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Even thou the concept of solar electric is simple.
Photovoltaic(PV) energy is still a science with allot of calculations, and consumers with allot of questions.
TPVS1.0 helps with the calculations that answer the questions.

If the homeowner, has a tool to design and compare pricing and benefit at their fingertips.

More of your desires in the design, you just may build it.

About TPVS

TURBO PV SOLAR, LLC. (TPVS)

TPVS is committed to help the reduction of soft-costs for residential Photovoltaic (PV) systems. By providing an easy to use application, to help installers quickly provide sizing, pricing and benefit analsys of their products. Or the DIY to compare modules and inverters they can obtain pricing for.
We hope that more consumers will recognize the benefit of PV, but we also recognize not all will be scholars of PV mathematics.

TPVS is a relational database application to marry the various data required to quickly size and performance analysis small residential PV systems.
This is were we feel out tools will be of use, giving the installer/client education on, and a dialog of the proposed system,
User's can change parameters of size, placement, components, incentives and rebates to quickly perform the calculations.
Allowing the expert or novice designer to quickly assess the viability of PV under market conditions for the proposed system.

With more of your desires in the design, you just may build it.

TPVS applications run on the Msft Access 2010 platform
You must have Access 2010 installed or install the free runtime (reader) program.
We use Access Msft to enable you to leverage a database application and keep development cost low, passing these savings to you.

TPVS Designer 1.1

TPVS Designer v1.1 helps the user quickly calculate photovoltaic (PV) system essentials.
Such as system size for desired electrical offset. Will it fit the defined space and how much you may expect to benefit.
Unlike the other programs that help initially size, then you have to select modules and inverters from a vast database.
We allow you to pre-price the modules and inverters, and give you a selection guide to build the system using actual specs of the components you have priced.

INPUT SCREENS
- Zip code
- Electrical Use & Cost
- Available space, Orientation/ Tilt, De-Rates
- Scalable unit pricing of Modules & Inverters
- Incentives / Rebates

RESULTS
- Estimate of system size and savings.
- Ability to modify system size to produce desired offset.
- Price comparison of selected parts to a per watt price, gross, net and per Kwh over time.
- Reports of, system and 20 year estimated financial analysis.
- One Line Diagram, to visualize selected components and help design balance of system.

ADDITIONAL FEATURES
- Over 900 current UL listed & CEC approved modules, including 170 + inverters.
- Ability to Add Modules & Inverters to database
- All securely on your PC, no need to have internet connection except for some informational links.
- All data is saved and retained as you enter
- Output to PDF, for email or printing.
- One time license, No high, or re-occuring subscription fee's.

USER REQUIREMENTS.
Ultimately you make the end choices in configuring your system.
We only help with the calculations and present you choices to evaluate. You should have an understanding of:

- Basic PV concepts and terminology.
- Can self-survey your site
- Ability to look up potential rebates or incentives.
- Can find online or local dealer pricing of modules and inverters.

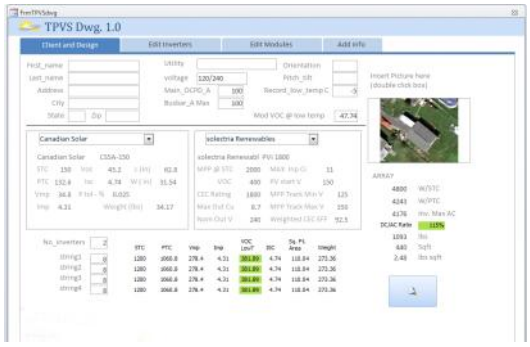
TPVS Dwg 1.1

TPVS Dwg is a database application to quickly build a specification driven "One Line Drawing" of the selected components and interactive calculations.
Quickly give your client's a picture worth a thousand words and open the discussion of BOS or benefits

- Choose from over 900 modules and 170 inverters
- Ability to add your own
- Helps Voc, Isc, Vmp, Imp calculations of specified strings. As well As array square footage and weight per sq ft.
- Save to PDF for printing or email

TPVS Dwg is include with TPVS Designer 1.1

TPVS Dwg 1.1 is a stand alone app for diagrams only, and includes NO sizing or ROI calculations.



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Requirements & Installation

PC Requirements,

TPVS operates on the MSFT Access 2010 Runtime platform.
You must have Access 2010, or Install the FREE Runtime program prior to installing TPVS (linked below)

Supported Operating Systems: Windows 7, Windows Server 2003 R2 (32-Bit x86), Windows Server 2003 R2 x64 editions, Windows Server 2008 R2, Windows Server 2008 Service Pack 2, Windows Vista Service Pack 1, Windows XP Service Pack 3
Only the 32-bit Access 2010 Runtime is supported on Windows XP Service Pack 3.

http://www.microsoft.com/download/en/details.aspx?displaylang=en&id=10910

Access 2010 is not supported for MAC or Android OS

TPVS requires approximately 20mb of disc space in addition to Access Runtime versions

File Name	Size
AccessRuntime.exe	175.5 MB
AccessRuntime_X64.exe	212.4 MB

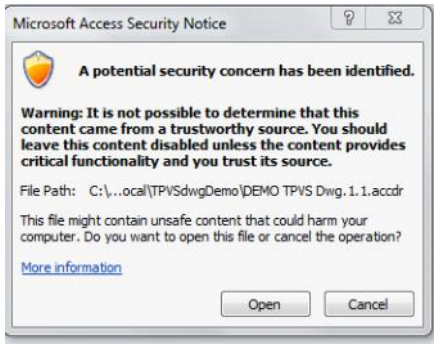
Installation,

You have the option to obtain a license for:
1. TPVS product only (you must have Access or Runtime installed prior.)
2. TPVS product + Access Runtime.exe
3. TPVS product + Access Runtime_X64.exe

You will receive a download link upon purchase of license.(please be sure to provide a valid email address)
Or download instantly with registration for Demo version.

Once you have downloaded your .msi file.
Double click the file to start installation.
Follow the screen prompts to complete installation.
Select run from the Start menu or desktop shortcut.

Upon opening the program you will be prompted by a security warning.
If you have downloaded your app from TPVS and our authorized sites click OPEN, otherwise we advise caution that you obtained your copy from an authorized distributor.



TPVS will Open to splash screen and zip code entry.

Next Navigation & Quick Start guide to program.

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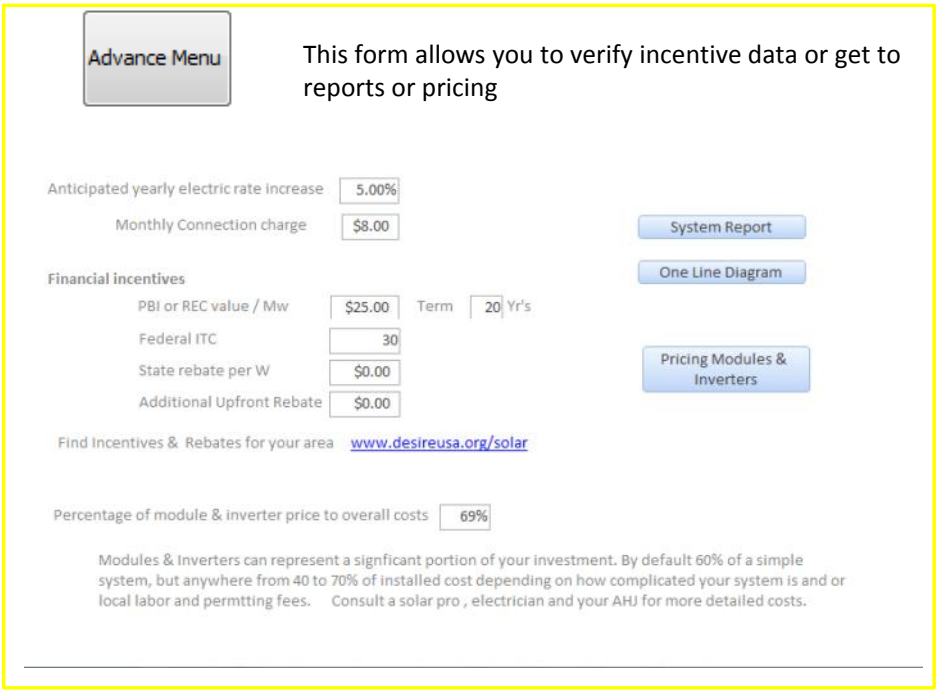
Navigation

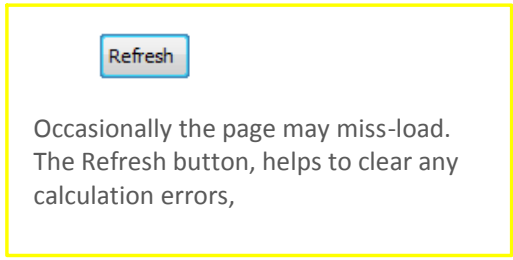
Header Navigation Buttons

Navigation of the forms is fairly easy. Each button in the header represents a form of the program to collect various information about your systems design.

The RED outlined button is where you are in the program and you may click either right to progress or left to go back thru the forms.

As you navigate there will be additional buttons to open additional information or data forms, these will open allowing you to view or update data. Typically you must close the form after editing to proceed.





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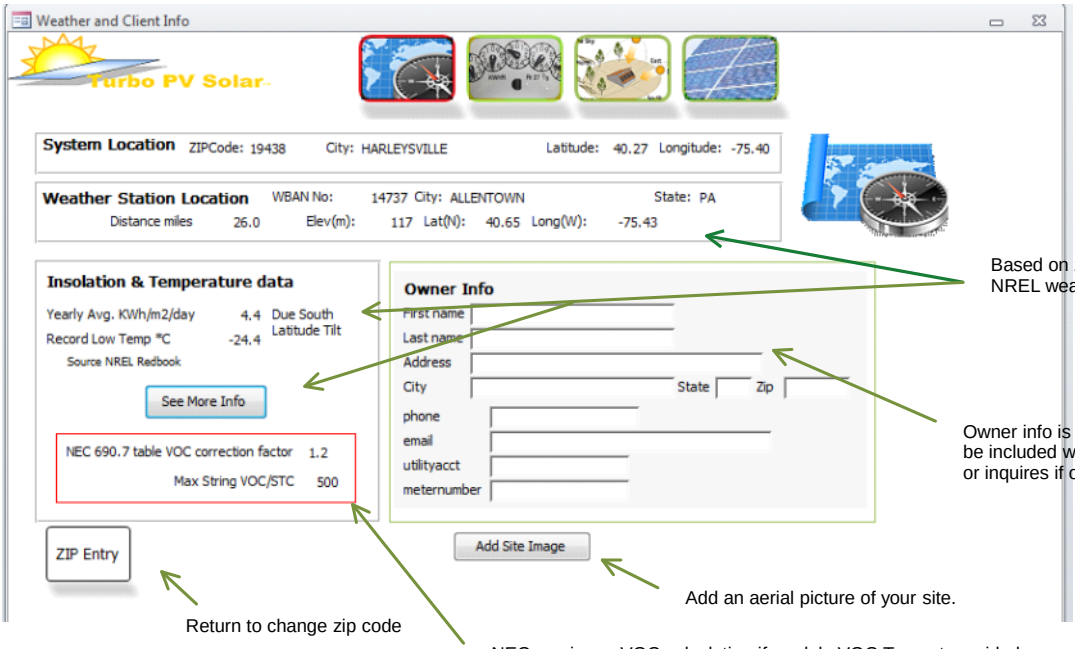
Quick Start

The quick start guide is to show you each screen of the program, with explanation of user entry and results as you proceed thru the program

1. **Enter your zip code, and we will bring to focus the nearest weather data**



Based on zip code, locate closest NREL weather station data

Owner info is optional, but will not be included when printing reports or inquires if omitted.

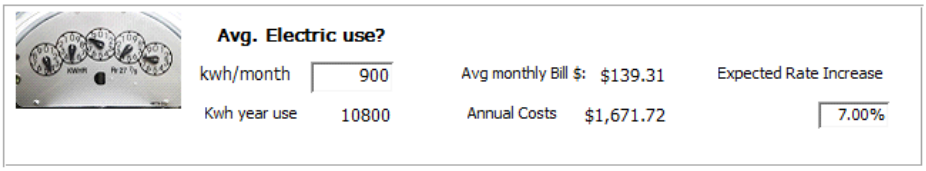
Add an aerial picture of your site.

Return to change zip code

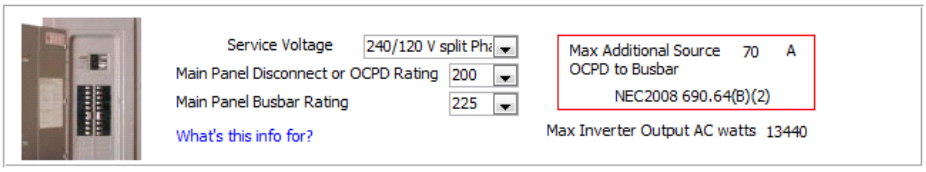
NEC maximum VOC calculation if module VOC Tco not provided

2. Enter current electrical service, rates and desired savings. And we start to calculate your potential systems.

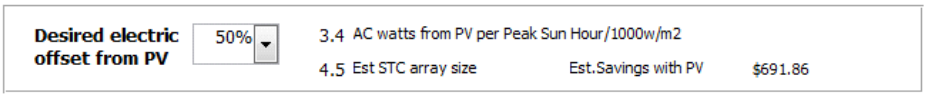
Tell us who your utility is, and how much you may pay for a kwh of electricity.
Default rate, available EIA retail rate.



Tell us how much electric you use.(Kwh/month)
And what you may expect in annual increases

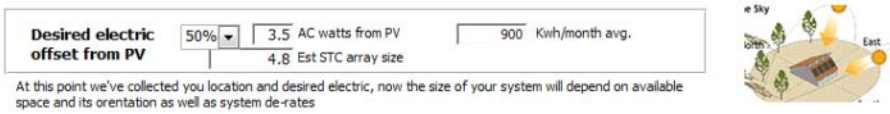


Enter existing service information
This info will limit inverter selection, to voltage and OCPD that will fit load side.
see help for more info

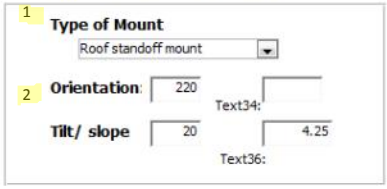


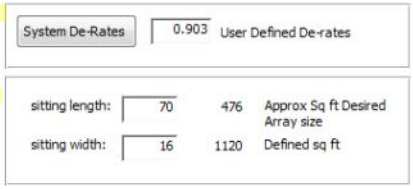
How much energy do you want to save?
(type percentage, or use dropdown list)
See potential System size & savings

3. Tell us more about your site.
And we drill into module and inverter spec's to calculate your system choices.

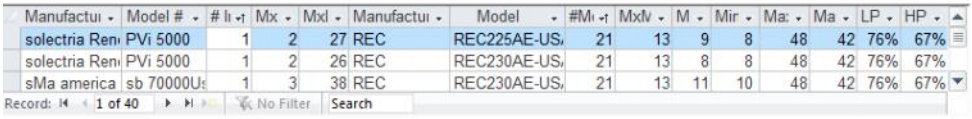


Electrical use & desire,
Carry over from prior electric form





1. Type of mount will set the temp adder.
2. Orientation and tilt, will set your estimated insolation.
3. User defined De-rates can be set
4. Approximate dimensions of your mounting area will help determine what will fit.



Manufactur	Model #	# li	Mx	Mxl	Manufactur	Model	#Mi	MxIV	M	Mir	Ma	Ma	LP	HP
solectria Ren	PVi 5000	1	2	27	REC	REC225AE-US	21	13	9	8	48	42	76%	67%
solectria Ren	PVi 5000	1	2	26	REC	REC230AE-US	21	13	8	8	48	42	76%	67%
sMa america	sb 70000U	1	3	38	REC	REC230AE-US	21	13	11	10	48	42	76%	67%

Record: 1 of 40 No Filter Search

Configuration bar, the heart of helping you design a system.

After taking into account your locations resources ,electric use ,desired savings, available space and orientation.
We start calculating systems from our database of modules and inverters.
What number of modules are needed? How many inverters ?
What string combinations?
How many will fit the space you define?

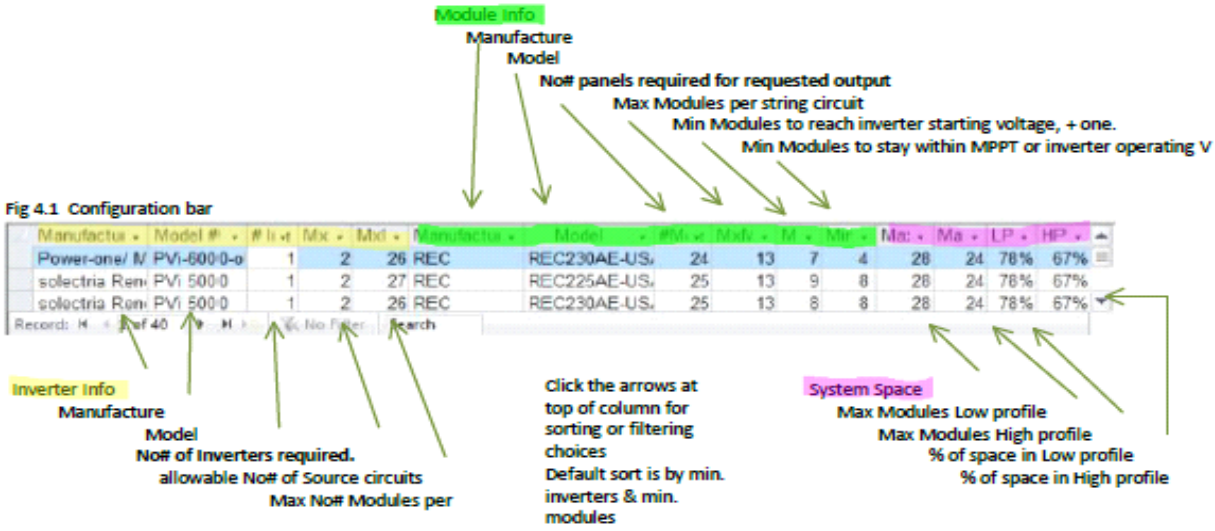
We have over 500+ common modules and 100+ inverters in the database,
This potentially could lead to 5000+ combinations.

The way we help drill them down, is to include only what you can price.
Our default pricing gets you started, but add from an installer or DIY.
You can even add your own modules & inverters to the database.
We provide some use full links to find this info.

3a. Configuration Bar:
here we combine the information you have so far supplied and start configuring potential systems.

The below illustrates what info we provide to help design your system.

In figure 4.1 We consolidate a lot of information to help you chose what systems may fit your interests.
Understanding the layout and significance of the data helps to receive full benefit of the program



The first time you see the configuration bar, it is essentially informational. You are not choosing components , but determining what size system will fit the defined space and your desired electricity offset.
Make adjustments to prior inputs of offset, space or orientation/ tilt and see immediate changes in the configuration bar

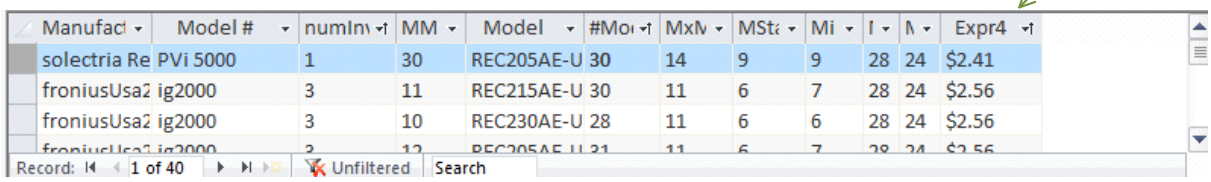
In the above example:; 1 PVI 6000 inverter, can take up to 2 stings of an REC 230w module, and max out at 26 modules
Which you only need 24 of. And can series string them from 7 to 13 modules.
2 series strings of 12 modules meets the requirement, And still fits in low profile (28 max) or High profile (24 max)mounting. Utilizing 78% or 67% or available space.

If this bar is blank, You have most likely exceeded space vs. desired system size. Make adjustments to desired offset or confirm space size. (other limiting factors may also apply, see help and website FAQ)

In the next form and second version "Price bar", (fig. 4.2) we now add pricing to the solution.
Based on unit pricing of modules and inverters that you can preload.
We break it down to per watt for the # of modules/inverter(s) and suggested system size.

Default sorted by lowest price

Fig4.2 Configuration Price bar.



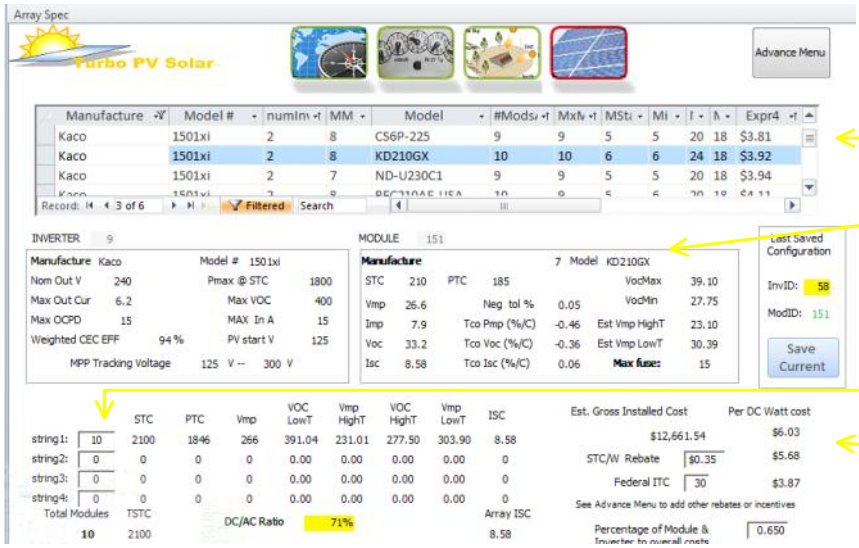
Manufact	Model #	numInv	MM	Model	#Mo	MxM	MSta	Mi	I	N	Expr4
solectria Re	PVi 5000	1	30	REC205AE-U	30	14	9	9	28	24	$2.41
froniusUsa2	ig2000	3	11	REC215AE-U	30	11	6	7	28	24	$2.56
froniusUsa2	ig2000	3	10	REC230AE-U	28	11	6	6	28	24	$2.56
froniusUsa2	ig2000	3	12	REC205AE-U	31	11	6	7	28	24	$2.56

Record: 1 of 40 Unfiltered Search

Any column can be filtered or sorted by clicking the "Arrow" in heading

4. Now using the configurator bar, you can select a potential system and string the modules to provide your best price, minimal modules or inverters.

Here in the fourth screen, based on the row selected, Inverter and modules specifications are shown to allow you to string the modules to make your systems power. Understanding series and parallel circuits is required to build your system



Selected row brings to focus

inverter & module specifications

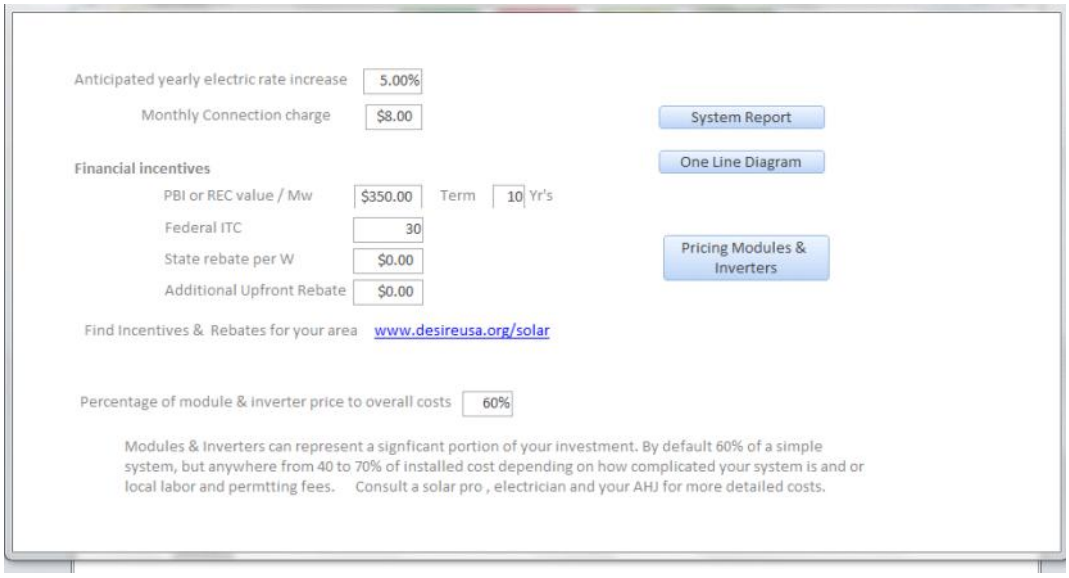
Enter the number of modules to configure your system strings.

And see potential installed costs*

*(installed costs are a function of estimating BOS, permits, racking, installation conduit & wire. As a percentage of overall costs.) See system pricing criteria

Once you have selected and strung modules, SAVE the configuration, this will queue it for reporting. If you move to another record, cells will change to yellow.

Go to Advanced menu button to do a review of rate increase, rebates or incentive



Edit electrical cost escalation
Monthly connection charges

Add Performance Based Incentives or Renewable Energy Credit values

Per Watt upfront rebates, or just cash incentives

Estimate the percentage BOS cost are to overall system

Then view and print/save your reports

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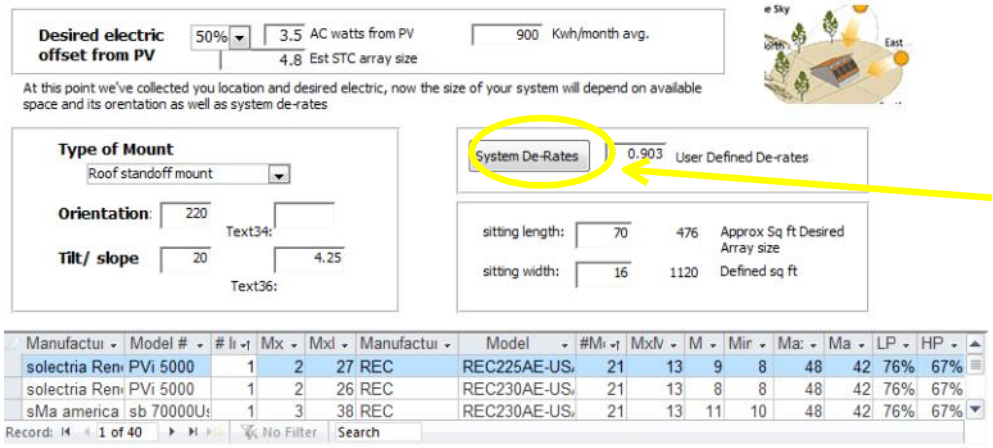
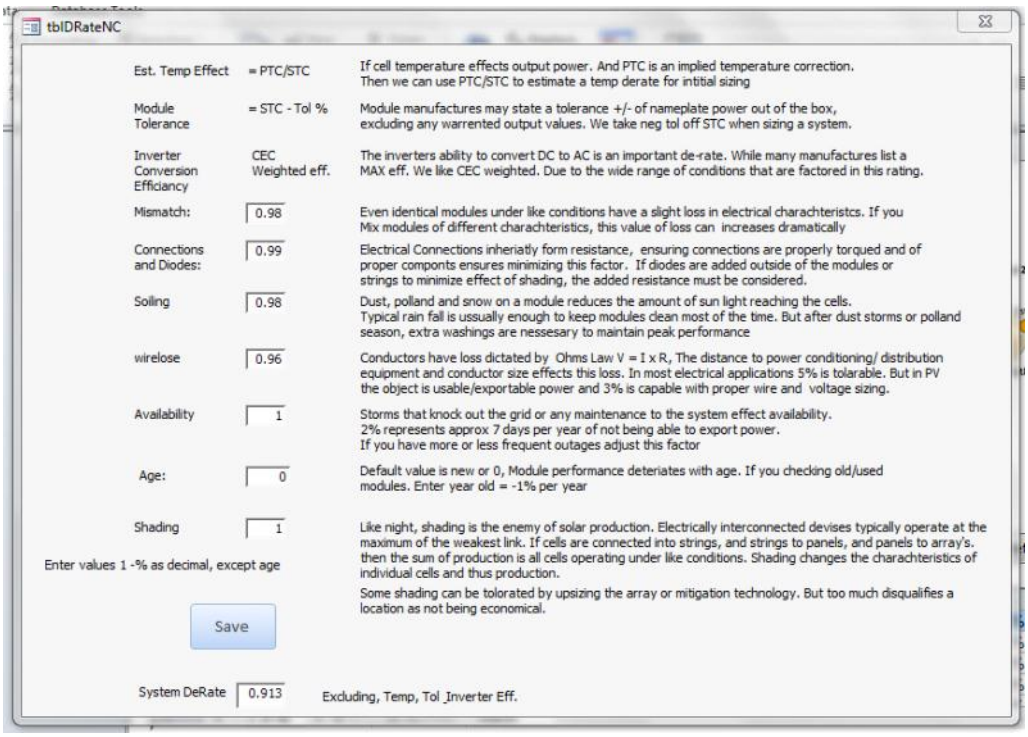
De-Rating the system

De-rates, are the variable that is estimated from you BOS design. and location. Estimated your de-rate to be included with the calculations.



From form 3, Mount & Orientation you may select "System De-Rates" to edit user inputs of the system



De-rates are an integral part of system design, they take into account factors outside of the efficiencies of temperature, modules and inverters.

The first 3 parts of de-rate are dependent of selected components

But other de-rates exist outside of these, such as shading, wire loss, & soiling

Here you apply estimated derates to be used in sizing your system and performance.

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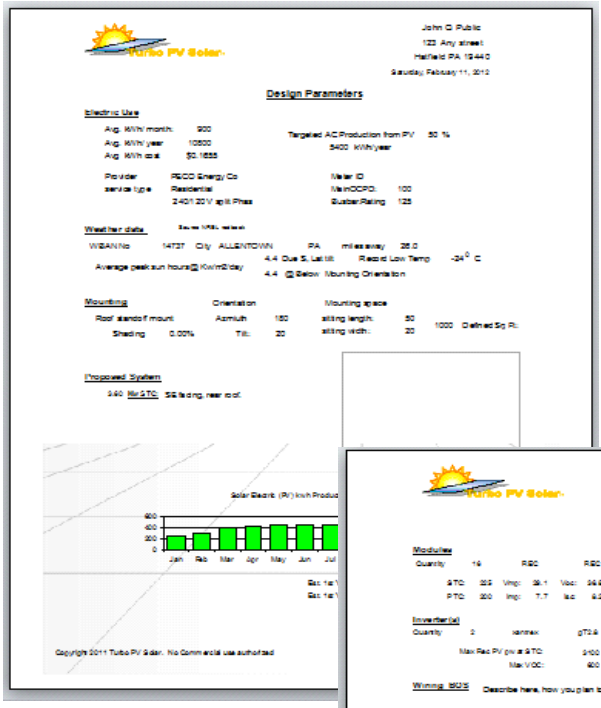
Reports

3 basic reports currently available from TPVS.

1. System report is a 3 page report, of user entered data, estimated system size, cost and savings over time.

2. One line diagram, is great for conveying the idea to installer or local authorities in the pre planning phase.

3. And then the Financial analysis that export's to excel for you to add calculations as you see fit to help make your best deal
(Msft Excel required. This report is also include in system report for printing or email purpose.)



System report

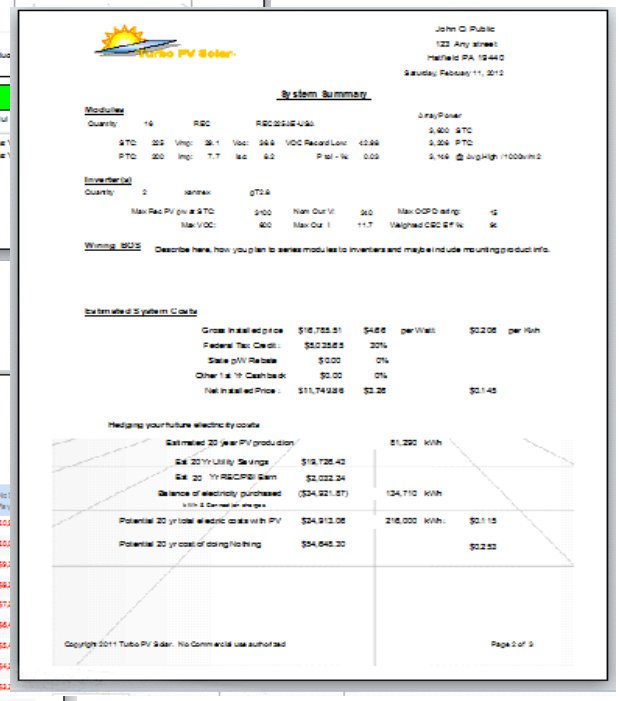
User entered parameters of the design.

Weather station data user for calculations

Site conditions of orientation, tilt and available space

Proposed system size and optional site picture.

Graph of estimated monthly production and 1st year savings

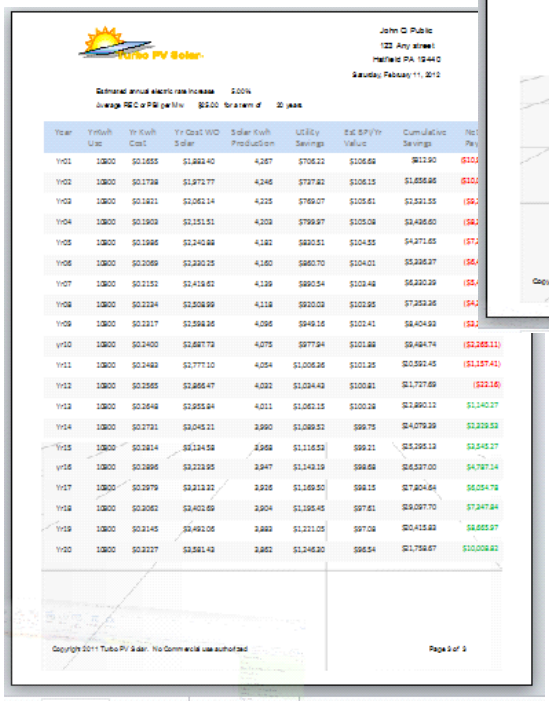


Page 2 gives a summary of major components of modules and inverters

Summary of gross cost minus rebates & incentives

Then breaks those cost down to estimated KwH cost, Gross, Net and over 20 years.

With a comparison of doing nothing and continuing to pay for your electricity from the provider.



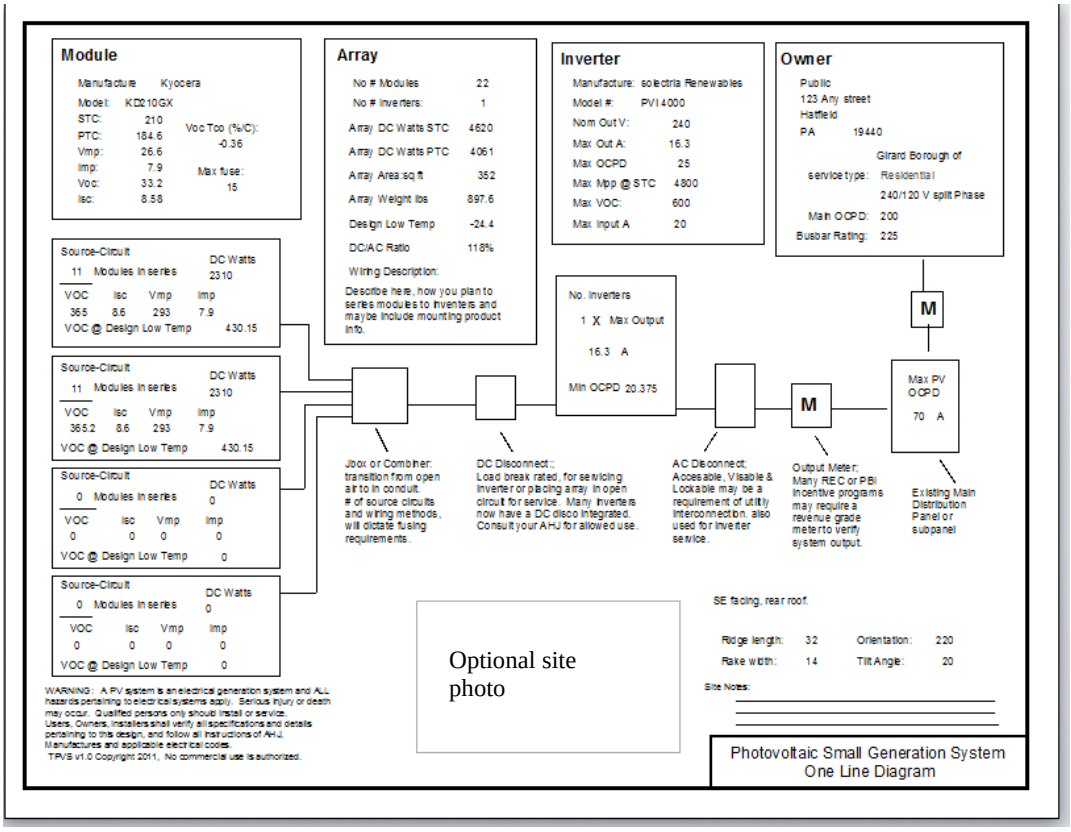
Page 3, Financial analysis page, reports estimated cost of electric as increased year over year

Estimated PV Production, with electrical cost savings. And potential SREC or other incentive.

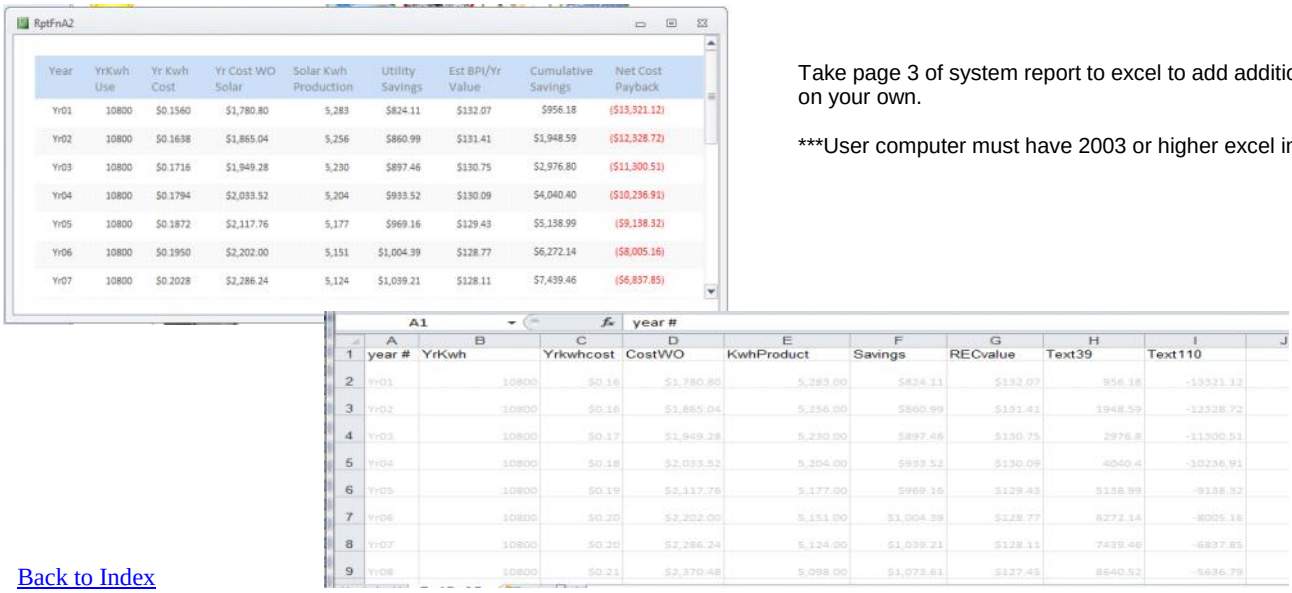
Simple payback, on costs of your initial investment.

One Line Diagram,

Here we turn your idea into a picture, offering information that helps to design the balance of system (BOS) of wire, disconnects and mounting.



Export Financial Analysis to excel



Year	YrKwh Use	Yr Kwh Cost	Yr Cost WO Solar	Solar Kwh Production	Utility Savings	Est BPI/Yr Value	Cumulative Savings	Net Cost Payback
Yr01	10800	$0.1560	$1,780.80	5,283	$824.11	$132.07	$956.18	($13,321.12)
Yr02	10800	$0.1638	$1,865.04	5,256	$860.99	$131.41	$1,948.59	($12,328.72)
Yr03	10800	$0.1716	$1,949.28	5,230	$897.46	$130.75	$2,976.80	($11,300.51)
Yr04	10800	$0.1794	$2,033.52	5,204	$933.52	$130.09	$4,040.40	($10,236.91)
Yr05	10800	$0.1872	$2,117.76	5,177	$969.16	$129.43	$5,138.99	($9,138.32)
Yr06	10800	$0.1950	$2,202.00	5,151	$1,004.39	$128.77	$6,272.14	($8,005.16)
Yr07	10800	$0.2028	$2,286.24	5,124	$1,039.21	$128.11	$7,439.46	($6,837.85)

	A	B	C	D	E	F	G	H	I	J
1	year #	YrKwh	Yrkwhcost	CostWO	KwhProduct	Savings	RECvalue	Text39	Text110	
2	Yr01	10800	$0.16	$1,780.80	5,283.00	$824.11	$132.07	956.18	-13321.12	
3	Yr02	10800	$0.16	$1,865.04	5,256.00	$860.99	$131.41	1948.59	-12328.72	
4	Yr03	10800	$0.17	$1,949.28	5,230.00	$897.46	$130.75	2976.8	-11300.51	
5	Yr04	10800	$0.18	$2,033.52	5,204.00	$933.52	$130.09	4040.4	-10236.91	
6	Yr05	10800	$0.19	$2,117.76	5,177.00	$969.16	$129.43	5138.99	-9138.32	
7	Yr06	10800	$0.20	$2,202.00	5,151.00	$1,004.39	$128.77	6272.14	-8005.16	
8	Yr07	10800	$0.20	$2,286.24	5,124.00	$1,039.21	$128.11	7439.46	-6837.85	
9	Yr08	10800	$0.21	$2,370.48	5,098.00	$1,073.61	$127.45	8640.52	-5636.79	

Take page 3 of system report to excel to add additional calculations on your own.

User computer must have 2003 or higher excel installed.

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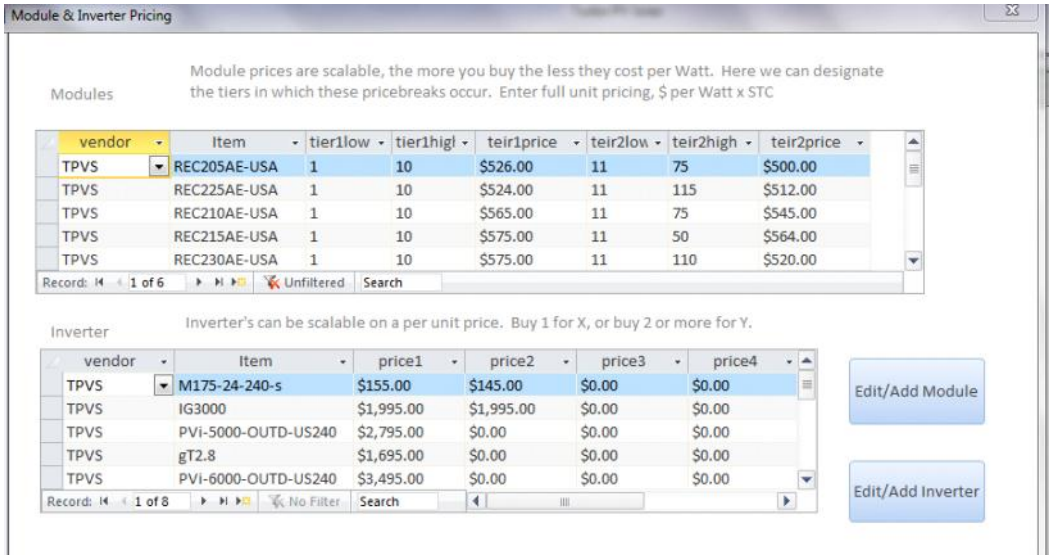
Update pricing

In DEMO version this function is disabled

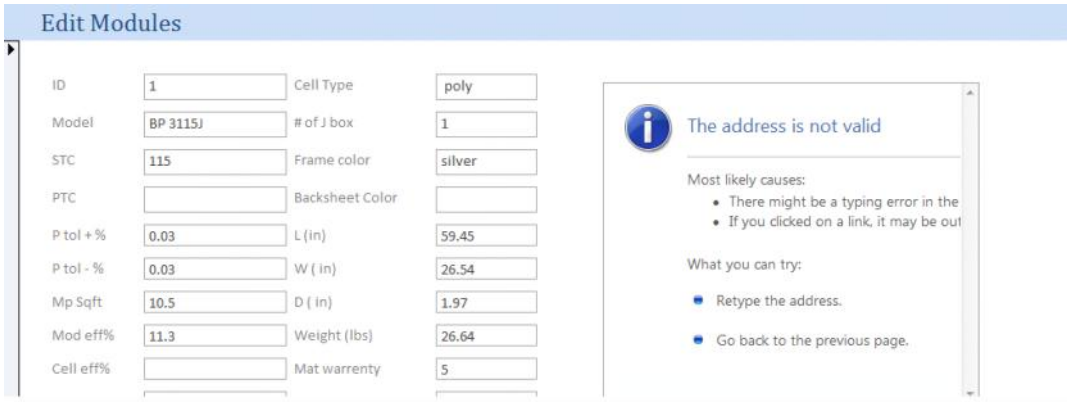
From the Advanced Menu by clicking (Module & Inverter Pricing button)



Here you can edit the pricing of modules and inverters that will be evaluated.

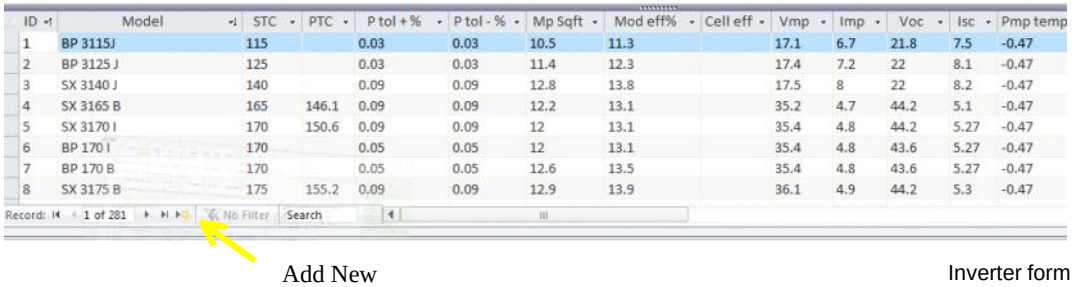
Modules and Inverters are scalable, meaning the more you buy the less expensive they can get. Enter the price break low & high quantities and corresponding prices.

The Edit/Add buttons will open the new forms in which you can edit existing or edit those contained in database



Web link to manufacture site or datasheet

Edit data of existing modules in database or add your own.



Split form,
Standard on top, Table or datasheet view at bottom, datasheet view can be sorted or filtered on each column.

Add New

Inverter form is similar in design

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Website, Help & Support

Having problems with your download, installing or operating TPVS contact support@turbopvsolar.com

Please note, Support is limited to installing and operating the application.
TPVS does not sell PV equipment or installation services.
We do not offer specific advice on any system, nor make any recommendations of modules or inverters.

Online support and additional resources. www.turbopvsolar.com/TPVShelp.html