



Updates in the upcoming PVsyst versions

PVPMC Workshop

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Overview

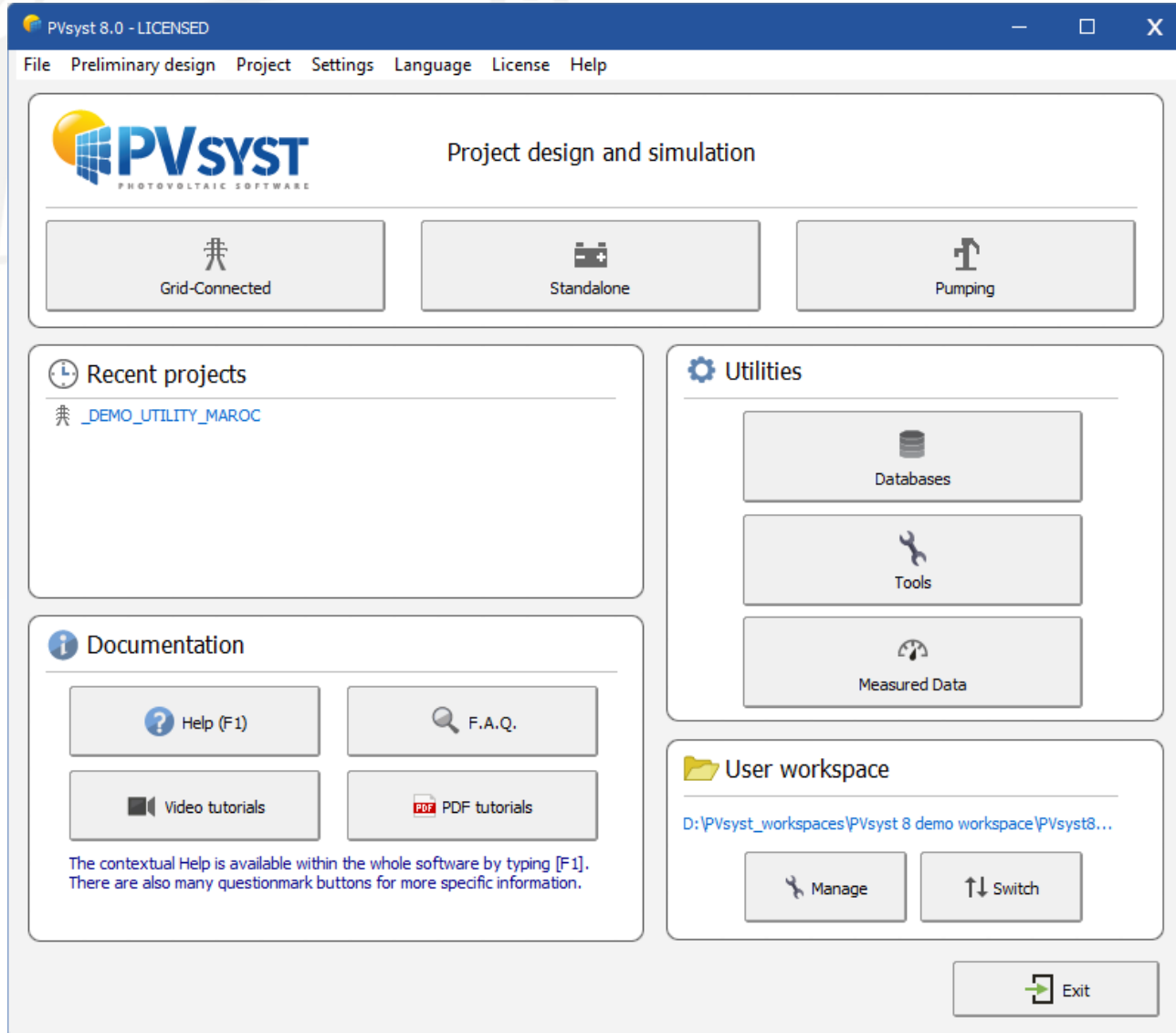


PVsyst 7.4.7 will include final correction patches for 7.4

In this presentation:

- **PVsyst 8**
- **PVsystCLI**





Part I

PVsyst 8

Feature presentation



PVsyst 8 : more flexible orientations

- No limit to the number and type of orientations

Orientations management

PVsyst uses orientations to calculate the transposition factor
Each orientation must be linked to at least one sub-array in the System part.
When you define a 3D scene, the 3D areas of each orientation must match with the ones defined in the System !

+ Add orientation ?

>> Orientation #1 - Fixed, Tilt 20.0°, Azim. -90.0°	Status : OK	
>> Orientation #2 - Fixed, Tilt 20.0°, Azim. 90.0°	Status : OK	
>> Orientation #3 - Fixed, Tilt 20.0°, Azim. 0.0°	Status : OK	
>> Orientation #4 - Tracking horizontal axis, Azim. 0.0°	Status : OK	
✓ Orientation #5 - Tracking, tilted axis, Tilt 2.0°, Azim. 20.0°	Status : OK	

Field type: Tracking, tilted axis

Name: Tracking, tilted axis, Tilt 2.0°, Azim. 20.0°

Module area	
System	0 m² 0 modules
3D scene	0 m² 0 modules

Axis and limiting angles

Axis Tilt

Axis azimuth

Phi min.

Phi max.

Central gap

Special Behaviors

☐ Backtracking ?

☐ Irradiance optimization ?

Phi is the rotating angle around the axis, defined as Phi=0 when the plane is facing the axis azimuth.

Please define the mechanical stroke limits (PhiMin towards east, Phimax towards West).

Axis azimuth 20°

Rotating phi limits -60°/60°

Facing Axis azimuth = 20°

Cancel OK

Orientations now allow to better link between system and 3D model



PVsyst 8 : more flexible orientations

Grid system definition, Variant VC0: "1 MWac PV system on two roofs (4 orientations)"

List of subarrays

Name	#Mod #Inv.	#String #MPPT
PV Array - Mixed #1 and #2		
Generic - Mono 440 Wp Twin 1...	16	80
Generic - 500 kWac inverter	1	1
Sub-array #2 - Mixed #3 and #4		
Generic - Mono 440 Wp Twin 1...	16	80
Generic - 500 kWac inverter	1	1

Sub-array Sub-array #2

Select the orientation

Orientation #3: Fixed, Tilt 10.0°, Azim. -115.5°

☒ 2nd orientation #4: Fixed, Tilt 10.0°, Azim. 64.5°

Select the PV module

Available Now Filter All PV modules

Generic 440 Wp 35V Si-mono Mono 440 Wp Twin 144 half-c Since 2020 Typical

☐ Use optimizer

Sizing voltages : Vmpp (60°C) 35.8 V
Voc (-10°C) 55.1 V

Select the inverter

Available Now Output voltage 400 V Tri 50Hz

Generic 500 kW 320 - 800 V LF Tr 50/60 Hz 500 kWac inverter Since 2012

Nb. of inverters 1 ☒ Operating voltage: 320-800 V Global Inverter's power 500 kWac

Input maximum voltage: 1000 V

Design the array

Number of modules and strings

Mod. in series 16 ☐ between 9 and 18

Nb. strings 80

Overload loss 0.0 %

Pnom ratio 1.13

Operating conditions

Vmpp (60°C) 573 V
Vmpp (20°C) 679 V
Voc (-10°C) 881 V

Plane irradiance 1000 W/m²

Imp (STC) 856 A
Isc (STC) 888 A
Isc (at STC) 888 A

Max. in data ☐ STC ☒

Max. operating power (at 1000 W/m² and 50°C) 689 kW

Array nom. Power (STC) 563 kWp

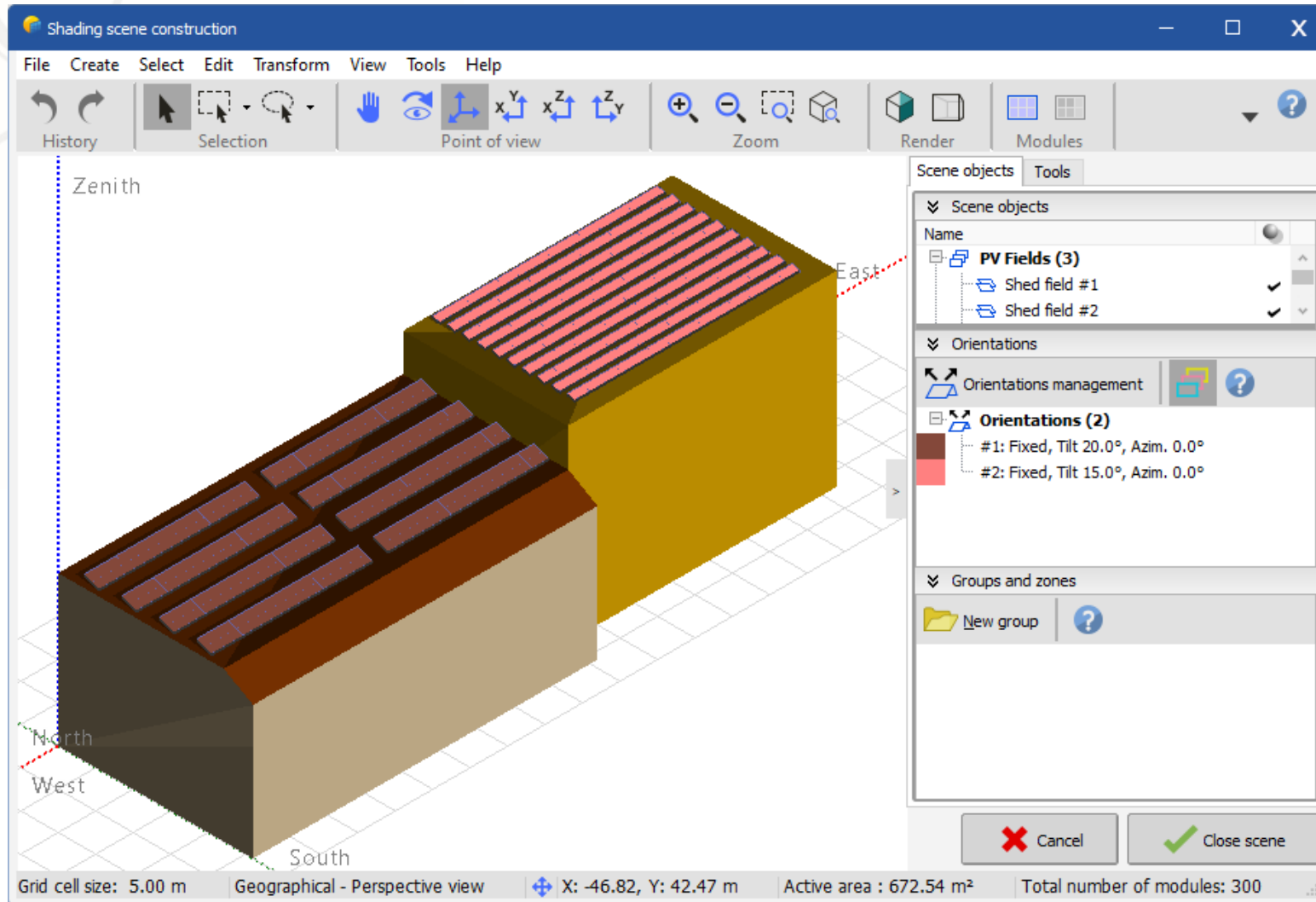
Global system summary

Nb. of modules	2560
Module area	5696 m²
Nb. of inverters	2
Nominal PV Power	1126 kWp
Nominal AC Power	1000 kWAC
Pnom ratio	1.126

- No limit to the number and type of orientations
- Mix **any** two orientations on an inverter



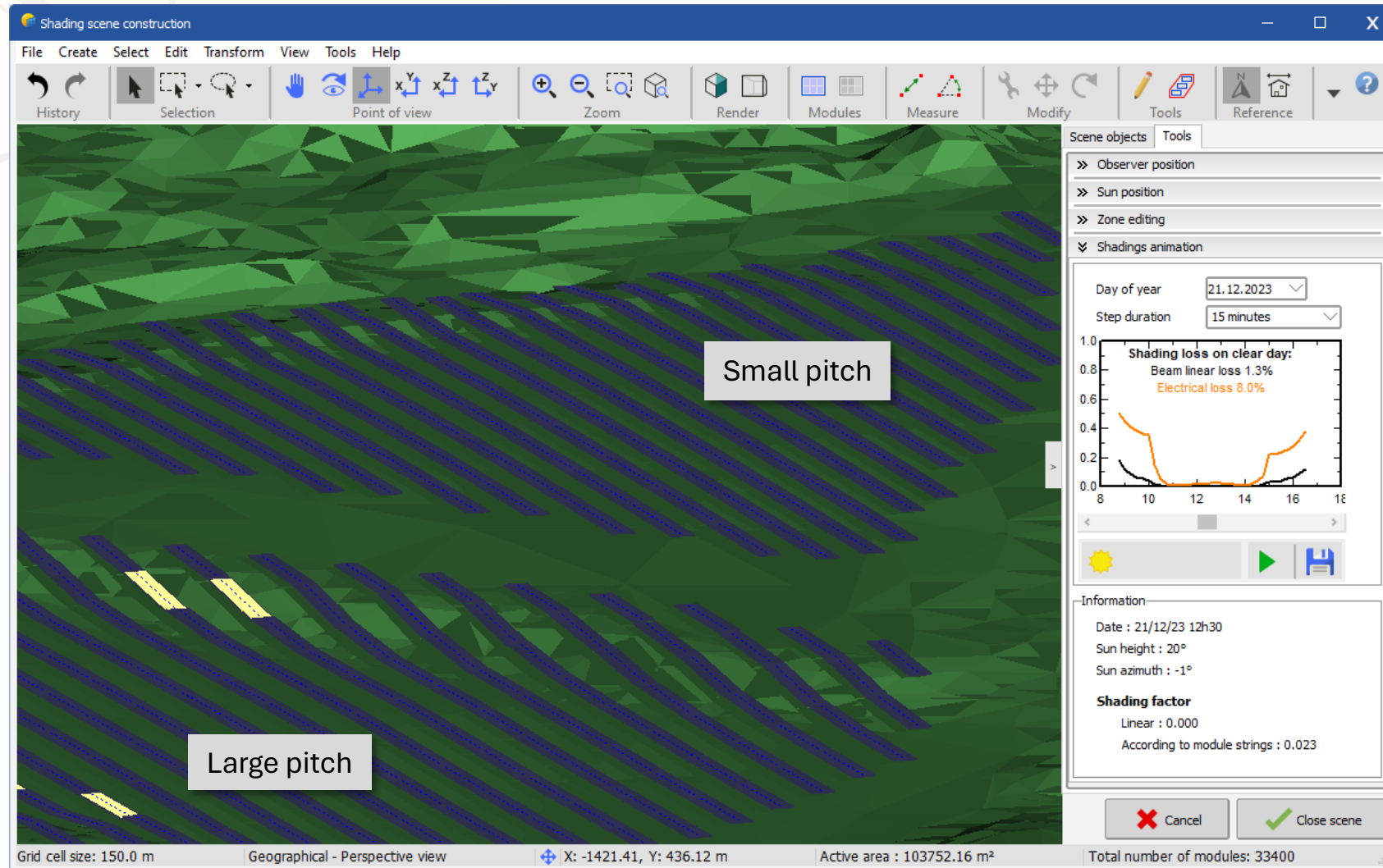
PVsyst 8 : more flexible orientations



- No limit to the number and type of orientations
- Mix **any** two orientations on an inverter
- Multiple bifacial orientations



PVsyst 8 : more flexible orientations

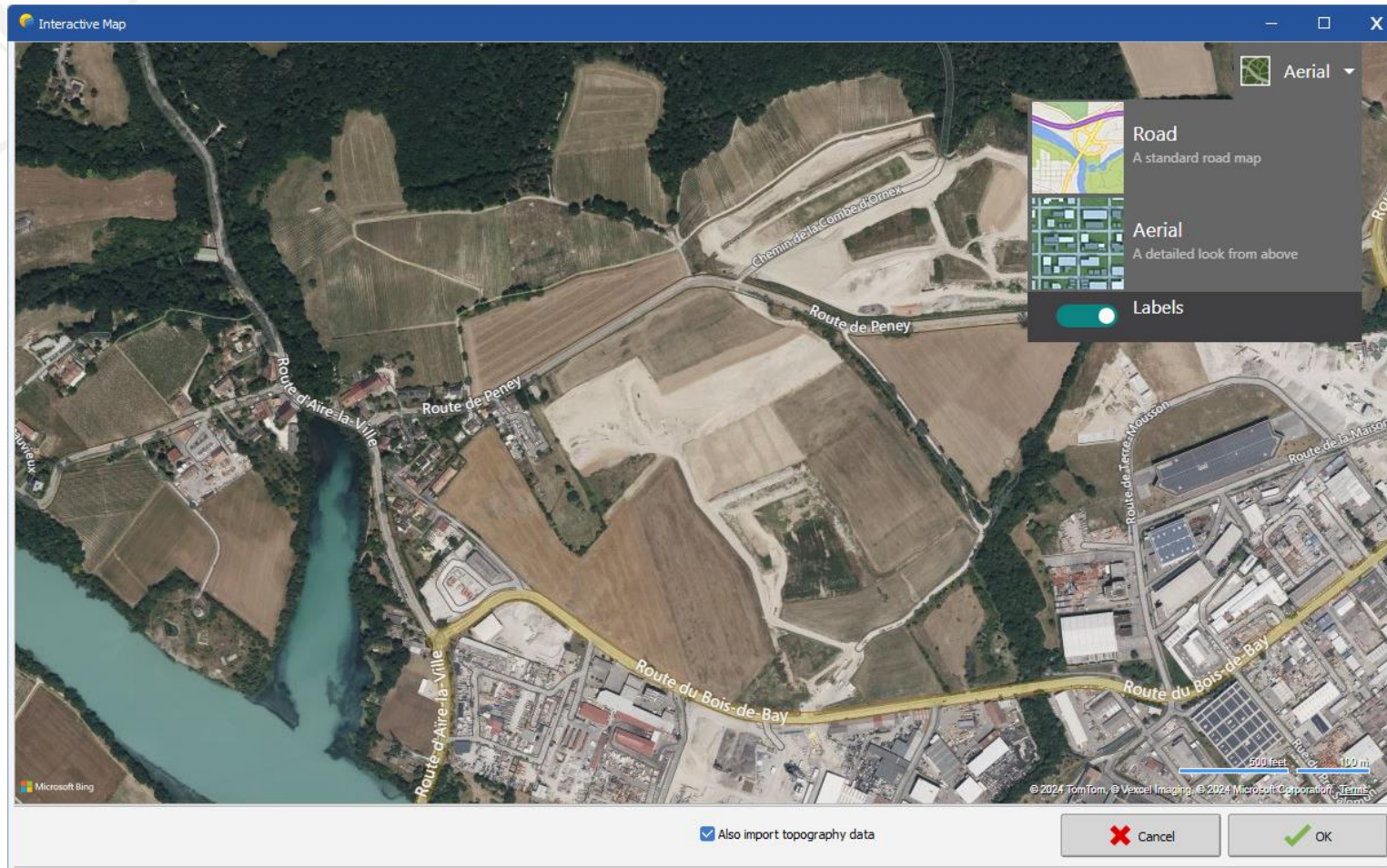


- No limit to the number and type of orientations
- Mix **any** two orientations on an inverter
- Multiple bifacial orientations
- Multiple tracking orientations / pitch

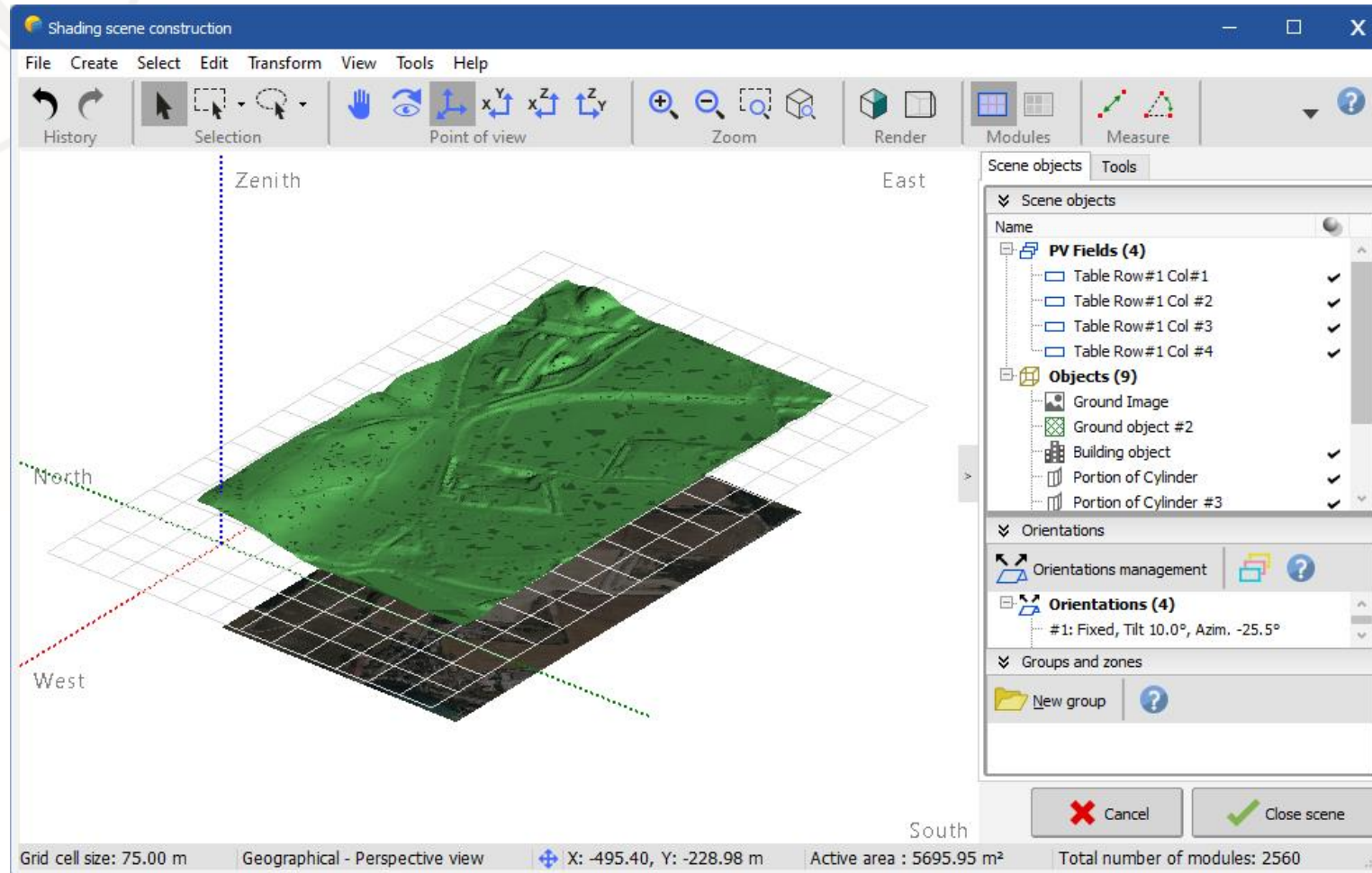


PVsyst 8: new 3D scene tools

- Ground image from API



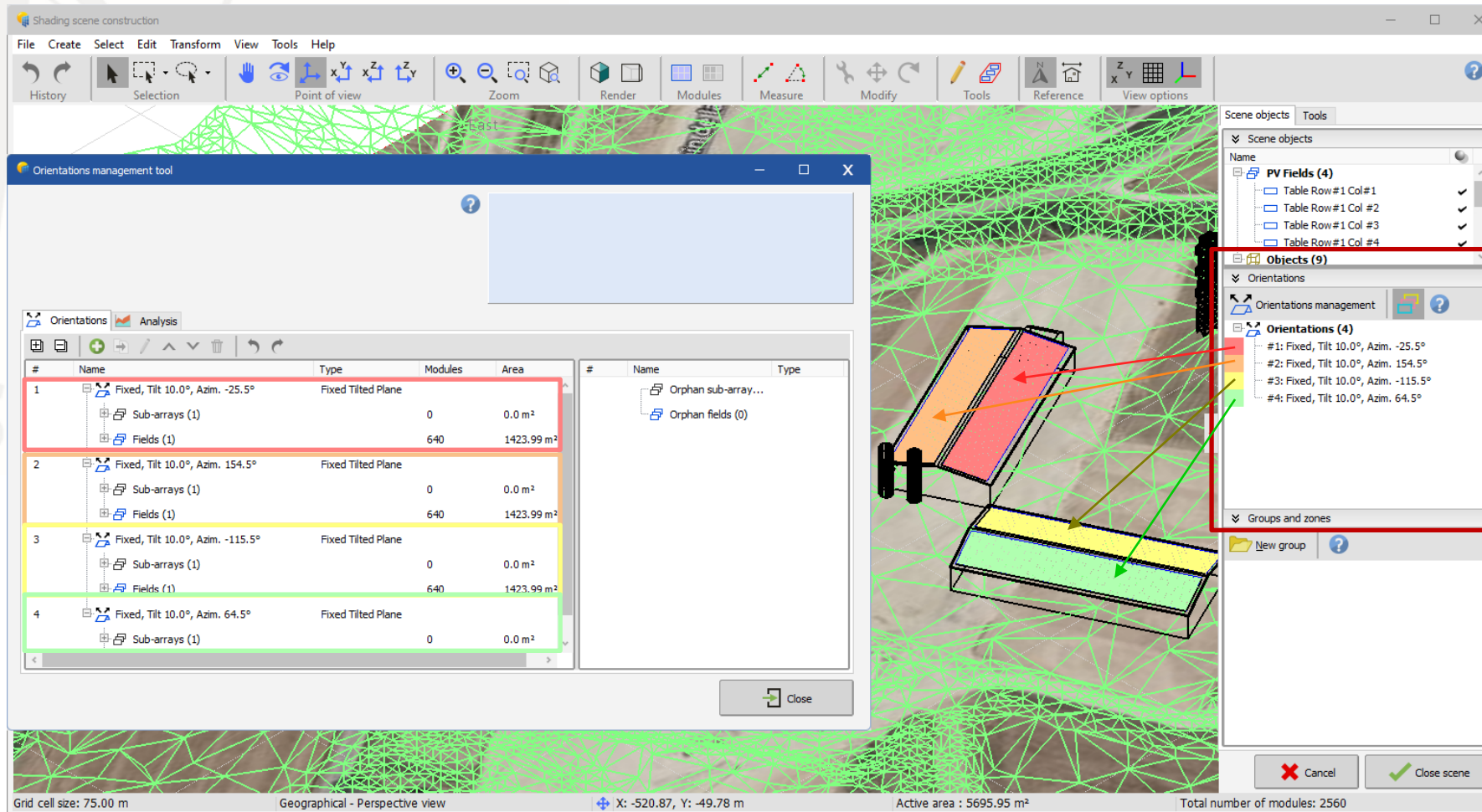
PVsyst 8: new 3D scene tools



- Ground image from API
- Topography from API



PVsyst 8: new 3D scene tools



- Ground image from API
- Topography from API
- Orientation management



PVsyst 8: sub-hourly clipping correction

Model based on imported sub-hourly weather data

Are added to the MET file:

- Min / max GHI
- Number of minutes above average



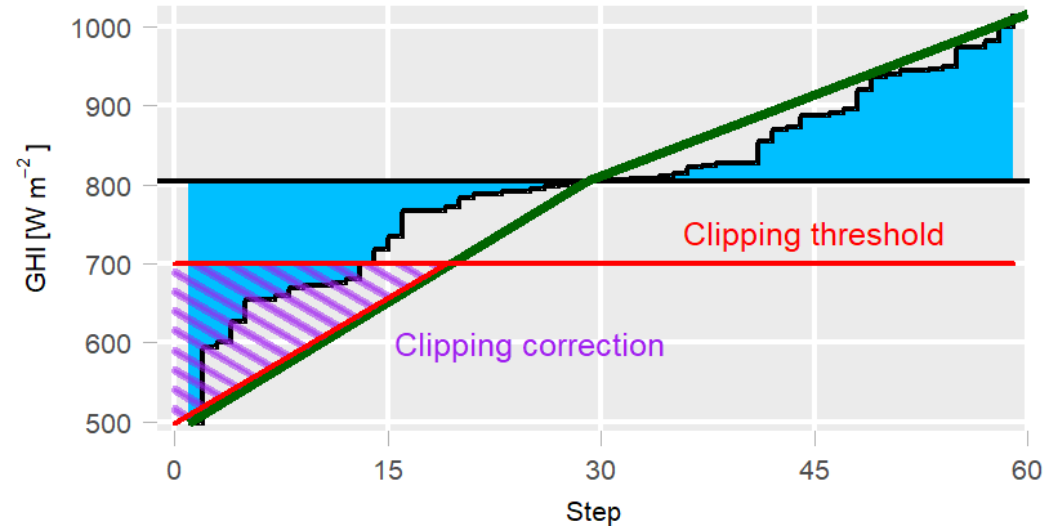
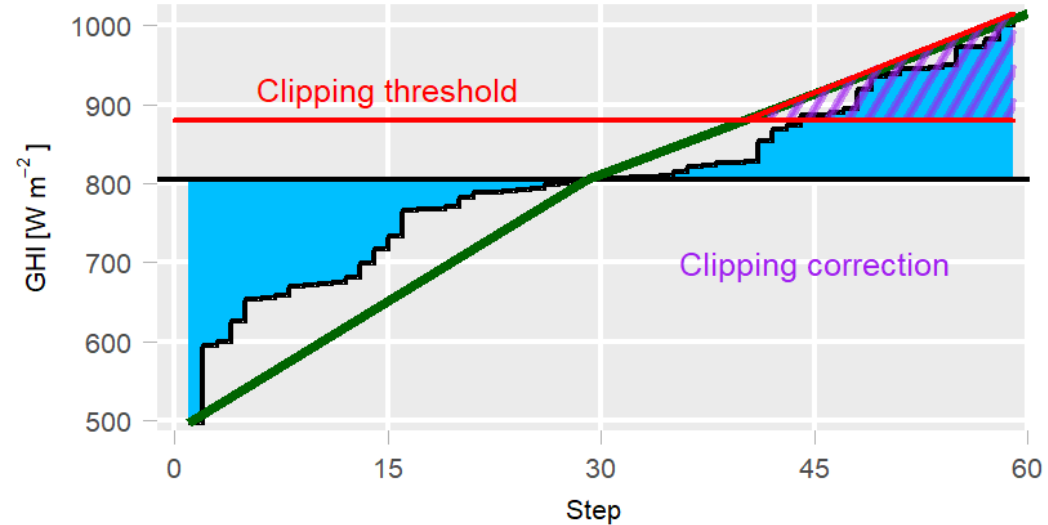
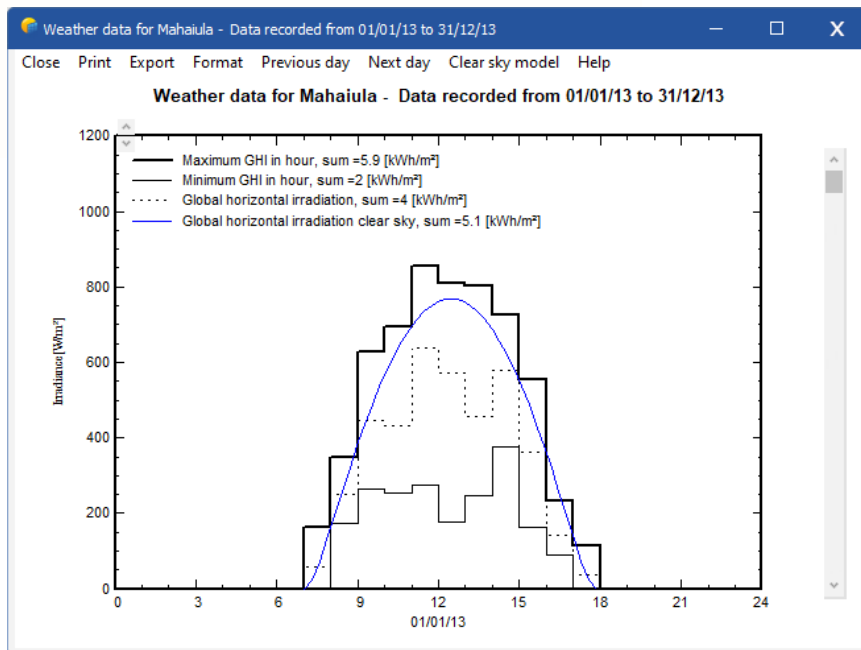
PVsyst 8: sub-hourly clipping correction

Model based on imported sub-hourly weather data

Are added to the MET file:

- Min / max GHI
- Number of minutes above average

Also works with POA data



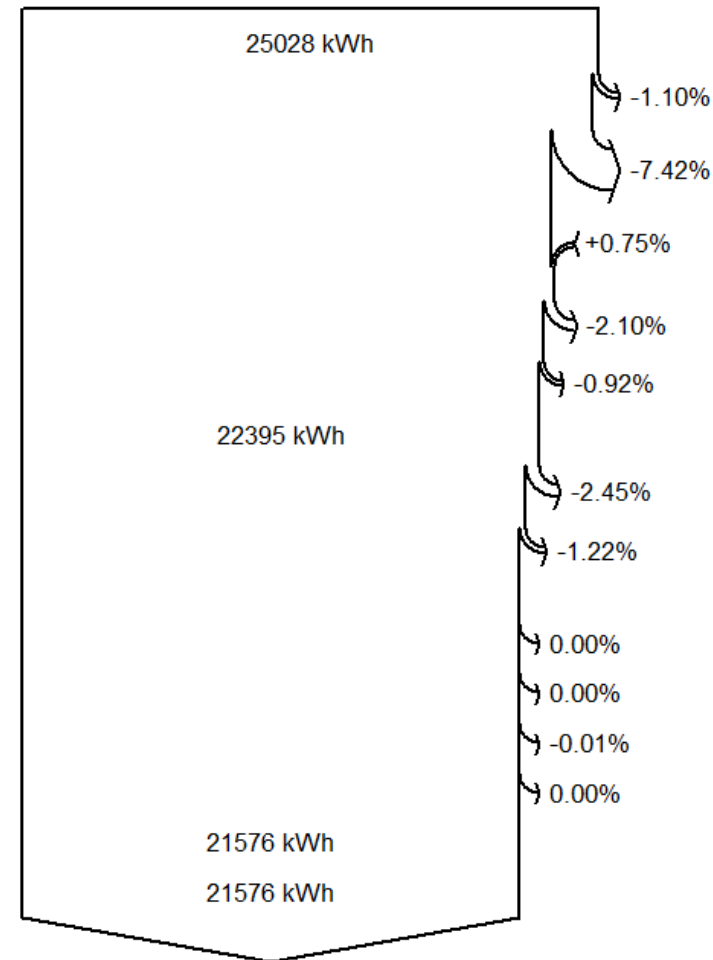
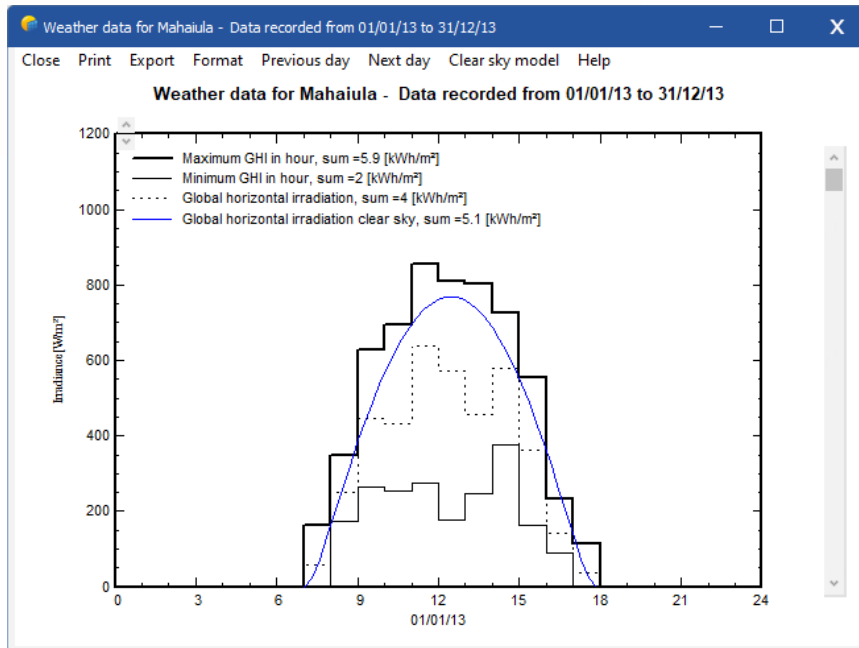
PVsyst 8: sub-hourly clipping correction

Model based on imported sub-hourly weather data

Are added to the MET file:

- Min / max GHI
- Number of minutes above average

Also works with POA data



Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Module quality loss

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power
(incl. 0.58% for sub-hourly clipping corr.)

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

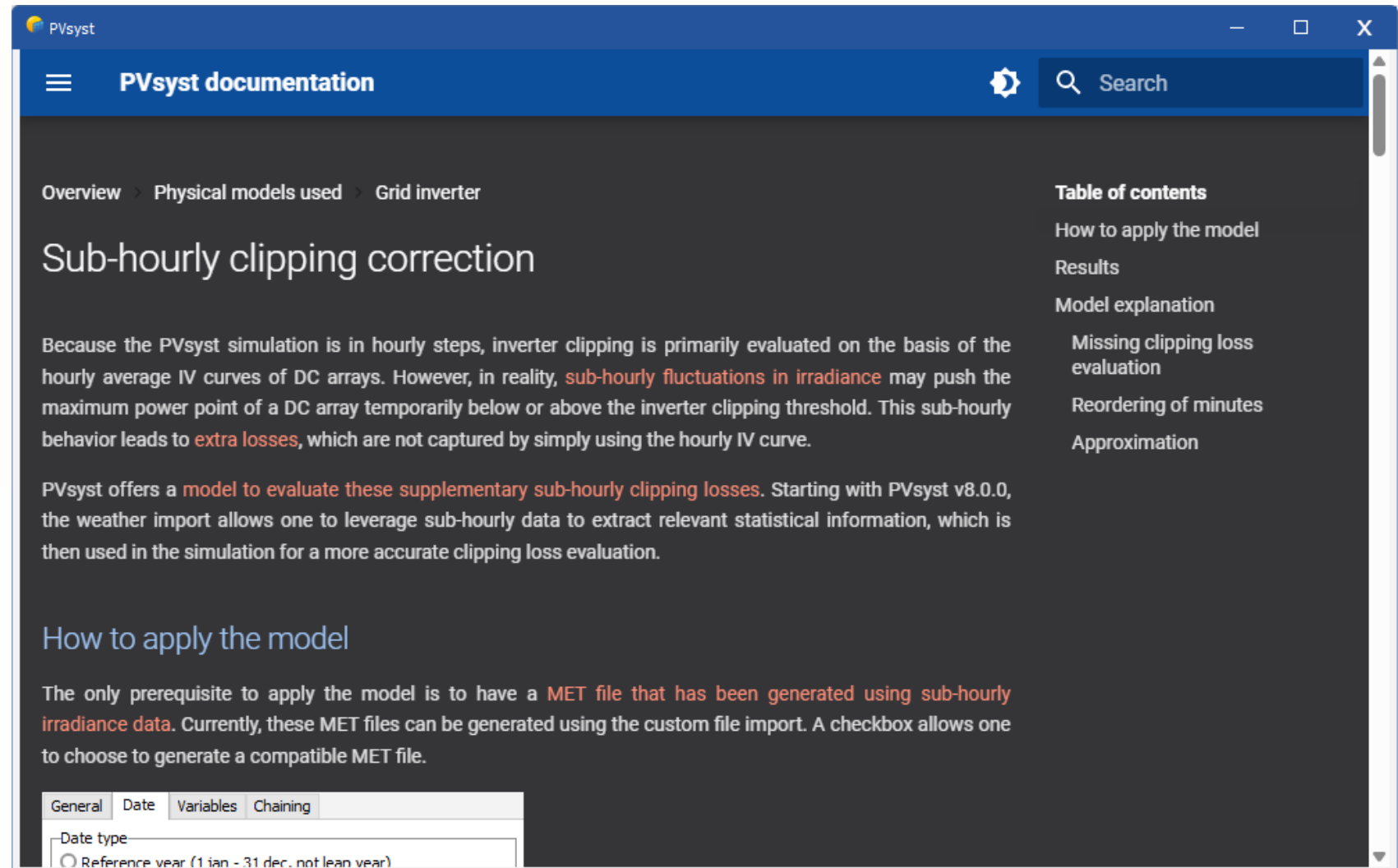
Available Energy at Inverter Output

Energy injected into grid



PVsyst 8: new help design

- Enhanced search and navigation
- Light and dark themes



The screenshot displays the PVsyst 8 documentation interface. At the top, there is a blue header bar with the PVsyst logo, a hamburger menu icon, the text 'PVsyst documentation', a gear icon for settings, and a search bar labeled 'Search'. Below the header, the breadcrumb trail reads 'Overview > Physical models used > Grid inverter'. The main content area is titled 'Sub-hourly clipping correction' and contains two paragraphs of text. The first paragraph explains that inverter clipping is evaluated on the basis of hourly average IV curves, but sub-hourly fluctuations in irradiance can push the maximum power point of a DC array temporarily below or above the inverter clipping threshold, leading to extra losses. The second paragraph states that PVsyst offers a model to evaluate these supplementary sub-hourly clipping losses, starting with PVsyst v8.0.0, where weather import allows leveraging sub-hourly data for more accurate clipping loss evaluation. To the right of the main content is a 'Table of contents' sidebar with links: 'How to apply the model', 'Results', 'Model explanation', 'Missing clipping loss evaluation', 'Reordering of minutes', and 'Approximation'. At the bottom of the page, there is a navigation pane with tabs for 'General', 'Date', 'Variables', and 'Chaining'. The 'Date' tab is active, showing a 'Date type' section with a radio button selected for 'Reference year (1 jan - 31 dec., not leap year)'.

PVsyst

PVsyst documentation

Overview > Physical models used > Grid inverter

Sub-hourly clipping correction

Because the PVsyst simulation is in hourly steps, inverter clipping is primarily evaluated on the basis of the hourly average IV curves of DC arrays. However, in reality, **sub-hourly fluctuations in irradiance** may push the maximum power point of a DC array temporarily below or above the inverter clipping threshold. This sub-hourly behavior leads to **extra losses**, which are not captured by simply using the hourly IV curve.

PVsyst offers a **model to evaluate these supplementary sub-hourly clipping losses**. Starting with PVsyst v8.0.0, the weather import allows one to leverage sub-hourly data to extract relevant statistical information, which is then used in the simulation for a more accurate clipping loss evaluation.

How to apply the model

The only prerequisite to apply the model is to have a **MET file that has been generated using sub-hourly irradiance data**. Currently, these MET files can be generated using the custom file import. A checkbox allows one to choose to generate a compatible MET file.

Table of contents

- How to apply the model
- Results
- Model explanation
 - Missing clipping loss evaluation
 - Reordering of minutes
 - Approximation

General Date Variables Chaining

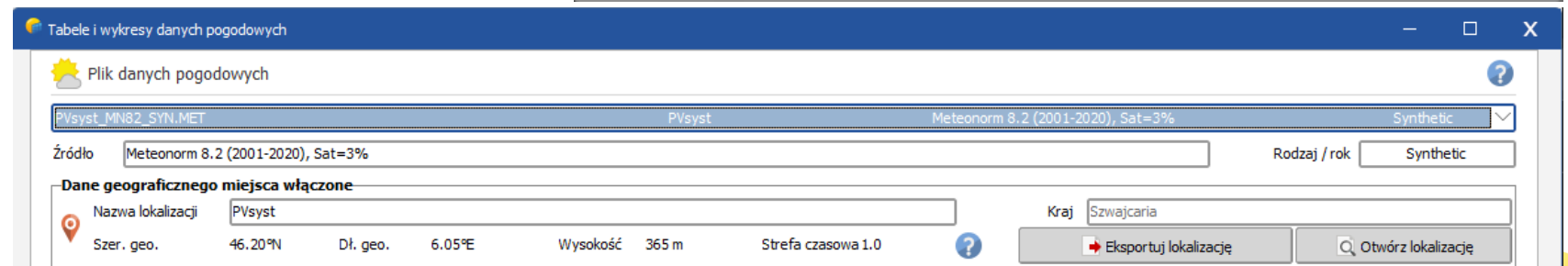
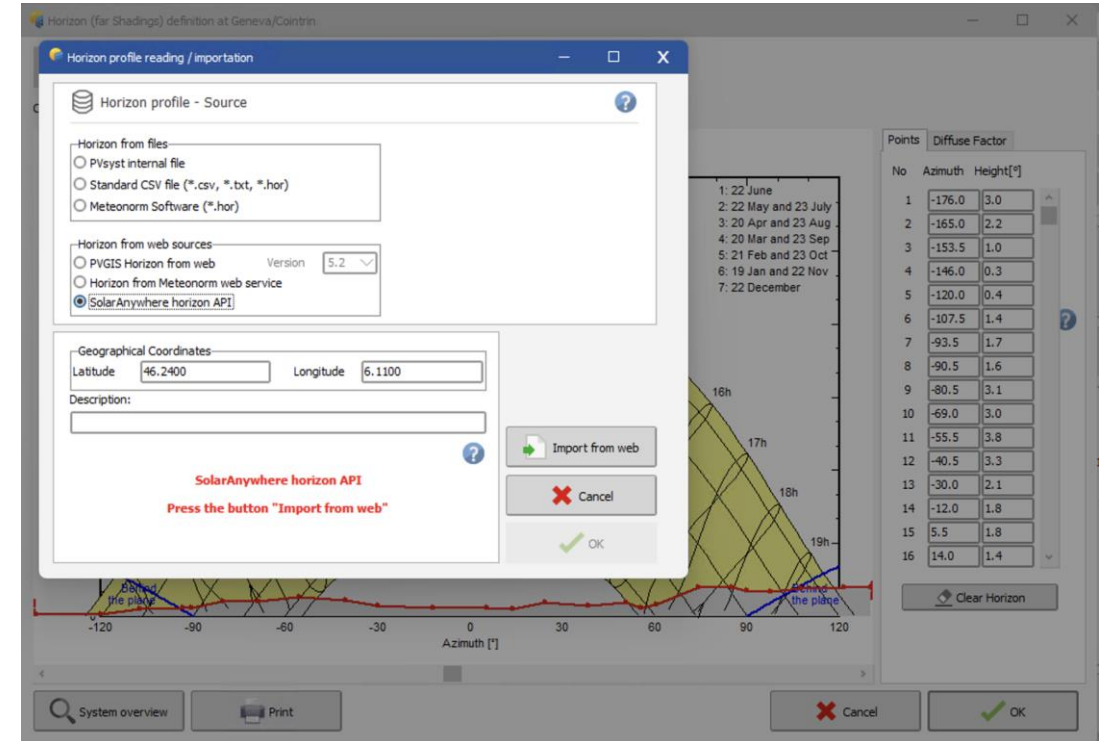
Date type

☐ Reference year (1 jan - 31 dec., not leap year)



PVsyst 8: other improvements

- **Bifacial modeling: more parameters**
 - Number of rows
 - Pitch
- **Meteonorm 8.2**
- **Added SolarAnywhere horizon API**
- **Hourly albedo import**
 - In 8.0.0: monthly summarization
 - Future versions: hourly albedo
- **Polish translation**
- ...



```

Windows PowerShell
Executes the simulation by steps of one hour - 70%
Executes the simulation by steps of one hour - 80%
Executes the simulation by steps of one hour - 90%
Simulation done in 0min 5sec
PS C:\Users\mio> pvsystcli.exe run-simulation -workspace:D:\PVsyst_workspaces\ws_dev_orientations -project:Test_fixed_plane.PRJ -variant:VC1

Checking license...
Loading workspace D:\PVsyst_workspaces\ws_dev_orientations...
Loading project Test_fixed_plane.PRJ...
Loading variant VC1...
Checking variant ...
Running simulation ...
Simulation initialization - 0%
New diffuse integrals - 100%
Reading load profile from file - 0%
Reading load profile from file - 100%
Simulation initialization - 100%
Executes the simulation by steps of one hour - 0%
Executes the simulation by steps of one hour - 10%
Executes the simulation by steps of one hour - 20%
Executes the simulation by steps of one hour - 30%
Executes the simulation by steps of one hour - 40%
Executes the simulation by steps of one hour - 50%
Executes the simulation by steps of one hour - 60%
Executes the simulation by steps of one hour - 70%
Executes the simulation by steps of one hour - 80%
Executes the simulation by steps of one hour - 90%
Simulation done in 0min 5sec
PS C:\Users\mio> |

b2 C:\η2ε12\ω10> |
27ηηfεf10u qouε 1u 0ω1u 2εεc
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 20%
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 80%
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 10%
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 00%
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 20%
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 10%
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 30%
εxεcηfε2 fηε 27ηηfεf10u ρλ 2fεb2 ο4 ουε ηονη. - 50%

