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CECPV Calculator

Project Title: Single Site, Single Inverter, Minimal Shade Example

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: BP Solar BP3180N

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story 12 ft

Number of Series Modules in each String: 12

Number of Parallel Strings per Inverter: 3

Tracking: Fixed

Roof Pitch: 5:12 Tilt 22.6 degrees

Azimuth: 180 degrees

Inverter: SMA America SB7000US (240V)

City: West Sacramento Climate Zone 12

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail | Run | CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

CEC PV Calculator - Results

kWh Production per Site	
January	457.9
Febuary	544
March	883.3
April	1043.9
May	1141.3
June	1169.8
July	1238.6
August	1194.5
September	1052.6
October	847.5
November	622.7
December	416.7
Annual	10613

kW AC system size per Site	5.59
Annual kWh per Site	10613
TDV(kWh) per Site	154386
NSHP Incentive per Site	$15253

Application Total kW AC system size	5.59
Application Total Annual kWh	10613
Application Total TDV(kWh)	154386
Application Total NSHP Incentive	$15253

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

Single Site, Single Inverter, Minimal Shade Example
Project Title

01/29/2010 9:00:08 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

West Sacramento 12
City Used in Calculator Run Climate Zone

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Reservation
PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **BP Solar BP3180N**

Inverter Manufacturer and Model: SMA America SB7000US (240V)

Series Modules in each String: 12 Parallel Strings: 3 Total Modules: 36

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 180 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	5.59	kW AC System Size:	5.59
Annual kWh:	10,613	Annual kWh:	10,613
TDV (kWh) Production:	154,386	TDV (kWh) Production:	154,386
NSHP Incentive:	$15,253	NSHP Incentive:	$15,253

CECPV Calculator

Project Title: Single Site, Single Inverter, Shade Example

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: BP Solar BP3180N

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story 12 ft

Number of Series Modules in each String: 12

Number of Parallel Strings per Inverter: 3

Tracking: Fixed

Roof Pitch: 5:12 Tilt 22.6 degrees

Azimuth: 180 degrees

Inverter: SMA America SB7000US (240V)

City: West Sacramento Climate Zone 12

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☐ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

User Input for Describing Shading

	Orientation - Enter Shading Sector Here	Obstruction Type	Height* of Shading Obstruction	Horizontal Distance to Shading Obstruction	Shading Angle
1	S (Azimuth >168.75 to 191.25)	Medium Tree (Existing - Mature)		20.00	
2	SSW (Azimuth >191.25 to 213.75)	On Roof Obstruction (Enter Distance and Height)	2.00	3.00	
3	SSE (Azimuth >146.25 to 168.75)	Neighboring Structure (Enter Distance and Height)	30.00	25.00	
4	SE (Azimuth >123.75 to 146.25)	Large Tree (Existing - Mature - Measured Angle)			30.00
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Clear Entries

Run

Run Status

CECPV 2.4 MOD2.4a/INV2.4a

CEC PV Calculator - Results

kWh Production per Site	
January	100.1
Febuary	286.2
March	825
April	1043.9
May	1141.3
June	1169.8
July	1238.6
August	1194.5
September	1038.3
October	612.5
November	142.1
December	76.7
Annual	8869

kW AC system size per Site	5.59
Annual kWh per Site	8869
TDV (kWh) per Site	137341
NSHP Incentive per Site	$13569

Application Total kW AC system size	5.59
Application Total Annual kWh	8869
Application Total TDV (kWh)	137341
Application Total NSHP Incentive	$13569

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

Single Site, Single Inverter, Shade Example — Project Title

01/29/2010 10:23:12 AM — Date

12 First St — Project Address/Lot Number

West Sacramento, CA 95691 — City/State/ZIP

West Sacramento — City Used in Calculator Run

12 — Climate Zone

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Reservation _____

PV _____

Date _____

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details: 1

Project Address List

12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **BP Solar BP3180N**

Inverter Manufacturer and Model: SMA America SB7000US (240V)

Series Modules in each String: 12 Parallel Strings: 3 Total Modules: 36

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 180 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story

Shading Type: User-Defined Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	Large Tree (Existing - Mature - Measured Angle)	30 degrees	1.73	N/A	N/A	N/A
SSE (146-169)	Neighboring Structure (Measured Angle)	36 degrees	1.39	N/A	N/A	N/A
S (169-191)	Medium Tree (Existing - Mature)	49 degrees	0.87	N/A	N/A	N/A
SSW (191-214)	On Roof Obstruction (Measured Angle)	34 degrees	1.5	N/A	N/A	N/A
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	5.59	kW AC System Size:	5.59
Annual kWh:	8,869	Annual kWh:	8,869
TDV (kWh) Production:	137,341	TDV (kWh) Production:	137,341
NSHP Incentive:	$13,569	NSHP Incentive:	$13,569

CECPV Calculator

Project Title: Single Site, Multiple Inverters, Incentive Capped Example

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 3

For a site with multiple inverters, enter the total number of inverters here.

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: BP Solar BP3180N

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story 12 ft

Number of Series Modules in each String: 12

Number of Parallel Strings per Inverter: 3

Tracking: Fixed

Roof Pitch: 5:12 Tilt 22.6 degrees

Azimuth: 180 degrees

Inverter: SMA America SB7000US (240V)

City: West Sacramento Climate Zone 12

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

The Annual kWh and TDV (kWh) are shown for the overall project which in this example is 16.78 kW AC.

CEC PV Calculator - Results

kWh Production per Site	
January	457.9
Febuary	544
March	883.3
April	1043.9
May	1141.3
June	1169.8
July	1238.6
August	1194.5
September	1052.6
October	847.5
November	622.7
December	416.7
Annual	31839

kW AC system size per Site	16.78
Annual kWh per Site	31839
TDV (kWh) per Site	463158
NSHP Incentive per Site	$20458

The per site incentive has been limited to the first 7.5 kW AC of the solar energy system, per the NSHP Guidebook.

The incentive amount is limited to the first 7.5 kW AC of the solar energy system.

Application Total kW AC system size	16.78
Application Total Annual kWh	31839
Application Total TDV (kWh)	463158
Application Total NSHP Incentive	$20458

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

Single Site, Multiple Inverters, Incentive Capped Example
Project Title

01/29/2010 10:53:19 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

West Sacramento — City Used in Calculator Run

12 — Climate Zone

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Reservation _____
PV _____
Date _____

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details: 3

The form indicates the number of inverters on the site.

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **BP Solar BP3180N**
Inverter Manufacturer and Model: SMA America SB7000US (240V)
Series Modules in each String: 12 Parallel Strings: 3 Total Modules: 36
Mounting (BIPV or Rack Mounted): Rack Mounted
Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 180 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

The per site incentive has been limited to the first 7.5 kW AC of the solar energy system, per the NSHP Guidebook.

	Per Site		Application Total
kW AC System Size:	16.78	kW AC System Size:	16.78
Annual kWh:	31,839	Annual kWh:	31,839
TDV (kWh) Production:	463,158	TDV (kWh) Production:	463,158
NSHP Incentive:	$20,458	NSHP Incentive:	$20,458

The form will indicate when the incentive has been capped to the first 7.5 kW AC of the solar energy system

CECPV Calculator

Project Title: Single Site, Multiple Microinverters Example

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details * : 24

For a project using microinverters, enter the total number of microinverters used.

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: BP Solar BP3180N

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story 12 ft

Number of Series Modules in each String: 1

Number of Parallel Strings per Inverter: 1

For a microinverter project, the number of modules in each string and number of parallel strings will be one.

Tracking: Fixed

Roof Pitch: 5:12 Tilt: 22.6 degrees

Azimuth: 180 degrees

Inverter: Enphase Energy M190-72-240-S11

City: West Sacramento Climate Zone: 12

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

* Note that an Enphase D380 is really two microinverters in a single package and should be entered as two microinverters in the calculator, not one.

CEC PV Calculator - Results

kWh Production per Site	
January	12.7
Febuary	15.1
March	24.5
May	31.6
June	32.4
July	34.3
August	33.1
September	29.1
October	23.5
November	17.3
December	11.6
Annual	7056

kW AC system size per Site	3.69
Annual kWh per Site	7056
TDV (kWh) per Site	102600
NSHP Incentive per Site	$10136

A project using microinverters will require the use of an external display or standalone performance meter.

The incentive amount will be the sum of all of the microinverters.

External display or standalone performance meter required to meet NSHP Guidebook requirements.

Application Total kW AC system size	3.69
Application Total Annual kWh	7056
Application Total TDV (kWh)	102600
Application Total NSHP Incentive	$10136

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

Single Site, Multiple Microinverters Example
Project Title

01/29/2010 11:37:25 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

West Sacramento 12
City Used in Calculator Run Climate Zone

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Reservation
PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 24

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **BP Solar BP3180N**

Inverter Manufacturer and Model: Enphase Energy M190-72-240-S11

Series Modules in each String: 1 Parallel Strings: 1 Total Modules: 1

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

The compliance form will display a message indicating a separate meter is required for a microinverter project.

Azimuth: 180 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

External display or standalone performance meter required to meet NSHP Guidebook requirements.

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	3.69	kW AC System Size:	3.69
Annual kWh:	7,056	Annual kWh:	7,056
TDV (kWh) Production:	102,600	TDV (kWh) Production:	102,600
NSHP Incentive:	$10,136	NSHP Incentive:	$10,136

For microinverter projects, the Field Verification Table will display a sum of the total expected power output for all microinverters in the application.

CERTIFICATE OF COMPLIANCE FORM: NSHP PV (Page 2 of 3) CF-1R-PV

Single Site, Multiple Microinverters Example

Project Title

01/29/2010 11:37:25 AM

Date

The power output values in this table are for one inverter. For microinverters only, the values are for the specified Number of Inverters per Site with Identical Design Details.

FIELD VERIFICATION TABLE FVT110

Irradiance on Tilted Surface (W/m²)	Temperature (degrees Fahrenheit) T=15	T=20	T=25	T=30	T=35	T=40	T=45	T=50	T=55	T=60	T=65	T=70	T=75	T=80	T=85	T=90	T=95	T=100	T=105	T=110	T=115	T=120
300	1032	1008	1008	984	984	960	960	936	936	912	912	888	864	864	840	840	816	816	792	792	768	768
325	1104	1104	1080	1080	1056	1032	1032	1008	1008	984	984	960	960	936	912	912	888	888	864	864	840	816
350	1200	1176	1176	1152	1128	1128	1104	1104	1080	1080	1056	1032	1032	1008	984	984	960	960	936	912	912	888
375	1272	1272	1248	1248	1224	1200	1200	1176	1152	1152	1128	1128	1104	1080	1080	1056	1032	1008	1008	984	960	960
400	1368	1344	1344	1320	1296	1296	1272	1248	1248	1224	1200	1200	1176	1152	1152	1128	1104	1080	1080	1056	1032	1008
425	1464	1440	1416	1416	1392	1368	1368	1344	1320	1296	1296	1272	1248	1224	1224	1200	1176	1152	1152	1128	1104	1080
450	1536	1536	1512	1488	1464	1464	1440	1416	1392	1392	1368	1344	1320	1320	1296	1272	1248	1224	1200	1200	1176	1152
475	1632	1608	1584	1584	1560	1536	1512	1512	1488	1464	1440	1416	1392	1392	1368	1344	1320	1296	1272	1248	1248	1224
500	1728	1704	1680	1656	1632	1632	1608	1584	1560	1536	1512	1488	1488	1464	1440	1416	1392	1368	1344	1320	1296	1272
525	1800	1776	1776	1752	1728	1704	1680	1656	1632	1632	1608	1584	1560	1536	1512	1488	1464	1440	1416	1392	1368	1344
550	1896	1872	1848	1824	1800	1800	1776	1752	1728	1704	1680	1656	1632	1608	1584	1560	1536	1512	1488	1464	1440	1416
575	1992	1968	1944	1920	1896	1872	1848	1824	1800	1776	1752	1728	1704	1680	1656	1632	1608	1584	1560	1536	1512	1464
600	2064	2040	2016	1992	1968	1944	1920	1896	1872	1848	1824	1800	1776	1752	1728	1704	1680	1656	1632	1584	1560	1536
625	2160	2136	2112	2088	2064	2040	2016	1992	1968	1944	1896	1872	1848	1824	1800	1776	1752	1728	1680	1656	1632	1608
650	2256	2232	2184	2160	2136	2112	2088	2064	2040	2016	1992	1944	1920	1896	1872	1848	1824	1776	1752	1728	1704	1656
675	2328	2304	2280	2256	2232	2208	2160	2136	2112	2088	2064	2040	1992	1968	1944	1920	1872	1848	1824	1800	1752	1728
700	2424	2400	2376	2328	2304	2280	2256	2232	2184	2160	2136	2112	2064	2040	2016	1992	1944	1920	1896	1848	1824	1800
725	2496	2472	2448	2424	2400	2352	2328	2304	2280	2232	2208	2184	2136	2112	2088	2040	2016	1992	1944	1920	1896	1848
750	2592	2568	2520	2496	2472	2448	2400	2376	2352	2304	2280	2256	2208	2184	2160	2112	2088	2040	2016	1992	1944	1920
775	2664	2640	2616	2592	2544	2520	2496	2448	2424	2400	2352	2328	2280	2256	2232	2184	2160	2112	2088	2040	2016	1968
800	2760	2736	2688	2664	2640	2592	2568	2520	2496	2472	2424	2400	2352	2328	2280	2256	2208	2184	2136	2112	2064	2040
825	2832	2808	2784	2736	2712	2664	2640	2616	2568	2544	2496	2472	2424	2400	2352	2328	2280	2256	2208	2160	2136	2088
850	2928	2880	2856	2808	2784	2760	2712	2688	2640	2616	2568	2544	2496	2472	2424	2376	2352	2304	2280	2232	2184	2160
875	3000	2976	2928	2904	2856	2832	2784	2760	2712	2688	2640	2616	2568	2520	2496	2448	2400	2376	2328	2280	2256	2208
900	3072	3048	3000	2976	2928	2904	2856	2832	2784	2760	2712	2664	2640	2592	2544	2520	2472	2424	2400	2352	2304	2280
925	3168	3120	3096	3048	3024	2976	2928	2904	2856	2808	2784	2736	2688	2664	2616	2568	2544	2496	2448	2400	2376	2328
950	3240	3192	3168	3120	3096	3048	3000	2976	2928	2880	2856	2808	2760	2712	2688	2640	2592	2544	2520	2472	2424	2376
975	3312	3288	3240	3192	3168	3120	3072	3048	3000	2952	2904	2880	2832	2784	2736	2688	2664	2616	2568	2520	2472	2424
1000	3408	3360	3312	3264	3240	3192	3144	3096	3072	3024	2976	2928	2904	2856	2808	2760	2712	2664	2616	2568	2544	2496
1025	3600	3432	3384	3336	3312	3264	3216	3168	3144	3096	3048	3000	2952	2904	2856	2808	2784	2736	2688	2640	2592	2544
1050	3600	3600	3600	3408	3384	3336	3288	3240	3192	3144	3120	3072	3024	2976	2928	2880	2832	2784	2736	2688	2640	2592
1075	3600	3600	3600	3600	3600	3408	3360	3312	3264	3216	3168	3120	3072	3024	2976	2928	2880	2832	2784	2736	2688	2640
1100	3600	3600	3600	3600	3600	3600	3432	3384	3336	3288	3240	3192	3144	3096	3048	3000	2952	2904	2832	2784	2736	2688
1125	3600	3600	3600	3600	3600	3600	3600	3600	3384	3336	3288	3240	3192	3144	3096	3048	3000	2952	2904	2856	2784	2736
1150	3600	3600	3600	3600	3600	3600	3600	3600	3600	3408	3360	3312	3264	3216	3144	3096	3048	3000	2952	2904	2856	2784
1175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

For a project with multiple sites, enter the total number of sites here

CECPV Calculator

Project Title: Subdivision, CFI, BIPV Example

Number of Sites with Solar: 6

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? (•) Yes ( ) No

PV Module: BP Solar BP365TS

Standoff Height: Building Integrated

Mounting Height: Two-Story 22 ft

Number of Series Modules in each String: 40

Number of Parallel Strings per Inverter: 2

Tracking: Fixed

Roof Pitch: 5:12 Tilt: 22.6 degrees

Azimuth: 170 degrees

When the California Flexible Installation option is selected, the tracking, roof pitch, tilt, and azimuth fields will be pre-populated with data specific to this type of installation.

Inverter: Xantrex Technology GT3.3-NA-DS-240-POS

City: West Sacramento Climate Zone: 12

Incentive Type:

( ) Market Rate Housing with Solar as Standard (•) All Other Market Rate Housing

( ) Affordable Housing Residential Dwelling Unit ( ) Affordable Housing Common Area

[x] Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

CEC PV Calculator - Results

kWh Production per Site	
January	359.9
Febuary	406.7
March	620.3
April	716
May	779.4
June	807.5
July	845.4
August	810.6
September	726.1
October	613.8
November	477
December	331.7
Annual	7495

kW AC system size per Site	3.91
Annual kWh per Site	7495
TDV (kWh) per Site	106451
NSHP Incentive per Site	$10517

Since the kW AC system size at each site is less than 7.5 kW AC, there is no incentive cap for this application.

The results page will display production and incentive results for each site above as well as results for total application below.

Application Total kW AC system size	23.45
Application Total Annual kWh	44970
Application Total TDV (kWh)	638706
Application Total NSHP Incentive	$63102

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

CEC PV Calculator - Site Information

Project Title: Subdivision, CFI, BIPV Example

Project Address(es): 12 First St, 23 Second St, 34 Third St, 45 Fourth St,
56 Fifth St, 67 Sixth St

City, State Zip: West Sacramento, CA 95691

When entering site information to generate compliance forms, enter addresses for all sites in the application here.

Homeowner or Builder/Developer or Applicant's Authorized Representative

Name: John Doe

Company/Firm: John's Builders

Address: 78 Fourth St

City, State Zip: West Sacramento, CA 95691

Telephone No.: 916-123-4567 License No.: C012345

Documentation Author

Name: Jane Smith

Company/Firm: California Energy Commission

Address: 1516 Ninth St

City, State Zip: Sacramento, CA 95814

Telephone No.: 800-555-7794 Run Status:

Continue

CECPV 2.4 MOD2.4a/INV2.4a

Subdivision, CFI, BIPV Example
Project Title

01/29/2010 12:36:08 PM
Date

12 First St, 23 Second St, 34 Third St, 45 Fourth St,
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

West Sacramento 12
City Used in Calculator Run Climate Zone

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Reservation
PV
Date

Number of Sites with Solar: 6

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St, 23 Second St, 34 Third St, 45 Fourth St,
56 Fifth St, 67 Sixth St

The form will display the number of sites in the applications as well as all of the project addresses.

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **BP Solar BP365TS**
Inverter Manufacturer and Model: Xantrex Technology GT3.3-NA-DS-240-POS
Series Modules in each String: 40 Parallel Strings: 2 Total Modules: 80
Mounting (BIPV or Rack Mounted): Building Integrated
Standoff Height (if rack mounted): N/A

Installation Option: **California Flexible Installation**

Azimuth: 150-270 degrees Tilt: 0 - 30.3 degrees Mounting Height Above Ground: Any
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	N/A	26	56
E (79-101)	N/A	Min Shading	2	N/A	26	56
ESE (101-124)	N/A	Min Shading	2	N/A	26	56
SE (124-146)	N/A	Min Shading	2	N/A	26	56
SSE (146-169)	N/A	Min Shading	2	N/A	26	56
S (169-191)	N/A	Min Shading	2	N/A	26	56
SSW (191-214)	N/A	Min Shading	2	N/A	26	56
SW (214-236)	N/A	Min Shading	2	N/A	26	56
WSW (236-259)	N/A	Min Shading	2	N/A	26	56
W (259-281)	N/A	Min Shading	2	N/A	26	56
WNW (281-305)	N/A	Min Shading	2	N/A	26	56

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	3.91	kW AC System Size:	23.45
Annual kWh:	7,495	Annual kWh:	44,970
TDV (kWh) Production:	106,451	TDV (kWh) Production:	638,706
NSHP Incentive:	$10,517	NSHP Incentive:	$63,102

The form will display results for each site as well as for the overall application

CECPV Calculator

Project Title: Single Site, Tracking Example

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: BP Solar BP3180N

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: Two-Story 22 ft

Number of Series Modules in each String: 12

Number of Parallel Strings per Inverter: 3

Tracking: Dual Axis

Roof Pitch: Enter Tilt Tilt: 0 degrees

Azimuth: 0 degrees

Inverter: SMA America SB7000US (240V)

City: West Sacramento Climate Zone: 12

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

CEC PV Calculator - Results

kWh Production per Site	
January	618.5
Febuary	754.3
March	1216.9
April	1477.9
May	1720.6
June	1831.4
July	1885.7
August	1716.4
September	1485
October	1190.9
November	895
December	567.1
Annual	15360

kW AC system size per Site	5.59
Annual kWh per Site	15360
TDV (kWh) per Site	217626
NSHP Incentive per Site	$21501

Application Total kW AC system size	5.59
Application Total Annual kWh	15360
Application Total TDV (kWh)	217626
Application Total NSHP Incentive	$21501

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

Single Site, Tracking Example — Project Title

01/29/2010 1:17:59 PM — Date

12 First St — Project Address/Lot Number

West Sacramento, CA 95691 — City/State/ZIP

West Sacramento — City Used in Calculator Run

12 — Climate Zone

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Reservation _____

PV _____

Date _____

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details: 1

Project Address List

12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **BP Solar BP3180N**

Inverter Manufacturer and Model: SMA America SB7000US (240V)

Series Modules in each String: 12 Parallel Strings: 3 Total Modules: 36

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: N/A Tilt: N/A Mounting Height Above Ground: Two-Story

Shading Type: Minimal Shading Tracking: Dual Axis

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	N/A	26	56
E (79-101)	N/A	Min Shading	2	N/A	26	56
ESE (101-124)	N/A	Min Shading	2	N/A	26	56
SE (124-146)	N/A	Min Shading	2	N/A	26	56
SSE (146-169)	N/A	Min Shading	2	N/A	26	56
S (169-191)	N/A	Min Shading	2	N/A	26	56
SSW (191-214)	N/A	Min Shading	2	N/A	26	56
SW (214-236)	N/A	Min Shading	2	N/A	26	56
WSW (236-259)	N/A	Min Shading	2	N/A	26	56
W (259-281)	N/A	Min Shading	2	N/A	26	56
WNW (281-305)	N/A	Min Shading	2	N/A	26	56

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	5.59	kW AC System Size:	5.59
Annual kWh:	15,360	Annual kWh:	15,360
TDV (kWh) Production:	217,626	TDV (kWh) Production:	217,626
NSHP Incentive:	$21,501	NSHP Incentive:	$21,501

CECPV Calculator

Project Title: Single Site, Multiple Inverters, Different Orientations, Incentive Capped

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: Suntech Power STP175S-24/Ab-1

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story — 12 ft

The azimuth of the first system is 170 degrees.

Number of Series Modules in each String: 10

Number of Parallel Strings per Inverter: 3

Tracking: Fixed

Roof Pitch: 5:12 — Tilt: 22.6 degrees

Azimuth: 170 degrees

Inverter: PV Powered PVP4800

City: San Jose — Climate Zone: 4

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail | Run | CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

Incentive and expected production for the first system with an azimuth of 170 degrees. Note the AC system size is 4.49 kW.

CEC PV Calculator - Results

kWh Production per Site	
January	447.8
Febuary	517.2
March	723.2
April	805.1
May	914.7
June	893.8
July	937.9
August	904.1
September	774.2
October	635.2
November	468.3
December	381.1
Annual	8403

kW AC system size per Site	4.49
Annual kWh per Site	8403
TDV (kWh) per Site	119094
NSHP Incentive per Site	$11766

Application Total kW AC system size	4.49
Application Total Annual kWh	8403
Application Total TDV (kWh)	119094
Application Total NSHP Incentive	$11766

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

Single Site, Multiple Inverters, Different Orientations, Incentive Capped
Project Title

02/22/2010 7:42:55 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

San Jose 4
City Used in Calculator Run Climate Zone

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PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **Suntech Power STP175S-24/Ab-1**

Inverter Manufacturer and Model: PV Powered PVP4800

Series Modules in each String: 10 Parallel Strings: 3 Total Modules: 30

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 170 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	4.49	kW AC System Size:	4.49
Annual kWh:	8,403	Annual kWh:	8,403
TDV (kWh) Production:	119,094	TDV (kWh) Production:	119,094
NSHP Incentive:	$11,766	NSHP Incentive:	$11,766

CECPV Calculator

Project Title: Single Site, Multiple Inverters, Different Orientations, Incentive Capped

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: Suntech Power STP175S-24/Ab-1

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story 12 ft

The azimuth of the second system is 205 degrees.

Number of Series Modules in each String: 8

Number of Parallel Strings per Inverter: 3

Tracking: Fixed

Roof Pitch: 5:12 Tilt: 22.6 degrees

Azimuth: 205 degrees

Inverter: PV Powered PVP3500

City: San Jose Climate Zone: 4

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

Incentive and expected production for the system with an azimuth of 205 degrees. Note the AC system size is 3.58 kW.

CEC PV Calculator - Results

kWh Production per Site	
January	343.9
Febuary	404.9
March	567.4
April	641.2
May	742.6
June	732.9
July	765.2
August	736.1
September	622
October	507.5
November	369.9
December	297.8
Annual	6731

kW AC system size per Site	3.58
Annual kWh per Site	6731
TDV (kWh) per Site	98786
NSHP Incentive per Site	$9760

Application Total kW AC system size	3.58
Application Total Annual kWh	6731
Application Total TDV (kWh)	98786
Application Total NSHP Incentive	$9760

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

Single Site, Multiple Inverters, Different Orientations, Incentive Capped
Project Title

02/22/2010 7:44:53 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

San Jose 4
City Used in Calculator Run Climate Zone

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PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **Suntech Power STP175S-24/Ab-1**

Inverter Manufacturer and Model: PV Powered PVP3500

Series Modules in each String: 8 Parallel Strings: 3 Total Modules: 24

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 205 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	3.58	kW AC System Size:	3.58
Annual kWh:	6,731	Annual kWh:	6,731
TDV (kWh) Production:	98,786	TDV (kWh) Production:	98,786
NSHP Incentive:	$9,760	NSHP Incentive:	$9,760

Since the overall AC system size of this application is greater than 7.5 kW, an incentive cap will be applied.

Overall AC System Size = AC Size of System 1 + AC Size of System 2
= 4.49 kW + 3.58 kW
= 8.07 kW

The incentive cap calculation is based on the TDV (kWh) production from each orientation. Separate calculations must be made for each system and the sum of those values will give the capped incentive amount.

The formula to find the proportional incentive for system 1 is:

7.5 * IncentiveAmount1/AC Size1 * TDV1/(TDV1 + TDV2) = Proportional Incentive1

7.5 * $11,766/4.49 * (119,094 / (119,094 + 98,786)) = $10,742.77

The formula to find the proportional incentive for system 2 is:

7.5 * IncentiveAmount2/AC Size2 * TDV2/(TDV1 + TDV2) = Proportional Incentive2

7.5 * $9,760/3.58 * (98,786 / (119,094 + 98,786)) = $9,270.56

Total Capped Incentive = proportional incentive1 + proportional incentive2

Total Capped Incentive = $10,742.77 + $9,270.56 = $20,013.33 ---> $20,013

The azimuth of the first array is 135 degrees.

CECPV Calculator

Project Title: One Site, One Inverter, Multiple Orientation Arrays, No Incentive Cap

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: Mitsubishi Electric PV-UD190MF5

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story — 12 ft

Number of Series Modules in each String: 16

Number of Parallel Strings per Inverter: 1

Tracking: Fixed

Roof Pitch: 5:12 — Tilt: 22.6 degrees

Azimuth: 135 degrees

Inverter: Fronius USA IG Plus 6.0-1 UNI (240V)

City: San Diego (within city limits) - Climate Zone 7 *+# — Climate Zone: 7

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail | Run | CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

Incentive and expected production for the first array.

CEC PV Calculator - Results

kWh Production per Site	
January	296.3
Febuary	325
March	416.6
April	434.3
May	446.5
June	411.3
July	462.3
August	466
September	383.5
October	369.8
November	300.3
December	282.3
Annual	4594

kW AC system size per Site	2.61
Annual kWh per Site	4594
TDV (kWh) per Site	72759
NSHP Incentive per Site	$7188

Application Total kW AC system size	2.61
Application Total Annual kWh	4594
Application Total TDV (kWh)	72759
Application Total NSHP Incentive	$7188

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

One Site, One Inverter, Multiple Orientation Arrays, No Incentive Cap
Project Title

02/22/2010 7:56:31 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

San Diego (within city limits) - Climate Zone 7 *+# 7
City Used in Calculator Run Climate Zone

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PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **Mitsubishi Electric PV-UD190MF5**

Inverter Manufacturer and Model: Fronius USA IG Plus 6.0-1 UNI (240V)

Series Modules in each String: 16 Parallel Strings: 1 Total Modules: 16

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 135 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	2.61	kW AC System Size:	2.61
Annual kWh:	4,594	Annual kWh:	4,594
TDV (kWh) Production:	72,759	TDV (kWh) Production:	72,759
NSHP Incentive:	$7,188	NSHP Incentive:	$7,188

CERTIFICATE OF COMPLIANCE FORM: NSHP PV (Page 2 of 3) CF-1R-PV

Single Site, Single Inverter, Different Orientations, No Incentive Cap

02/17/2010 2:20:07 PM

Project Title

Date

The power output values in this table are for one inverter. For microinverters only, the values are for the specified Number of Inverters per Site with Identical Design Details.

FIELD VERIFICATION TABLE FVT110

Irradiance on Tilted Surface (W/m²)	Temperature (degrees Fahrenheit) T=15	T=20	T=25	T=30	T=35	T=40	T=45	T=50	T=55	T=60	T=65	T=70	T=75	T=80	T=85	T=90	T=95	T=100	T=105	T=110	T=115	T=120
300	740	732	724	715	707	699	690	682	674	665	657	648	640	631	622	613	605	596	587	578	569	561
325	802	793	785	776	767	758	749	739	730	721	712	703	694	684	675	665	656	646	637	627	618	608
350	865	855	846	836	826	816	807	797	787	777	768	758	748	737	727	717	707	697	686	676	666	656
375	927	917	907	896	886	875	865	855	844	834	823	813	802	791	780	769	758	747	736	725	714	703
400	989	978	967	956	945	934	923	912	901	890	879	867	856	844	833	821	809	798	786	774	762	751
425	1051	1040	1028	1016	1005	993	981	969	958	946	934	922	910	898	885	873	860	848	836	823	811	798
450	1113	1101	1089	1076	1064	1051	1039	1027	1014	1002	989	976	963	951	938	925	912	899	885	872	859	846
475	1175	1162	1149	1136	1123	1110	1097	1084	1071	1057	1044	1031	1017	1003	990	976	962	949	935	921	907	894
500	1237	1224	1210	1196	1182	1169	1155	1141	1127	1113	1099	1085	1070	1056	1041	1027	1013	998	984	969	955	941
525	1299	1285	1270	1256	1242	1227	1212	1198	1183	1169	1154	1139	1124	1108	1093	1078	1063	1048	1033	1017	1002	987
550	1361	1346	1331	1316	1301	1285	1270	1255	1239	1224	1208	1193	1177	1161	1145	1129	1113	1097	1081	1065	1049	1033
575	1422	1407	1391	1375	1359	1343	1327	1311	1295	1279	1263	1246	1230	1213	1196	1180	1163	1146	1130	1113	1096	1080
600	1483	1467	1451	1434	1418	1401	1385	1368	1351	1334	1317	1300	1282	1265	1247	1230	1212	1195	1178	1160	1143	1125
625	1544	1527	1510	1493	1476	1458	1441	1424	1406	1389	1371	1353	1335	1316	1298	1280	1262	1244	1225	1207	1189	1171
650	1604	1587	1569	1551	1533	1515	1497	1479	1461	1443	1424	1405	1387	1368	1349	1330	1311	1292	1273	1254	1235	1216
675	1664	1646	1627	1609	1590	1572	1553	1534	1515	1496	1477	1457	1438	1418	1399	1379	1360	1340	1320	1300	1281	1261
700	1724	1705	1686	1666	1647	1628	1608	1589	1569	1549	1529	1509	1489	1468	1448	1428	1407	1387	1367	1346	1326	1306
725	1783	1763	1743	1723	1703	1683	1663	1643	1623	1602	1581	1560	1539	1518	1497	1476	1455	1434	1413	1392	1371	1350
750	1842	1821	1801	1780	1759	1739	1718	1697	1676	1654	1632	1611	1589	1567	1545	1524	1502	1480	1458	1437	1415	1393
775	1900	1879	1858	1836	1815	1793	1772	1750	1728	1706	1683	1661	1638	1616	1593	1571	1548	1526	1503	1481	1458	1436
800	1958	1936	1914	1892	1869	1847	1825	1803	1780	1757	1734	1710	1687	1664	1641	1618	1594	1571	1548	1525	1501	1478
825	2015	1992	1969	1947	1924	1901	1878	1855	1831	1807	1783	1759	1735	1712	1688	1664	1640	1616	1592	1568	1544	1520
850	2071	2048	2024	2001	1977	1954	1930	1906	1881	1857	1832	1808	1783	1758	1734	1709	1684	1660	1635	1610	1586	1561
875	2127	2103	2079	2054	2030	2006	1982	1957	1931	1906	1881	1855	1830	1805	1779	1754	1728	1703	1678	1652	1627	1601
900	2182	2157	2132	2107	2082	2057	2032	2006	1980	1954	1928	1902	1876	1850	1824	1798	1772	1746	1720	1694	1667	1641
925	2236	2211	2185	2160	2134	2108	2082	2056	2029	2002	1976	1949	1922	1895	1868	1842	1815	1788	1761	1734	1707	1680
950	2290	2264	2238	2211	2185	2158	2132	2104	2077	2049	2022	1994	1967	1939	1912	1884	1857	1829	1802	1774	1747	1719
975	2343	2316	2289	2262	2235	2208	2180	2152	2124	2096	2067	2039	2011	1983	1955	1926	1898	1870	1842	1813	1785	1757
1000	2394	2367	2339	2312	2284	2256	2228	2199	2170	2141	2112	2083	2055	2026	1997	1968	1939	1910	1881	1852	1823	1794
1025	2446	2418	2390	2361	2333	2304	2275	2245	2215	2186	2157	2127	2098	2068	2038	2009	1979	1949	1920	1890	1860	1831
1050	2497	2468	2439	2410	2381	2351	2321	2291	2261	2231	2201	2170	2140	2110	2079	2049	2019	1988	1958	1928	1897	1867
1075	2547	2518	2488	2458	2429	2398	2367	2337	2306	2275	2244	2213	2182	2151	2120	2089	2058	2027	1996	1965	1934	1903
1100	2597	2567	2536	2506	2476	2444	2413	2381	2350	2318	2287	2255	2224	2192	2160	2128	2097	2065	2033	2001	1970	1938
1125	2646	2615	2584	2553	2522	2490	2458	2426	2393	2361	2329	2297	2265	2232	2200	2167	2135	2102	2070	2037	2005	1973
1150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CECPV 2.4 MOD2.4b/INV2.4a

If during field verification, the temperature is 73 degrees Fahrenheit, and the irradiance is 835 W/m^2. The expected production of this system would be 1,808 Watts.

For an application with a single inverter and multiple orientation arrays at the same site, the installer and HERS rater must enter the sum of the expected production values from the FVTs for each orientation in Row 7 of the CF-4R-PV and CF-6R-PV compliance forms.

CECPV Calculator

Project Title: One Site, One Inverter, Multiple Orientation Arrays, No Incentive Cap

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: Mitsubishi Electric PV-UD190MF5

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story — 12 ft

The azimuth of the second array is 225 degrees.

Number of Series Modules in each String: 16

Number of Parallel Strings per Inverter: 1

Tracking: Fixed

Roof Pitch: 5:12 — Tilt: 22.6 degrees

Azimuth: 225 degrees

The same inverter model is selected for the second calculator run as the first.

Inverter: Fronius USA IG Plus 6.0-1 UNI (240V)

City: San Diego (within city limits) - Climate Zone 7 *+# — Climate Zone: 7

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail | Run | CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

Incentive and expected production for the second array.

CEC PV Calculator - Results

kWh Production per Site	
January	299.7
Febuary	343.4
March	440.5
April	474.1
May	480.2
June	461.2
July	513.1
August	518.8
September	429
October	392.9
November	316.2
December	282.6
Annual	4952

kW AC system size per Site	2.61
Annual kWh per Site	4952
TDV (kWh) per Site	81735
NSHP Incentive per Site	$8075

Application Total kW AC system size	2.61
Application Total Annual kWh	4952
Application Total TDV (kWh)	81735
Application Total NSHP Incentive	$8075

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

One Site, One Inverter, Multiple Orientation Arrays, No Incentive Cap
Project Title

02/22/2010 7:59:46 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

San Diego (within city limits) - Climate Zone 7 *+# 7
City Used in Calculator Run Climate Zone

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Reservation
PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **Mitsubishi Electric PV-UD190MF5**

Inverter Manufacturer and Model: Fronius USA IG Plus 6.0-1 UNI (240V)

Series Modules in each String: 16 Parallel Strings: 1 Total Modules: 16

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 225 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	2.61	kW AC System Size:	2.61
Annual kWh:	4,952	Annual kWh:	4,952
TDV (kWh) Production:	81,735	TDV (kWh) Production:	81,735
NSHP Incentive:	$8,075	NSHP Incentive:	$8,075

CERTIFICATE OF COMPLIANCE FORM: NSHP PV (Page 2 of 3) CF-1R-PV

One Site, One Inverter, Multiple Orientation Arrays, No Incentive Cap 02/22/2010 7:59:46 AM

Project Title The power output values in this table are for one inverter. For microinverters only, the Date

FIELD VERIFICATION TABLE FVT110 values are for the specified Number of Inverters per Site with Identical Design Details.

Irradiance on Tilted Surface	Temperature (degrees Fahrenheit)																				
(W/m²)	T=15	T=20	T=25	T=30	T=35	T=40	T=45	T=50	T=55	T=60	T=65	T=70	T=75	T=80	T=85	T=90	T=95	T=100	T=105	T=110	T=115	T=120
300	740	732	724	715	707	699	690	682	674	665	657	648	640	631	622	613	605	596	587	578	569	561
325	802	793	785	776	767	758	749	739	730	721	712	703	694	684	675	665	656	646	637	627	618	608
350	865	855	846	836	826	816	807	797	787	777	768	758	748	737	727	717	707	697	686	676	666	656
375	927	917	907	896	886	875	865	855	844	834	823	813	802	791	780	769	758	747	736	725	714	703
400	989	978	967	956	945	934	923	912	901	890	879	867	856	844	833	821	809	798	786	774	762	751
425	1051	1040	1028	1016	1005	993	981	969	958	946	934	922	910	898	885	873	860	848	836	823	811	798
450	1113	1101	1089	1076	1064	1051	1039	1027	1014	1002	989	976	963	951	938	925	912	899	885	872	859	846
475	1175	1162	1149	1136	1123	1110	1097	1084	1071	1057	1044	1031	1017	1003	990	976	962	949	935	921	907	894
500	1237	1224	1210	1196	1182	1169	1155	1141	1127	1113	1099	1085	1070	1056	1041	1027	1013	998	984	969	955	941
525	1299	1285	1270	1256	1242	1227	1212	1198	1183	1169	1154	1139	1124	1108	1093	1078	1063	1048	1033	1017	1002	987
550	1361	1346	1331	1316	1301	1285	1270	1255	1239	1224	1208	1193	1177	1161	1145	1129	1113	1097	1081	1065	1049	1033
575	1422	1407	1391	1375	1359	1343	1327	1311	1295	1279	1263	1246	1230	1213	1196	1180	1163	1146	1130	1113	1096	1080
600	1483	1467	1451	1434	1418	1401	1385	1368	1351	1334	1317	1300	1282	1265	1247	1230	1212	1195	1178	1160	1143	1125
625	1544	1527	1510	1493	1476	1458	1441	1424	1406	1389	1371	1353	1335	1316	1298	1280	1262	1244	1225	1207	1189	1171
650	1604	1587	1569	1551	1533	1515	1497	1479	1461	1443	1424	1405	1387	1368	1349	1330	1311	1292	1273	1254	1235	1216
675	1664	1646	1627	1609	1590	1572	1553	1534	1515	1496	1477	1457	1438	1418	1399	1379	1360	1340	1320	1300	1281	1261
700	1724	1705	1686	1666	1647	1628	1608	1589	1569	1549	1529	1509	1489	1468	1448	1428	1407	1387	1367	1346	1326	1306
725	1783	1763	1743	1723	1703	1683	1663	1643	1623	1602	1581	1560	1539	1518	1497	1476	1455	1434	1413	1392	1371	1350
750	1842	1821	1801	1780	1759	1739	1718	1697	1676	1654	1632	1611	1589	1567	1545	1524	1502	1480	1458	1437	1415	1393
775	1900	1879	1858	1836	1815	1793	1772	1750	1728	1706	1683	1661	1638	1616	1593	1571	1548	1526	1503	1481	1458	1436
800	1958	1936	1914	1892	1869	1847	1825	1803	1780	1757	1734	1710	1687	1664	1641	1618	1594	1571	1548	1525	1501	1478
825	2015	1992	1969	1947	1924	1901	1878	1855	1831	1807	1783	1759	1735	1712	1688	1664	1640	1616	1592	1568	1544	1520
850	2071	2048	2024	2001	1977	1954	1930	1906	1881	1857	1832	1808	1783	1758	1734	1709	1684	1660	1635	1610	1586	1561
875	2127	2103	2079	2054	2030	2006	1982	1957	1931	1906	1881	1855	1830	1805	1779	1754	1728	1703	1678	1652	1627	1601
900	2182	2157	2132	2107	2082	2057	2032	2006	1980	1954	1928	1902	1876	1850	1824	1798	1772	1746	1720	1694	1667	1641
925	2236	2211	2185	2160	2134	2108	2082	2056	2029	2002	1976	1949	1922	1895	1868	1842	1815	1788	1761	1734	1707	1680
950	2290	2264	2238	2211	2185	2158	2132	2104	2077	2049	2022	1994	1967	1939	1912	1884	1857	1829	1802	1774	1747	1719
975	2343	2316	2289	2262	2235	2208	2180	2152	2124	2096	2067	2039	2011	1983	1955	1926	1898	1870	1842	1813	1785	1757
1000	2394	2367	2339	2312	2284	2256	2228	2199	2170	2141	2112	2083	2055	2026	1997	1968	1939	1910	1881	1852	1823	1794
1025	2446	2418	2390	2361	2333	2304	2275	2245	2216	2186	2157	2127	2098	2068	2038	2009	1979	1949	1920	1890	1860	1831
1050	2497	2468	2439	2410	2381	2351	2321	2291	2261	2231	2201	2170	2140	2110	2079	2049	2019	1988	1958	1928	1897	1867
1075	2547	2518	2488	2458	2429	2398	2367	2337	2306	2275	2244	2213	2182	2151	2120	2089	2058	2027	1996	1965	1934	1903
1100	2597	2567	2536	2506	2476	2444	2413	2381	2350	2318	2287	2255	2224	2192	2160	2128	2097	2065	2033	2001	1970	1938
1125	2646	2615	2584	2553	2522	2490	2458	2426	2393	2361	2329	2297	2265	2232	2200	2167	2135	2102	2070	2037	2005	1973
1150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CECPV 2.4 MOD2.4a/INV2.4a

If during field verification, the temperature is 68 degrees Fahrenheit, and the irradiance is 615 W/m^2. The expected production of this system would be 1,371 Watts.

For an application with a single inverter and multiple orientation arrays at the same site, the installer and HERS rater must enter the sum of the expected production values from the FVTs for each orientation in Row 7 of the CF-4R-PV and CF-6R-PV compliance forms.

For this example the total expected production would be the sum of array with a 135 degree azimuth and the array with a 225 degree azimuth.

Sum of Expected Production = Expected Production Array 1 + Expected Production Array 2
= 1,808 W + 1,371 W
= 3,179 W

Therefore, an installer and HERS rater would enter 3,179 W in Row 7 of the CF-4R-PV and CF-6R-PV and then verify whether the electric production on the inverter integral meter or external performance meter display is greater than this expected amount.

The total incentive amount would be the sum of the incentives for each orientation. Since the overall system size of this application was less than 7.5 kW AC, the incentive would be $7,188 for array 1 and $8,075 for array 2 for a total incentive amount of $15,263

CECPV Calculator

Project Title: One Site, One Inverter, Multiple Orientation Arrays, Incentive Capped

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: Mitsubishi Electric PV-UD190MF5

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story 12 ft

The azimuth of the first array is 135 degrees.

Number of Series Modules in each String: 14

Number of Parallel Strings per Inverter: 3

Tracking: Fixed

Roof Pitch: 6:12 Tilt: 26.6 degrees

Azimuth: 135 degrees

Inverter: Fronius USA IG Plus 11.4-1 UNI (240V)

City: West Sacramento Climate Zone: 12

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

Incentive and expected production for the first array with an azimuth of 135 degrees. Note the AC system size is 6.85 kW.

CEC PV Calculator - Results

kWh Production per Site	
January	532.9
Febuary	642.3
March	1065
April	1271.3
May	1408
June	1446.3
July	1517.3
August	1439.7
September	1247.5
October	1000.8
November	729.5
December	484.7
Annual	12785

kW AC system size per Site	6.85
Annual kWh per Site	12785
TDV (kWh) per Site	172209
NSHP Incentive per Site	$17014

Application Total kW AC system size	6.85
Application Total Annual kWh	12785
Application Total TDV (kWh)	172209
Application Total NSHP Incentive	$17014

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

One Site, One Inverter, Multiple Orientation Arrays, Incentive Capped
Project Title

02/22/2010 8:18:06 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

West Sacramento 12
City Used in Calculator Run Climate Zone

FOR OFFICIAL USE ONLY
Reservation
PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **Mitsubishi Electric PV-UD190MF5**

Inverter Manufacturer and Model: Fronius USA IG Plus 11.4-1 UNI (240V)

Series Modules in each String: 14 Parallel Strings: 3 Total Modules: 42

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 135 degrees Tilt: 26.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	6.85	kW AC System Size:	6.85
Annual kWh:	12,785	Annual kWh:	12,785
TDV (kWh) Production:	172,209	TDV (kWh) Production:	172,209
NSHP Incentive:	$17,014	NSHP Incentive:	$17,014

CERTIFICATE OF COMPLIANCE FORM: NSHP PV (Page 2 of 3) CF-1R-PV

One Site, One Inverter, Multiple Orientation Arrays, Incentive Capped 02/22/2010 8:18:06 AM

Project Title | The power output values in this table are for one inverter. For microinverters only, the | Date

FIELD VERIFICATION TABLE FVT110 | values are for the specified Number of Inverters per Site with Identical Design Details.

Irradiance on Tilted Surface	Temperature (degrees Fahrenheit)																				
(W/m²)	T=15	T=20	T=25	T=30	T=35	T=40	T=45	T=50	T=55	T=60	T=65	T=70	T=75	T=80	T=85	T=90	T=95	T=100	T=105	T=110	T=115	T=120
300	1971	1949	1926	1903	1881	1858	1835	1812	1789	1766	1743	1720	1697	1673	1650	1627	1604	1580	1557	1534	1511	1487
325	2137	2112	2088	2063	2038	2014	1989	1964	1939	1915	1890	1865	1840	1815	1790	1765	1740	1715	1690	1664	1639	1614
350	2302	2276	2249	2223	2196	2170	2143	2116	2090	2063	2036	2009	1983	1956	1929	1902	1875	1848	1821	1794	1767	1741
375	2468	2439	2411	2383	2354	2326	2297	2269	2240	2212	2183	2154	2125	2097	2068	2039	2010	1982	1953	1924	1895	1866
400	2633	2603	2573	2543	2512	2482	2451	2421	2391	2360	2329	2299	2268	2238	2207	2176	2146	2115	2084	2053	2022	1992
425	2797	2765	2733	2701	2670	2638	2606	2573	2541	2509	2476	2444	2411	2378	2346	2313	2281	2248	2215	2182	2150	2117
450	2960	2927	2893	2860	2826	2792	2758	2724	2690	2656	2622	2588	2554	2519	2485	2450	2415	2381	2346	2311	2277	2242
475	3124	3088	3053	3017	2982	2946	2910	2874	2839	2803	2767	2731	2695	2659	2623	2586	2550	2513	2477	2440	2403	2367
500	3287	3249	3212	3174	3137	3099	3062	3024	2986	2949	2911	2873	2835	2797	2759	2721	2683	2645	2607	2568	2530	2491
525	3449	3410	3370	3331	3292	3252	3213	3173	3134	3094	3054	3014	2975	2935	2895	2855	2815	2775	2735	2695	2655	2615
550	3611	3569	3528	3487	3446	3404	3363	3322	3280	3239	3197	3155	3114	3072	3030	2988	2946	2904	2863	2821	2779	2737
575	3771	3728	3685	3642	3599	3556	3513	3469	3426	3382	3339	3295	3252	3208	3164	3121	3077	3033	2989	2945	2901	2858
600	3931	3886	3842	3797	3752	3706	3661	3616	3571	3525	3480	3434	3389	3343	3298	3252	3206	3161	3115	3069	3023	2978
625	4090	4044	3997	3950	3903	3856	3809	3762	3715	3667	3620	3573	3525	3478	3430	3383	3335	3287	3240	3192	3144	3097
650	4248	4200	4151	4102	4053	4004	3956	3906	3857	3808	3759	3710	3660	3611	3562	3512	3463	3413	3364	3314	3264	3215
675	4405	4355	4304	4253	4203	4152	4101	4050	3999	3948	3897	3846	3794	3743	3692	3641	3589	3538	3486	3435	3383	3332
700	4560	4508	4456	4403	4351	4298	4245	4192	4139	4087	4033	3980	3927	3874	3821	3768	3714	3661	3608	3554	3501	3447
725	4714	4660	4606	4551	4497	4442	4388	4333	4279	4224	4169	4114	4059	4004	3949	3893	3838	3783	3728	3672	3617	3562
750	4867	4811	4754	4698	4642	4585	4529	4472	4416	4359	4303	4246	4189	4132	4075	4018	3961	3904	3846	3789	3732	3675
775	5018	4960	4901	4843	4785	4727	4668	4610	4552	4493	4435	4376	4318	4259	4200	4141	4082	4023	3964	3905	3846	3786
800	5167	5107	5047	4987	4927	4866	4806	4746	4686	4625	4565	4505	4444	4384	4323	4262	4202	4141	4080	4019	3958	3897
825	5315	5253	5191	5129	5067	5004	4942	4880	4818	4756	4694	4631	4569	4507	4444	4382	4320	4257	4194	4131	4068	4005
850	5460	5397	5333	5269	5205	5141	5077	5013	4949	4885	4820	4756	4692	4628	4564	4500	4435	4371	4307	4242	4177	4112
875	5604	5539	5473	5407	5341	5275	5209	5143	5077	5011	4945	4879	4813	4747	4681	4615	4549	4483	4417	4351	4284	4218
900	5746	5679	5611	5543	5476	5408	5340	5272	5204	5136	5069	5001	4933	4865	4797	4729	4661	4593	4525	4458	4390	4322
925	5887	5817	5747	5678	5608	5539	5469	5399	5330	5260	5190	5120	5051	4981	4911	4841	4772	4702	4632	4562	4493	4423
950	6025	5953	5882	5810	5739	5667	5596	5524	5453	5381	5310	5238	5166	5095	5023	4952	4880	4808	4737	4665	4594	4522
975	6161	6088	6015	5941	5868	5795	5721	5648	5574	5501	5428	5354	5281	5207	5134	5060	4987	4914	4840	4767	4693	4620
1000	6294	6220	6145	6070	5995	5920	5845	5770	5694	5619	5544	5469	5393	5318	5243	5168	5092	5017	4942	4867	4791	4716
1025	6426	6350	6274	6197	6121	6044	5967	5890	5813	5736	5659	5582	5504	5427	5350	5273	5196	5119	5042	4965	4888	4811
1050	6557	6479	6401	6323	6244	6166	6088	6009	5930	5851	5772	5693	5614	5535	5457	5378	5299	5220	5141	5062	4984	4905
1075	6687	6607	6527	6447	6366	6286	6206	6126	6046	5965	5884	5804	5723	5642	5561	5481	5400	5319	5239	5158	5078	4997
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CECPV 2.4 MOD2.4a/INV2.4a

If during field verification, the temperature is 66 degrees Fahrenheit, and the irradiance is 785 W/m^2. The expected production of this system would be 4,565 Watts.

For an application with a single inverter and multiple orientation arrays at the same site, the installer and HERS rater must enter the sum of the expected production values from the FVTs for each orientation in Row 7 of the CF-4R-PV and CF-6R-PV compliance forms.

CECPV Calculator

Project Title: One Site, One Inverter, Multiple Orientation Arrays, Incentive Capped

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: Mitsubishi Electric PV-UD190MF5

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: One-Story 12 ft

Number of Series Modules in each String: 14

Number of Parallel Strings per Inverter: 2

Tracking: Fixed

Roof Pitch: 6:12 Tilt: 26.6 degrees

Azimuth: 225 degrees

Inverter: Fronius USA IG Plus 11.4-1 UNI (240V)

City: West Sacramento Climate Zone: 12

Incentive Type:

○ Market Rate Housing with Solar as Standard ◉ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ○ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4a/INV2.4a

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

The azimuth of the second array is 225 degrees.

The same inverter model is selected for the second calculator run as the first.

Incentive and expected production for the array with an azimuth of 225 degrees. Note the AC system size is 4.56 kW.

CEC PV Calculator - Results

kWh Production per Site	
January	362.1
Febuary	430.4
March	697.6
April	842.7
May	941.6
June	978.1
July	1027
August	972
September	839.5
October	656.8
November	478.4
December	327.6
Annual	8554

kW AC system size per Site	4.56
Annual kWh per Site	8554
TDV (kWh) per Site	132988
NSHP Incentive per Site	$13139
Application Total kW AC system size	4.56
Application Total Annual kWh	8554
Application Total TDV (kWh)	132988
Application Total NSHP Incentive	$13139

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $2.50/W

CECPV 2.4 MOD2.4a/INV2.4a

One Site, One Inverter, Multiple Orientation Arrays, Incentive Capped
Project Title

02/22/2010 8:21:09 AM
Date

12 First St
Project Address/Lot Number

West Sacramento, CA 95691
City/State/ZIP

West Sacramento 12
City Used in Calculator Run Climate Zone

FOR OFFICIAL USE ONLY
Reservation
PV
Date

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details 1

Project Address List
12 First St

Housing Type: **All Other Market Rate Housing**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **Mitsubishi Electric PV-UD190MF5**

Inverter Manufacturer and Model: Fronius USA IG Plus 11.4-1 UNI (240V)

Series Modules in each String: 14 Parallel Strings: 2 Total Modules: 28

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 225 degrees Tilt: 26.6 degrees Mounting Height Above Ground: One-Story
Shading Type: Minimal Shading Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	4.56	kW AC System Size:	4.56
Annual kWh:	8,554	Annual kWh:	8,554
TDV (kWh) Production:	132,988	TDV (kWh) Production:	132,988
NSHP Incentive:	$13,139	NSHP Incentive:	$13,139

CERTIFICATE OF COMPLIANCE FORM: NSHP PV (Page 2 of 3) CF-1R-PV

One Site, One Inverter, Multiple Orientation Arrays, Incentive Capped 02/22/2010 8:21:09 AM

Project Title | The power output values in this table are for one inverter. For microinverters only, the | Date

FIELD VERIFICATION TABLE FVT110 | values are for the specified Number of Inverters per Site with Identical Design Details.

Irradiance on Tilted Surface	Temperature (degrees Fahrenheit)																				
(W/m²)	T=15	T=20	T=25	T=30	T=35	T=40	T=45	T=50	T=55	T=60	T=65	T=70	T=75	T=80	T=85	T=90	T=95	T=100	T=105	T=110	T=115	T=120
300	1305	1290	1274	1259	1244	1229	1214	1199	1184	1169	1153	1138	1123	1108	1093	1078	1063	1047	1032	1017	1002	987
325	1416	1399	1383	1366	1350	1333	1317	1301	1284	1268	1251	1235	1218	1202	1185	1169	1152	1136	1120	1103	1087	1070
350	1527	1509	1491	1474	1456	1438	1420	1402	1385	1367	1349	1331	1314	1296	1278	1260	1242	1225	1207	1189	1171	1154
375	1638	1619	1600	1581	1562	1543	1524	1505	1485	1466	1447	1428	1409	1390	1371	1352	1333	1313	1294	1275	1256	1237
400	1750	1730	1709	1689	1668	1648	1627	1607	1586	1566	1545	1525	1504	1484	1464	1443	1423	1402	1382	1361	1341	1321
425	1860	1838	1817	1795	1774	1753	1731	1709	1687	1665	1644	1622	1600	1578	1556	1535	1513	1491	1469	1448	1426	1404
450	1969	1947	1924	1901	1879	1856	1833	1810	1787	1765	1742	1719	1696	1672	1649	1626	1603	1580	1557	1533	1510	1487
475	2079	2055	2031	2007	1983	1959	1935	1911	1887	1863	1838	1814	1790	1766	1742	1717	1693	1668	1644	1619	1595	1570
500	2188	2163	2137	2112	2087	2062	2036	2011	1986	1960	1935	1909	1884	1858	1833	1807	1782	1756	1731	1705	1679	1653
525	2297	2270	2244	2217	2191	2164	2138	2111	2084	2058	2031	2004	1977	1951	1924	1897	1870	1843	1816	1790	1763	1736
550	2405	2378	2350	2322	2294	2266	2238	2211	2183	2155	2127	2099	2071	2042	2014	1986	1958	1930	1902	1874	1845	1817
575	2513	2484	2455	2426	2397	2368	2339	2310	2280	2251	2222	2193	2163	2134	2104	2075	2046	2016	1987	1957	1928	1898
600	2621	2591	2560	2530	2500	2469	2439	2408	2378	2347	2317	2286	2255	2225	2194	2163	2133	2102	2071	2040	2009	1979
625	2727	2696	2664	2633	2602	2570	2538	2506	2475	2443	2411	2379	2347	2315	2283	2251	2219	2187	2155	2123	2091	2058
650	2832	2800	2767	2734	2702	2669	2637	2604	2571	2538	2504	2471	2438	2405	2371	2338	2305	2271	2238	2204	2171	2138
675	2937	2903	2869	2835	2801	2767	2733	2699	2665	2631	2597	2563	2528	2494	2459	2424	2390	2355	2320	2286	2251	2216
700	3040	3005	2970	2935	2900	2865	2830	2794	2759	2724	2688	2653	2617	2582	2546	2510	2474	2438	2402	2366	2330	2294
725	3143	3107	3070	3034	2998	2961	2925	2888	2852	2815	2778	2742	2705	2668	2631	2595	2557	2520	2483	2445	2408	2371
750	3245	3207	3170	3132	3094	3057	3019	2981	2943	2906	2868	2830	2792	2754	2716	2678	2639	2601	2563	2524	2486	2447
775	3346	3307	3268	3229	3190	3151	3112	3073	3034	2995	2956	2917	2877	2838	2799	2759	2720	2681	2641	2602	2562	2522
800	3445	3405	3365	3325	3285	3245	3205	3164	3124	3083	3043	3003	2962	2922	2881	2840	2800	2759	2718	2678	2637	2596
825	3544	3503	3461	3420	3379	3337	3296	3254	3213	3171	3129	3087	3046	3004	2962	2920	2878	2836	2795	2753	2711	2669
850	3641	3599	3556	3514	3471	3428	3386	3343	3300	3257	3214	3171	3128	3085	3042	2999	2956	2913	2870	2826	2783	2740
875	3738	3694	3650	3606	3562	3519	3475	3431	3386	3342	3298	3254	3210	3165	3121	3077	3032	2988	2944	2899	2855	2810
900	3833	3788	3743	3698	3653	3607	3562	3517	3472	3426	3381	3335	3290	3244	3199	3153	3108	3062	3016	2971	2925	2879
925	3926	3880	3834	3788	3741	3695	3649	3602	3556	3509	3462	3416	3369	3322	3275	3229	3182	3135	3088	3041	2994	2947
950	4019	3972	3924	3877	3829	3781	3734	3686	3638	3590	3543	3495	3447	3399	3351	3303	3255	3207	3158	3110	3062	3014
975	4110	4062	4013	3964	3916	3867	3818	3769	3720	3671	3622	3573	3524	3474	3425	3376	3327	3277	3228	3179	3129	3080
1000	4201	4151	4101	4051	4001	3951	3901	3851	3801	3750	3700	3650	3599	3549	3498	3448	3397	3347	3296	3246	3195	3145
1025	4290	4239	4188	4137	4086	4034	3983	3932	3880	3829	3777	3726	3674	3622	3571	3519	3467	3416	3364	3312	3260	3209
1050	4378	4326	4274	4222	4169	4117	4064	4012	3959	3906	3854	3801	3748	3695	3642	3590	3537	3484	3431	3378	3325	3272
1075	4466	4413	4359	4306	4252	4198	4145	4091	4037	3983	3929	3875	3821	3767	3713	3659	3605	3551	3497	3442	3388	3334
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CECPV 2.4 MOD2.4a/INV2.4a

If during field verification, the temperature is 72 degrees Fahrenheit, and the irradiance is 890 W/m^2. The expected production of this system would be 3,335 Watts.

For an application with a single inverter and multiple orientation arrays at the same site, the installer and HERS rater must enter the sum of the expected production values from each FVT in Row 7 of the CF-4R-PV and CF-6R-PV compliance forms.

For this example the total expected production would be the sum of the array with a 135 degree azimuth and the array with a 225 degree azimuth.

Sum of Expected Production = Expected Production Array 1 + Expected Production Array 2
= 4,565 W + 3,335 W
= 7,900 W

Therefore, an installer and HERS rater would enter 7,900 W in Row 7 of the CF-4R-PV and CF-6R-PV and then verify whether the electric production on the inverter integral meter or external performance meter display is greater than this expected amount.

Since the overall AC system size of this application is greater than 7.5 kW, an incentive cap will be applied.

Overall AC System Size = AC Size of Array 1 + AC Size of Array 2
= 6.85 kW + 4.56 kW
= 11.41 kW

The incentive cap calculation is based on the TDV (kWh) production from each orientation. Separate calculations must be made for each array and the sum of those values will give the capped incentive amount.

The formula to find the proportional incentive for Array 1 is:

7.5 * IncentiveAmount1/AC Size1 * TDV1/(TDV1 + TDV2) = Proportional Incentive1

7.5 * $17,014/6.85 * (172,209 / (172,209 + 132,988)) = $10,511.21

The formula to find the proportional incentive for Array 2 is:

7.5 * IncentiveAmount2/AC Size2 * TDV2/(TDV1 + TDV2) = Proportional Incentive2

7.5 * $13,139/4.56 * (132,988 / (172,209 + 132,988)) = $9,416.53

Total Capped Incentive = Proportional Incentive1 + Proportional Incentive2

Total Capped Incentive = $10,511.21 + $9,416.53 = $19,927.74 ---> $19,928

CECPV Calculator

Project Title: Multi-family Affordable Housing using Virtual Net Metering

Number of Sites with Solar: 1

Number of Inverters per Site with Identical Design Details: 1

Is this project eligible for the California Flexible Installation? ○ Yes ◉ No

PV Module: Sanyo Electric HIP-215NKHA5

Standoff Height: Roof Mounted (greater than 3.5 inches from roof)

Mounting Height: Two-Story 22 ft

Number of Series Modules in each String: 10

Number of Parallel Strings per Inverter: 39

Tracking: Fixed

Roof Pitch: Enter Tilt Tilt: 5 degrees

Azimuth: 180 degrees

Inverter: Satcon Technology PVS-75 (240V)

City: Bakersfield Climate Zone: 13

Incentive Type:

○ Market Rate Housing with Solar as Standard ○ All Other Market Rate Housing

○ Affordable Housing Residential Dwelling Unit ◉ Affordable Housing Common Area

☑ Minimal Shading

Run Status

Add Shading Detail Run CECPV 2.4 MOD2.4d/INV2.4d

The CEC-PV Calculator implements the "5 parameter" public domain algorithms published by Beckman, W.A., et.al., Solar Energy: 80 (2006) 78-88."

CEC PV Calculator - Results

kWh Production per Site	
January	4900.3
Febuary	6756
March	11168
April	13682.1
May	16226.8
June	16553
July	16924.1
August	15470.2
September	13243.8
October	10288.9
November	6466.5
December	4141.8
Annual	135,821

kW AC system size per Site	74.73
Annual kWh per Site	135,821
TDV (kWh) per Site	1,891,947
NSHP Incentive per Site	$246,737

This would be the correct total incentive amount only if 100% of the virtual net meter credits were allocated to the common area.

Application Total kW AC system size	74.73
Application Total Annual kWh	135,821
Application Total TDV (kWh)	1,891,947
Application Total NSHP Incentive	$246,737

Print Results/Inputs

View Compliance Form

Run Another Simulation

Base Incentive Rate for the Reference System $3.30/W

CECPV 2.4 MOD2.4d/INV2.4d

Multi-family Affordable Housing using Virtual Net Metering — **05/27/2010 2:30:14 PM**

Project Title — Date

12 First St

Project Address/Lot Number

Bakersfield, CA 93301

City/State/ZIP

Bakersfield — 13

City Used in Calculator Run — Climate Zone

FOR OFFICIAL USE ONLY

Reservation _____

PV _____

Date _____

Number of Sites with Solar: 1

Number of Inverters per Site: with Identical Design Details: 1

Project Address List

12 First St

Housing Type: **Affordable Housing Common Area**

PV SYSTEM INFORMATION

Module Manufacturer and Model: **Sanyo Electric HIP-215NKHA5**

Inverter Manufacturer and Model: Satcon Technology PVS-75 (240V)

Series Modules in each String: 10 — Parallel Strings: 39 — Total Modules: 390

Mounting (BIPV or Rack Mounted): Rack Mounted

Standoff Height (if rack mounted): Roof Mounted (greater than 3.5 inches from roof)

Installation Option: **Detailed**

Azimuth: 180 degrees — Tilt: 5 degrees — Mounting Height Above Ground: Two-Story

Shading Type: Minimal Shading — Tracking: Fixed

SHADING TABLE

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance To Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	N/A	26	56
E (79-101)	N/A	Min Shading	2	N/A	26	56
ESE (101-124)	N/A	Min Shading	2	N/A	26	56
SE (124-146)	N/A	Min Shading	2	N/A	26	56
SSE (146-169)	N/A	Min Shading	2	N/A	26	56
S (169-191)	N/A	Min Shading	2	N/A	26	56
SSW (191-214)	N/A	Min Shading	2	N/A	26	56
SW (214-236)	N/A	Min Shading	2	N/A	26	56
WSW (236-259)	N/A	Min Shading	2	N/A	26	56
W (259-281)	N/A	Min Shading	2	N/A	26	56
WNW (281-305)	N/A	Min Shading	2	N/A	26	56

CEC PV CALCULATOR RESULTS

	Per Site		Application Total
kW AC System Size:	74.73	kW AC System Size:	74.73
Annual kWh:	135,821	Annual kWh:	135,821
TDV (kWh) Production:	1,891,947	TDV (kWh) Production:	1,891,947
NSHP Incentive:	$246,737	NSHP Incentive:	$246,737

Because the incentive calculated in this example uses the Affordable Housing Common Area incentive type, an adjustment is necessary for a project that has virtual net meter credits allocated to residential dwelling units. In order to determine the total incentive amount, use the following formula along with the virtual net meter credit allocation percentages provided in the utility interconnection agreement:

Total Incentive Amount =
[% of virtual net meter credits allocated for common area * calculated NSHP Incentive] +
[% of virtual net meter credits allocated for residential dwelling units *
calculated NSHP Incentive *
(Affordable Housing Residential Dwelling Unit incentive rate/Affordable Housing Common Area incentive rate)]

In the example provided, if the project was allocating 30 percent of its virtual net meter credits to the common area and 70 percent to the residential dwelling units, the total incentive amount would be:

Total Incentive Amount =
= [0.3 * $246,737] + [0.7 * $246,737 *(3.50/3.30)]
= $257,204.63 --> $257,205

Note: Always run the NSHP calculator using the Affordable Housing Common Area incentive type, even if all of the virtual net meter credits will be allocated to residential dwelling units. If the Affordable Housing Residential Dwelling Unit incentive type were to be used, the incentive will be capped and the total incentive amount would not be correct.