	1.40	1.35	1.31	1.27	1.22	1.18	1.13	1.09	1.05	1.00	0.96	0.92	0.87	0.83	0.79	0.74	0.70	0.65	0.61	0.57	0.52	0.48	0.44	0.39	0.35	0.31	0.26	0.22	0.17	0.13	0.09	0.04	
Gross Fixed Assets	0.87	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Accumulated Depreciation			0.04	0.09	0.13	0.17	0.22	0.26	0.31	0.35	0.39	0.44	0.48	0.52	0.57	0.61	0.65	0.70	0.74	0.79	0.83	0.87	0.92	0.96	1.00	1.05	1.09	1.13	1.18	1.22	1.27	1.31	1.35	1.40	1.44	1.48	1.53	1.57	1.61	1.66	1.70	1.75
Current Assets			0.01	-1.29	0.05	0.10	0.06	0.10	0.06	0.11	0.06	0.11	0.07	0.12	0.07	0.12	0.07	0.13	0.08	0.14	0.08	0.13	0.07	0.13	0.08	0.15	0.10	0.17	0.10	0.18	0.10	0.18	0.10	0.19	0.11	0.19	0.11	0.20	0.11	0.21	0.12	0.20
Working Capital																																										
Accounts Receivable			0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
Cash					0.04		0.04		0.05		0.05		0.05		0.05		0.06		0.06		0.06		0.06		0.06		0.06		0.08		0.08		0.08		0.08		0.09		0.09		0.09		0.09	
O&M Reserve																																										
Debt Service Reserve																																										
Liquid Funds (Provision for Tax & Div.)				-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12		0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Total Assets	0.87	1.75	1.72	0.37	1.67	1.67	1.58	1.58	1.50	1.50	1.42	1.42	1.33	1.34	1.25	1.26	1.16	1.18	1.08	1.10	1.00	1.01	0.90	0.92	0.82	0.85	0.75	0.79	0.67	0.70	0.58	0.62	0.50	0.54	0.41	0.46	0.33	0.37	0.24	0.29	0.16	0.20
Equity and Liabilities																																										
Equity																																										
O&M Reserve																																										
Retained Earnings/Loss			0.02	1.33	1.35	1.28	1.29	1.22	1.24	1.17	1.19	1.11	1.14	1.06	1.08	1.00	1.03	0.95	0.98	0.89	0.93	0.84	0.86	0.78	0.81	0.71	0.74	0.62	0.66	0.54	0.58	0.45	0.49	0.36	0.41	0.28	0.32	0.19	0.24	0.10	0.15	0.00
Long-Term Debt	0.17	0.35	0.35	0.33	0.32	0.30	0.29	0.27	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.13	0.11	0.10	0.08	0.06	0.05	0.03	0.02																		
Current Liabilities	0.70	1.40	1.35	-1.30	0.00	0.09	0.00	0.09	0.00	0.10	0.00	0.10	0.00	0.11	0.00	0.11	0.00	0.12	0.00	0.12	0.00	0.12	0.01	0.12	0.01	0.14	0.01	0.16	0.01	0.17	0.01	0.17	0.01	0.18	0.01	0.18	0.01	0.18	0.01	0.19	0.01	0.20
Accounts Payable			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Contingency Loan	0.70	1.40	1.34																																							
Income Tax																																										
Gross Dividends				-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12		0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Total Equity and Liabilities	0.87	1.75	1.72	0.37	1.67	1.67	1.58	1.58	1.50	1.50	1.42	1.42	1.33	1.34	1.25	1.26	1.16	1.18	1.08	1.10	1.00	1.01	0.90	0.92	0.82	0.85	0.75	0.79	0.67	0.70	0.58	0.62	0.50	0.54	0.41	0.46	0.33	0.37	0.24	0.29	0.16	0.20

Table 13-11: Project Cash Flow for Scenario III (3 x V47 used Vestas WT)

Project Cash Flow (figures in mill. EUR) Period		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Operating Year				1		2		3		4		5		6		7		8		9	
Cash Inflow	0.17	0.18	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11
Sales Revenues			0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11
Interest on Positive Cash Account																					
Equity Injections																					
Loan Disbursements	0.17	0.18																			
Cash Outflow	0.87	0.87	0.03	-1.25	0.05	0.13	0.05	0.14	0.05	0.14	0.05	0.14	0.05	0.15	0.05	0.15	0.05	0.16	0.04	0.16	0.04
Investment	0.87	0.87																			
Plant & Equipment in mill.EUR	0.87	0.87																			
CDM upfront costs																					
Financing Fee		0.00																			
Capitalized Interest																					
Cost of Sales			0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Debt Service				0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Interest on Negative Cash Account																					
Interest on Loan				0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interest Withholding Tax																					
Loan Repayment				0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Offshore credit repayment																					
Corporate Income Tax																					
Net Cash Flow	-0.70	-0.70	0.06	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
Cash Account (semi-annual)	-0.70	-1.40	-1.33	-1.29	-1.25	-1.21	-1.17	-1.13	-1.08	-1.03	-0.99	-0.94	-0.89	-0.84	-0.78	-0.73	-0.67	-0.61	-0.55	-0.49	-0.43
Cash Account (annual)				-1.29		-1.21		-1.13		-1.03		-0.94		-0.84		-0.73		-0.61		-0.49	
Change in Working Capital			0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change in O&M Reserve																					
Net Cash Flow after Reserves	-0.70	-0.70	0.05	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
Cash Account after Reserves (semi-annual)	-0.70	-1.40	-1.34	-1.30	-1.26	-1.22	-1.18	-1.14	-1.09	-1.05	-1.00	-0.95	-0.90	-0.85	-0.79	-0.74	-0.68	-0.63	-0.57	-0.51	-0.45
Cash Account (annual)				-1.30		-1.22		-1.14		-1.05		-0.95		-0.85		-0.74		-0.63		-0.51	
Cash Available for Debt Service Reserve	-0.70	-1.40	-1.34	-1.30	0.04	0.08	0.04	0.09	0.05	0.09	0.05	0.10	0.05	0.10	0.05	0.11	0.06	0.11	0.06	0.12	0.06
Debt Service				0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Debt Service Coverage Ratio				2.57	2.65	2.73	2.81	2.90	2.99	3.09	3.19	3.29	3.40	3.51	3.63	3.75	3.88	4.01	4.15	4.30	4.45
Check																					
Net Income afterTax			0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Cash Flow available for Dividends				-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12	
Gross Dividend				-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12	
Dividend Withholding Tax																					
Net Dividends				-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12	
Net Cash Flow	-0.70	-0.70	0.06	1.34	0.04	-0.04	0.04	-0.04	0.05	-0.04	0.05	-0.05	0.05	-0.05	0.05	-0.05	0.06	-0.06	0.06	-0.06	0.06
Cash Account (semi-annual)	-0.70	-1.40	-1.33	0.01	0.05	0.01	0.05	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.07	0.01	0.07	0.01	0.07	0.01	0.07
Cash Account (annual)		-1.40		0.01		0.01		0.01		0.01		0.01		0.01		0.01		0.01		0.01	
Net Cash Flow represented by:																					
Change in Debt Service Account																					
Change in Working Capital			0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change in O&M Reserve																					
Change in Cash	-0.70	-0.70	0.05	1.34	0.04	-0.04	0.04	-0.04	0.05	-0.05	0.05	-0.05	0.05	-0.05	0.05	-0.05	0.06	-0.06	0.06	-0.06	0.06
Cash Account Represented by																					
Debt Service Account																					
Working Capital			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
O&M Reserve																					
Cash (Negative cash)	-0.70	-1.40	-1.34		0.04		0.04		0.05		0.05		0.05		0.05		0.06		0.06		0.06
check OK										0.00		0.00		0.00		0.00		0.00		0.00	
Basis for interest on positive cash account	-0.70	-1.40	-1.34		0.04		0.04		0.05		0.05		0.05		0.05		0.06		0.06		0.06

Project Cash Flow (figures in mill. EUR) Period	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year	10		11		12		13		14		15		16		17		18		19		20
Cash Inflow	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13
Sales Revenues	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13
Interest on Positive Cash Account																					
Equity Injections																					
Loan Disbursements																					
Cash Outflow	0.17	0.05	0.16	0.05	0.17	0.03	0.19	0.03	0.20	0.03	0.20	0.03	0.20	0.03	0.21	0.03	0.21	0.03	0.22	0.03	0.24
Investment																					
Plant & Equipment in mill.EUR																					
CDM upfront costs																					
Financing Fee																					
Capitalized Interest																					
Cost of Sales	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Debt Service	0.02	0.02	0.02	0.02																	
Interest on Negative Cash Account																					
Interest on Loan	0.00	0.00	0.00	0.00																	
Interest Withholding Tax																					
Loan Repayment	0.02	0.02	0.02	0.02																	
Offshore credit repayment																					
Corporate Income Tax																					
Net Cash Flow	0.05	0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10
Cash Account (semi-annual)	-0.38	-0.32	-0.26	-0.21	-0.13	-0.05	0.03	0.11	0.19	0.27	0.35	0.44	0.52	0.61	0.70	0.79	0.88	0.97	1.06	1.15	
Cash Account (annual)	-0.38		-0.26		-0.13		0.03		0.19		0.35		0.52		0.70		0.88		1.06		
Change in Working Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
Change in O&M Reserve																					
Net Cash Flow after Reserves	0.06	0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.11
Cash Account after Reserves (semi-annual)	-0.39	-0.33	-0.28	-0.22	-0.14	-0.06	0.01	0.09	0.17	0.26	0.34	0.42	0.51	0.59	0.68	0.77	0.86	0.95	1.05	1.14	
Cash Account (annual)	-0.39		-0.28		-0.14		0.01		0.17		0.34		0.51		0.68		0.86		1.05		
Cash Available for Debt Service Reserve	0.12	0.06	0.11	0.06	0.13	0.08	0.16	0.08	0.16	0.08	0.16	0.08	0.17	0.09	0.17	0.09	0.18	0.09	0.18	0.09	0.20
Debt Service	0.02	0.02	0.02	0.02																	
Debt Service Coverage Ratio	4.12	4.28	4.44	4.62																	
Check																					
Net Income afterTax	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05
Cash Flow available for Dividends	0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Gross Dividend	0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Dividend Withholding Tax																					
Net Dividends	0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Net Cash Flow	-0.06	0.06	-0.06	0.06	-0.06	0.08	-0.08	0.08	-0.08	0.08	-0.08	0.08	-0.08	0.09	-0.09	0.09	-0.09	0.09	-0.09	0.09	-0.11
Cash Account (semi-annual)	0.01	0.07	0.01	0.07	0.01	0.09	0.01	0.09	0.01	0.10	0.01	0.10	0.01	0.10	0.01	0.10	0.01	0.11	0.02	0.11	
Cash Account (annual)	0.01		0.01		0.01		0.01		0.01		0.01		0.01		0.01		0.01		0.02		
Net Cash Flow represented by:																					
Change in Debt Service Account																					
Change in Working Capital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02
Change in O&M Reserve																					
Change in Cash	-0.06	0.06	-0.06	0.06	-0.06	0.08	-0.08	0.08	-0.08	0.08	-0.08	0.08	-0.08	0.09	-0.09	0.09	-0.09	0.09	-0.09	0.09	-0.09
Cash Account Represented by																					
Debt Service Account																					
Working Capital	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	
O&M Reserve																					
Cash (Negative cash)		0.06		0.06		0.08		0.08		0.08		0.08		0.09		0.09		0.09		0.09	
check OK	0.00		0.00		0.00		0.00				0.00		0.00		0.00						
Basis for interest on positive cash account		0.06		0.06		0.08		0.08		0.08		0.08		0.09		0.09		0.09		0.09	

Table 13-12: Financial Ratio for Scenario III (3 x V47 used Vestas WT)

Financial Ratios (figures in mill. EUR) **Period (semi-annual)**			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Operating Year					1		2		3		4		5		6		7		8		9	
Investment		-0.87	-0.87																			
Operating Income				0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08
Net Cash Flow before Financing		-0.87	-0.87	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08
Operating IRR	5.79%																					
Net Present Value Mio. EUR	(0.47)																					
Depreciation				0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Interest Expense					0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Debt Service Reserve																						
Net Pre-Tax Cash Flow		-0.87	-0.87	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12
Tax																						
Net Post-Tax Cash Flow		-0.87	-0.87	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12
Post-Tax IRR	11.4%																					
Net Present Value Mio. EUR	0.16																					
Investment		-0.87	-0.87																			
Financing Fee			0.00																			
Working Capital																						
Capitalized Interest																						
Capital Requirements		-0.87	-0.87																			
Loan Drawdown		0.17	0.18																			
Equity Paid-In/Return of Capital																						
Dividend					-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12	
Equity Cash Flow					-1.30		0.08		0.09		0.09		0.10		0.10		0.11		0.11		0.12	
Equity Cash Flow w/o Equity Reimbursement					*-1.30*		*0.08*		*0.09*		*0.09*		*0.10*		*0.10*		*0.11*		*0.11*		*0.12*	
ROE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROE w/o Equity Reimb.																						
ROE after period																						
5	-																					
10	-																					
15	-																					
20	6.58%																					
Equity Balance					-1.30	-1.30	-1.22	-1.22	-1.14	-1.14	-1.05	-1.05	-0.95	-0.95	-0.85	-0.85	-0.74	-0.74	-0.63	-0.63	-0.51	-0.51
Payback in Year	13																					
Loan Disbursements		-0.17	-0.18																			
Financing Fee			0.00																			
Debt Service					0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Financing Cash Flow		-0.17	-0.17		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Return on Financing	4.43%										-23.3%	-18.4%	-14.5%	-11.2%	-8.5%	-6.3%	-4.3%	-2.7%	-1.3%	-0.1%	0.9%	1.8%
Operating Income				0.06	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.16	0.16
Balance Debt Service Account																						
Subtotal				0.06	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.16	0.16
Repayment					0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Interest (excl. Witholding Tax)					0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Min. Debt Service					0.02	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Debt Service Coverage Ratio	2.69x	-	-	-	5.10	-	2.69	-	2.86	-	3.04	-	3.24	-	3.46	-	3.69	-	3.95	-	4.23	-
DSCR incl. Debt Serv. Res.	.28x	-	-	-	0.28	-	2.69	-	2.86	-	3.04	-	3.24	-	3.46	-	3.69	-	3.95	-	4.23	-

Period (semi-annual)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year	10		11		12		13		14		15		16		17		18		19		20
Investment																					
Operating Income	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10
Net Cash Flow before Financing	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10
Depreciation	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Interest Expense	0.00	0.00	0.00	0.00																	
Net Pre-Tax Cash Flow	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14
Net Post-Tax Cash Flow	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14
Dividend	0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Equity Cash Flow	0.12		0.11		0.13		0.16		0.16		0.16		0.17		0.17		0.18		0.18		0.20
Equity Cash Flow w/o Equity Reimbursement	*0.12*		*0.11*		*0.13*		*0.16*		*0.16*		*0.16*		*0.17*		*0.17*		*0.18*		*0.18*		*0.20*
ROE	-	-	-	-	-	-	-	-	-	-	-	-	3.9%	3.9%	4.7%	4.7%	5.4%	5.4%	6.0%	6.0%	6.6%
Equity Balance	-0.39	-0.39	-0.28	-0.28	-0.14	-0.14	0.01	0.01	0.17	0.17	0.34	0.34	0.51	0.51	0.68	0.68	0.86	0.86	1.05	1.05	1.25
Debt Service	0.02	0.02	0.02	0.02																	
Financing Cash Flow	0.02	0.02	0.02	0.02																	
Return on Financing	2.6%	3.3%	3.9%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Operating Income	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19
Subtotal	0.15	0.15	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.19	0.19
Repayment	0.03	0.03	0.03	0.03	0.02																
Interest (excl. Witholding Tax)	0.00	0.00	0.00	0.00	0.00																
Min. Debt Service	0.04	0.03	0.03	0.03	0.02																
Debt Service Coverage Ratio	4.29	-	4.36	-	9.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DSCR incl. Debt Serv. Res.	4.29																				

Table 13-13: P&L Account Scenario IV (6 used V47 Vestas WT)

