Valuation of Solar Arrays and Cell Towers

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April 16th

Version: 4-2019b

VERMONT
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1

Valuation of Solar Plants

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Valuation of Solar Plants

The valuation of solar plants has been codified by the Legislature in 32 VSA § 3481(1)(D). The Lister/Assessor shall use the PVValue tool to determine Assessed Value. This workshop is designed to provide guidance to the local Lister/Assessor. It's important to keep in mind that the assessment is the Average Value indicated by PVValue Tool and set in the grand list at 70%. The Assessed Value will remain unchanged for the life of the project.

3

Rates & Expenses for PV Value

- 50,000W (50kW) exemption on net metered projects
  - None on commercial projects (speed/ppa)
- Derate factor calculation
  - Default (.77) or
  - Installer furnished value, or
  - AC capacity / DC capacity
- Operation & Expense – DC Watt Size (before 50K exemption)
  - 55 cents p/w systems up to 100kW
  - 40 cents p/w >100kW
- New discount rate 13.31 (to arrive at Average 13.50)

4

Rates & Expenses for PV Value

- New net metered (utility rate) credit 19 cents – 1/1/2015
- credit @ 19 cents p/watt or
  - Contract price with inclusion of contract
- 70% of Average Value indicated by Photo Voltaic Value
- (**PVValue**) set for 25 yrs (does not change)

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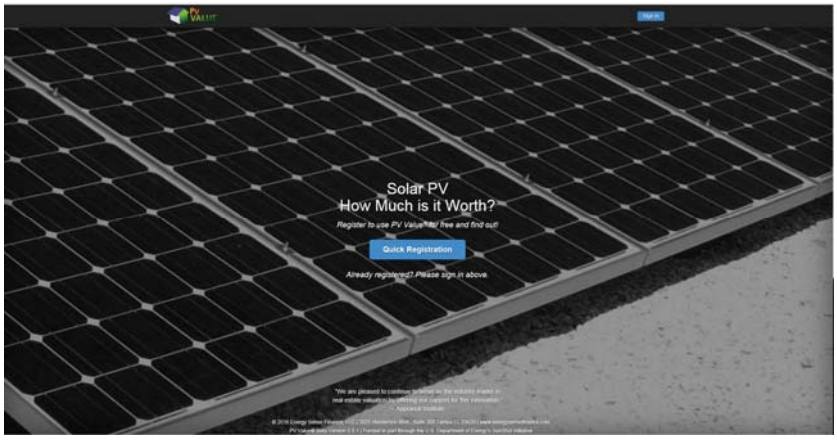
Rates & Expenses for PV Value

- Category 1: 15kW or Less (located anywhere)
  - Rate: 19.00 cents
- Category 2: >15kW and </= 150KW on a preferred site
  - Rate: 18.919 cents
- Category 3: >150kW and </= 500kW and on a preferred site
  - Rate: 16.910 cents
- Category 4: >15kW and </=150kw and not on preferred site
  - Rate: 14.919 cents

6

PV Value



7

PV Value

04/13/2015 09:49:24 Beta Version 0.8.1

Income Approach Method

Subject Property Data

Property		Solar Resource		O & M Expense	
Address:	1266 US-5	System Size:	488200 watts	Inverter Size:	494000 watts
City:	St Johnsbury	Module Warranty Yrs:	25	Inverter Warranty Yrs:	15
State:	VT	System Age Yrs:	1	Inverter Age Yrs:	1
Zip Code:	05819	Remaining Yrs:	24	Inverter Replaced:	No
Property Type:	commercial	Derate Factor:	0.83	Replacement Cycle Yrs:	15
PV Project Type:	existing	Degradation Rate:	0.25	Replacement Cost ¢/W (survey):	35
PV Ownership:	owned	Array Tilt:	22.6	User Replacement Cost ¢/W:	40
		Array Azimuth:	180	O & M Expense (future):	$195,280.00
		kWh Produced/Year:	717,683	O & M Expense (discounted):	$33,167.73

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PV Value

Discount Rate

Discount Rate High:	13.56 %
Discount Rate Avg:	13.50 %
Discount Rate Low:	13.44 %
FNM 30yr Rate:	3.37
FNM Date:	April 13, 2015
User Input Rate (WACC):	13.31 %
Min Basis Points:	12.5
Max Basis Points:	25

Estimated Value of Energy

Low Estimated Value: $1,083,596.62

Avg Estimated Value: $1,087,209.22

High Estimated Value: $1,090,845.29

Utility Rate

NREL Utility Co:	Central Vermont Public Service Corp
NREL Utility Rate:	13.63 ¢kWh
User Input Rate:	19.91 ¢kWh
Utility Rate Used:	19.91 ¢kWh
EIA Escalation Rate:	2.32 %(CAGR)
User Input Esc Rate:	0.00 %(CAGR)
Escalation Rate Used:	0.00 %(CAGR)

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PV Value

Estimate of Accumulated Energy Production

		Low Estimated Value		Avg Estimated Value		High Estimated Value	
Year	Annual kWh	Annual Value	Accumulated Value	Annual Value	Accumulated Value	Annual Value	Accumulated Value
1	715,889	0.00	0.00	0.00	0.00	0.00	0.00
2	714,095	142,176.23	142,176.23	142,176.23	142,176.23	142,176.23	142,176.23
3	712,300	125,016.75	267,192.99	124,950.67	267,126.90	124,884.65	267,060.88
4	710,506	109,927.58	377,120.57	109,811.39	376,938.29	109,695.38	376,756.26
5	708,712	96,659.02	473,779.58	96,505.81	473,444.09	96,352.92	473,109.18
6	706,918	84,991.46	558,771.04	84,811.88	558,255.98	84,632.78	557,741.96
7	705,124	74,731.79	633,502.83	74,534.47	632,790.45	74,337.78	632,079.74
8	703,329	65,710.18	699,213.02	65,502.04	698,292.49	65,294.66	697,374.40
9	701,535	57,777.29	756,990.31	57,563.83	755,856.31	57,351.26	754,725.66
10	699,741	50,801.76	807,792.07	50,587.32	806,443.63	50,373.89	805,099.55
11	697,947	44,668.11	852,460.18	44,456.04	850,899.67	44,245.09	849,344.64
12	696,153	39,274.75	891,734.93	39,067.63	889,967.30	38,861.70	888,206.34
13	694,358	34,532.38	926,267.31	34,332.10	924,299.40	34,133.10	922,339.44
14	692,564	30,362.44	956,629.75	30,170.39	954,469.79	29,979.65	952,319.09
15	690,770	26,695.85	983,325.60	26,512.97	980,982.76	26,331.44	978,650.54
16	688,976	23,471.89	973,629.77	23,298.78	971,113.81	23,127.03	968,609.83
17	687,181	20,637.14	994,266.91	20,474.10	991,587.91	20,312.43	988,922.27
18	685,387	18,144.52	1,012,411.52	17,991.75	1,009,579.66	17,840.26	1,006,762.53
19	683,593	15,953.03	1,028,364.55	15,810.27	1,025,389.93	15,668.86	1,022,431.39
20	681,799	14,026.06	1,042,390.61	13,893.19	1,039,283.12	13,761.65	1,036,193.04
21	680,005	12,331.76	1,054,722.37	12,208.48	1,051,491.61	12,086.51	1,048,279.55
22	678,210	10,842.05	1,065,564.42	10,727.99	1,062,219.60	10,615.20	1,058,894.74
23	676,416	9,532.23	1,075,096.65	9,426.97	1,071,646.57	9,322.93	1,068,217.67
24	674,622	8,380.60	1,083,477.25	8,283.67	1,079,930.24	8,187.92	1,076,405.58
25	672,828	7,368.04	1,090,845.29	7,278.98	1,087,209.22	7,191.03	1,083,596.62

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NOTES Page:

Solar Definitions

Alternating Current (AC) — A type of electrical current, the direction of which is reversed at regular intervals or cycles. Electricity transmission networks use AC because voltage can be controlled with relative ease.

Azimuth – The orientation of the total array in relationship to the sun. Ideal orientation is 180°

Direct Current (DC) — A type of electricity transmission and distribution by which electricity flows in one direction through the conductor, usually relatively low voltage and high current. DC must be converted to alternating current, its opposite.

Electrical Grid – Sometimes simply called "the grid," this term refers to the system that delivers electricity from suppliers to consumers. Electrical grids are made up of generating stations, transmission lines, and distribution lines. Generating stations produce the electrical power, which is carried over high-voltage transmission lines to demand centers. Distribution lines then move the electricity from the demand centers to individual customers.

Escalation Rate – Is the anticipated change in electricity cost.

CPG – Certificate of Public Good given from the Public Utility Commission (formerly Public Service Board)

Derate Factor - PVWatts **Definition**: The **derate factor** compensates for the loss electrical production due to a multitude of factors which can range from tree shading to loss of power when converting DC power to AC power. The assessor is concerned with the loss of electricity when converting from DC power to AC power.

Discount Rate – In commercial real estate the discount rate is used in a discounted cash flow analysis to compute a net present value. Typically, the investors require rate of return is used as a discount rate, or in the case of an institutional investor, the weighted average cost of capital.

Group Net Metered - Group net metering means that more than one account with the utility can share the benefit of a single solar array. The specifics of how group net metering work depend on the laws and regulations of the state.

Inverters –A solar inverter converts direct current (DC) power to alternating current (AC) electricity, either for individual solar panels or for grid-connected solar power systems. DC power produced by a solar array must be converted to AC electricity, so it can be used in household appliances — without an inverter, the energy from your solar panels cannot easily be put to use.

Kilowatt/Kilowatt Hours – kW – Kilowatts or 1000 Watts. A kilowatt (kW) is a measure of power — the *demand* at any given time. A kilowatt-hour (kWh), on the other hand, is a measure of energy — the *consumption* of power over a period of time. A kWh is the power demand (kW) multiplied by the total amount of time the power is being used (in hours). So, if a 30-watt bulb is running for 24 hours, 720 watt-hours or .72 kWh is consumed (30 watts times 24 hours).

The average household consumes about 30 kWh per day. If your solar panels receive five hours of peak sunlight per day, you need 6 kW of output (30 kWh divided by 5 hours — that's your demand) to cover 100% of your energy use. A typical solar panel can produce between 250 and 270 watts of peak power during ideal conditions, which means you'll need about 24 solar panels to make a 6-kW array.

Solar Definitions

Megawatt/Megawatt Hours – One megawatt (MW) is equal to one thousand kilowatts (kW). One megawatt hour (MWh) is equivalent to 1,000 kilowatt-hours (kWh) continuously consumed in an hour. One MW

Net Metering– a utility billing mechanism available that offers a credit to residential and business customers who are making excess electricity with their solar panel system and sending it back to the grid. With net metering, the homeowner is only billed for the "net" energy used each month, that is, the difference between the energy produced by the solar power system and the energy consumed by the house over the monthly billing period.

Operations and maintenance (O&M) – The ongoing operational needs of a solar system, including cleaning, repairs, replacement of parts, bill management and so on; primarily refers to larger-scale commercial and utility-scale solar systems.

Photovoltaic (PV) – The term *photovoltaic* (PV) comes from two root words: "photo" (light) and "voltaic" (voltage). In physics, "photovoltaic" refers to anything that produces electricity when exposed to light or other radiant energy. Solar cells, solar modules, and solar panels are often referred to as P V cells, PV modules, and PV panels to express how their electricity is produced.

PPA – Power Purchase Agreement

PUC (formerly PSB public service board)- The Public Utility Commission is an independent, three-member, quasi-judicial commission that regulates the siting of electric and natural gas infrastructure and supervises the rates, quality of service, and overall financial management of Vermont's public utilities: electric, gas, energy efficiency, telecommunications, cable television (terms of service only, not rates), water and large wastewater companies.

Solar Array – A solar array is a collection of solar panels wired together to create the desired energy output. The typical residential solar array consists of 20–25 solar panels to cover 100% of its energy consumption.

Solar Lease – This payment option has similar benefits and drawbacks as a PPA, but instead of paying a specified rate with the solar provider (e.g., $0.16 per kWh), you make a monthly payment to the solar provider. You can think of it as a way to make a lower monthly payment for cleaner electricity. For more information on a solar lease and what it is, check out How to Pay for Solar.

Solar Plant – For purposes of the Uniform Capacity Tax (UCT), a group of solar-generating facilities is considered one "plant" if the group is part of the same project and uses common equipment and infrastructure such as roads, control facilities, and connections to the electric grid. Each plant should have one CPG for the entire plant

Solar Renewable Energy Credit (SREC) – An SREC is another way to monetize energy reduced by solar and other renewable energy sources. A solar producer earns one SREC for everyone thousand Kilowatts produced. The SRECs are sold on the open market.

Speed - In 2005, the Vermont General Assembly established the SPEED Program to encourage the development of renewable energy resources in Vermont as well as the purchase of renewable power by the state's electric distribution utilities.

Tilt – the angle at which solar panels are mounted to optimize the energy yield.

Utility Rate – The utility rate is the rate provided to the producer by the utility. It can vary now based on location and siting of the plant.

Instructions for Listers Using PV Value® for Commercial PV Systems

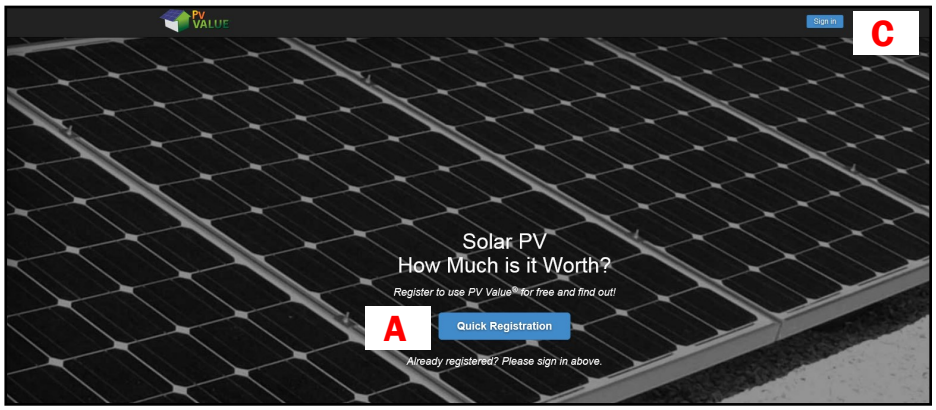
PV Value® is a web-based tool that calculates the energy production value for a residential or commercial photovoltaic (PV) system. The tool complies with the Uniform Standards of Progressional Appraisal Practice and has been endorsed by the Appraisal Institute for the income approach method. Valuing a PV system is done using an ***income capitalization approach***, which considers the present value of projected future energy production along with estimated operating and maintenance costs that are anticipated to occur during the PV module power production warranty timeframe. For more information, see the following:

- Form PV-604, Vermont Photovoltaic (PV) System Inventory Form
  https://www.vtenergydashboard.org/energy-atlas
- Office of Energy Efficiency & Renewable Energy
  https://www.energy.gov/eere/solarpoweringamerica/pv-value

Step 1. Register an account

You must register at www.pvvalue.com to use the PV Value® tool.

Registration is quick and easy. To begin, click Quick Registration **[A]**. The next screen will be the form.



a. Make sure you write down your **Username** and **Password**.

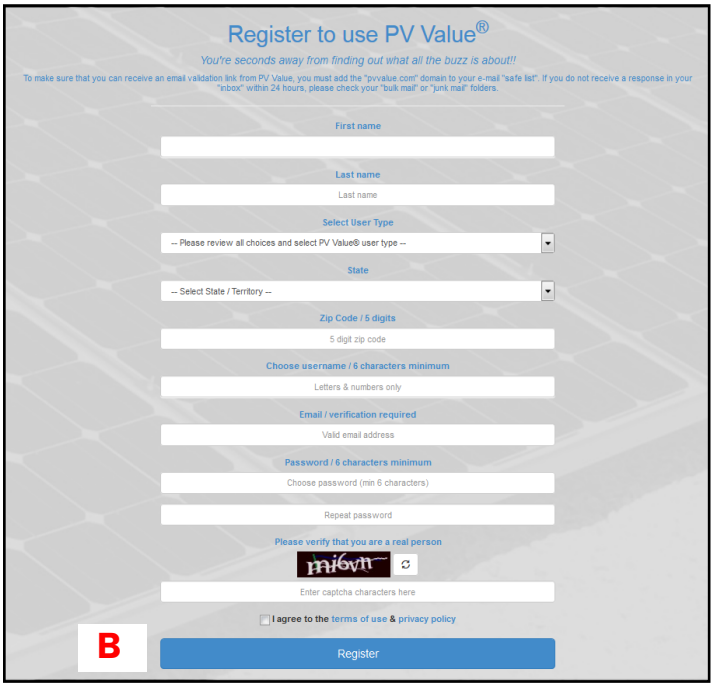
b. Once the form is complete, click **Register [B]**.

c. You will see this message: **Your account has been created successfully and we have sent you an email.**

d. The system will send an email to the address you've entered on the form. Please click the **verification link** within that email.

e. Check your email (and junk email) to find the system email and validate that your email address has been registered. Once this is done, you are registered in PV Value.

f. Next time you visit the website, click **Sign In [C]** at the top of the home page.



Disclaimer: This fact sheet is intended to provide an overview only. Vermont tax statutes, regulations, Vermont Department of Taxes rulings, or court decisions supersede information provided in this fact sheet.

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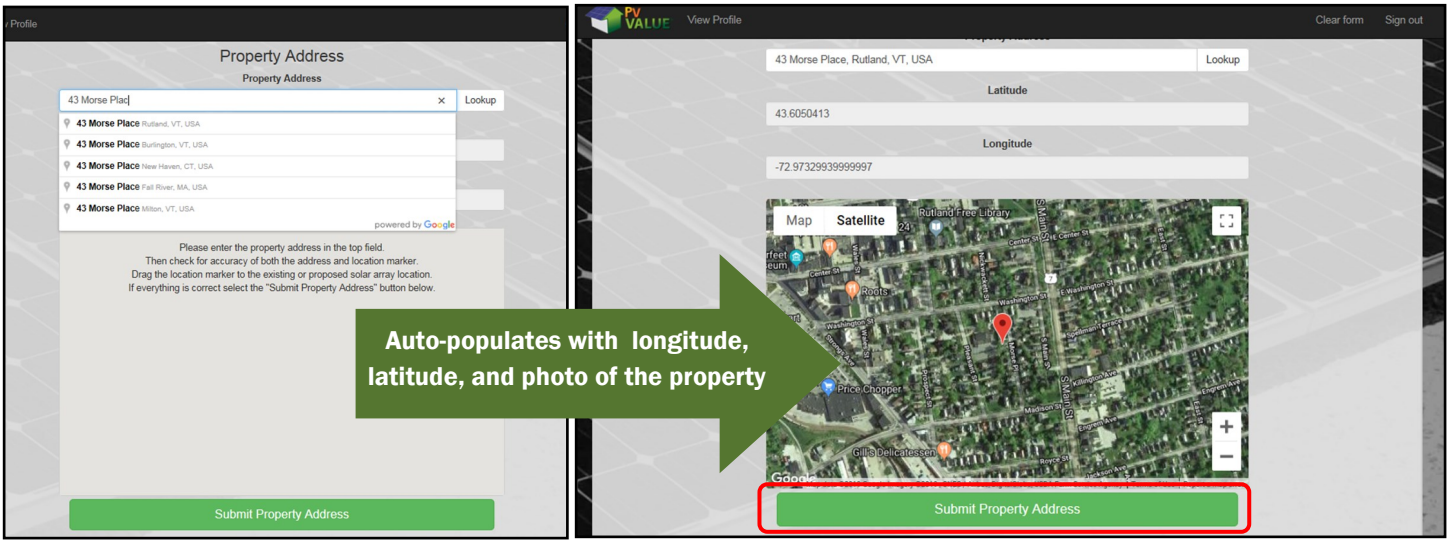
Step 2. Sign in

Sign in with your **Username** and **Password**.

Check the box beside "I agree to the terms of use & privacy policy."

Step 3. Enter Property Address

Begin by entering the solar property address. You will need the "911" physical location. The **Latitude** and **Longitude** will auto-populate along with a photo of the property. Click **Submit Property Address**.



Step 4. Enter Property Information

a. Select **Property Type:** Residential or Commercial or Utility Scale. Always select "**Commercial.**"

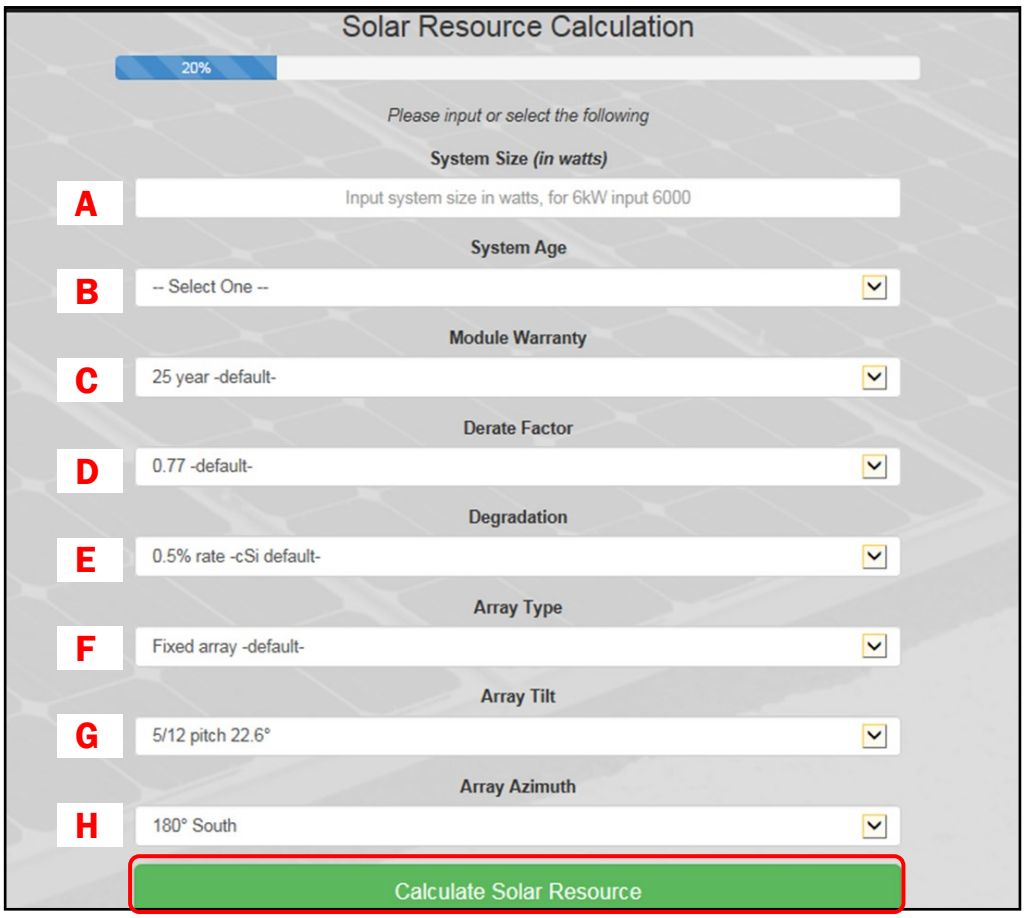
b. Select **PV Project Type**: Existing or Under Construction or Proposed.

c. Select PV Ownership: Owner or Leased. Always select **"Owned."**

d. Click **Submit Property Information**.

Step 5. Enter data for Solar Source Calculation

Note: Use the default option unless the solar owner gives more specific information.



A. Select **System Size**: enter in DC* Watts (1kW = 1000W). If group or net-metered, the first 50kW (50,000W) is exempt under Act 174. Calculate 75kW array input at 25kW or 25000 Watts DC. **Note: Contracts in Generation or Sustainably Priced Energy Enterprise Development (SPEED) projects do not get an exemption.**

B. Select **System Age:** Find this on the property owner Inventory Form.

C. Select **Module Warranty:** Use information from the owner or use **"25 year—default."**

D. Select **Derate Factor**: Calculate from site plan by dividing the AC system size by DC capacity. Derate factor may also be furnished by owner/installer. This will vary by array type. All Certificates of Public Good are required to have an engineered site plan filed with the application. See http://rredc.nrel.gov/solar/calculators/PVWATTS/derate.cgi. If unknown, use **"0.77—default"** DC to AC conversion.

E. Select **Degradation**: If unknown, use **".05% rate –cSi default."**

F. Select **Array Type**: Use **"Fixed array—default."** Fixed array is Fixed Array / Single Axis Tracker / Dual Axis Tracker. Most PV installations are fixed and will not track the sun. If there is a tracker, then the single or double axis will need to be selected. Single axis is typically east to west with the tilt angle fixed. Dual axis tracks east to west and also changes the tilt angle to where the direct component of the solar irradiance is perpendicular to the array at all times.

G. Select **Array Tilt**: Enter value reported by the owner or use default to zip code **"5/12 pitch 22.6 ."**

H. Select **Array Azimuth**: Enter value reported by owner or use default **"180° South."**

*30 V.S.A. § 8002 (15): "Plant capacity" means the rated electrical nameplate for a plant, except that, in the case of a solar energy plant, the term shall mean the aggregate AC nameplate capacity of all inverters used to convert the plant's output to AC power.

Step 6. Enter data for Operations and Maintenance Expense

a. Enter **Inverter Size (in watts)**: Use watts from Certificate of Public Good or inventory form.

b. Select **Inverter Warranty**: If unknown, use "15 year-default-."

c. Select **Inverter Age**: If unknown, use "Same as System Age."

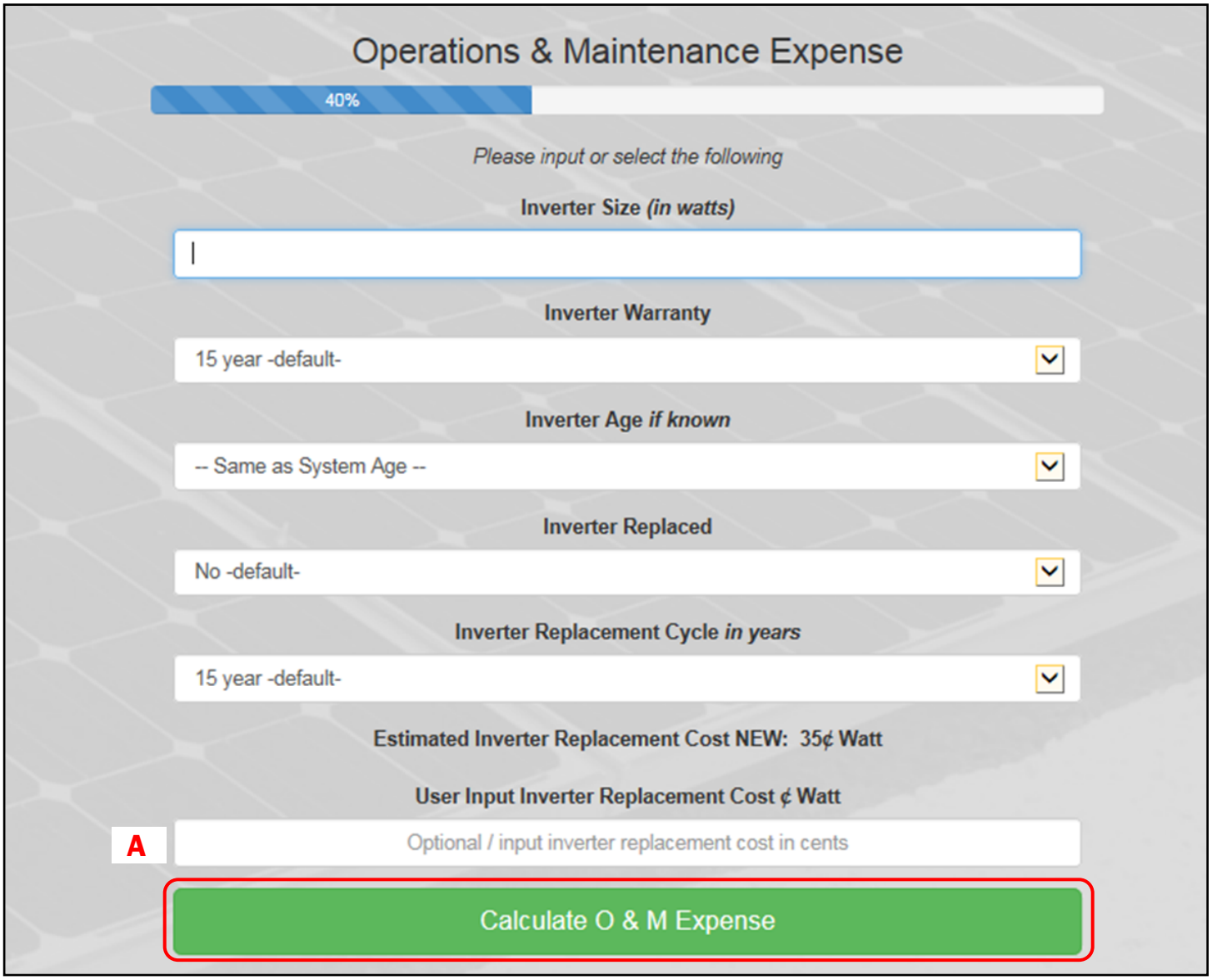
d. Select **Inverter Replaced**: No or Yes. If unknown, use "No-default-."

e. Enter **Inverter Replacement Cycle in years**: If unknown, use "15 year-default-."

f. Enter **User Input Inverter Replacement Cost ¢ Watt**: Select appropriate cost per watt based on total system size as whole number. Do not use a decimal. **[A]**

A

System Size in Kw Before exemption	O & M Cost Per Watt
>50 Kw to 100kW	55¢
>100kW	40¢



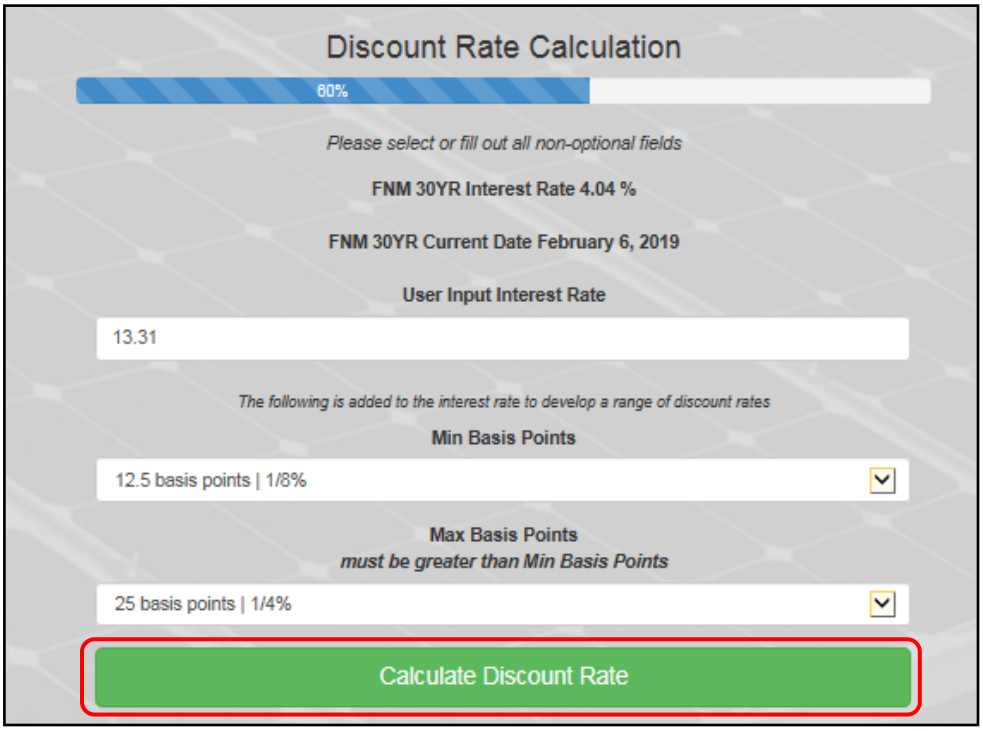
Step 7. Enter data for Discount Rate Calculation

a. Enter **User Input Interest Rate:** 13.31

b. Select **Min Basis Points**: Use 12.5 basis points | 1/8%

c. Select **Max Basis Points**: Use 25 basis points | 1/4%

d. Click **Calculate Discount Rate**.



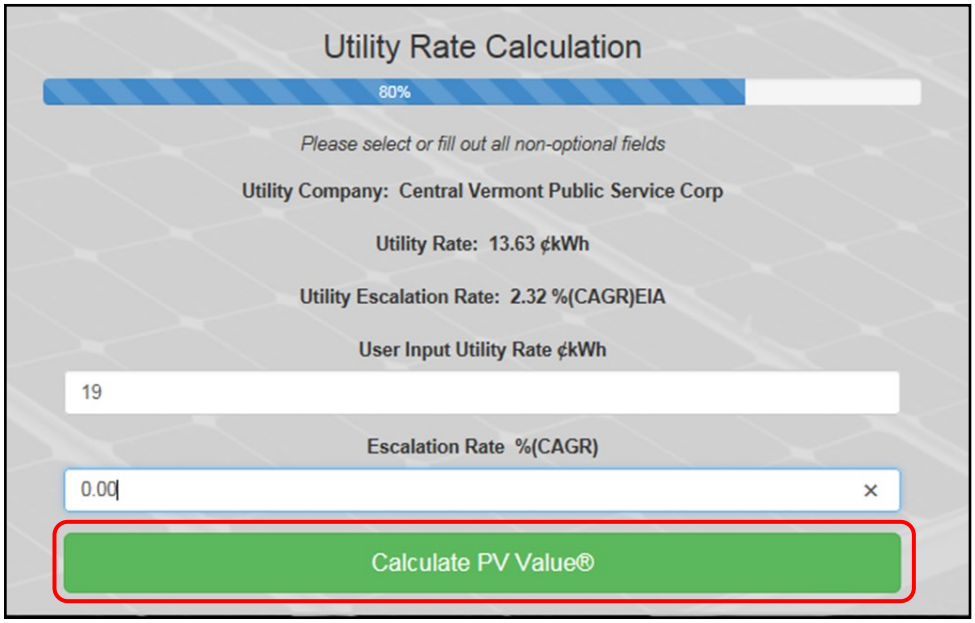
Step 8. Enter data for Utility Rate Calculation

a. Enter **Custom Utility Rate:** 19 if Net Metered . Enter as a whole number. Do not use a decimal.
OR
Enter **Custom Utility Rate:** if based on contract rate for Group Net Metered on inventory form

b. If commissioned prior to 1/1/2015, **Custom Utility Rate** would be 20

c. Enter **Escalation Rate:** 0.00

d. Click on **Calculate PV Value®**.

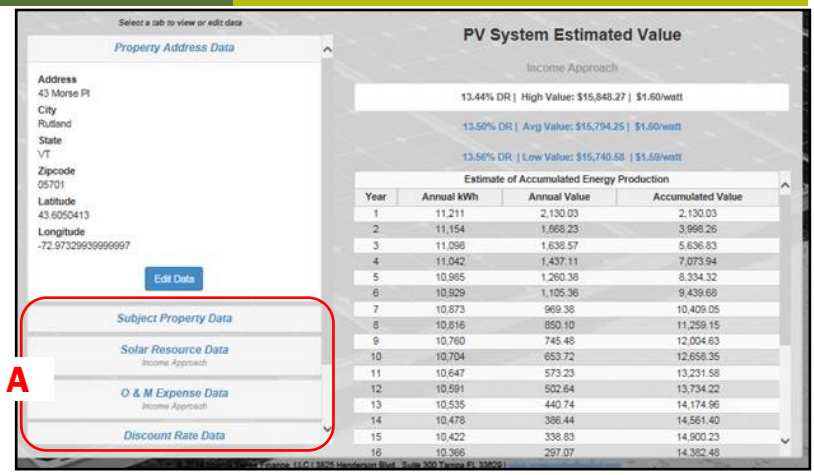


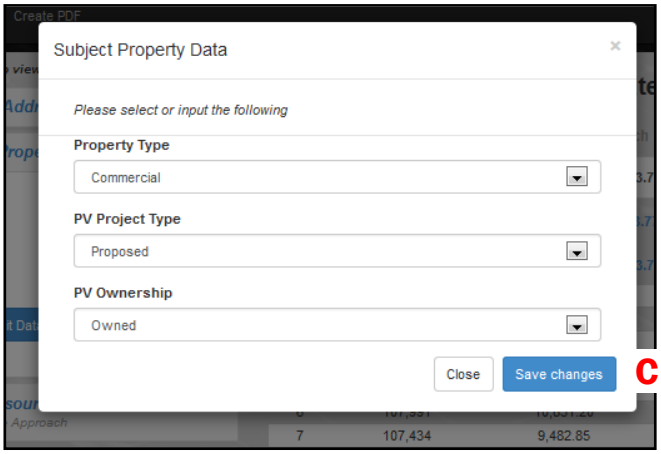
How to correct data entered

a. You may make corrections on this page by clicking on the titles in blue **[A]**, which are hyperlinks to the sections in the PV Value® Tool.

b. Once in the section you wish to edit, click **Edit Data [B]**.

c. Edit as needed and click **Save Changes [C]**.



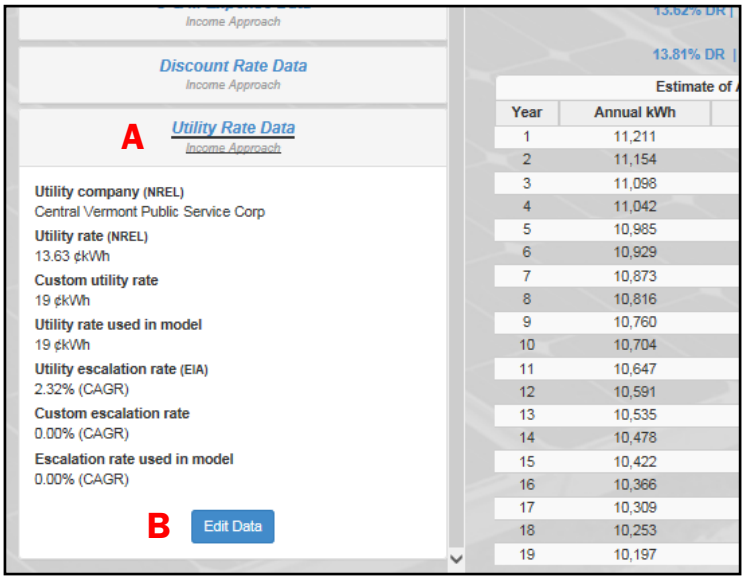


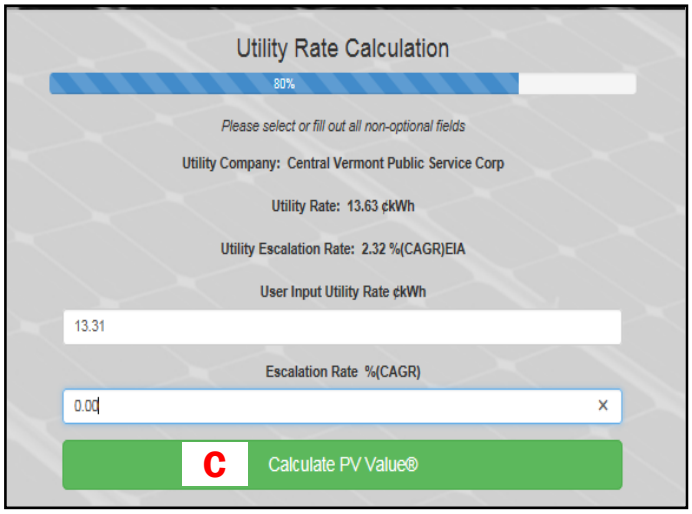
How to save changes

a. Once all edits are made to the form, go to **Utility Rate Data [A].**

b. Click **Edit Data [B]**.

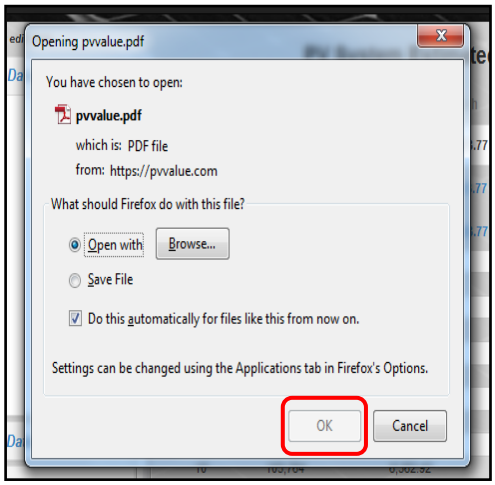
c. Click **Calculate PV Value® [C]**.





How to create a PDF and print

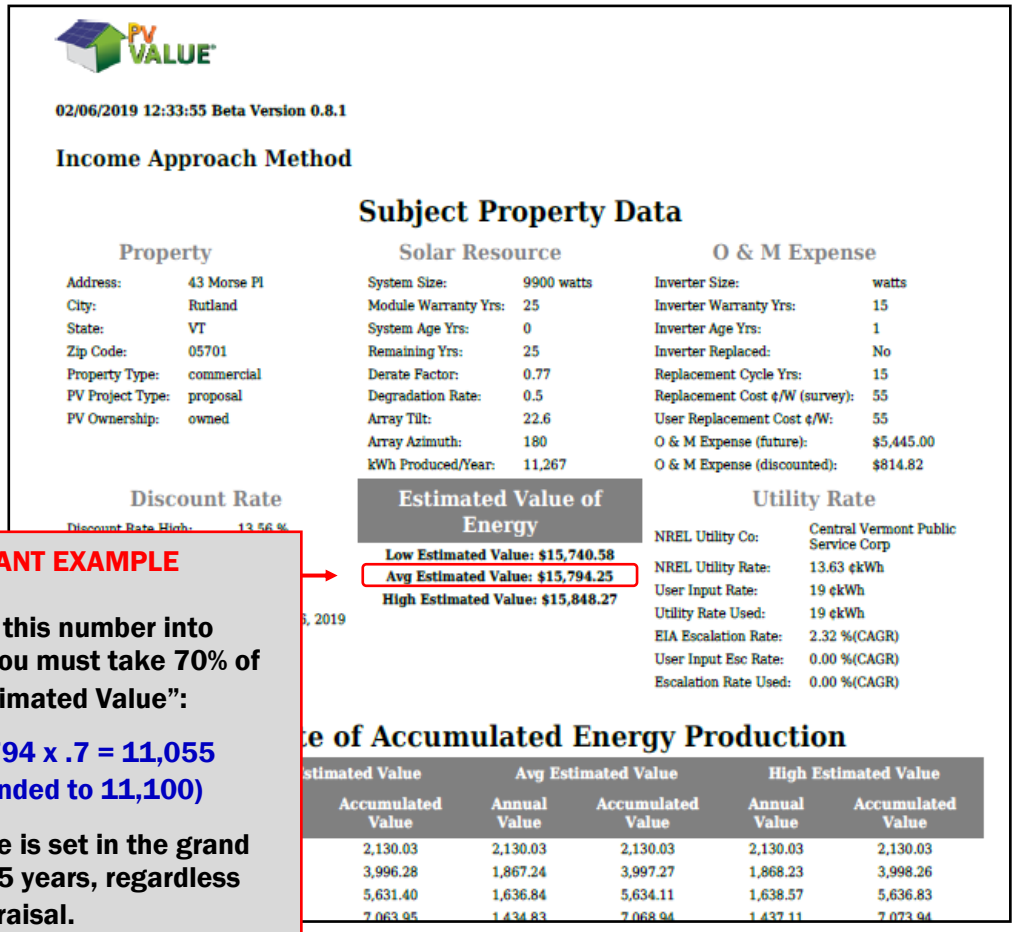
a. Click **Create PDF** at the top of the page.
b. The "pvvalue.pdf" will open.
c. Your options are to:
   - "Open with" [the software you select]— If you choose this option, you may view and then print the file.
   - "Save File"—If you choose this option, you will have reopen the file to view and print.
   - Click **OK**.



How to view and print

Now you may view the estimated value of energy and the data you've entered.

We recommend you print your document on legal paper so it the print will be larger. If you use letter paper, you may adjust the print to 90%, and it will print all on one page in the largest print possible.



PV VALUE

02/06/2019 12:33:55 Beta Version 0.8.1

Income Approach Method

Subject Property Data

Property

Address:	43 Morse Pl
City:	Rutland
State:	VT
Zip Code:	05701
Property Type:	commercial
PV Project Type:	proposal
PV Ownership:	owned

Solar Resource

System Size:	9900 watts
Module Warranty Yrs:	25
System Age Yrs:	0
Remaining Yrs:	25
Derate Factor:	0.77
Degradation Rate:	0.5
Array Tilt:	22.6
Array Azimuth:	180
kWh Produced/Year:	11,267

O & M Expense

Inverter Size:	watts
Inverter Warranty Yrs:	15
Inverter Age Yrs:	1
Inverter Replaced:	No
Replacement Cycle Yrs:	15
Replacement Cost ¢/W (survey):	55
User Replacement Cost ¢/W:	55
O & M Expense (future):	$5,445.00
O & M Expense (discounted):	$814.82

Discount Rate

Discount Rate High: 13.56 %

Estimated Value of Energy

Low Estimated Value: $15,740.58
Avg Estimated Value: $15,794.25
High Estimated Value: $15,848.27

Utility Rate

NREL Utility Co:	Central Vermont Public Service Corp
NREL Utility Rate:	13.63 ¢kWh
User Input Rate:	19 ¢kWh
Utility Rate Used:	19 ¢kWh
EIA Escalation Rate:	2.32 %(CAGR)
User Input Esc Rate:	0.00 %(CAGR)
Escalation Rate Used:	0.00 %(CAGR)

te of Accumulated Energy Production

stimated Value		Avg Estimated Value		High Estimated Value	
	Accumulated Value	Annual Value	Accumulated Value	Annual Value	Accumulated Value
	2,130.03	2,130.03	2,130.03	2,130.03	2,130.03
	3,996.28	1,867.24	3,997.27	1,868.23	3,998.26
	5,631.40	1,636.84	5,634.11	1,638.57	5,636.83
	7,063.95	1,434.83	7,068.94	1,437.11	7,073.94

IMPORTANT EXAMPLE

To enter this number into CAMA, you must take 70% of "Avg Estimated Value":

15,794 x .7 = 11,055 rounded to 11,100)

The value is set in the grand list for 25 years, regardless of reappraisal.

Review the data sheet

Check all numbers circled in red on the example Data Sheet shown below. These numbers should match your data entry. Note: These numbers may be different if the owner sent in the inventory of plant form giving different information.

Numbers that should be entered:

- User **Replacement Cost** of 55 cents or 40 cents according to array Total Watts (see table at right)
- User **Utility Rate** of 19 **or** rate provided by property owner on inventory form
- **Escalation Rate** entered as 0.00
- User **Discount Rate** of 13.31
- **Min discount** 12.5 basis points | 1/8%
- **Max discount** 25 basis points | 1/4%

System Size in Kw Before exemption	O & M Cost Per Watt
>50 Kw to 100kW	55¢
>100kW	40¢

Example Data Sheet

Check these fields when Data Sheet is complete.

Entering Watts

(No deduction for speed project)

9,900W = (59,900 – 50,000)

Input appropriate value (55 or 40) using the O&M cost per Watt using Total System size

03/03/2019 13:54:29 Beta Version 0.8.1

Income Approach Method

Property information

Subject Property Data

Property

Address:	43 Morse Pl
City:	Rutland
State:	VT
Zip Code:	05701
Property Type:	commercial
PV Project Type:	existing
PV Ownership:	owned

Solar Resource

System Size:	9900 watts
Module Warranty Yrs:	25
System Age Yrs:	0
Remaining Yrs:	25
Derate Factor:	0.77
Degradation Rate:	0.5
Array Tilt:	22.6
Array Azimuth:	180
kWh Produced/Year:	11,267

System's age

O & M Expense

Inverter Size:	59900 watts
Inverter Warranty Yrs:	15
Inverter Age Yrs:	0
Inverter Replaced:	No
Replacement Cycle Yrs:	15
Replacement Cost ¢/W (survey):	55
User Replacement Cost ¢/W:	55
O & M Expense (future):	$5,445.00
O & M Expense (discounted):	$814.82

Discount Rate

Discount Rate High:	13.56 %
Discount Rate Avg:	13.50 %
Discount Rate Low:	13.44 %
FNM 30yr Rate:	4.11
FNM Date:	March 1, 2019
User Input Rate (WACC):	13.31 %
Min Basis Points:	12.5
Max Basis Points:	25

Estimated Value of Energy

Low Estimated Value: $15,740.58

Avg Estimated Value: $15,794.25

High Estimated Value: $15,848.27

Utility Rate

NREL Utility Co:	Central Vermont Public Service Corp
NREL Utility Rate:	13.63 ¢kWh
User Input Rate:	19 ¢kWh
Utility Rate Used:	19 ¢kWh
EIA Escalation Rate:	2.32 %(CAGR)
User Input Esc Rate:	0.00 %(CAGR)
Escalation Rate Used:	0.00 %(CAGR)

Input value 19

Input value 13.31
Min -12.5 basis points | 1/8%
Max - 25 basis points | 1/4%

IMPORTANT EXAMPLE

To enter this number into CAMA, you must take 70% of "Avg Estimated Value":

15,794 x .7 = 11,055 (rounded to 11,100)

The value is set in the grand list for 25 years, regardless of reappraisal.

Entered in NEMRC MicroSolve CAMA

Enter as an "outbuilding."

Rounded value 11,055 is entered in the "Rate" field as **11,100** **[A]**.

Outbld ID	**Add for solar**
Area/Diam	**1**
Name	**Solar Array**
Rate [A]	**11,100**
May be entered as:	
Add to Hsite [B]	**N (if commercial only)**
Ad to Hmstd [C]	**N (if commercial only)**

Quality:	0	No Data	Finish:		
Quantity:	0	No Data	Class:	0	No Data
Sl Name:			Quality:	0	No Data
Rate:			% Good:		
Add to Hsite:	0	NoData	Name:	Solar Array 2018	
Add to Hmstd:	0	NoData	A Rate:	11100.00	
Outbld ID:	1		B Add to Hsite:	1	No
Type:	0	No Data	Silo/BarnHt:		
Area/Diam:	1		C Add to Hmstd:	1	No
Siding:	0	NoData			

From CAMA Cost Sheet

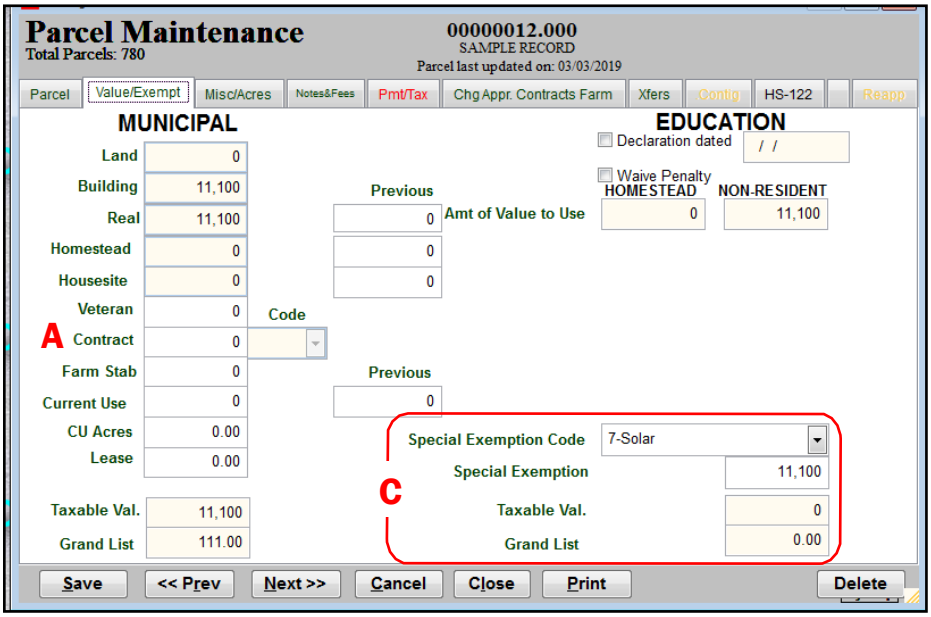
OUTBUILDINGS	Hsite/Hstd	% Good	Size	Rate.	Extras	
Solar Array 2018	n / n	0	1	11,100.00		A 11,100
Total						11,100
TOTAL PROPERTY VALUE						11,100

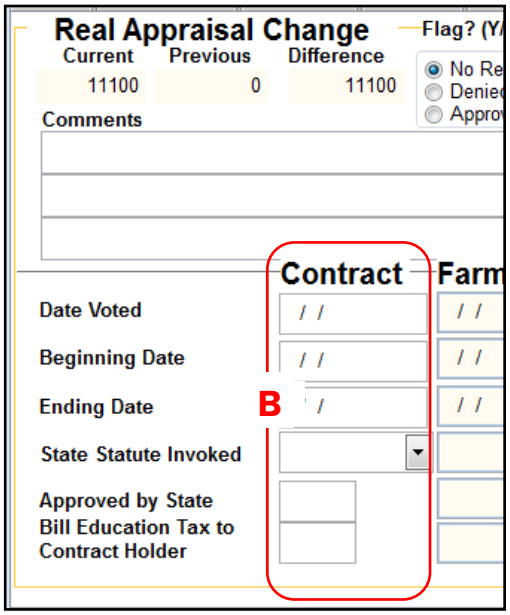
Entered in NEMRC Value/Exempt Tab

Create a new parcel ID for the solar array. Use category code **"UE"** (Utility Electric).

Town DID NOT vote Solar Exempt under 32 V.S.A. § 3845 (a) Alternate energy sources:

Municipal and Education Contract [A] [B]	**Leave blank**
Special Exemption [C]	**Enter values as shown**

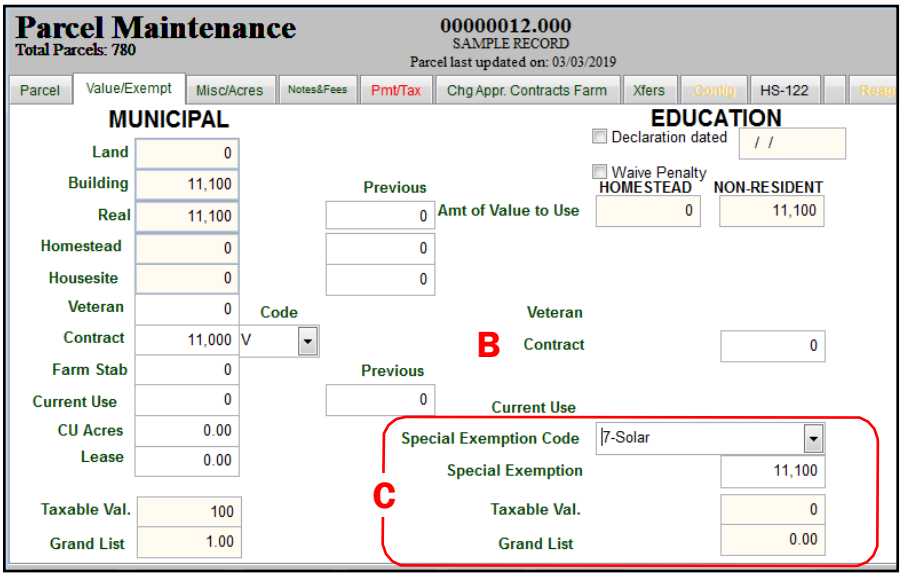


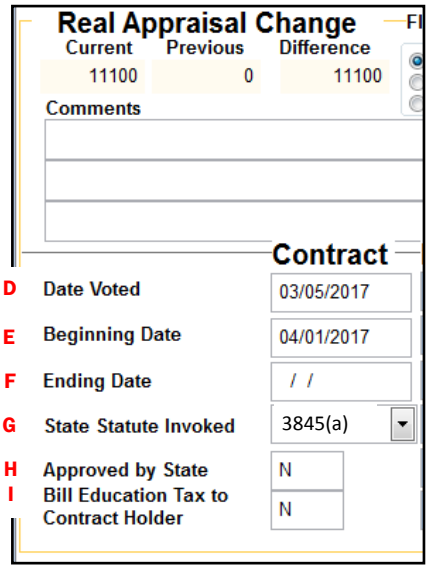


Town voted Solar Exempt under 32 V.S.A. § 3845 (a) Alternate energy sources:

Municipal Contract [A]	**Enter 11,100 and Code V (Voted)**
Education Contract [B]	**Leave blank**
Enter values as shown [C]	
Date Voted D]	**Date of town vote**
Beginning Date [E]	**Grand List exemption date**

Ending Date [f]	**Leave blank**
State Statute Invoked [G]	**3848:3849**
Approved by State [H]	**N**
Bill Education Tax to Contract Holder [I]	**N**





NOTES Page:

Cell Towers and Cell Tower Leases

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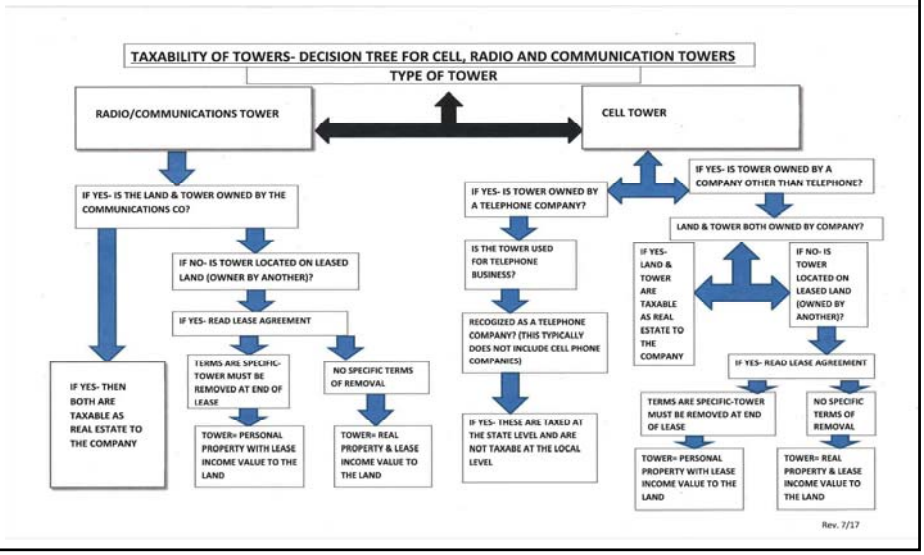
Can a Cell Tower be taxed in your Municipality?



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Types of Cell Towers

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Types of Cell Towers

Lattice Towers

Lattice towers are freestanding and segmentally designed with rectangular or triangular base steel lattices. This type of tower construction can be useful in situations which require modifications such as mounting large number of panel or dish antennas. They can be used as electricity transmission towers, radio towers or as an observation tower. The Eiffel Tower is a famous example of a lattice tower.

Lattice

- 200 - 400 feet
- Also called self-support
- Typical use: telephony

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Types of Cell Towers

Guyed Towers

Guyed towers can be lightweight to heavyweight towers often seen as slender steel structures. Commonly seen in the tower industry, guyed towers are designed to provide maximum strength, efficiency and versatility with easy installation. They are supported by one or more levels of braided or stranded steel guy cables that anchor to the ground.

Guyed

- 200 - 2,000 feet
- Typical use: television and radio broadcasting, paging and telephony

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Types of Cell Towers

Monopole Towers

Monopole towers work well when space is limited, zoning is difficult or harsh weather conditions need to be considered. Designed as a single-pole that can be a tubular section design or a formed, tapered pole, they are the least intrusive – making them the most popular tower types in the wireless communication industry. Because of the single-pole design, it advantageously reduces visual impact and results in a shorter construction time (and typically cost) compared to traditional lattice structures. Many monopoles can also be designed as stealth, camouflage towers.

Monopole

- 100 - 200 feet
- Typical use: telephony

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Types of Cell Towers

Camouflage or Stealth Towers

Camouflage towers are typically used in urban areas when the need to reduce visual impact on the environment is a concern. They are often seen in the form of artificial pine trees, palm trees, clock towers, steeples and even in the form of artificial cacti.

Stealth

- Range in size
- Generally used to maintain aesthetic quality of area
- Particularly useful in areas with strict zoning regulations

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Types of Cell Towers

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Types of Cell Towers

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Types of Cell Towers

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Cell Tower Construction Cost

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Cell Tower Construction Cost

- Cell Tower Costs vary widely depending on the type and location of the tower.
- Information regarding Cost can be found in M&S section 67 page 6 which gives a wide range of values based on height diameter. Local Contractors are the best source of cost information.
- The internet is a source of information an example

	US	LatAm	Africa	India
Typical Tower Construction Cost	$225-$275K	$125-$150k	$150-$175k	$30-$50k

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Cell Tower Construction Cost

RADIO AND TV TOWERS

Radio and television towers are individually designed for the location, considering climatic conditions such as ice, wind, seismic and antenna loads. Costs are typical cost ranges excluding extremes. Due to the number of variables involved, we would suggest that whenever possible, manufacturers', installers' or contract costs be obtained.

Included in the costs are concrete footings, erection, painting, guy wires, lighting, platforms, and designers' fees. Antennas and transmission cables are not included. Multiple antenna installations and mono-poles will tend to be at the high end of the range.

SELF-SUPPORTING TOWERS

HEIGHT (FEET)	COST RANGE	HEIGHT (FEET)	COST RANGE
50	14,500.00 – 23,300.00	225	133,000.00 – 148,000.00
75	29,400.00 – 44,300.00	250	143,000.00 – 164,000.00
100	46,600.00 – 68,250.00	300	152,000.00 – 185,000.00
150	91,500.00 – 124,000.00	350	175,000.00 – 214,000.00
200	125,000.00 – 141,000.00	400	196,000.00 – 242,000.00

TRIANGULAR GUYED TOWERS

(Price per linear foot, up to 400 feet high)

10" Ham radio*, police and fire bands	92.50 – 134.00
20" Taxi and public service bands	139.00 – 201.00
24" Radio, V.H.F., U.H.F. bands	175.00 – 263.00
30" Cellular applications	211.00 – 350.00
40" Microwave towers	263.00 – 427.00
54" Master TV systems	427.00 – 950.00

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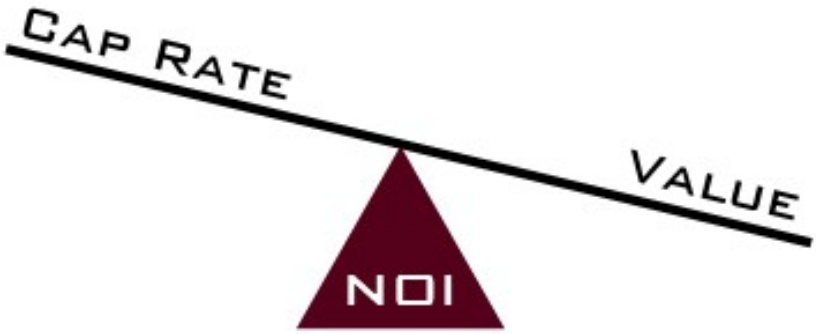
Cell Tower Income Approach



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Cell Tower Income Approach

- The **Income Approach** is a real estate appraisal **method** that allows investors to estimate the value of a property by taking the net operating **income** of the rent collected and dividing it by the **capitalization** rate.

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Cell Tower Income Approach Leases

The cell tower lease recorded in the Town Clerks typically does not include the amount of the monthly rent. A copy of the lease should be viewed, or a copy obtained from the property owner(lessor).

Lease will usually define the base monthly payment and specify an amount when there are additional users added to the tower.

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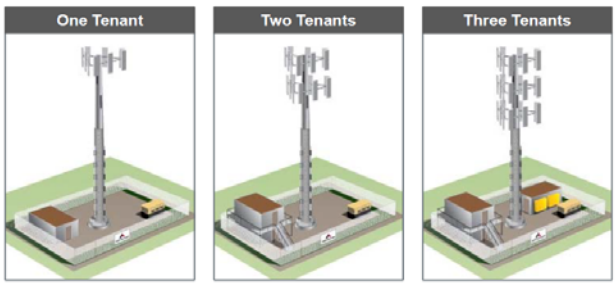
Cell Tower Income Approach Leases

Sample Monthly Lease

$2000 base monthly rent

$500 per additional user

Two Users Gross Monthly Rent $2500



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Cell Tower Income Approach

Computation for Land Cap Rate for Cellular/Wireless Manangement Sites Build Up Method

Risk - free rate using 30 years T-Bond 3/30/17	2.99%
Allowance Risk	3.00%
Allowance Liquidity	1.50%
Allowance for Management	1.00%
Allowance for Taxes* (may be adjusted if needed) (Average Municipal and Non-Residential Education Tax Rate)	**2.05%**
Estimated Discount Rate for Land (Calculated)	10.54%
Estimated Discount Rate for Land Rounded to:	**11.00%**

Monthly Rent						
Base Rent** (includes Tower and 1 user (co-locator)						**2,000**
Co-locators or additional users	1	x	$500	=	$500	
						Total Value
Total Monthly Rent	$2,500					**272,700**

Calculation Example	
Base Rent**	$2,000
(2) Co-locators (2 x $500 each)	$1,000
Total Monthly Rent	$3,000

Total Monthly Rent (Base rent plus additional co-locators $2,000 + $1,000= $3,000)
Total Value: $3,000 x 12 months = $36,000 / .10 = $360,000
(Total Value Equals Total Monthly Rent times 12 months divided by Discount Rate)

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Cell Tower Income Approach

Capitalization Rate

- Monthly Rent $2500
- Annual Rent $30,000
- NOI $30,000/Sale Price $275,000= Cap Rate .109

Gross Rent Multiplier

- Gross Rent Multiplier
- 275,000 / 2500 = 110

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