

#### Updates and improvements in the latest PVsyst versions PVPMC Workshop

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B. Wittmer on behalf of the PVsyst development team PVsyst SA, Switzerland

PVSYST SA - Route de la Maison-Carrée 30 - 1242 Satigny - Suisse www.pvsyst.com  Last PVsyst presentation at a PVPMC workshop was in 2019 -> PVsyst V6.8.0



### **Overview**

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Today we are at PVsyst V7.2.17



Many novelties and improvements have accumulated, here we briefly cover:

- Improvements in modeling
- Improvements in tools
- Improvements in user interface
- Upcoming features



### **Improvements for PV components**

• Improved user guidance for the creation of new PAN and OND files

- Twin half-cut cell modules in 'Module Layout'
- Tool for checking or determining R<sub>serie</sub> ٠ Definition of a PV module Basic data Sizes and Technology Model parameters Additional Data Commercial Graphs Description Hanwha O Cells, O.Peak-Duo-XL-G11.3-590 Optional additional specifications available for this PV module Measured low-light data Measured I-V Curve Customized IAM Secondary parameters Degradatio Measured Low-light performance data O Define points O Efficiencies O Effic. errors This tool creates a module corresponding to the measured one.. ? Show original module Relative efficiency This should not be confused with the "father" module. Rel. efficiencies (model and points) Relative effic. with respect to STC G ref. T ref. Pmp Rel. effic 8 
   1000 W/m2
   25 °C
   589.7 W
   0.00%

   800 W/m2
   25 °C
   471.9 W
   0.02%

   600 W/m2
   25 °C
   352.8 W
   -0.30%

   400 W/m2
   25 °C
   233.1 W
   -1.20%
   Model Rel. effic at 25°C 800 W/m², -0.01 % 600 W/m², -0.31 % 400 W/m², -1.13 % low-light data from - 25.0 °C 200 W/m², -3.25 % 400 Irradiance IEC 61853 measurements 200 600 800 1000 Optimize Rs Rserie 0.178 ohm Pmp at STC 589.7 W/m<sup>2</sup> 😋 Add point 🗙 Delete Rshunt 1700.0 ohm Err Meas - model 0.00% Rserie Max 0.187 Q RMS Meas - model 0.04% ? Paste from Excel RSerie optimized R<sub>serie</sub> determination 🗸 ок Show Optimization Gopy to table R, v Page 3



 Power optimizers: more manufacturers improved modeling



# **Aging Tool and Transposition**

• Multi-year simulations with PV module degradation

• Explicit treatment of circumsolar irradiance

🇖 Aging Tool	- D X
Aging Parameters	() Information
Every # years         (E)         <	Define aging properties
Anteso 😸	of PV modules
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47	
0.00 81 62 63 64 65 66 67 68 69 60 11 12 13 16 16 16 17 18 19 28 21 22 23 24 25 The dependent	





# More flexibility for the System design

#### • More detail in AC circuit

Thermal parameter Ohmic Losses Module quality - LID - Mismatch Soiling Loss IAM	I Losses Auxiliaries Aging Unavailability Spectral correction
DC circuit: ohmic losses for the array Specified by	alled computation
Voltage Drop across series diode 0.7 V Sefault AC losses after the inverter	Add HV and MV transformers
AC Wire loss Inverter to transfo (per inverter)	Medium and High voltage transformers
Wites AC circuit ohmic loss         Image: Circuit ohmic loss         Image: Circuit ohmic loss           Length Inverter to Transformer         40.0         m         Wre section           Loss fraction at PNom         0.12         %         2000 mm³         Image: Circuit ohmic loss           Pnom: Pac = 2000 kW, Vac = 800 V Tri, I = 1443 A         Image: Copper Au         Image: Circuit ohmic loss         Image:	Image: With Transformer(s), full system         Image: With Transformer(s), full system         Image: With Transformer(s), full system           Number of MV transfors         1         Image: With Transformer(s), full system         Image:
Uses a HV transformer	Transformer from Datasheets
Medium Voltage line           MV line voltage         20.0         kV           Length MV Transfo to injection         590         m         Wire section           Loss fraction at PNom         0.09         %         300 mm <sup>3</sup> (?)           Promi: Pas = 1000 kW, Vac = 20.0 kV Tri, 1 = 293 A         @ Copper         Au         Au	W Loes datasheets data           Nominal power           Tiron losses (no load loss)           0.0100           MVA           Copper (resistive) loss at PNom           0.0260           MVA           Global loss at PNom           0.0260           MVA           Global efficiency at PNom           99.74
Define different stretches of AC cables	Define transformers from technical specifications

#### • Unlimited number of sub-arrays

Grid system definition, Variant VC9: "Many sub-arrays"		1		,
Sub-array	Different subarrays for	List of subarrays	(	?
Sub-array name and Orientation Pre-siz	different configurations	+ → AB v ∧ III ◆		
Name Sub-array #4 Order 4   No si Orient. Tracking, tilted axis	PV module type,	Name	#Mod #String #Inv. #MPPT	
Select the PV module	invertor type string	Sub-array #2		1
Available Now V Filter All PV modules V	inverter type, string	Generic - Mono 250 Wp 60	22 308	
Generic 250 Wp 26V Si-mono Mono 250 Wp 60 o	length, orientation, etc.	Generic - 60 kWac string inv	22 1	- 1
Use optimizer	iengin, onentation, etc.	Generic - Mono 250 Wp 60	22 150	
		Generic - 60 kWac string inv	11 1	
Sizing voltages : Vmpp (60°C) 26.2 V		Sub-array #4		
Voc (-10°C) 41.7 V		Generic - Mono 250 Wp 60	22 308	
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6. of inverters 3 🗘 🗹 Operating voltage: 320-70	0 V Global Inverter's power 1500 kWac	Sub-array #6		- 1
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		Generic - 60 kwać string inv	22 1	>
Design the array				
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Nod. in series 22 between 13 and 22 Voc (-10°C)	688 V 917 V	Module area 56458 m²		
(b. strings 308		Nb. of inverters 100 Nominal PV Power 8849 kW	ln.	
Mane irradianci Imno (STC)	1000 W/m <sup>2</sup> O Max. In data STC     2519 A Max. operating power 1523 kW		/DC	
	2658 A (at 1000 W/m <sup>2</sup> and 50°C)	Nominal AC Power 7320 kW	/AC	
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to modules 6776 Area 11024 m. Isc (actic)	Array Ionic Power (STC) 1054 kmp			
Q. System overview	d. Simplified	sketch 🗙 Cancel	🖌 ок	
		Ketch Californi	🗸 (K	
Previously limi	ted to 8 sub-			
· ·				
arrays, now no	limit			



## Shadings on complex terrain

• Importing of 3D drawings (including trackers and terrain) from other software packages



PVC format based on open-source Collada (DAE) with additional keywords to describe PV tables and trackers

• Visualization tools for understanding orientations







## **Advanced Editing Tools**

• Multiple selection editing









## **Improvements in 3D drawing tools**

• Filling zones with automatic height adjustment

• Tracking systems with a single or several common vertical axes (floating PV)



The tables can be fixed tilt or SAT





### Weather data

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- Updated weather data sources: Meteonorm 8 built-in (prepared for sub-hourly data) Meteonorm API for horizon import Solcast API SolarAnywhere API

  - SolarGIS API (upcoming)
  - PVGIS API (5.2) including multi-year time series and horizon



TMY generation according to several standards

Site Salt Lake City_PVGIS_NSRD	B_		Salt Lake City	PVGIS	S-NSRDB				11 years $\sim$	
븠 Meteo data			Graph	Type Site - Compar	isons					
Meteo File	Meteo dates		250	1 1		_				
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## **Overhauled Economic Evaluation**

• Fully customizable cost breakdown



Detailed financing plan



- Includes also self-consumption, storage
- Extended to standalone and pumping systems

Flexible tariffs



Detailed results



• Integrated into batch simulations and optimization tool



## **General Improvements of User Interface**

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• Overhauled report with many possibilities of customization

review	Options Project's name	Variant
Venion 7:		Modify the name for the cover page:
<b>PV</b> SYST	Project: PVPMC 2022	Variant: Customized report
	-System kind	Cover image - Custom text
PVsyst - Simulation report	Customize the proposed system kind text	Change cover image / Edit custom text
Grid-Connected System Project: PVPMC 2022	roof-mounted PV system	Cover image     O Custom text
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Direct comparison of two simulations

• Renewed look of user interface in release 7.0



## **Improvements of User Interface**

• Direct feedback during simulation



• Issues summary after simulation





• Tutorials on YouTube and Vimeo



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## **Upcoming features**

Single line diagram ٠



System summary and notes





### **Summary**

Many novelties and improvements have accumulated we have briefly shown:

#### Improvements in modeling

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- PV components Detailed modeling of Twin half cell modules Easier creation of PN files and determination of single diode model parameters Power optimizers: more manufacturers and improved modeling
- Transposition Explicit treatment of circumsolar irradiance
- System design More detail in AC circuit Unlimited number of sub-arrays
- Weather Data
   Updated weather sources
   Integrations of APIs for weather data and horizon
   lines
   Tool for the creation of TMY files

#### Improvements in tools

- Aging Tool multi-year simulations with PV module degradation
- 3D editor
   Importing of drawings including terrain and trackers

   Editing of multiple selections
   Customization of backtracking
   Automatic filling zones
   Trackers with common vertical axis (used for floating PV)

   Tool to visualize orientations
- Overhauled Economic Evaluation Fully customizable cost breakdown, financing plan and tariffs Detailed financial analysis Integration into batch simulations

#### Improvements in user interface

- Overhauled report
- Direct comparison of two simulations
- More languages
- More details during and after simulation
- More video tutorials

#### **Upcoming features**

- Single line diagram
- System summary and notes
- Sub-hourly clipping losses
- More flexibility for complex orientations
- Bifacial systems: current 2D modeling generalized to 3D drawing