Profit and Loss Account (figures in mill. EUR)	2007	2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-annual)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Gross Operating Income		0.14	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16
Sales Revenues		0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24
Cost of Sales		0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09
Depreciation		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Interest Expense			0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00																	
Cash Account Interest																																									
Debt Service Interest			0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00																	
Gross Income/Loss before Tax(semi-annual)		0.06	0.05	0.05	0.05	0.06	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
Gross Income/Loss (annual)			0.11		0.11		0.10		0.10		0.10		0.11		0.12		0.13		0.13		0.12		0.11		0.11		0.12		0.12		0.13		0.13		0.14		0.14		0.14		0.15
Pre-Reserve Taxable Income		0.06	0.05	0.05	0.05	0.06	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
Transfer to O&M Reserve																																									
Loss Carried Forward																																									
Taxable Income			0.11		0.11		0.10		0.10		0.10		0.11		0.12		0.13		0.13		0.12		0.11		0.11		0.12		0.12		0.13		0.13		0.14		0.14		0.14		0.15
Income Tax																																									
Net Income after Tax (semi-annual)		0.06	0.05	0.05	0.05	0.06	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
Net Income after Tax (annual)			0.11		0.11		0.10		0.10		0.10		0.11		0.12		0.13		0.13		0.12		0.11		0.11		0.12		0.12		0.13		0.13		0.14		0.14		0.14		0.15
Change in Debt Service Account																																									
Net Income minus DSR plus retained Earnings			0.11		2.57		2.46		2.35		2.26		2.16		2.07		1.98		1.88		1.77		1.65		1.55		1.43		1.27		1.11		0.96		0.80		0.65		0.49		0.34
Available Cash			-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Gross Dividend			-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Dividend Withholding Tax																																									
Net Dividends			-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Retained Earning minus DSR end of period		0.06	2.46	2.51	2.36	2.42	2.26	2.30	2.15	2.21	2.05	2.11	1.95	2.01	1.85	1.91	1.75	1.81	1.65	1.72	1.54	1.59	1.44	1.50	1.31	1.37	1.15	1.21	0.99	1.05	0.83	0.89	0.67	0.73	0.51	0.58	0.35	0.42	0.19	0.26	
Retained Earnings/Loss in Period		0.06	2.40	0.05	-0.15	0.06	-0.16	0.05	-0.15	0.05	-0.15	0.05	-0.16	0.06	-0.16	0.06	-0.16	0.07	-0.17	0.07	-0.18	0.05	-0.15	0.06	-0.19	0.06	-0.22	0.06	-0.22	0.06	-0.22	0.07	-0.23	0.07	-0.23	0.07	-0.23	0.07	-0.23	0.07	-0.26
Retained Earnings/Loss End of Period		0.06	2.46	2.51	2.36	2.42	2.26	2.30	2.15	2.21	2.05	2.11	1.95	2.01	1.85	1.91	1.75	1.81	1.65	1.72	1.54	1.59	1.44	1.50	1.31	1.37	1.15	1.21	0.99	1.05	0.83	0.89	0.67	0.73	0.51	0.58	0.35	0.42	0.19	0.26	0.00

Table 13-14: Balance Sheet Scenario IV (6 used V47 Vestas WT)

Balance Sheet (figures in mill. EUR)	2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027	
Period (semi-annual)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Operating Year				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Fixed Assets	1.61	3.21	3.13	3.05	2.97	2.89	2.81	2.73	2.65	2.57	2.49	2.41	2.33	2.25	2.17	2.09	2.01	1.93	1.85	1.77	1.69	1.61	1.53	1.45	1.37	1.29	1.20	1.12	1.04	0.96	0.88	0.80	0.72	0.64	0.56	0.48	0.40	0.32	0.24	0.16	0.08	
Gross Fixed Assets	1.61	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21
Accumulated Depreciation			0.08	0.16	0.24	0.32	0.40	0.48	0.56	0.64	0.72	0.80	0.88	0.96	1.04	1.12	1.20	1.29	1.37	1.45	1.53	1.61	1.69	1.77	1.85	1.93	2.01	2.09	2.17	2.25	2.33	2.41	2.49	2.57	2.65	2.73	2.81	2.89	2.97	3.05	3.13	3.21
Current Assets			0.03	-2.32	0.13	0.23	0.13	0.23	0.13	0.23	0.13	0.23	0.14	0.24	0.14	0.25	0.14	0.26	0.15	0.27	0.15	0.26	0.14	0.24	0.14	0.28	0.17	0.31	0.18	0.32	0.18	0.32	0.18	0.33	0.18	0.33	0.19	0.34	0.19	0.34	0.19	0.34
Working Capital																																										
Accounts Receivable			0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
Cash					0.10		0.11		0.10		0.10		0.11		0.11		0.11		0.12		0.12		0.10		0.11		0.14		0.14		0.14		0.15		0.15		0.15		0.15		0.15	0.00
O&M Reserve																																										
Debt Service Reserve																																										
Liquid Funds (Provision for Tax & Div.)				-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Total Assets	1.61	3.21	3.16	0.73	3.10	3.13	2.95	2.96	2.78	2.80	2.62	2.64	2.46	2.49	2.31	2.34	2.15	2.19	2.00	2.04	1.84	1.87	1.66	1.69	1.51	1.56	1.38	1.44	1.22	1.28	1.06	1.13	0.90	0.97	0.75	0.82	0.59	0.66	0.43	0.50	0.27	0.34
Equity and Liabilities																																										
Equity																																										
O&M Reserve																																										
Retained Earnings/Loss			0.06	2.46	2.51	2.36	2.42	2.26	2.30	2.15	2.21	2.05	2.11	1.95	2.01	1.85	1.91	1.75	1.81	1.65	1.72	1.54	1.59	1.44	1.50	1.31	1.37	1.15	1.21	0.99	1.05	0.83	0.89	0.67	0.73	0.51	0.58	0.35	0.42	0.19	0.26	0.00
Long-Term Debt	0.32	0.64	0.64	0.61	0.58	0.56	0.53	0.50	0.47	0.44	0.41	0.38	0.35	0.32	0.29	0.26	0.23	0.20	0.18	0.15	0.12	0.09	0.06	0.03																		
Current Liabilities	1.28	2.57	2.45	-2.35	0.00	0.21	0.00	0.21	0.01	0.20	0.01	0.21	0.01	0.22	0.01	0.23	0.01	0.24	0.01	0.24	0.01	0.24	0.01	0.22	0.01	0.26	0.01	0.29	0.01	0.30	0.01	0.30	0.01	0.30	0.01	0.31	0.01	0.31	0.01	0.32	0.01	0.34
Accounts Payable			0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Contingency Loan	1.28	2.57	2.45																																							
Income Tax																																										
Gross Dividends				-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Total Equity and Liabilities	1.61	3.21	3.16	0.73	3.10	3.13	2.95	2.96	2.78	2.80	2.62	2.64	2.46	2.49	2.31	2.34	2.15	2.19	2.00	2.04	1.84	1.87	1.66	1.69	1.51	1.56	1.38	1.44	1.22	1.28	1.06	1.13	0.90	0.97	0.75	0.82	0.59	0.66	0.43	0.50	0.27	0.34

Table 13-15: Project Cash Flow for Scenario IV (6 x V47 used Vestas WT)

Project Cash Flow (figures in mill. EUR)																																										
Period		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**
Operating Year				**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**		**11**		**12**		**13**		**14**		**15**		**16**		**17**		**18**		**19**		**20**
Cash Inflow	0.32	0.32	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24
Sales Revenues			0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.19	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24
Interest on Positive Cash Account																																									
Equity Injections																																									
Loan Disbursements	0.32	0.32																																								
Cash Outflow	1.61	1.61	0.02	-2.28	0.07	0.27	0.06	0.28	0.08	0.27	0.08	0.28	0.08	0.29	0.08	0.30	0.08	0.30	0.08	0.31	0.08	0.32	0.10	0.31	0.10	0.31	0.07	0.35	0.07	0.36	0.07	0.36	0.08	0.37	0.08	0.38	0.08	0.38	0.08	0.39	0.09	0.42
Investment	1.61	1.61																																								
Plant & Equipment in mill.EUR	1.61	1.61																																								
CDM upfront costs																																									
Financing Fee		0.00																																							
Capitalized Interest																																									
Cost of Sales			0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09
Debt Service				0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03																	
Interest on Negative Cash Accou																																									
Interest on Loan				0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00																	
Interest Withholding Tax																																									
Loan Repayment				0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03																	
Offshore credit repayment																																										
Corporate Income Tax																																									
Net Cash Flow	-1.28	-1.28	0.14	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.10	0.10	0.11	0.11	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16
Cash Account (semi-annual)	-1.28	-2.57	-2.42	-2.32	-2.22	-2.12	-2.01	-1.91	-1.82	-1.72	-1.62	-1.51	-1.41	-1.30	-1.19	-1.08	-0.97	-0.85	-0.73	-0.61	-0.49	-0.39	-0.29	-0.18	-0.07	0.07	0.20	0.35	0.49	0.63	0.77	0.92	1.06	1.21	1.36	1.51	1.66	1.81	1.96	2.11	2.27	
Cash Account (annual)				-2.32		-2.12		-1.91		-1.72		-1.51		-1.30		-1.08		-0.85		-0.61		-0.39		-0.18		0.07		0.35		0.63		0.92		1.21		1.51		1.81		2.11		
Change in Working Capital			0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
Change in O&M Reserve																																									
Net Cash Flow after Reserves	-1.28	-1.28	0.12	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.11	0.10	0.11	0.11	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.18
Cash Account after Reserves (semi-annual)	-1.28	-2.57	-2.45	-2.35	-2.25	-2.14	-2.04	-1.94	-1.84	-1.74	-1.64	-1.54	-1.43	-1.32	-1.21	-1.10	-0.99	-0.87	-0.76	-0.64	-0.52	-0.41	-0.31	-0.20	-0.10	0.04	0.18	0.32	0.46	0.61	0.75	0.89	1.04	1.19	1.33	1.48	1.63	1.78	1.93	2.09	2.24	
Cash Account (annual)				-2.35		-2.14		-1.94		-1.74		-1.54		-1.32		-1.10		-0.87		-0.64		-0.41		-0.20		0.04		0.32		0.61		0.89		1.19		1.48		1.78		2.09		
Cash Available for Debt Service Reserve	-1.28	-2.57	-2.45	-2.35	0.10	0.21	0.11	0.20	0.10	0.20	0.10	0.20	0.11	0.21	0.11	0.22	0.11	0.23	0.12	0.24	0.12	0.23	0.10	0.21	0.11	0.25	0.14	0.28	0.14	0.28	0.14	0.29	0.15	0.29	0.15	0.30	0.15	0.30	0.15	0.31	0.15	0.34
Debt Service				0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03																	
Debt Service Coverage Ratio				3.22	3.30	3.39	3.47	3.26	3.34	3.43	3.52	3.62	3.72	3.83	3.93	4.05	4.17	4.29	4.42	4.55	4.70	4.17	4.30	4.44	4.58																	
Check																																									
Net Income afterTax			0.06	0.05	0.05	0.05	0.06	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
Cash Flow available for Dividends				-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Gross Dividend				-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Dividend Withholding Tax																																										
Net Dividends				-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Net Cash Flow	-1.28	-1.28	0.14	2.45	0.10	-0.10	0.11	-0.11	0.10	-0.10	0.10	-0.10	0.11	-0.11	0.11	-0.11	0.11	-0.11	0.12	-0.12	0.12	-0.12	0.10	-0.10	0.11	-0.11	0.14	-0.14	0.14	-0.14	0.14	-0.14	0.15	-0.15	0.15	-0.15	0.15	-0.15	0.15	-0.15	-0.18
Cash Account (semi-annual)	-1.28	-2.57	-2.42	0.02	0.13	0.02	0.13	0.02	0.12	0.02	0.12	0.02	0.13	0.02	0.13	0.02	0.14	0.02	0.14	0.03	0.15	0.02	0.13	0.02	0.13	0.02	0.16	0.02	0.16	0.02	0.17	0.02	0.17	0.02	0.17	0.02	0.17	0.02	0.18	0.03	0.18	0.00
Cash Account (annual)		-2.57		0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.03		0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.03		0.00
Net Cash Flow represented by:																																									
Change in Debt Service Account																																									
Change in Working Capital			0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
Change in O&M Reserve																																									
Change in Cash	-1.28	-1.28	0.12	2.45	0.10	-0.10	0.11	-0.11	0.10	-0.10	0.10	-0.10	0.11	-0.11	0.11	-0.11	0.11	-0.11	0.12	-0.12	0.12	-0.12	0.10	-0.10	0.11	-0.11	0.14	-0.14	0.14	-0.14	0.14	-0.14	0.15	-0.15	0.15	-0.15	0.15	-0.15	0.15	-0.15	-0.15
Cash Account Represented by																																									
Debt Service Account																																									
Working Capital			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
O&M Reserve																																									
Cash	-1.28	-2.57	-2.45		0.10		0.11		0.10		0.10		0.11		0.11		0.11		0.12		0.12		0.10		0.11		0.14		0.14		0.14		0.15		0.15		0.15		0.15		0.15	0.00
Negative cash				0.00		0.00		0.00	0.00	0.00	0.00	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00
Basis for interest on positive cash account	-1.28	-2.57	-2.45		0.10		0.11		0.10		0.10		0.11		0.11		0.11		0.12		0.12		0.10		0.11		0.14		0.14		0.14		0.15		0.15		0.15		0.15	0.15	0.00	0.00

Table 13-16: Financial Ratio for Scenario IV (6 x V47 used Vestas WT)

Financial Ratios (figures in mill. EUR)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Period				1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20
Operating Year																																											
Investment		-1.61	-1.61																																							
Operating Income				0.14	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16
Net Cash Flow before Financing		-1.61	-1.61	0.14	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.16
Operating IRR	6.44%																																									
Net Present Value Mio. E	(0.69)																																									
Depreciation				0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Interest Expense					0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00																	
Debt Service Reserve																																											
Net Pre-Tax Cash Flow		-1.61	-1.61	0.22	0.21	0.21	0.21	0.22	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.24
Tax																																										
Net Post-Tax Cash Flow		-1.61	-1.61	0.22	0.21	0.21	0.21	0.22	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.21	0.21	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.24
Post-Tax IRR	12.2%																																									
Net Present Value Mio. E	0.47																																									
Investment		-1.61	-1.61																																							
Financing Fee			0.00																																							
Working Capital																																										
Capitalized Interest																																										
Capital Requirements		-1.61	-1.61																																							
Loan Drawdown		0.32	0.32																																							
Equity Paid-In/Return of Capital																																										
Dividend				-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Equity Cash Flow				-2.35		0.21		0.20		0.20		0.20		0.21		0.22		0.23		0.24		0.23		0.21		0.25		0.28		0.28		0.29		0.29		0.30		0.30		0.31		0.34
Equity Cash Flow w/o Equity Reimbursement				*-2.35*		*0.21*		*0.20*		*0.20*		*0.20*		*0.21*		*0.22*		*0.23*		*0.24*		*0.23*		*0.21*		*0.25*		*0.28*		*0.28*		*0.29*		*0.29*		*0.30*		*0.30*		*0.31*		*0.34*
ROE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0%	2.0%	3.3%	3.3%	4.3%	4.3%	5.2%	5.2%	5.9%	5.9%	6.5%	6.5%	7.1%	7.1%	7.5%
ROE w/o Equity Reimb.																																										
ROE after period																																										
5	-																																									
10	-																																									
15	4.33%																																									
20	7.52%																																									
Equity Balance				-2.35	-2.35	-2.14	-2.14	-1.94	-1.94	-1.74	-1.74	-1.54	-1.54	-1.32	-1.32	-1.10	-1.10	-0.87	-0.87	-0.64	-0.64	-0.41	-0.41	-0.20	-0.20	0.04	0.04	0.32	0.32	0.61	0.61	0.89	0.89	1.19	1.19	1.48	1.48	1.78	1.78	2.09	2.09	2.42
Payback in Year	12																																									
Loan Disbursements		-0.32	-0.32																																							
Financing Fee			0.00																																							
Debt Service				0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03																	
Financing Cash Flow		-0.32	-0.32	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03																	
Return on Financing	4.40%									-23.3%	-18.5%	-14.5%	-11.3%	-8.6%	-6.3%	-4.4%	-2.7%	-1.4%	-0.2%	0.9%	1.8%	2.6%	3.3%	3.9%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Operating Income				0.14	0.29	0.29	0.30	0.30	0.29	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.31	0.29	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.31	0.31	0.31
Balance Debt Service Account																																										
Subtotal				0.14	0.29	0.29	0.30	0.30	0.29	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.31	0.29	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.31	0.31	0.31
Repayment				0.03	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.03																	
Interest (excl. Witholding Tax)				0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00																	
Min. Debt Service				0.05	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.03																	
Debt Service Coverage Ratio	3.34x	-	-	- 6.40	-	3.34	-	3.37	-	3.39	-	3.57	-	3.77	-	3.99	-	4.23	-	4.49	-	4.44	-	4.37	-	9.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DSCR incl. Debt Serv. Res.	.28x	-	-	- 0.28	-	3.34	-	3.37	-	3.39	-	3.57	-	3.77	-	3.99	-	4.23	-	4.49	-	4.44																					

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