

Updates and improvements in the latest PVsyst versions PVPMC Workshop

23,24 August 2022 Salt Lake City, USA

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

٠

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_{serie} 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/m² 😋 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_{serie} 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	- 🗅 X
Aging Parameters	Ø Information
Every # years D Image: Specific netros (angle netros file used for all smultitine) Image: Specific netros (angle netros file user smultitine) Image: Specific netros (angle netros (angle netros file user smultitine) Image: Specific netros (angle netros	Define aging properties
Anten State	of D\/ modulos
Meteo Alexo File (Dick to reset to default) Meteo Anteo Ante	of FV modules
Set Lake City Buera Vista_MHID_SIM Note Set Lake City_Buera Vista_MHID_SIM Netes Re used for this	Themal parameter Ohnic Losses Module puelty - LID - Menatch Soling Loss (LAM Losses Auslanies Aging Unavailability Spectral correction
6 No No	Uses degradation in the simulation
Select typical year or	Parameters is simulation Simulation for year to 1 0 T
	Individual PV modules: Global degrad. Notor: 0.03 % g 00 Datac degradation
measured time series	Mendel depend factor 0.041 % Z W With ennual increasing research Model warranty
	PF module sping parameters
	Imp RMI dependen Mujmar ● Efficiencies . Vmp RMI dependen Lisses
Aging simulation	Store the Meete Carlo values OB Used for this evaluation Hedde warranty
Result variable to plot Performance Ratio	Nameth System 0.66% Operation new Waverhyte No Maxach 30 years 1.56% 20 Modes in testes new 30 Waverhyte New Maxach 30 years 1.56% 20 Modes in testes new 30 Waverhyte New
Run Sinulation	Needo 3 years 2.23% Monte Calo caluidan fear 25 Wanach (20.0% how 4.71% Calo caluidan fear 25 Wanach (20.0% how 6.71%)
Aerbonance Rate - D X	The inside The inside density around Open Open
Performance Ratio	Courts Hamach Kell Hono
0.02	
Multiyear	simulation:
Eull voor d	imulations dark
full-years	
f Interpolat	ions light
0.78	
Twart of operation	





More flexibility for the System design

• More detail in AC circuit

Thermal parameter Ohmic Losses Module quality - LID - Mismatch Soiling Loss IAN	M Losses Auxiliaries Aging Unavailability Spectral correction
DC circuit: ohmic losses for the array Specified by	aled computation
Voltage Drop across series dode 0.7 V Default AC losses after the inverter	Add HV and MV transformers
AC Wire loss Inverter to transfo (per inverter)	Medium and High voltage transformers
Cluses AC circuit ohmic loss Image: Constraint of the circuit of the ci	INUT Transformer(s), full system Image: Construction of the system Image: Construction of the system Number of MV transfors 1 0 Image: Construction of the system Image: Construction of the system Center's values 1 0 Image: Construction of the system Image: Construction of the system Reference Pacific Notation 0 10 HW Image: Construction of the system Image: Construction of the syste
Uses a HV transformer	Transformer from Datasheets
Hedium Voltage line MV line voltage 20.0 kV Length MV Transfo to injection 590 m Wire section Loss fraction at PNom 0.09 % 300 mm² ? Promi: Pas = Look KV, Vac = 20.0 kV Tri, I = 299 A @ Copper O Alu	Wiles datableets data Nominal power 10.00 Itron losses (no load loss) 0.0100 Ocoper (resistive) loss at PNom 0.0160 Global loss at PNom 0.0260 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		0
Sub-array name and Orientation Pre-sizing	different configurations			
Name Sub-array #4 Order 4 No sizin; Orient. Tracking, tilted axis	PV module type,	Name	#Mod # #Inv. #	#String #MPPT
Select the PV module	invertor type string	Sub-array #2	** .	• •
Available Now V Filter All PV modules V	inverter type, string	Generic - Mono 250 Wp 60	22 3	308
Generic 250 Wn 26V Si-mann Mann 250 Wn 60 cells	length orientation etc	Generic - 60 kWac string inv	22	1
	ichgin, onentation, etc.	Sub-array #3	22	150
_] Use optimizer		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 3	308
Select the inverter	20 Kit	Generic - 500 kWac inverter	3 1	1
Available Now V Output voltage 400 V Tri 50Hz	301/2 ≤ 60 Hz	Generic - Mono 400 Wp 72 c	26	120
_Generic V 500 kW 320 - 700 V LF Tr 50 Hz 500 kWac in	verter Since 2012 V O Open	Generic - 60 kWac string inv	20	1
6. of inverters 3 . V Operating voltage: 320-700	/ Global Inverter's power 1500 kWac	Sub-array #6		
Input maximum voltage: 1000		Generic - Mono 250 Wp 60	22 3	308
		Generic - 60 kwać string inv	22	
Design the array				
Number of modules and strings Operating condition	ans	Global system summary		
Vmpp (60°C)	577 V	Nb. of modules 33524		
4od. in series 22 0 ⊕ between 13 and 22 2 Voc (-10°C)	917 V	Module area 56458 m²		
vb. strings 308		Nb. of inverters 100 Nominal DV Power 8840 kW	Vo	
Plane irradiance Impo (STC) 25	1000 W/m ² O Max. in data @ STC 9 A Max. operating power 1523 kW	Maximum PV Power kW	/DC	
hom ratio 1.13 Show sizing Isc (STC) 26	8 A (at 1000 W/m ² and 50°C)	Nominal AC Power 7320 kW	/AC	
the madeles CTTC Area 11074 -1 Inc (st CTC) 26	2 A Away non Down (CTC) 1604 Min	Pnom ratio 1.209		
10. modules 6776 Area 11024 m* 150 (at 310) 20.	6 A Anay Ion. Power (SIC) 1094 Mp			
	. Constitute	tutt 🖌 🖌 Canad		~
C system over view	m smpined s	Keton Carros	× •	JK.
Previously limit	ed to 8 sub-			
arrays, now no	imit			
, ,				



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

٠

- 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		_				
B-Salt Lake City_PVGIS_NSRD8_	2005 to 2015		Long	-term mean values Glob	al		1			
Salt Lake City_PVGIS_NSRDB_20	05.MET 2005		200 Long	-term mean values Diffi	150					
- Salt Lake City_PVGIS_NSRDB_20	06.MET 2006		TMY	Diffuse					1	
Salt Lake City_PVGIS_NSRDB_20	07.MET 2007		1							
Salt Lake City_PVGIS_NSRDB_20	08.MET 2008		道 ¹⁵⁰						1	
Salt Lake City_PVGIS_NSRDB_20	09.MET 2009		24 -							
Salt Lake City PVGIS NSRDB 20	10.MET 2010		불 100 -							
Salt Lake C										
Salt Lake C Select	weather data				Juning		- <u>-</u>			
Salt Lake C Salt Lake C Salt Lake C Salt Lake C	weather data		50	 						
SaltLake C SaltLake C SaltLake C SaltLake C SaltLake C SaltLake C SaltLake C	weather data eries		50)			
Salt Lake c Salt Lake c Salt Lake c Salt Lake c Salt Lake c Salt Lake c	weather data eries		B				·····		·····	
Salt Lake C Salt Lake C Salt Lake C Salt Lake C Salt Lake C	weather data eries		50 Jan F	eb Mar Apr	May Ju	un Jul	Aug	Sep	Oct Nov Dec	
Saltake c	weather data eries		50 Jan F	eb Mar Apr	May Ju	un Jul	Aug	Sep	Oct Nov Dec	
SaltJake C SaltJake C SaltJake C SaltJake C SaltJake C SaltJake C	weather data eries		50 Jan F Long-term mean vi Global	eb Mar Apr lues Diffuse Tempe	May Ju Generate	un Jul ed TMY mont Global	Aug hly values Diffuse	Sep Temper.	Oct Nov Dec	nd
Satuate Satuate Satuate Satuate Generation options	weather data eries	Weight	50 Jan F Long-term mean v. Global kWt/m ² /m benary.	b Mar Apr lues Diffuse Tempe bk/Wh/my/mth °C 23.4 - 37	May Ju Generate r.	un Jul ed TMY mont Global kWh/m²/mbh	Aug hly values- Diffuse kWh/m²/mth 21.4	Sep Temper. °C -3.2	Oct Nov Dec	nd
Satuar Satuar Satuar Satuar Satuar Generation options	weather data eries Variable Daily global irradiation	Weight 1	50 50 Jan F Long-term mean v Global kWh/m²/m January 61.1 February 80.6	b Mar Apr ilues Diffuse Tempe blw/h/m/mthi °C 23.4 -3.7 32.3 -0.8	May Ju Generate Jan (2009) Feb (2009)	un Jul ed THY mont Global kWh/m²/mth) 62.0 76.9	Aug hly values Diffuse kWh/m²/mth 21.4 32.2	Sep Temper. °C -3.2 -1.2	Oct Nov Dec	nd
Satuke Select Satuke Select Satuke State Satuke Select Satuke Select Satuke Select	Verable Daily global tradation Dry bub temperature - daily mean	Weight 1 1	Jan F Jan F Long-term mean v. KWh/m ³ /m January 61.1 February 80.6 March 132.0	b Mar Apr kues Diffuse Tempe th:Wh/m?/mth °C 23.4 -3.7 32.3 -0.8 50.4 3.9	May Ju Generate r. Jan (2009) Feb (2009) Mar (2005)	un Jul d THY mont Global kWh/m²/mth) 62.0 76.9 132.0	Aug hly values- Diffuse kWh/m²/mth 21.4 32.2 45.9	Sep Temper. °C -3.2 -1.2 4.4	Oct Nov Dec Visualize a save the re	nd esul
Soltake Construint of the soltake Construint	Verable Variable Variable Daily global irradiation Dry blob importaire - daily mean Relative hundridy - daily mean Relative hundridy - daily mean	Weight 1 1 1	Jan F Long-term mean v. Global kWh/m ³ /m January 80.6 March 132.0 April 164.7	b Mar Apr hucs Diffuse Tempe hkWh/m³/mbi °C 23.4 -3.7 32.3 -0.8 50.4 3.9 62.9 8.4	May Ji Generate Jan (2009) Feb (2003) Mar (2005) Apr (2014)	un Jul cd THY mont Global kWfh/m ² /mbh 62.0 76.9 132.0 163.7	Aug hly values Diffuse kWh/m²/mth 21.4 32.2 45.9 64.9	Sep •C -3.2 -1.2 4.4 9.5	Oct Nov Dec Visualize a save the re	nd esul
Soltake Select Soltake Select Soltake Soltake	Veriable Daly globel tradation Dry bolds temperature - daly mean Relative humidty - daly mean Total weight -	Weight 1 1 1 1 /3	50 50 Jan F Long-term mean v Global kWh/m ³ /m January 61.1 Pebruary 80.6 March 132.0 March 132.0 March 132.0 March 132.0	b Mar Apr Diffuse bk/th/m/mbt %C 23.4 -3.7 32.3 -0.8 50.4 3.9 62.9 8.4 73.1 14.2 32.0	May Ju Generate r. Jan (2009) Feb (2009) Mar (2005) Apr (2014) May (2013)	un Jul d THY mont Global kWh/m²/mbhl 62.0 76.9 132.0 163.7 211.6 207 p	Aug hly values- Diffuse kWh/m²/mth 21.4 32.2 45.9 64.9 67.8 7.0	Sep Temper. °C -3.2 -1.2 4.4 9.5 15.3 20.5	Oct Nov Dec Visualize a save the re	nd esul
Soltake Sol	weather data eries Vande Dahg ofol readaton Dry bub temperature daly mean Total neight	Weight 1 1 1 /3	Jan F Jan F Long-term mean v. Global Withms/m Silo January 80.6 April 164.7 March 132.0 April 164.7 June 2033.8 June 2033.8 May 205.7 June 2033.8 May	b Mar Apr hues Diffuse Tempe but/hm/m/met 50.4 3.9 62.9 8.4 73.1 14.2 59.1 21.0 69.4 26.9 69.4 26.9	May Ju Generate r. Jan (2009) Mar (2005) Apr (2014) May (2013) Jun (2008) hd (2018)	n Jul ed TMY mont Global kWh/m?(mbh) 62.0 76.9 132.0 163.7 211.6 236.5 298.4	Aug hly values- Diffuse kWh/m²/mth 21.4 32.2 45.9 64.9 67.8 57.0 69.2	Sep Temper. [↑] C -3.2 -1.2 4.4 9.5 15.3 20.5 27.6	Oct Nev Dec Visualize a save the re	nd esul
Soltake Soltak	weather data eries Daly dobi irradaton Dy lub temperate - daly mean Total weight	Weight 1 1 1 /3	Jan F Long-term mean v Global XWh/m/m January 61.1 February 80.6 March 132.0 Mar 164.7 May 205.7 June 233.8 July 202.5	b Mar Apr Diffuse Tempe bkWh/m?mb; °C 23.4 -3.7 32.3 -0.8 50.4 3.9 62.9 8.4 73.1 14.2 59.1 21.0 59.1 21.0 59.4 26.2	May Ju Generate r. Jan (2009) Feb (2009) Mar (2014) May (2013) Jun (2008) Jul (2008) Jul (2008)	n Jul ed THY mont Global kWh/m2/mthl 62.0 76.9 132.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.	Aug hly values- Diffuse kWh/m²/mth 21.4 32.2 45.9 64.9 67.8 57.0 59.2 45.8	Sep Temper. °C -3.2 -1.2 4.4 9.5 15.3 20.5 27.6 25.8	Orthogonalize a save the re	nd esul
Soltake G Solta	Verable Dahy glob rradaton Dy tub tropenative - ddy mean Relative hundty - daily mean Total weight	Weight 1 1 1 /3	Jan F Jan F Long-term mean Global ktVh/mb/lt January January 80.6 April 164.7 March 132.0 April 164.7 June 233.8 Juhy 230.8 August 202.5 September 155.0	b Mar Apr hues Diffuse Tempe bic/hin/hit °C 23.4 + -3.7 32.3 -0.8 50.4 -3.7 33.4 -3.7 50.4	May Ju Generate r. Jan (2009) Feb (2009) Mar (2014) May (2013) Jun (2008) Jul (2008) Jul (2008) Aug (2008) Sep (2014)	un Jul d THY mont Global kWh/m²/mthl 62.0 76.9 132.0 163.7 211.6 236.5 238.4 213.8 158.4	Aug hly values- Diffuse kWh/m²/mth 21.4 32.2 45.9 64.9 67.8 57.0 59.2 45.8 36.8	Sep Temper. °C -3.2 -1.2 4.4 9.5 15.3 20.5 27.6 25.8 20.3	Oct Nov Dec	nd esul
Soltake Select Select time soltake Select	Verable Caly dold irradaton Dry bub temperature - daly mean Relative hundry - daly mean Total weight	Weight 1 1 1 /3	Image: Section 2016 Image: Section 2016 Image: Section 2016 Image: Section 2016 <td>b Mar Apr https://bites/feed/feed/feed/feed/feed/feed/feed/fe</td> <td>May Ju Generate r. Jan (2009) Feb (2009) May (2013) Jun (2008) Jul (2008) Jul (2008) Sep (2014) Oct (2005)</td> <td>n Jul d THY mont Global kVt/n/m2/mbh 62.0 163.7 211.6 236.5 238.4 211.8 158.4 118.4 114.4</td> <td>Aug hly values- Diffuse kWh/m²/mth 21.4 32.2 45.9 64.9 67.0 57.0 57.0 57.0 59.2 45.8 36.8 31.4</td> <td>Sep *C -3.2 -1.2 4.4 9.5 15.3 20.5 27.6 25.8 20.3 11.6</td> <td>Oct Nov Dec</td> <td>nd esul</td>	b Mar Apr https://bites/feed/feed/feed/feed/feed/feed/feed/fe	May Ju Generate r. Jan (2009) Feb (2009) May (2013) Jun (2008) Jul (2008) Jul (2008) Sep (2014) Oct (2005)	n Jul d THY mont Global kVt/n/m2/mbh 62.0 163.7 211.6 236.5 238.4 211.8 158.4 118.4 114.4	Aug hly values- Diffuse kWh/m²/mth 21.4 32.2 45.9 64.9 67.0 57.0 57.0 57.0 59.2 45.8 36.8 31.4	Sep *C -3.2 -1.2 4.4 9.5 15.3 20.5 27.6 25.8 20.3 11.6	Oct Nov Dec	nd esul
Soltake Saltake	Veriable Davy goda radaton David goda radaton David boda radaton David stopparter- ddy mean Total weight	Weight 1 1 1 /3	Image: Second	bb Mar Apr bb Mar Apr <t< td=""><td>May Ji Generate r. Jan (2009) Heb (2009) May (2013) Jan (2008) Jal (2008) Jal (2008) Sep (2014) Oct (2005) Nov (2014)</td><td>n Jul cl THY mont Global kWh/m?/mbh 62.0 76.9 132.0 163.7 211.6 236.4 238.4 114.4 70.2</td><td>Aug hly values- Diffuse KWh/m³/mth 21.4 32.2 64.9 67.8 57.0 64.9 67.8 59.2 45.8 36.8 31.4 26.2</td><td>Sep Temper. °C -3.2 -1.2 4.4 9.5 15.3 20.5 27.6 25.8 20.5 27.6 25.8 20.5 11.6 3.1</td><td>Oct Nov Dec Visualize a save the re</td><td>nd esul</td></t<>	May Ji Generate r. Jan (2009) Heb (2009) May (2013) Jan (2008) Jal (2008) Jal (2008) Sep (2014) Oct (2005) Nov (2014)	n Jul cl THY mont Global kWh/m?/mbh 62.0 76.9 132.0 163.7 211.6 236.4 238.4 114.4 70.2	Aug hly values- Diffuse KWh/m³/mth 21.4 32.2 64.9 67.8 57.0 64.9 67.8 59.2 45.8 36.8 31.4 26.2	Sep Temper. °C -3.2 -1.2 4.4 9.5 15.3 20.5 27.6 25.8 20.5 27.6 25.8 20.5 11.6 3.1	Oct Nov Dec Visualize a save the re	nd esul



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

٠

• Overhauled report with many possibilities of customization

review	Options Project's name	Variant
Version :	72.17 Modify the name for the cover page:	Modify the name for the cover page;
	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
Breiset Brühlt 2002	roof-mounted PV system	Cover image O Custom text
Variant: Customized report	Contact information	
System power: 444 KNp	Client	User - Author
- undefined	🧪 Edit 📂 Load 🗷 Deselect 📕 Change logo	🧪 Edit 🚨 Ghange logo
	Client signature line	Author signature line
	Display dient logo (MytLogo	🗹 Display author logo
	-Client designation	User / author designation
	Client	Author
Na 5 March	Show client on cover page	
	Company Energy Coop SA	Company Bruno Wittmer (Suisse)
	- 🗹 Address	- Address PVsyst SA
	City/Zip code	- City/Zip code
	•	
Clast Autor Energy Dog SA Brace Witter (Suite)		
Signature Signature	Fully customizable	
See 1		
	cover nage	
	cover page	

All pages of the report are Select any pair of simulations compared Pages 1 2 3 4 5 6 7 8 9 🔸 Report options 🍨 Edit cover page 🛛 📖 Save do ment as PDF 🖷 Print 📋 Copy to dipboard 🛛 🜌 Export |< < Page 8 of 9. > >| | ●, ●, | I ↔ | □ □ | □B Compare with another project/variant 🔮 Highlight differe Project: DEMO COMMERCIAL MARSEILLE Project: DEMO COMMERCIAL MARSEILLE G 6 MMERCIAL_MARSEILLE_Nears Shading_Do PVsyst V7.2.17 VC4, Sinulation da 04/10/21 16:33 with v7.2.7 PVsyst V7.2.17 VC5. Simulation dat 04/10/21 16:33 dent in coll. plane ciency at STC 3-6.37% PV loss due to temperature PV loss due dule quality loss fismatch loss, modu thmic wiring loss trray virtual env The differences are highlighted for quick identification

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



Page 12

Upcoming features

Single line diagram ٠

System summary and notes

Summary

Many novelties and improvements have accumulated we have briefly shown:

Improvements in modeling

٠

- 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

