| Energy Trust Shade Effect Evaluation Form   | 70° <sub>□</sub>           |  |                                    |     |          |                     |              |       |       |            |         |            |       |         |       |                      |
|---|----------------------------|--|------------------------------------|-----|----------|---------------------|--------------|-------|-------|------------|---------|------------|-------|---------|-------|----------------------|
| Job Name:   | -                          | (c) Univ. of (<br>Sponsor: Ene                                   | ergy Trust                         | L   |          | 11h                 | 3.5          | 3     | 12h   | 2.9        | 13h     |            |       |         |       | AC outpu<br>per year |
| Contractor:  Date: Array Tilt: Array Orientation:   | 60° -                      | Lat: 45.6; Lor<br>(Solar) time<br>Tilt: 45; Aspe<br>Portland, OR | ng: —122.6<br>zone: —8<br>ect: 120 | 10h | 73.      | 11h                 |              | .5    | 3.    | 0          | 131,    |            | 14h   |         |       |                      |
| Zip Code of Site:   | 500                        |  |                                    | 3.1 | $\times$ | 3.5                 |              |       |       | 1          | 2.4     | $\nearrow$ | 1.7   |         |       |                      |
| The sun path chart to the right is for a solar electric system located in Portland, Oregon tilted 45  | 50°  -                     |  | 9h                                 | 3.1 |          | ₹Q <sup>f</sup> 3.1 |              | 3.1   | 2.5   |            | 2.0     | 1.         | 6     | 15h     |       |                      |
| degrees with a 120 degree azimuthal orientation. The annual AC output for a system with these characteristics is about 0.9 kWh/Watt DC per year.          | Elevation 004              |  | 2.8/<br>8h / 5                     | 3.8 | 2.9      | 105                 | 50           | 2.4   | 2.1   | 1500       | 22      | 1.1        |       | 6.9     | 16h   |                      |
| For comparison, annual production capacity per Watt of an optimally oriented system (32 degree tilt and 190 degree azimuth) is 1.08 kWh/Watt DC per year. | Solar Elev<br>00           |  | # 3                                | 2.4 |          |                     | 2.5          | 1.9   | 1.6   | 1.t        | 0.6     |            | 0.3   |         | 04    |                      |
| Local Production Capacity = 1.08 kWh/Watt DC per year.  | <u>-</u><br>-              | 71   | 2.3                                | 2.0 | 0        | 1.4                 | 1.9          | 1.2   | 0.9   | 1.1        | 0.3     | 0.:        | 2     | 0.3     | 3 173 | h                    |
| At Portland, a system oriented as in the sun path chart to the right will produce 83% of the annual electricity produced by an optimally oriented         | 20° -<br>-<br>-<br>-       | 6h   | 1.4                                | 1.1 | 0.9      | 6.7                 | 1.2<br>\sec_ |       |       | 20.6<br>23 | 0.2     |            |       |         | 0.1   | 18h                  |
| system.   | 10° -<br>-<br>-<br>-       | 5h 0.3   | 0.7                                | 0.3 | 0.3/     | <i>Y</i>            |              |       |       |            |         | $\bigvee$  |       |         |       | 19h                  |
| Draw the horizon on the sun path chart and shade obstructed areas. To calculate the percent reduction due to shading, enter the percentage of system      |                            | 60°  | 90°                                | 120 |          | 150                 |              | 180   | -     |            | 00      |            | \     | 2'      | 70°   | 300°                 |
| power output shown on the sun path chart for areas  | East < Solar Azimuth> West |  |                                    |     |          |                     |              |       |       |            |         |            |       |         |       |                      |
| 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 1 | 15-16      | 16-17 | 17-18   | 18-19 | Period/Hr            |
| For example, assume the percentage of system  |                            | May-Jun  |                                    |     |          |                     |              |       |       |            |         |            |       |         |       | Jun-Jul              |
| power output from 7:00 to 8:00 between September  |                            | Apr-May  |                                    |     |          |                     |              |       |       |            |         |            |       |         |       | Jul-Aug              |
| 22 and October 21 is 0.4%, and 50% of that period   |                            | Mar-Apr<br>Feb-Mar   |                                    |     |          |                     |              |       |       |            |         |            |       |         |       | Aug-Sep              |
| s shaded. Enter 0.2% in the column under 7-8 and  |                            | Ian-Feh  |                                    |     |          |                     |              |       |       |            |         |            |       |         |       | Sep-Oct              |
| ne row laneled Ben-Iviar on one side and Sen-Det  |                            | Jan-ren  |                                    |     |          |                     |              |       |       |            |         |            |       | III III |       | UCI-NOV              |

Dec-Jan

Sum of

Hourly

Shading

Nov-Dec

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.

on the other. Enter zero for each box where there is

no shading. Note that hours are in solar time.

Percent Annual Shading: