Shading Summary Reports
via Solmetric and Pathfinder

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Shade Analysis is Critical to Solar System Performance

*"Short of outright physical destruction, **hard shadows** are the worst possible thing you can do to a PV module output."*

- The Solar Living Source Book

- Solar systems consist of series connections of modules called "strings".

- Shading on just a small section of a (crystal silicon) module dramatically reduces the output of the module and even the entire string.

Shading Analysis – Installation Considerations

Shading Analysis – Installation Considerations

Minimum
4 Corners of Array

**3-D Solar
System Picture Layout**

Layout Type   Four Corners
Layout Point Count 4

Dave, Doug, & Dan serving the tri-state area. 987.654.3210 www.dddsolar.com
Report generated by SolarPathfinder Assistant Version 2.0.1.0. http://www.solarpathfinder.com
Page: 2/7
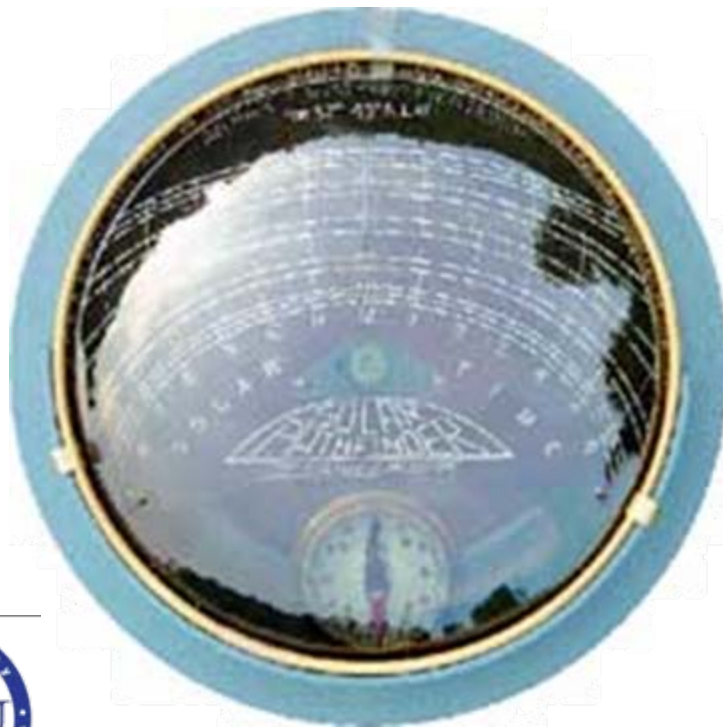
Shading Analysis – Tools of the Trade

Solar PathFinder:

Identifies shadowing problems by tracking the path of the sun.

Shading Analysis–Tools of the Trade

Solmetric Suneye

Integrated handheld measurement device that accurately measures solar access and shading with the press of a button.

Solar Access Skyline

- Information needed for program performance qualification.

- Average of the annual solar access from the four corners.

Sky02 -- 08/05/06 02:26 -- Southeast corner of roof

Solar Access
Annual: 60%
May-Oct: 74%
Nov-Apr: 45%
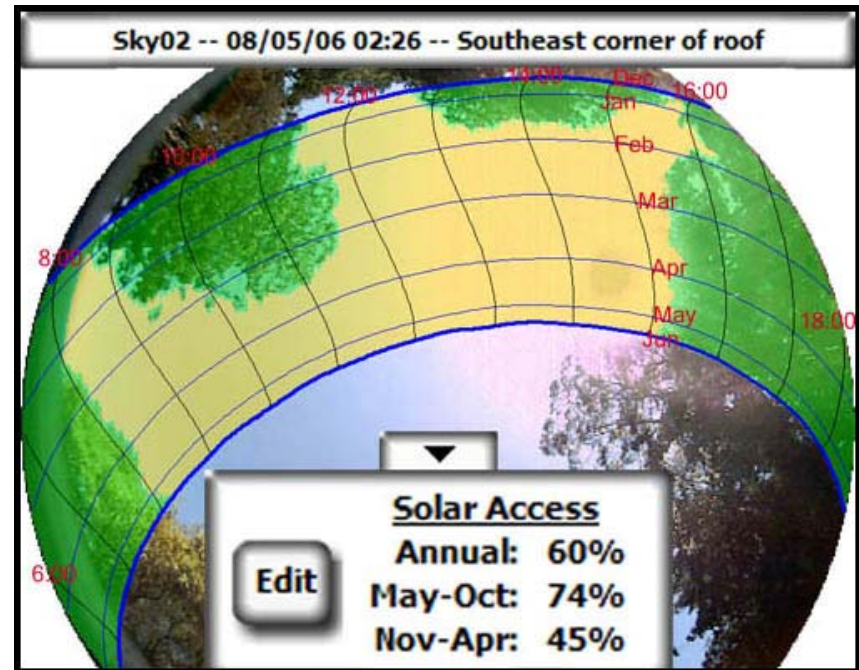
Pathfinder Summary Page

Summary Report
Solar Obstruction Data

Up to 12 columns of info…

Month	Actual Shaded Solar Radiation Azimuth=180.0 Tilt=35.0 KWH/m^2/day	Actual Shaded AC Energy (KWH) Azimuth=180.00 Tilt=35.00	Actual Unshaded AC Energy (KWH) Azimuth=180.0 Tilt=35.00	Ideal Unshaded AC Energy (KWH) Azimuth=180.0 Tilt=39.99	PV Solar Cost Savings 0.05 ($/KWH)	PVWatts Unshaded % Actual Site Azimuth=180.0 Tilt=35.00	Actual Site Efficiency % Azimuth=180.0 Tilt=35.00	Ideal Site Efficiency % Azimuth=180.0 Tilt=39.99
January	1.23	126.02	241.00	249.00	$6.30	51.21 %	49.76 %	51.11 %
February	3.89	358.29	447.00	457.00	$17.91	79.68 %	77.61 %	79.36 %
March	3.52	347.94	382.00	382.00	$17.40	88.64 %	88.42 %	88.71 %
April	4.06	372.47	415.00	407.00	$18.62	87.40 %	88.73 %	87.62 %
May	4.46	419.15	458.00	444.00	$20.96	88.97 %	91.34 %	89.19 %
June	4.85	426.65	464.00	448.00	$21.33	89.70 %	92.61 %	89.89 %
July	5.88	519.82	560.00	545.00	$25.99	90.67 %	93.41 %	90.86 %
August	4.45	395.19	437.00	426.00	$19.76	88.29 %	89.90 %	88.47 %
September	3.98	353.01	390.00	388.00	$17.65	87.89 %	88.08 %	87.97 %
October	3.42	320.52	387.00	394.00	$16.03	81.83 %	80.48 %	81.64 %
November	2.60	248.76	369.00	380.00	$12.44	66.53 %	64.39 %	66.43 %
December	0.87	84.84	242.00	251.00	$4.24	34.14 %	32.97 %	34.08 %
Totals	**36.52**	**3,972.64**	**4,792.00**	**4,771.00**	**$198.63**	**77.91 %**	**78.14 %**	**77.95 %**
	Effect: 81.81%					**Unweighted**	**Unweighted**	**Unweighted**
	Sun Hrs: 3.60					**Yearly Avg**	**Yearly Avg**	**Yearly Avg**

Notes: [None]

Solmetric Summary Annual Solar Access

Session Solar Access Averages

Averages of all skylines(5) in "Session 2"

Annual: 72%

May-Oct: 83%   **Nov-Apr:** 58%

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
37%	58%	74%	84%	89%	90%	90%	86%	81%	65%	45%	35%
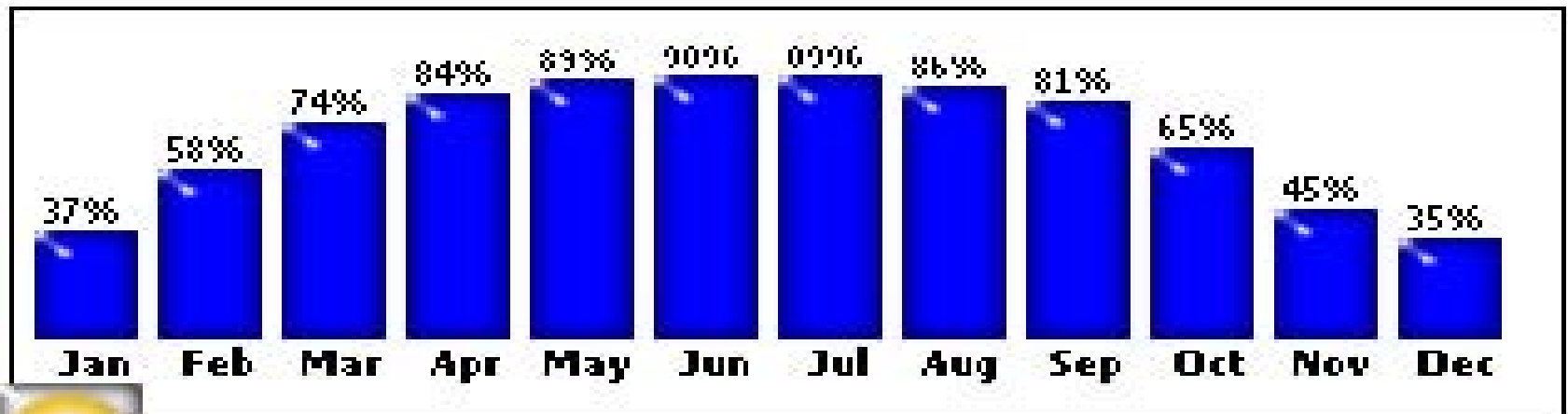
Default PVWATTS

Station Identification:

WBAN Number:	14734
City:	Newark
State:	New_Jersey

PV System Specifications:

DC Rating (kW):   4.0

DC to AC Derate Factor: 0.77   [DERATE FACTOR HELP]

Array Type: [Fixed Tilt ▾]

Fixed Tilt or 1-Axis Tracking System:

Array Tilt (degrees):   40.7   (Default = Latitude)

Array Azimuth (degrees):   180.0   (Default = South)

Energy Data:

Cost of Electricity (cents/kWh):   Default = State Average

[Calculate]   [HELP]   [Reset Form]

PVwatts
Derate Factor Page

Calculator for Overall DC to AC Derate Factor

Component Derate Factors	Component Derate Values	Range of Acceptable Values
PV module nameplate DC rating	0.95	0.80 - 1.05
Inverter and Transformer	0.92	0.88 - 0.98
Mismatch	0.98	0.97 - 0.995
Diodes and connections	0.995	0.99 - 0.997
DC wiring	0.98	0.97 - 0.99
AC wiring	0.99	0.98 - 0.993
Soiling	0.95	0.30 - 0.995
System availability	0.98	0.00 - 0.995
Shading	1.00	0.00 - 1.00
Sun-tracking	1.00	0.95 - 1.00
Age	1.00	0.70 - 1.00
Overall DC to AC derate factor	**0.77**	*(PVWATTS Default)*

Calculate Derate Factor

Pathfinder
Summary Page

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	Sun Hrs: 3.60							

Notes: [None]

Column:
"PVwatts Unshaded % Actual Site"

- The percentage of the sun's path where there is no obstruction for a given month. This value is calculated using the hourly weighted values from PVWatts (actual Azimuth, actual Tilt).

- Formula = (Actual site[azimuth & tilt] Shaded) / (Actual site[azimuth & tilt] Unshaded)