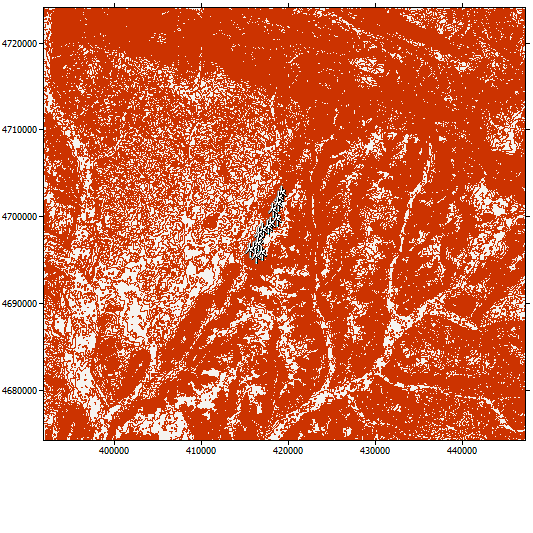
# 'Turbine cluster 1' Wind farm report

Produced on 21/03/2019 at 16:48:07 by licenced user: Carmen Garcia Guerra using WAsP Version: 12.02.0014

## Site information

|  |  |
| --- | --- |
| Site count | 15 |
| Uniform hub height a.g.l | 93 m |

The Wind farm lies in a map called 'Emplazamiento UTM WGS84 30N\_recortado - Generated by Global Mapper (www.globalmapper.com)'.



## Summary results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Total | Average | Minimum | Maximum |
| Net AEP [GWh] | 127,557 | 8,504 | 8,234 | 9,262 |
| Gross AEP [GWh] | 132,354 | 8,824 | 8,557 | 9,538 |
| Wake loss [%] | 3,62 | - | - | - |

## Site results

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | Location [m] | Turbine | Elevation [m] a.s.l. | Height [m] a.g.l. | Air density [kg/m&sup3] | Net AEP [GWh] | Wake loss [%] |
| Turbine site 01 | (418859, 4698991) | G114 2MW | 945,5 | 93,0 | 1,105 | 8,331 | 2,88 |
| Turbine site 02 | (418232, 4698464) | G114 2MW | 941,4 | 93,0 | 1,106 | 8,259 | 4,33 |
| Turbine site 03 | (417794,4, 4698116,0) | G114 2MW | 941,1 | 93,0 | 1,106 | 8,319 | 4,62 |
| Turbine site 04 | (417325,2, 4697706,0) | G114 2MW | 940,5 | 93,0 | 1,106 | 8,425 | 4,57 |
| Turbine site 05 | (416869,6, 4697260,0) | G114 2MW | 938,3 | 93,0 | 1,106 | 8,569 | 4,31 |
| Turbine site 06 | (416866,1, 4696638,0) | G114 2MW | 936,2 | 93,0 | 1,106 | 8,234 | 4,93 |
| Turbine site 07 | (416676,7, 4696075,0) | G114 2MW | 935,5 | 93,0 | 1,106 | 8,241 | 4,51 |
| Turbine site 08 | (416287,1, 4695594,0) | G114 2MW | 935,3 | 93,0 | 1,106 | 8,461 | 4,31 |
| Turbine site 09 | (415729, 4695412) | G114 2MW | 935,0 | 93,0 | 1,106 | 9,262 | 2,9 |
| Turbine site 010 | (416439,3, 4694762,0) | G114 2MW | 930,5 | 93,0 | 1,107 | 8,898 | 2,63 |
| Turbine site 011 | (417119,2, 4695067,0) | G114 2MW | 930,7 | 93,0 | 1,107 | 8,402 | 2,97 |
| Turbine site 012 | (419444, 4702034) | G114 2MW | 952,6 | 93,0 | 1,104 | 8,454 | 2,9 |
| Turbine site 013 | (419170, 4701395) | G114 2MW | 950,6 | 93,0 | 1,105 | 8,403 | 3,35 |
| Turbine site 014 | (418987,4, 4700740,0) | G114 2MW | 944,3 | 93,0 | 1,105 | 8,307 | 2,92 |
| Turbine site 015 | (418407,8, 4700039,0) | G114 2MW | 945,2 | 93,0 | 1,105 | 8,994 | 2,35 |

## Site wind climates

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site | Location [m] | H [m] | A [m/s] | k | U [m/s] | E [W/m²] | RIX [%] | dRIX [%] |
| Turbine site 01 | (418859, 4698991) | 93,0 | 8,0 | 2,55 | 7,13 | 312 | 0,0 | 0,0 |
| Turbine site 02 | (418232, 4698464) | 93,0 | 8,1 | 2,57 | 7,15 | 313 | 0,0 | 0,0 |
| Turbine site 03 | (417794,4, 4698116,0) | 93,0 | 8,1 | 2,54 | 7,21 | 322 | 0,0 | 0,0 |
| Turbine site 04 | (417325,2, 4697706,0) | 93,0 | 8,2 | 2,56 | 7,26 | 328 | 0,0 | 0,0 |
| Turbine site 05 | (416869,6, 4697260,0) | 93,0 | 8,2 | 2,56 | 7,32 | 336 | 0,0 | 0,0 |
| Turbine site 06 | (416866,1, 4696638,0) | 93,0 | 8,1 | 2,59 | 7,15 | 311 | 0,0 | 0,0 |
| Turbine site 07 | (416676,7, 4696075,0) | 93,0 | 8,1 | 2,56 | 7,15 | 314 | 0,0 | 0,0 |
| Turbine site 08 | (416287,1, 4695594,0) | 93,0 | 8,2 | 2,59 | 7,25 | 323 | 0,0 | 0,0 |
| Turbine site 09 | (415729, 4695412) | 93,0 | 8,6 | 2,60 | 7,61 | 375 | 0,0 | 0,0 |
| Turbine site 010 | (416439,3, 4694762,0) | 93,0 | 8,3 | 2,62 | 7,38 | 340 | 0,1 | 0,0 |
| Turbine site 011 | (417119,2, 4695067,0) | 93,0 | 8,0 | 2,63 | 7,13 | 305 | 0,0 | 0,0 |
| Turbine site 012 | (419444, 4702034) | 93,0 | 8,1 | 2,59 | 7,18 | 314 | 0,0 | 0,0 |
| Turbine site 013 | (419170, 4701395) | 93,0 | 8,1 | 2,60 | 7,17 | 312 | 0,0 | 0,0 |
| Turbine site 014 | (418987,4, 4700740,0) | 93,0 | 8,0 | 2,59 | 7,10 | 304 | 0,0 | 0,0 |
| Turbine site 015 | (418407,8, 4700039,0) | 93,0 | 8,4 | 2,61 | 7,43 | 347 | 0,0 | 0,0 |

## Calculation of annual output for 'Turbine cluster 1'

### Sector 1 (0°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 8,3 | 2,34 | 4,25 | 7,32 | 378,157 | 359,976 | 95,19 |
| Turbine site 02 | 8,7 | 2,33 | 4,65 | 7,71 | 442,456 | 430,247 | 97,24 |
| Turbine site 03 | 8,5 | 2,32 | 4,46 | 7,57 | 414,063 | 414,063 | 100,0 |
| Turbine site 04 | 8,9 | 2,32 | 4,71 | 7,86 | 459,551 | 459,551 | 100,0 |
| Turbine site 05 | 8,7 | 2,33 | 4,49 | 7,74 | 429,538 | 429,538 | 100,0 |
| Turbine site 06 | 8,6 | 2,35 | 4,45 | 7,58 | 415,877 | 357,801 | 86,04 |
| Turbine site 07 | 8,5 | 2,33 | 4,47 | 7,55 | 414,604 | 390,914 | 94,29 |
| Turbine site 08 | 9,0 | 2,34 | 4,79 | 7,96 | 475,272 | 475,272 | 100,0 |
| Turbine site 09 | 9,5 | 2,34 | 4,81 | 8,39 | 507,424 | 507,424 | 100,0 |
| Turbine site 010 | 8,8 | 2,37 | 4,39 | 7,77 | 423,767 | 384,694 | 90,78 |
| Turbine site 011 | 8,8 | 2,37 | 4,70 | 7,81 | 457,199 | 432,417 | 94,58 |
| Turbine site 012 | 8,8 | 2,34 | 4,67 | 7,80 | 451,681 | 451,681 | 100,0 |
| Turbine site 013 | 8,5 | 2,36 | 4,40 | 7,56 | 409,692 | 409,576 | 99,97 |
| Turbine site 014 | 8,4 | 2,36 | 4,36 | 7,45 | 397,799 | 382,715 | 96,21 |
| Turbine site 015 | 9,3 | 2,35 | 4,86 | 8,27 | 504,317 | 504,317 | 100,0 |
| Sector 1 total | - | - | - | - | 6581,399 | 6390,186 | 97,09 |

### Sector 2 (22,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 7,0 | 2,19 | 4,23 | 6,20 | 285,921 | 282,919 | 98,95 |
| Turbine site 02 | 7,3 | 2,20 | 4,55 | 6,47 | 331,126 | 313,914 | 94,8 |
| Turbine site 03 | 7,2 | 2,19 | 4,31 | 6,36 | 304,694 | 285,436 | 93,68 |
| Turbine site 04 | 7,4 | 2,20 | 4,56 | 6,54 | 337,770 | 323,709 | 95,84 |
| Turbine site 05 | 7,4 | 2,19 | 4,39 | 6,53 | 324,707 | 315,566 | 97,18 |
| Turbine site 06 | 7,3 | 2,19 | 4,52 | 6,47 | 329,347 | 285,039 | 86,55 |
| Turbine site 07 | 7,2 | 2,19 | 4,39 | 6,37 | 311,201 | 223,763 | 71,9 |
| Turbine site 08 | 7,6 | 2,20 | 4,77 | 6,70 | 367,767 | 302,638 | 82,29 |
| Turbine site 09 | 8,0 | 2,20 | 4,80 | 7,06 | 401,517 | 388,966 | 96,87 |
| Turbine site 010 | 7,7 | 2,19 | 4,66 | 6,82 | 369,444 | 335,966 | 90,94 |
| Turbine site 011 | 7,7 | 2,19 | 4,95 | 6,81 | 391,345 | 376,132 | 96,11 |
| Turbine site 012 | 7,5 | 2,19 | 4,68 | 6,60 | 351,786 | 351,786 | 100,0 |
| Turbine site 013 | 7,3 | 2,19 | 4,52 | 6,48 | 329,335 | 278,065 | 84,43 |
| Turbine site 014 | 7,2 | 2,19 | 4,47 | 6,37 | 317,427 | 262,061 | 82,56 |
| Turbine site 015 | 7,9 | 2,20 | 4,94 | 7,00 | 406,945 | 379,999 | 93,38 |
| Sector 2 total | - | - | - | - | 5160,332 | 4705,960 | 91,19 |

### Sector 3 (45°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 6,3 | 2,78 | 4,84 | 5,63 | 260,225 | 260,225 | 100,0 |
| Turbine site 02 | 6,3 | 2,88 | 4,90 | 5,63 | 261,753 | 217,848 | 83,23 |
| Turbine site 03 | 6,3 | 2,88 | 4,76 | 5,58 | 248,321 | 173,136 | 69,72 |
| Turbine site 04 | 6,4 | 2,88 | 4,82 | 5,66 | 260,937 | 171,725 | 65,81 |
| Turbine site 05 | 6,4 | 2,87 | 4,86 | 5,74 | 272,145 | 166,311 | 61,11 |
| Turbine site 06 | 6,5 | 2,82 | 5,09 | 5,78 | 291,086 | 272,521 | 93,62 |
| Turbine site 07 | 6,3 | 2,86 | 4,87 | 5,61 | 258,109 | 252,244 | 97,73 |
| Turbine site 08 | 6,5 | 2,88 | 5,08 | 5,82 | 294,398 | 221,803 | 75,34 |
| Turbine site 09 | 6,9 | 2,88 | 5,12 | 6,14 | 335,799 | 279,416 | 83,21 |
| Turbine site 010 | 6,9 | 2,77 | 5,36 | 6,16 | 355,639 | 352,903 | 99,23 |
| Turbine site 011 | 6,7 | 2,85 | 5,55 | 6,00 | 345,931 | 345,931 | 100,0 |
| Turbine site 012 | 6,5 | 2,88 | 5,09 | 5,76 | 287,608 | 287,608 | 100,0 |
| Turbine site 013 | 6,5 | 2,79 | 5,13 | 5,83 | 299,742 | 297,879 | 99,38 |
| Turbine site 014 | 6,5 | 2,78 | 5,10 | 5,76 | 289,834 | 289,834 | 100,0 |
| Turbine site 015 | 6,9 | 2,89 | 5,33 | 6,12 | 346,768 | 300,053 | 86,53 |
| Sector 3 total | - | - | - | - | 4408,293 | 3889,436 | 88,23 |

### Sector 4 (67,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 7,5 | 3,37 | 7,09 | 6,73 | 561,175 | 561,175 | 100,0 |
| Turbine site 02 | 7,4 | 3,47 | 6,94 | 6,63 | 532,670 | 520,243 | 97,67 |
| Turbine site 03 | 7,4 | 3,41 | 6,85 | 6,66 | 531,919 | 486,465 | 91,45 |
| Turbine site 04 | 7,4 | 3,48 | 6,81 | 6,65 | 526,227 | 503,874 | 95,75 |
| Turbine site 05 | 7,6 | 3,43 | 6,97 | 6,82 | 567,945 | 563,236 | 99,17 |
| Turbine site 06 | 7,6 | 3,44 | 7,30 | 6,81 | 593,485 | 593,485 | 100,0 |
| Turbine site 07 | 7,4 | 3,43 | 6,98 | 6,67 | 543,696 | 543,696 | 100,0 |
| Turbine site 08 | 7,5 | 3,51 | 7,09 | 6,76 | 567,874 | 567,874 | 100,0 |
| Turbine site 09 | 7,9 | 3,51 | 7,10 | 7,11 | 628,534 | 483,104 | 76,86 |
| Turbine site 010 | 8,0 | 3,46 | 7,71 | 7,21 | 700,998 | 592,218 | 84,48 |
| Turbine site 011 | 7,7 | 3,50 | 7,60 | 6,91 | 636,361 | 636,361 | 100,0 |
| Turbine site 012 | 7,5 | 3,49 | 7,15 | 6,75 | 569,643 | 569,643 | 100,0 |
| Turbine site 013 | 7,6 | 3,44 | 7,39 | 6,87 | 610,926 | 610,926 | 100,0 |
| Turbine site 014 | 7,6 | 3,43 | 7,37 | 6,80 | 597,715 | 597,715 | 100,0 |
| Turbine site 015 | 7,8 | 3,51 | 7,20 | 6,98 | 615,661 | 615,661 | 100,0 |
| Sector 4 total | - | - | - | - | 8784,828 | 8445,674 | 96,14 |

### Sector 5 (90°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 8,1 | 3,09 | 7,03 | 7,20 | 631,383 | 631,383 | 100,0 |
| Turbine site 02 | 7,7 | 3,08 | 6,39 | 6,92 | 533,800 | 533,800 | 100,0 |
| Turbine site 03 | 7,9 | 3,09 | 6,69 | 7,10 | 587,321 | 587,321 | 100,0 |
| Turbine site 04 | 7,8 | 3,08 | 6,30 | 6,96 | 532,624 | 532,624 | 100,0 |
| Turbine site 05 | 8,1 | 3,08 | 6,64 | 7,20 | 596,347 | 596,347 | 100,0 |
| Turbine site 06 | 7,9 | 3,07 | 6,66 | 7,07 | 579,025 | 579,025 | 100,0 |
| Turbine site 07 | 7,9 | 3,08 | 6,66 | 7,05 | 576,291 | 576,291 | 100,0 |
| Turbine site 08 | 7,7 | 3,06 | 6,17 | 6,91 | 513,642 | 513,642 | 100,0 |
| Turbine site 09 | 8,1 | 3,06 | 6,13 | 7,23 | 554,551 | 525,176 | 94,7 |
| Turbine site 010 | 8,2 | 3,03 | 6,55 | 7,31 | 603,396 | 603,396 | 100,0 |
| Turbine site 011 | 7,6 | 3,03 | 6,13 | 6,83 | 499,765 | 499,765 | 100,0 |
| Turbine site 012 | 7,8 | 3,06 | 6,33 | 6,93 | 530,149 | 530,149 | 100,0 |
| Turbine site 013 | 8,0 | 3,07 | 6,73 | 7,13 | 592,937 | 592,937 | 100,0 |
| Turbine site 014 | 7,9 | 3,07 | 6,80 | 7,09 | 594,138 | 594,138 | 100,0 |
| Turbine site 015 | 7,9 | 3,04 | 6,02 | 7,02 | 515,883 | 515,883 | 100,0 |
| Sector 5 total | - | - | - | - | 8441,251 | 8411,877 | 99,65 |

### Sector 6 (112,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 7,2 | 2,69 | 4,14 | 6,37 | 294,801 | 294,801 | 100,0 |
| Turbine site 02 | 7,1 | 2,79 | 3,96 | 6,29 | 274,479 | 274,479 | 100,0 |
| Turbine site 03 | 7,3 | 2,79 | 4,21 | 6,53 | 313,969 | 313,969 | 100,0 |
| Turbine site 04 | 7,2 | 2,80 | 4,04 | 6,42 | 290,948 | 290,948 | 100,0 |
| Turbine site 05 | 7,3 | 2,78 | 4,07 | 6,53 | 304,013 | 304,013 | 100,0 |
| Turbine site 06 | 6,9 | 2,72 | 3,78 | 6,15 | 250,269 | 250,269 | 100,0 |
| Turbine site 07 | 7,2 | 2,78 | 4,07 | 6,38 | 289,990 | 289,990 | 100,0 |
| Turbine site 08 | 6,9 | 2,78 | 3,72 | 6,18 | 248,675 | 230,363 | 92,64 |
| Turbine site 09 | 7,3 | 2,78 | 3,68 | 6,46 | 269,671 | 258,029 | 95,68 |
| Turbine site 010 | 6,9 | 2,67 | 3,57 | 6,11 | 232,819 | 232,819 | 100,0 |
| Turbine site 011 | 6,5 | 2,75 | 3,37 | 5,78 | 193,473 | 193,473 | 100,0 |
| Turbine site 012 | 6,9 | 2,78 | 3,75 | 6,16 | 248,614 | 248,614 | 100,0 |
| Turbine site 013 | 6,9 | 2,70 | 3,74 | 6,12 | 244,004 | 244,004 | 100,0 |
| Turbine site 014 | 6,8 | 2,69 | 3,78 | 6,09 | 244,577 | 244,577 | 100,0 |
| Turbine site 015 | 6,9 | 2,77 | 3,51 | 6,16 | 232,456 | 232,456 | 100,0 |
| Sector 6 total | - | - | - | - | 3932,756 | 3902,802 | 99,24 |

### Sector 7 (135°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 5,8 | 2,03 | 3,92 | 5,13 | 182,688 | 182,688 | 100,0 |
| Turbine site 02 | 5,8 | 1,97 | 3,82 | 5,16 | 181,362 | 181,362 | 100,0 |
| Turbine site 03 | 5,9 | 1,99 | 3,99 | 5,26 | 197,237 | 197,237 | 100,0 |
| Turbine site 04 | 6,0 | 1,97 | 3,87 | 5,31 | 195,400 | 195,400 | 100,0 |
| Turbine site 05 | 6,0 | 1,98 | 3,89 | 5,28 | 193,621 | 193,621 | 100,0 |
| Turbine site 06 | 5,6 | 1,97 | 3,69 | 5,00 | 163,657 | 163,657 | 100,0 |
| Turbine site 07 | 5,8 | 1,98 | 3,89 | 5,15 | 183,891 | 183,891 | 100,0 |
| Turbine site 08 | 5,8 | 1,94 | 3,63 | 5,12 | 169,928 | 161,360 | 94,96 |
| Turbine site 09 | 6,0 | 1,94 | 3,61 | 5,36 | 185,787 | 164,670 | 88,63 |
| Turbine site 010 | 5,6 | 1,96 | 3,47 | 4,98 | 152,760 | 152,760 | 100,0 |
| Turbine site 011 | 5,3 | 1,90 | 3,33 | 4,73 | 131,302 | 131,302 | 100,0 |
| Turbine site 012 | 5,7 | 1,94 | 3,66 | 5,05 | 166,218 | 166,218 | 100,0 |
| Turbine site 013 | 5,6 | 1,98 | 3,66 | 4,99 | 160,768 | 160,768 | 100,0 |
| Turbine site 014 | 5,6 | 1,99 | 3,69 | 4,96 | 159,778 | 159,778 | 100,0 |
| Turbine site 015 | 5,8 | 1,93 | 3,50 | 5,14 | 165,015 | 165,015 | 100,0 |
| Sector 7 total | - | - | - | - | 2589,410 | 2559,725 | 98,85 |

### Sector 8 (157,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 6,3 | 2,78 | 5,04 | 5,58 | 264,949 | 264,949 | 100,0 |
| Turbine site 02 | 6,4 | 2,80 | 5,16 | 5,71 | 286,896 | 286,896 | 100,0 |
| Turbine site 03 | 6,5 | 2,78 | 5,30 | 5,82 | 308,831 | 308,831 | 100,0 |
| Turbine site 04 | 6,6 | 2,79 | 5,32 | 5,89 | 319,284 | 319,284 | 100,0 |
| Turbine site 05 | 6,5 | 2,78 | 5,16 | 5,83 | 301,360 | 298,427 | 99,03 |
| Turbine site 06 | 6,1 | 2,82 | 4,78 | 5,46 | 236,561 | 231,125 | 97,7 |
| Turbine site 07 | 6,4 | 2,78 | 5,14 | 5,68 | 283,107 | 250,092 | 88,34 |
| Turbine site 08 | 6,3 | 2,86 | 4,93 | 5,64 | 265,314 | 243,960 | 91,95 |
| Turbine site 09 | 6,6 | 2,87 | 4,89 | 5,90 | 292,872 | 292,872 | 100,0 |
| Turbine site 010 | 5,9 | 2,93 | 4,33 | 5,30 | 196,323 | 196,323 | 100,0 |
| Turbine site 011 | 5,8 | 3,00 | 4,36 | 5,14 | 179,837 | 179,837 | 100,0 |
| Turbine site 012 | 6,2 | 2,84 | 4,89 | 5,56 | 253,229 | 253,229 | 100,0 |
| Turbine site 013 | 6,1 | 2,83 | 4,69 | 5,41 | 226,414 | 226,414 | 100,0 |
| Turbine site 014 | 6,0 | 2,81 | 4,71 | 5,37 | 224,134 | 224,134 | 100,0 |
| Turbine site 015 | 6,3 | 2,95 | 4,63 | 5,58 | 240,125 | 210,920 | 87,84 |
| Sector 8 total | - | - | - | - | 3879,237 | 3787,294 | 97,63 |

### Sector 9 (180°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 7,3 | 2,85 | 7,65 | 6,52 | 568,439 | 568,439 | 100,0 |
| Turbine site 02 | 7,7 | 2,87 | 8,36 | 6,90 | 693,815 | 693,815 | 100,0 |
| Turbine site 03 | 7,6 | 2,88 | 8,02 | 6,80 | 647,609 | 644,124 | 99,46 |
| Turbine site 04 | 7,9 | 2,88 | 8,48 | 7,08 | 735,164 | 720,855 | 98,05 |
| Turbine site 05 | 7,8 | 2,87 | 8,07 | 6,92 | 673,148 | 491,878 | 73,07 |
| Turbine site 06 | 7,5 | 2,82 | 8,00 | 6,70 | 627,815 | 579,727 | 92,34 |
| Turbine site 07 | 7,6 | 2,86 | 8,05 | 6,75 | 640,720 | 616,579 | 96,23 |
| Turbine site 08 | 8,0 | 2,85 | 8,61 | 7,10 | 748,813 | 697,643 | 93,17 |
| Turbine site 09 | 8,4 | 2,85 | 8,65 | 7,47 | 817,378 | 817,378 | 100,0 |
| Turbine site 010 | 7,7 | 2,80 | 7,88 | 6,82 | 639,033 | 639,033 | 100,0 |
| Turbine site 011 | 7,6 | 2,79 | 8,26 | 6,81 | 666,846 | 666,846 | 100,0 |
| Turbine site 012 | 7,8 | 2,84 | 8,40 | 6,93 | 700,464 | 695,232 | 99,25 |
| Turbine site 013 | 7,5 | 2,81 | 7,90 | 6,66 | 612,935 | 570,108 | 93,01 |
| Turbine site 014 | 7,4 | 2,81 | 7,83 | 6,56 | 590,691 | 565,542 | 95,74 |
| Turbine site 015 | 8,2 | 2,83 | 8,73 | 7,32 | 797,437 | 768,098 | 96,32 |
| Sector 9 total | - | - | - | - | 10160,308 | 9735,299 | 95,82 |

### Sector 10 (202,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 7,4 | 3,69 | 7,72 | 6,70 | 605,513 | 591,888 | 97,75 |
| Turbine site 02 | 7,8 | 3,64 | 8,29 | 7,03 | 719,890 | 685,428 | 95,21 |
| Turbine site 03 | 7,6 | 3,69 | 7,87 | 6,87 | 651,934 | 589,026 | 90,35 |
| Turbine site 04 | 7,9 | 3,60 | 8,29 | 7,14 | 741,810 | 615,048 | 82,91 |
| Turbine site 05 | 7,8 | 3,69 | 8,02 | 7,06 | 701,492 | 625,351 | 89,15 |
| Turbine site 06 | 7,8 | 3,69 | 8,26 | 6,99 | 709,298 | 498,825 | 70,33 |
| Turbine site 07 | 7,6 | 3,69 | 8,01 | 6,89 | 666,383 | 608,023 | 91,24 |
| Turbine site 08 | 8,1 | 3,62 | 8,68 | 7,31 | 810,574 | 810,574 | 100,0 |
| Turbine site 09 | 8,5 | 3,62 | 8,74 | 7,71 | 895,031 | 895,031 | 100,0 |
| Turbine site 010 | 8,1 | 3,64 | 8,50 | 7,30 | 794,287 | 794,287 | 100,0 |
| Turbine site 011 | 8,1 | 3,65 | 9,03 | 7,30 | 843,495 | 843,495 | 100,0 |
| Turbine site 012 | 7,9 | 3,66 | 8,52 | 7,16 | 766,940 | 522,878 | 68,18 |
| Turbine site 013 | 7,8 | 3,69 | 8,25 | 7,00 | 709,405 | 520,822 | 73,42 |
| Turbine site 014 | 7,6 | 3,69 | 8,16 | 6,89 | 679,812 | 597,598 | 87,91 |
| Turbine site 015 | 8,5 | 3,62 | 8,99 | 7,63 | 904,997 | 820,975 | 90,72 |
| Sector 10 total | - | - | - | - | 11200,862 | 10019,248 | 89,45 |

### Sector 11 (225°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 7,9 | 2,85 | 8,45 | 7,07 | 729,794 | 561,746 | 76,97 |
| Turbine site 02 | 8,0 | 2,81 | 8,53 | 7,15 | 750,695 | 546,719 | 72,83 |
| Turbine site 03 | 8,0 | 2,82 | 8,29 | 7,08 | 717,879 | 540,467 | 75,29 |
| Turbine site 04 | 8,1 | 2,81 | 8,39 | 7,19 | 744,750 | 612,747 | 82,28 |
| Turbine site 05 | 8,2 | 2,82 | 8,47 | 7,28 | 766,992 | 760,791 | 99,19 |
| Turbine site 06 | 8,2 | 2,83 | 8,88 | 7,29 | 807,387 | 766,646 | 94,95 |
| Turbine site 07 | 8,0 | 2,82 | 8,47 | 7,12 | 740,036 | 605,832 | 81,87 |
| Turbine site 08 | 8,3 | 2,81 | 8,84 | 7,39 | 820,489 | 820,489 | 100,0 |
| Turbine site 09 | 8,7 | 2,82 | 8,88 | 7,78 | 890,146 | 890,146 | 100,0 |
| Turbine site 010 | 8,7 | 2,85 | 9,36 | 7,73 | 930,605 | 930,605 | 100,0 |
| Turbine site 011 | 8,5 | 2,83 | 9,60 | 7,57 | 925,472 | 920,990 | 99,52 |
| Turbine site 012 | 8,2 | 2,81 | 8,85 | 7,32 | 808,439 | 805,244 | 99,6 |
| Turbine site 013 | 8,2 | 2,84 | 8,95 | 7,34 | 821,966 | 815,010 | 99,15 |
| Turbine site 014 | 8,1 | 2,85 | 8,89 | 7,24 | 800,218 | 728,267 | 91,01 |
| Turbine site 015 | 8,7 | 2,83 | 9,11 | 7,71 | 900,651 | 900,094 | 99,94 |
| Sector 11 total | - | - | - | - | 12155,519 | 11205,794 | 92,19 |

### Sector 12 (247,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 8,1 | 3,41 | 7,80 | 7,28 | 720,846 | 703,425 | 97,58 |
| Turbine site 02 | 7,9 | 3,53 | 7,24 | 7,11 | 640,551 | 590,855 | 92,24 |
| Turbine site 03 | 8,0 | 3,46 | 7,38 | 7,19 | 666,942 | 647,593 | 97,1 |
| Turbine site 04 | 7,9 | 3,54 | 7,06 | 7,12 | 627,868 | 622,984 | 99,22 |
| Turbine site 05 | 8,2 | 3,47 | 7,44 | 7,34 | 698,982 | 698,982 | 100,0 |
| Turbine site 06 | 8,1 | 3,49 | 7,72 | 7,32 | 722,901 | 722,901 | 100,0 |
| Turbine site 07 | 8,0 | 3,47 | 7,47 | 7,19 | 674,763 | 652,210 | 96,66 |
| Turbine site 08 | 8,0 | 3,60 | 7,19 | 7,20 | 653,724 | 532,142 | 81,4 |
| Turbine site 09 | 8,4 | 3,60 | 7,18 | 7,57 | 713,654 | 713,654 | 100,0 |
| Turbine site 010 | 8,6 | 3,51 | 8,10 | 7,74 | 832,998 | 832,998 | 100,0 |
| Turbine site 011 | 8,2 | 3,56 | 7,76 | 7,38 | 738,342 | 631,236 | 85,49 |
| Turbine site 012 | 8,0 | 3,55 | 7,37 | 7,21 | 670,488 | 670,488 | 100,0 |
| Turbine site 013 | 8,2 | 3,48 | 7,85 | 7,39 | 746,223 | 746,223 | 100,0 |
| Turbine site 014 | 8,2 | 3,47 | 7,88 | 7,33 | 738,377 | 738,377 | 100,0 |
| Turbine site 015 | 8,3 | 3,60 | 7,29 | 7,44 | 701,884 | 701,884 | 100,0 |
| Sector 12 total | - | - | - | - | 10548,541 | 10205,954 | 96,75 |

### Sector 13 (270°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 9,5 | 3,04 | 8,84 | 8,46 | 1000,576 | 1000,576 | 100,0 |
| Turbine site 02 | 9,1 | 3,04 | 8,13 | 8,15 | 879,096 | 879,096 | 100,0 |
| Turbine site 03 | 9,3 | 3,04 | 8,40 | 8,34 | 935,071 | 935,071 | 100,0 |
| Turbine site 04 | 9,2 | 3,04 | 7,99 | 8,20 | 869,916 | 869,916 | 100,0 |
| Turbine site 05 | 9,5 | 3,04 | 8,39 | 8,47 | 951,641 | 951,641 | 100,0 |
| Turbine site 06 | 9,3 | 3,05 | 8,53 | 8,35 | 951,718 | 951,718 | 100,0 |
| Turbine site 07 | 9,3 | 3,04 | 8,42 | 8,29 | 930,417 | 930,417 | 100,0 |
| Turbine site 08 | 9,1 | 3,05 | 7,96 | 8,18 | 864,099 | 841,310 | 97,36 |
| Turbine site 09 | 9,6 | 3,05 | 7,93 | 8,57 | 911,984 | 911,984 | 100,0 |
| Turbine site 010 | 9,8 | 3,03 | 8,63 | 8,72 | 1011,680 | 1011,680 | 100,0 |
| Turbine site 011 | 9,1 | 3,03 | 8,12 | 8,15 | 877,589 | 867,135 | 98,81 |
| Turbine site 012 | 9,2 | 3,05 | 8,14 | 8,20 | 886,844 | 886,844 | 100,0 |
| Turbine site 013 | 9,4 | 3,05 | 8,63 | 8,42 | 972,739 | 972,739 | 100,0 |
| Turbine site 014 | 9,4 | 3,05 | 8,70 | 8,37 | 973,688 | 973,688 | 100,0 |
| Turbine site 015 | 9,3 | 3,05 | 7,87 | 8,34 | 877,226 | 877,226 | 100,0 |
| Sector 13 total | - | - | - | - | 13894,282 | 13861,040 | 99,76 |

### Sector 14 (292,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 10,1 | 2,71 | 7,74 | 8,97 | 907,988 | 907,988 | 100,0 |
| Turbine site 02 | 9,8 | 2,73 | 7,34 | 8,71 | 838,563 | 838,563 | 100,0 |
| Turbine site 03 | 10,1 | 2,74 | 7,75 | 9,01 | 916,471 | 916,471 | 100,0 |
| Turbine site 04 | 9,9 | 2,74 | 7,37 | 8,83 | 854,662 | 854,662 | 100,0 |
| Turbine site 05 | 10,2 | 2,73 | 7,57 | 9,06 | 899,805 | 899,805 | 100,0 |
| Turbine site 06 | 9,8 | 2,71 | 7,23 | 8,70 | 823,085 | 823,085 | 100,0 |
| Turbine site 07 | 10,0 | 2,73 | 7,57 | 8,86 | 880,238 | 880,238 | 100,0 |
| Turbine site 08 | 9,7 | 2,73 | 6,99 | 8,62 | 788,706 | 788,706 | 100,0 |
| Turbine site 09 | 10,1 | 2,72 | 6,93 | 9,01 | 819,801 | 819,801 | 100,0 |
| Turbine site 010 | 9,9 | 2,68 | 6,89 | 8,77 | 789,443 | 788,502 | 99,88 |
| Turbine site 011 | 9,3 | 2,70 | 6,58 | 8,24 | 703,769 | 660,332 | 93,83 |
| Turbine site 012 | 9,7 | 2,72 | 7,09 | 8,62 | 799,994 | 799,994 | 100,0 |
| Turbine site 013 | 9,8 | 2,70 | 7,19 | 8,72 | 818,376 | 818,376 | 100,0 |
| Turbine site 014 | 9,8 | 2,69 | 7,25 | 8,68 | 821,882 | 821,882 | 100,0 |
| Turbine site 015 | 9,7 | 2,72 | 6,71 | 8,67 | 760,895 | 760,895 | 100,0 |
| Sector 14 total | - | - | - | - | 12423,677 | 12379,299 | 99,64 |

### Sector 15 (315°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 9,2 | 2,45 | 6,02 | 8,19 | 625,075 | 625,075 | 100,0 |
| Turbine site 02 | 9,2 | 2,44 | 6,09 | 8,20 | 632,602 | 632,602 | 100,0 |
| Turbine site 03 | 9,5 | 2,44 | 6,21 | 8,40 | 662,392 | 662,392 | 100,0 |
| Turbine site 04 | 9,5 | 2,45 | 6,23 | 8,42 | 667,007 | 667,007 | 100,0 |
| Turbine site 05 | 9,5 | 2,44 | 6,08 | 8,42 | 650,353 | 650,353 | 100,0 |
| Turbine site 06 | 9,0 | 2,44 | 5,79 | 7,98 | 581,576 | 581,576 | 100,0 |
| Turbine site 07 | 9,3 | 2,44 | 6,07 | 8,22 | 632,214 | 632,214 | 100,0 |
| Turbine site 08 | 9,2 | 2,44 | 5,90 | 8,12 | 605,824 | 605,824 | 100,0 |
| Turbine site 09 | 9,6 | 2,44 | 5,87 | 8,50 | 634,829 | 634,829 | 100,0 |
| Turbine site 010 | 9,0 | 2,44 | 5,47 | 7,94 | 546,393 | 509,626 | 93,27 |
| Turbine site 011 | 8,5 | 2,42 | 5,37 | 7,54 | 500,736 | 485,475 | 96,95 |
| Turbine site 012 | 9,1 | 2,44 | 5,86 | 8,04 | 593,716 | 593,716 | 100,0 |
| Turbine site 013 | 9,0 | 2,44 | 5,72 | 7,96 | 572,779 | 572,779 | 100,0 |
| Turbine site 014 | 8,9 | 2,44 | 5,75 | 7,91 | 571,421 | 571,421 | 100,0 |
| Turbine site 015 | 9,2 | 2,44 | 5,70 | 8,15 | 586,832 | 586,832 | 100,0 |
| Sector 15 total | - | - | - | - | 9063,749 | 9011,720 | 99,43 |

### Sector 16 (337,5°)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | A [m/s] | k | Freq. [%] | U [m/s] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | 9,4 | 2,53 | 5,24 | 8,35 | 560,430 | 533,497 | 95,19 |
| Turbine site 02 | 9,8 | 2,54 | 5,63 | 8,73 | 633,212 | 633,212 | 100,0 |
| Turbine site 03 | 9,8 | 2,53 | 5,51 | 8,71 | 617,387 | 617,387 | 100,0 |
| Turbine site 04 | 10,1 | 2,54 | 5,75 | 8,97 | 664,226 | 664,226 | 100,0 |
| Turbine site 05 | 9,9 | 2,54 | 5,49 | 8,81 | 622,673 | 622,673 | 100,0 |
| Turbine site 06 | 9,5 | 2,55 | 5,33 | 8,44 | 578,072 | 576,494 | 99,73 |
| Turbine site 07 | 9,7 | 2,54 | 5,47 | 8,59 | 604,601 | 604,601 | 100,0 |
| Turbine site 08 | 10,0 | 2,56 | 5,67 | 8,86 | 647,565 | 647,565 | 100,0 |
| Turbine site 09 | 10,5 | 2,56 | 5,67 | 9,30 | 679,243 | 679,243 | 100,0 |
| Turbine site 010 | 9,5 | 2,57 | 5,12 | 8,47 | 559,260 | 540,566 | 96,66 |
| Turbine site 011 | 9,4 | 2,57 | 5,30 | 8,33 | 567,357 | 530,966 | 93,59 |
| Turbine site 012 | 9,8 | 2,56 | 5,55 | 8,67 | 620,651 | 620,651 | 100,0 |
| Turbine site 013 | 9,4 | 2,55 | 5,26 | 8,38 | 565,993 | 565,993 | 100,0 |
| Turbine site 014 | 9,3 | 2,55 | 5,23 | 8,28 | 555,579 | 555,579 | 100,0 |
| Turbine site 015 | 10,1 | 2,56 | 5,63 | 9,00 | 653,366 | 653,366 | 100,0 |
| Sector 16 total | - | - | - | - | 9129,616 | 9046,020 | 99,08 |

### All sectors

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Turbine | Location [m] | MWh (free) | MWh (Park 2) | Eff. [%] |
| Turbine site 01 | (418859, 4698991) | 8577,961 | 8330,750 | 97,12 |
| Turbine site 02 | (418232, 4698464) | 8632,966 | 8259,079 | 95,67 |
| Turbine site 03 | (417794,4, 4698116,0) | 8722,041 | 8318,991 | 95,38 |
| Turbine site 04 | (417325,2, 4697706,0) | 8828,146 | 8424,560 | 95,43 |
| Turbine site 05 | (416869,6, 4697260,0) | 8954,761 | 8568,531 | 95,69 |
| Turbine site 06 | (416866,1, 4696638,0) | 8661,159 | 8233,891 | 95,07 |
| Turbine site 07 | (416676,7, 4696075,0) | 8630,260 | 8240,994 | 95,49 |
| Turbine site 08 | (416287,1, 4695594,0) | 8842,665 | 8461,167 | 95,69 |
| Turbine site 09 | (415729, 4695412) | 9538,221 | 9261,724 | 97,1 |
| Turbine site 010 | (416439,3, 4694762,0) | 9138,846 | 8898,377 | 97,37 |
| Turbine site 011 | (417119,2, 4695067,0) | 8658,816 | 8401,692 | 97,03 |
| Turbine site 012 | (419444, 4702034) | 8706,464 | 8453,975 | 97,1 |
| Turbine site 013 | (419170, 4701395) | 8694,234 | 8402,618 | 96,65 |
| Turbine site 014 | (418987,4, 4700740,0) | 8557,070 | 8307,306 | 97,08 |
| Turbine site 015 | (418407,8, 4700039,0) | 9210,458 | 8993,675 | 97,65 |
| Wind farm | - | 132354,064 | 127557,329 | 96,38 |

### Wake effects modelling

Wake losses are modelled using PARK2, using default coefficient (0,09) for onshore.

### Generalised wind climate

A generalised wind climate called 'GWC 1' was used to calculate the predicted wind climates

### Data origins information

The map was imported by 'profesor' from a file called 'C:\Users\Profesor\Downloads\Emplazamiento SUR UTM WGS84 30N.map', on a computer called 'EOI316'. The map file data were last modified on the 19/03/2019 at 10:23:40.

There is no information about the origin of the wind atlas associated with this Wind farm.

The wind turbine generator associated with this Wind farm was imported by 'profesor' from a file called 'C:\Users\Profesor\Desktop\wasp\G114 2MW 93m.wtg', on a computer called 'EOI316'. The wind turbine generator file was last modified on the 19/03/2019 at 11:31:21

### WAsP project parameters

All of the WAsP project parameters have default values.

The Wind farm is in a project called 'Project 1'.

### Terrain analysis (IBZ) parameters

All of the Terrain analysis (IBZ) parameters have default values.