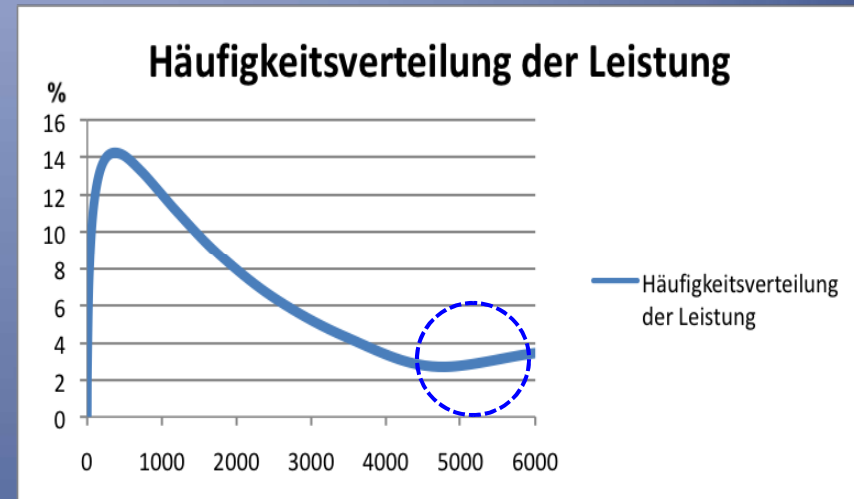
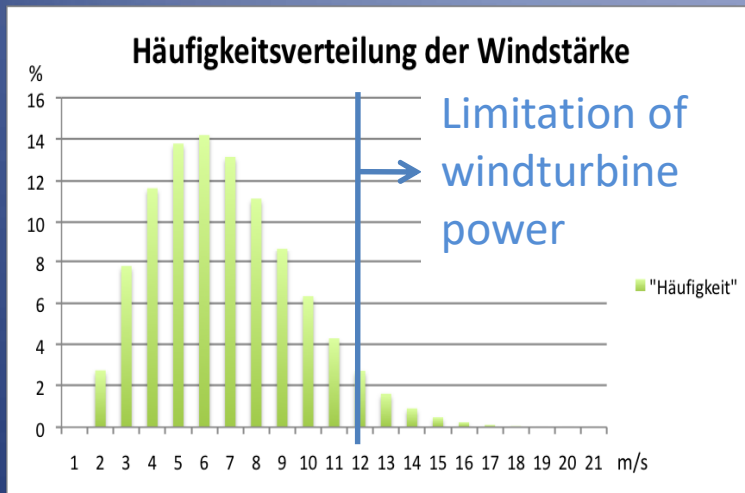


Wind Power Statistics and H₂ Evolution

* Technical Power-Limit enhances Frequency of Occurrence *

* This is realized today already! *



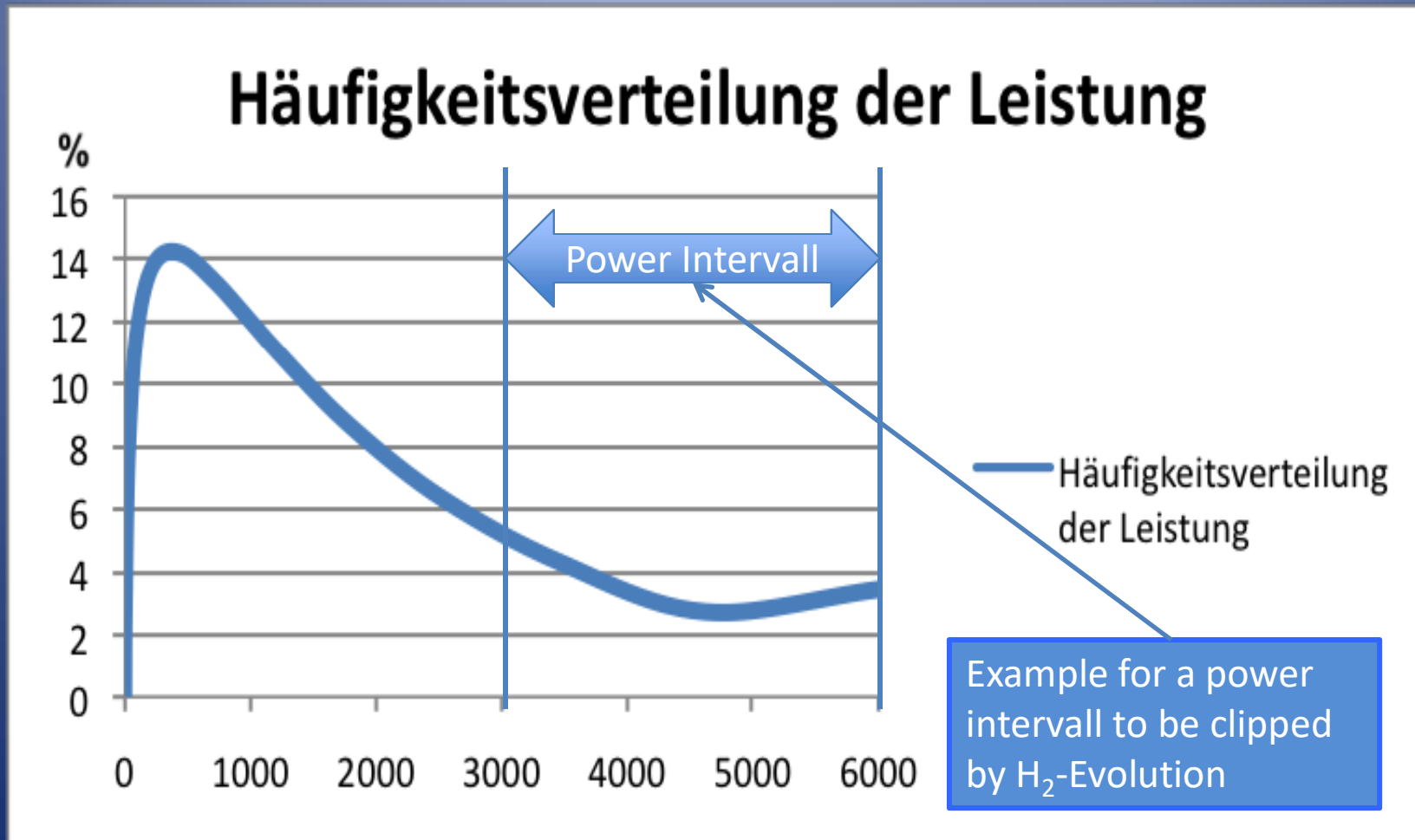
Example for the frequency of wind speed
(source: <https://wind-data.ch/tools/weibull.php>)

