| Energy Trust Shade Effect Evaluation Form | 70° ⊢ | | | | | | | | 12h | | | | | | | |
|---|----------------|--------------------------------|------------------------|-------------------------|--------------------|--------------|-------|--------|-------|-------|-----------------------|-----------------------|-------------------|---------------------------------------|--|--|
| | - | (c) Univ. of (| Oregon SR | ML | | | | | 1011 | | | | Esti | mated | annua | AC outpu |
| Job Name: | _ | Sponsor: Ene | | | | 11h | 1.1 | | | 1.3 | 13h | | 0.7 1 | «Wh∕W | att DC | per year |
| Contractor: | | Lat: 44.27; Lo (Solar) time | | 5 | 325 | | | | | | K) | X 2. | | | | |
| Date: | 60° | Tilt: 90; Aspe | ct: 270 | | 1.0 | | 1 | 0 | 1 | 3 | | 2.5 | | | | |
| Array Tilt: | - | Redmond, OF | 2 | 10h | | A \ | \ | | | / | 4 | , / | λ^{14h} | | | |
| Array Orientation: | _ | | | \perp | | 0.9 | | | | | 2.6 | X | | | | |
| Zip Code of Site: | | | | 160/ | $' \setminus $ | 639 | | | | | 7 | | /3 3/ | | | |
| | 50° – | | | 10.3/ | | \25. \ | | 1.0 | 1.4 | | 180 m | $\downarrow /$ | 10.51 | | | |
| The sun path chart to the right is for a solar electric | - | | 9h | | • X | | | | | | | X: | 3.9 | \\15h | | |
| system located in Redmond, Oregon tilted 90 | | | | / X | \angle | 0.9 | | | | | 2.5 | | \perp | | | |
| degrees with a 270 degree azimuthal orientation. The annual AC output for a system with these | _ | | 1 | ./ \ \ | / | \ | | | | 10 | / | / ` | \ / | /3.7 | | |
| characteristics is about 0.7 kWh/Watt DC per year. | ation 40° | | | / | 0.7 | | - J. | 0.9 | 1.3 | 1 % | | | \mathcal{N} | 15. | | |
| characteristics is accept on him water 20 per year. | at | | $_{8\mathrm{h}}$ / / | 0 5 | 0.7 | X m | \ | 0.0 | 1.0 | | 150 X | 3.6 | | 4.5 \ | \ 16h | |
| For comparison, annual production capacity per | Eleva | | -/ | \perp | | | 0.7 | | | 2 | .1 / ` | | | \perp | \ | |
| Watt of an optimally oriented system (36 degree tilt | Ħ | | // | | \setminus / \mid | \ | 2000 | | | Co. | | $ \setminus \rangle$ | / | \langle / \rangle | \ | |
| and 175 degree azimuth) is 1.43 kWh/Watt DC per | <u>g</u> 30° [| | Ø. ¥/ \ | 0.4 | X | .5 | | 0.7 | 1.1 | 1 6 | | , 6 X | 3.7 | \bigvee | 13.9 | |
| year. | Solar - | 71 | $\int \int_{0.2} \int$ | Λ | /\ | X | 0.6 | | | 1.9 | 1 | | | \bigwedge_{4} | 5 \ \ \ 17 | ,1 |
| Local Duadration Committee 1 42 hWb/Watt DC | _ | 71. | 0.2 | Λ | | | 05 | | | 1.9 | | | Δ | 4_ | $+$ λ 1' | 111 |
| Local Production Capacity = 1.43 kWh/Watt DC per year. | - | | $/ \wedge / $ | | .2 V | 0.3 | 305 | 0.3 | 0.7 | 13 | ` | \/ _ | $ \cdot $ | | $ \wedge \rangle$ | |
| per year. | 200 | | / \/ 0 | | .~ X | 0.3 | 0.3 | | | 1.4 | 2.2 | $ X _{S}$ | 2.3 X | 3.5 | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | į |
| At Redmond, a system oriented as in the sun path | | | / X | $ \cdot $ | /\ | | Voec | | | (C) | | | / \ | | $\bigvee_{3.8}$ | \ |
| chart to the right will produce 49% of the annual | - | 6h / | | \perp | | $\sqrt{0.1}$ | , A | | | · · | 1.5 | <u> </u> | $\downarrow /$ | \ / | 3.0 \ | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ |
| electricity produced by an optimally oriented | | / X | | / X | · / | X / | | | | | $ \setminus \rangle$ | 1.9 | 1.7 | , \ / | $ \cdot $ | $\mathbb{X}\setminus$ |
| system. | 10° | //\ | (/ | $(\bot \bot \bot)$ | -/ | <i>y</i> | | | | | Y | | A | ДX., | 2.2 \ / | \$.\$ |
| | - | 51 / / | X / | $\setminus \mid / \mid$ | \ / / | ' | | | | | | 1.1 | $' \setminus $ | | X | |
| | _ | $\frac{5h}{}$ | | \perp | X/ | | | | | | | X | 0.9 | | $\perp \wedge$ | 2.1 \\19h |
| Draw the hariner on the gar noth chest and she de | - | / | | IX / | / | | | | | | | X, | \\\ \\\ | $\left(\left \right _{0.5} \right)$ | \ / ' | / |
| Draw the horizon on the sun path chart and shade obstructed areas. To calculate the percent reduction | | | <u> V</u> | $I \setminus I$ | | | | | | | | \ | 1 10 | 1 | Y Lab | 1 / V.4 |
| due to shading, enter the percentage of system | | 60° | 90° | 120 | | 150 | | 180 | | | 10° | | 40° | 2 | :70° | 300° |
| power output shown on the sun path chart for areas | | | | | Ea | st <- | So | lar Az | zimu | th | -> W e | est | | | | |
| shaded by obstructions into the table on the right. | | Period/Hr | 5-6 6- | -7 7-8 | 8-9 | 9-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 | Period/Hr |
| • | | May-Jun | | , , , | | 7 10 | 10 11 | 11 12 | 12 10 | 10 11 | 1 . 10 | 10 10 | 10 17 | 1, 10 | 10 1) | Jun-Jul |
| For example, assume the percentage of system | | Apr-May | | | | | | | | | | | | | | Jul-Aug |
| power output from 7:00 to 8:00 between September | | Mar-Apr | | | | | | | | | | | | | | Aug-Sep |
| 22 and October 21 is 0.4%, and 50% of that period is shaded. Enter 0.2% in the column under 7-8 and | | Feb-Mar | | | | | | | | | | | | | | Sep-Oct |
| the row labeled Feb-Mar on one side and Sep-Oct | | Jan-Feb | | | | | | | | | | | | | | Oct-Nov |
| on the other. Enter zero for each box where there is | | Dec-Jan | | | | | | | | | | | | | | Nov-Dec |

Sum of

Hourly

Shading

Sum of

Hourly

Shading

Sum the shading values in each column and enter the total in the bottom row. Sum the bottom row to determine the percent annual shading.

no shading. Note that hours are in solar time.

Percent Annual Shading: