Energy Trust Shade Effect Evaluation Form	70° _[1 1		-					1				_
Tolo Nomo		(c) Univ. of								12h						annual		
Job Name:		Sponsor: Ene Lat: 46.15; Lo	ergy Tru ong: -12	1st 3.88			11h	3.	6		1.1	13 <u>h</u>		0.71	KWn/V	Watt DC	per yea	<u>r</u>
Contractor:	_	(Solar) time	zone: -									\bigvee	<u>کی</u>					
Array Tilt:	60°	_ Tilt: 45; Asp∈ Astoria, OR	ect: 90			- /3 .	8/5	\ :	3.5	3.	0 /	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	.\$~			+		
Array Orientation:	-				10h		8ª				Ĭ /		$\langle \ / \ \rangle$	14h				
Array Orientation: Zip Code of Site:					-/	X	3.6					2.2	\downarrow	$\overline{}$		+		_
Zip code of Site.	-				3.4		Á	, T					/ `	1.4				
The sun path chart to the right is for a solar electric	50°				/ /	\rightarrow	42°, 13	+	3.0	2.5		18 ES	+/-	1				
system located in Astoria, Oregon tilted 45 degrees				9h	3.:	3 <i>X</i>						, ec. ,	χ 1	.2 \	λ^{15h}			
with a 90 degree azimuthal orientation. The annual					X +	\nearrow	3.3					1.6	\wedge	$+$ \times	$\overline{}$	+		_
AC output for a system with these characteristics is	ă			3.1		/	\				1	/	\		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			
about 0.71 kWh/Watt DC per year.	ation 40°				$ \bigvee$	3.1					100		0.8	\bigvee	+ + +	+		_
	679		84	(/ 3.0		0.1	χ_{p_0}		2.2	1.5		Les X	0.8	0	$\langle $	16h		
For comparison, annual production capacity per Watt of an optimally oriented system (34 degree tilt	Elev			X +	$/ \setminus$			2.5			0.	9 /	\downarrow	\wedge	+X	1		_
and 191 degree azimuth) is 1.03 kWh/Watt DC per	<u> </u>		2/5/		/ '	\		(300)			Pox		$ \setminus $	' \	\langle / \rangle	$\rho \dot{\delta}$		
year.	Solar 00°		-//	\longrightarrow	2.5	X	.3		1.5	1.0	1	$\int \int_{0}^{\infty}$.4	0.5	\forall	1		_
	Ω	71	h 🗸 / 2.	2 / \	/	/	X	1.9	1.0	1.0		X	T / \		0.5	$\sqrt{\frac{171}{171}}$	n	
Local Production Capacity = 1.03 kWh/Watt DC	-		/ X 🗀	+	$\setminus A$	$\overline{}$	/ \	60			10.6 VOD		+/-	$\uparrow /$	+	$+\chi \setminus$		_
per year.	0	1	/_/ \	/	V 2	.0 \/	16	100	1.1	0.6	1 Co.	`	V o	$\frac{1}{2}$		$\mathcal{E}_{\cdot}Q$		
A	20°		/ X	1.7	Λ		1.6	/1.2			0.3	0.2	\mathcal{L}	$^{\sim}$	0.3	$\sqrt{}$		_
At Astoria, a system oriented as in the sun path chart to the right will produce 69% of the annual		6h //	′ 1.2 / \	\ /	/ \			Sec			60 31			/ \		0.1	λ^{18h}	
electricity produced by an optimally oriented	-	/ X				1.2	/1.0					0.1	/	1/	\setminus		$\langle \cdot \rangle$	
system.	100	ø.5/\	\setminus / \mid		1.3	1.~	/ /					$ \setminus $		X		$ \cdot \setminus \cdot $	$ \setminus \setminus $	
	10°	51	V 0.6	\wedge		65.	y					/			$\top \wedge \top$	$\perp \lambda$		
	_	5h $/ 0.4$	$/ \setminus $	/ \		\/"/							$\setminus \setminus$					∂h
		/ X /			0.5	X/							$\top \setminus \lambda$		/ \	$\langle / / \rangle$	/ X \	_
Draw the horizon on the sun path chart and shade	-	//.\/	V	0.5	$\setminus \setminus$	<i>y</i> .							\ \ \ \	\ . /	\	\bigvee	\	/
obstructed areas. To calculate the percent reduction		60°	90°		120	0	150)°	18	00	21	00	2	40°	2	700	300	jo
due to shading, enter the percentage of system power output shown on the sun path chart for areas						Ea	st <-	So	lar A	zimu								
shaded by obstructions into the table on the right.		D : 107			- 0	0.0	0.10	10.11	11.10	10.10	12.11		17.16	4 6 4 7	15.10	10.10	D 1 1/7	_
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/H	_
For example, assume the percentage of system		May-Jun															Jun-Jul	
power output from 7:00 to 8:00 between September		Apr-May Mar-Apr															Jul-Aug	
00 10 1 01: 0 40/ 1500/ 6:1 : 1		Viar-Apr			1		1	1		1			1	1			Allg-Sel	

Sep-Oct

Oct-Nov

Nov-Dec

Sum of

Hourly

Shading

Feb-Mar

Jan-Feb

Dec-Jan

Sum of

Hourly

Shading

For example, assume the percentage of system power output from 7:00 to 8:00 between September 22 and October 21 is 0.4%, and 50% of that period is shaded. Enter 0.2% in the column under 7-8 and the row labeled Feb-Mar on one side and Sep-Oct on the other. Enter zero for each box where there is no shading. Note that hours are in solar time.

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.

Percent Annual Shading: