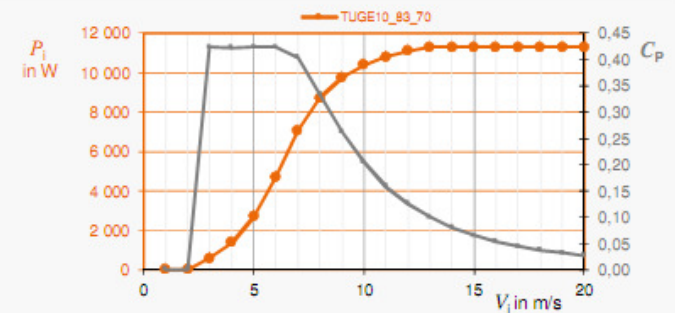


# Small Wind Turbine Yield Estimator V2.2010



Input Site Data	
Measurement Height	40 m
Average Wind Speed $V_{ave}$	7,0 m/s
Roughness Length $z_0$	0,1 m
Scale Parameter c	estimated: 7,9 m/s
Shape Factor k	2
Rayleigh Distribution	
Air Density $\rho$	1,225 kg/m <sup>3</sup>

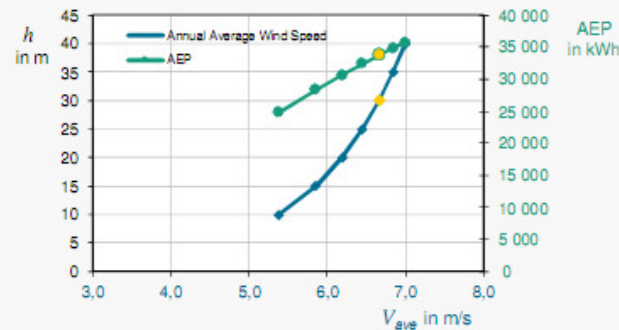
Project Data	
Location	
Notes	
7. Apr. 2015	
Terrain	
Agricultural land with some houses and 8 m tall sheltering hedgerows with a distance of approx. 500 m*	



Small Wind Turbine Data			
10,3 m • TUGE10_83_70			
Conversion Rate	30	%	
Uncertainty Factor	30	%	
Hub Height	30	m	
Rotor Diameter	10,3 m		
Rotor Swept Area	83,32 m <sup>2</sup>		
SWT Data Source	olsen		
$V_i$	$P_{Wind,i}$	$P_i$	$C_{P,i}$
m/s	W	W	
1	51	0	0,00
2	408	0	0,00
3	1 378	584	0,42
4	3 266	1 380	0,42
5	6 379	2 700	0,42
6	11 024	4 670	0,42
7	17 505	7 080	0,40
8	26 130	8 720	0,33
9	37 205	9 750	0,26
10	51 035	10 400	0,20
11	67 928	10 800	0,16
12	88 189	11 100	0,13
13	112 124	11 300	0,10
14	140 041	11 300	0,08
15	172 244	11 300	0,07
16	209 040	11 300	0,05
17	250 736	11 300	0,05
18	297 638	11 300	0,04
19	350 051	11 300	0,03
20	408 282	11 300	0,03

Output Table								Actual turbine performance may vary!			
Hub height	Average wind speed	Annual energy output $E_{out}$		Conversion rate	Annual specific energy		Wind power density	SWT average power	Increase in $E_{out}$ with height	Wind speed bin with highest annual output	
$h$	$V_{ave}$	Power Curve	30 %	Power Curve	Wind	Output SWT				$V_{max, E_{out}}$	Max $E_{out,i}$
m	m/s	kWh/a	kWh/a		(kWh/m <sup>2</sup> )/a	(kWh/m <sup>2</sup> )/a	W/m <sup>2</sup>	W/m <sup>2</sup>		m/s	kWh/a
30	6,7	33 731	75 106	13 %	3 005	405	343	46	100 %	8	4 879
10	5,4	24 807	39 950	19 %	1 598	298	182	34	74 %	7	4 365
15	5,9	28 322	51 390	17 %	2 056	340	235	39	84 %	7	4 532
20	6,2	30 665	60 617	15 %	2 425	368	277	42	91 %	8	4 725
25	6,5	32 388	68 386	14 %	2 736	389	312	44	96 %	8	4 826
30	6,7	33 731	75 106	13 %	3 005	405	343	46	100 %	8	4 879
35	6,8	34 819	81 027	13 %	3 241	418	370	48	103 %	8	4 906
40	7,0	35 727	86 316	12 %	3 453	429	394	49	106 %	8	4 916

Estimations for annual average wind speed and annual energy output at different heights



Energy distribution of generated electricity, i. e. annual energy output in each wind speed bin