Calculated frequency of power based on
data shown at left hand

*Numbers must be treated as an example, because wind speed frequency strongly depends on the site of the windturbine !
Power scaled in relative units.*

Wind Power Statistics and H₂ Evolution

Suitable Power Intervall for Power Clipping by H₂-Evolution



Wind Power Statistics and H₂ Evolution

Simplified Estimation of the Amount of Energy being applied,
while clipping the produced wind power by H₂-Evolution

1. Calculate the meanvalue of left intervall: 1.5 MW
2. Calculate the meanvalue of right intervall: 4.5 MW
3. Calculate operating hours from frequency:
 - 89% frequency of pure grid fed power => 7120 h/y operation
 - 11% frequency of grid fed power **clipped by H₂-Evolution** => 880 h/y
4. Calculate the amount of energy from operating hours:
 - 7120 h/y x 1.5 MW = 10.68 GWh/y (73%) <= grid fed energy
 - 880 h/y x 3.0 MW = 2.64 GWh/y (18,0%) <= grid fed energy
 - 880 h/y x 1.5 MW = **1.32 GWh/y (9,02%)** <= applied for H₂-evolution

Numbers must be treated as an example, because wind speed frequency strongly depends on the site of the windturbine !

Wind Power Statistics and H₂ Evolution

Appendix: Tables of Data used for the Graphs

Beispiel Winddaten (Weibull-Verteilung)

Windgeschw v [m/s]	Dynamik der Leistung [RE]	Häufigkeit der Leistung [%]			
0	0	0	0		
1	3	2,75	2,75		
2	28	7,80	7,80		
3	94	11,64	11,64		
4	222	13,79	13,79		
5	434	14,20	14,20		
6	750	13,15	13,15		
7	1191	11,14	11,14		
8	1778	8,72	8,72		
9	2531	6,34	6,34		
10	3472	4,30	4,30	4,30	
11	4622	2,73	2,73	2,73	
12	6000	1,62	1,62	1,62	1,62
13	6000	0,91	0,91	0,91	0,91
14	6000	0,48	0,48	0,48	0,48
15	6000	0,24	0,24	0,24	0,24
16	6000	0,11	0,11	0,11	0,11
17	6000	0,05	0,05	0,05	0,05
18	6000	0,02	0,02	0,02	0,02
19	6000	0,01	0,01	0,01	0,01
20	6000	0,00	0,00	0,00	0,00
Summe		100,00	89,53	10,47	3,44



Häufigkeitsverteilung der Leistung

Dynamik der Leistung [RE]	Häufigkeit der Leistung [%]
0	0
3	2,75
28	7,80
94	11,64
222	13,79
434	14,20
750	13,15
1191	11,14
1778	8,72
2531	6,34
3472	4,30
4622	2,73
6000	3,44
Summe	100

Numbers must be treated as an example, because wind speed frequency strongly depends on the site of the windturbine !

Power scaled in relative units.