```

Part II

PVsystCLI

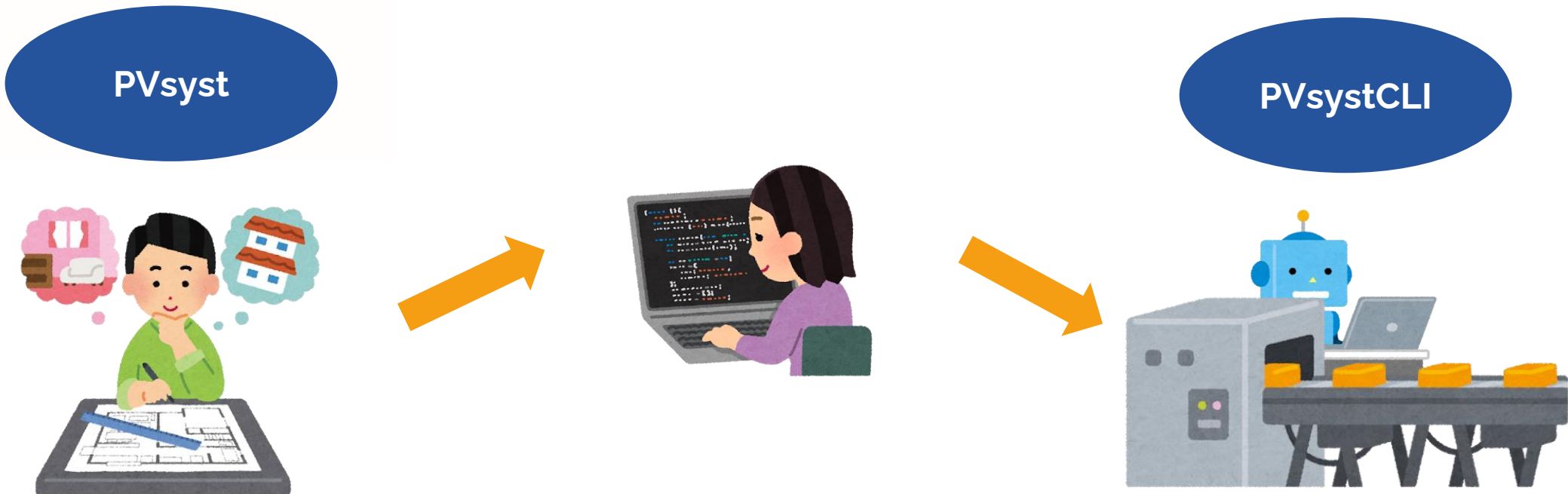
Feature presentation



PVsystCLI

Modeling can greatly benefit from automation.

- PVsyst works well to gradually improve design and test various modeling choices.
- *However, interacting with its UI can be a barrier to automation.*
- PVsystCLI removes repeated time-consuming UI actions to support automated processes.



Illustrations from www.irasutoya.com © Takashi Mifune



PVsystCLI: main functions

```
PS C:\Users\mio> pvsystcli.exe help
```

Use the following syntax to get help on a particular command: `help <command>`

Available commands:

- `convert-meteo`: Convert an input file using a conversion format definition
- `export-logs`: Export execution logs in a zip file
- `lic-activate`: Activate PVsystCLI with the given license key
- `lic-deactivate`: Deactivate PVsystCLI license from the machine
- `lic-info`: Show license status and expiration date
- `lic-synchronize`: Update the current license status and information from the server
- `run-simulation`: Run a simulation for the given project and variant, and output results
- `version`: Show PVsystCLI version and check for available updates

For more information about PVsystCLI, you can visit the online help available at https://www.pvsyst.com/help/index.html?contents_table.htm

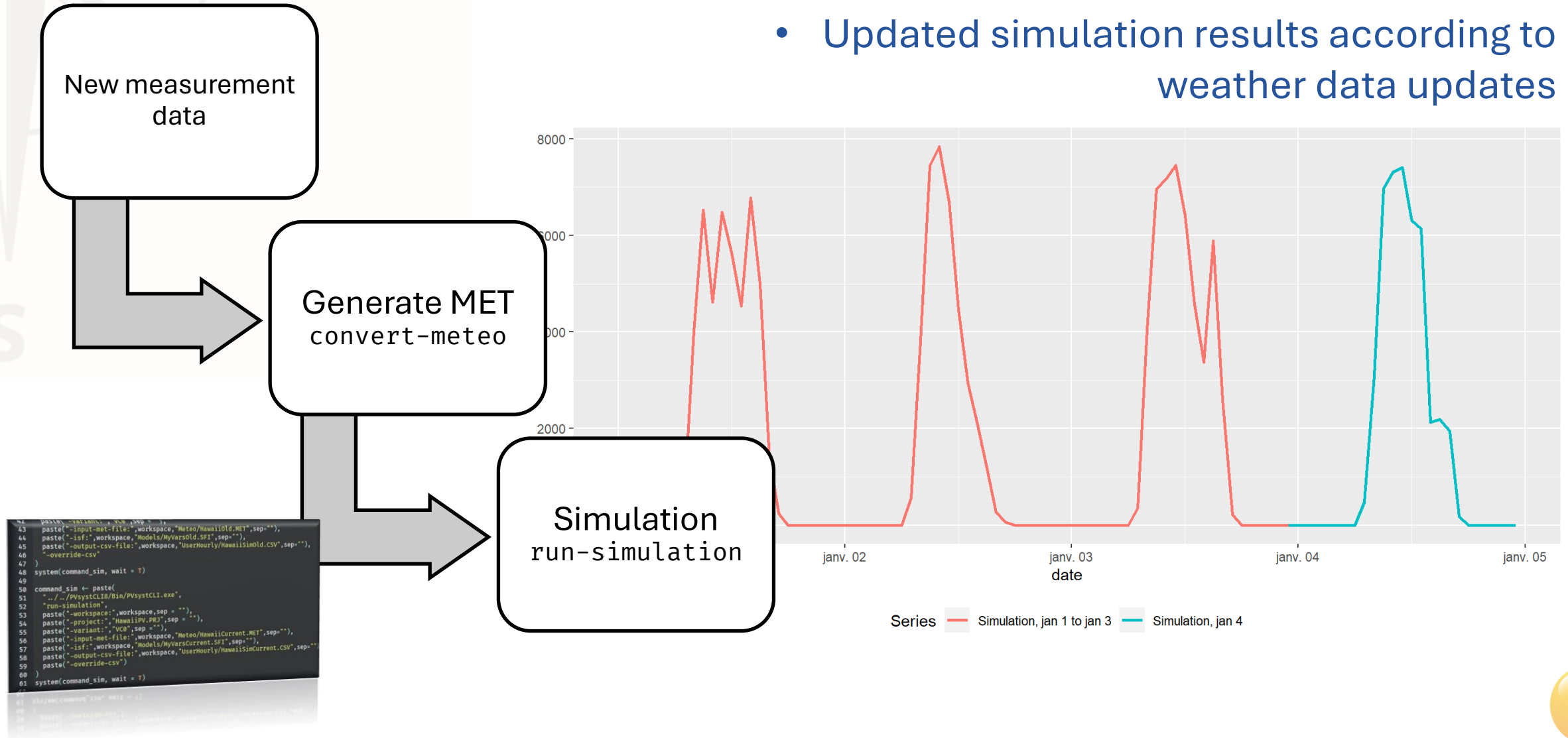
Main functions:

- Generate MET files from existing weather data
- Run simulations with Report and/or CSV output



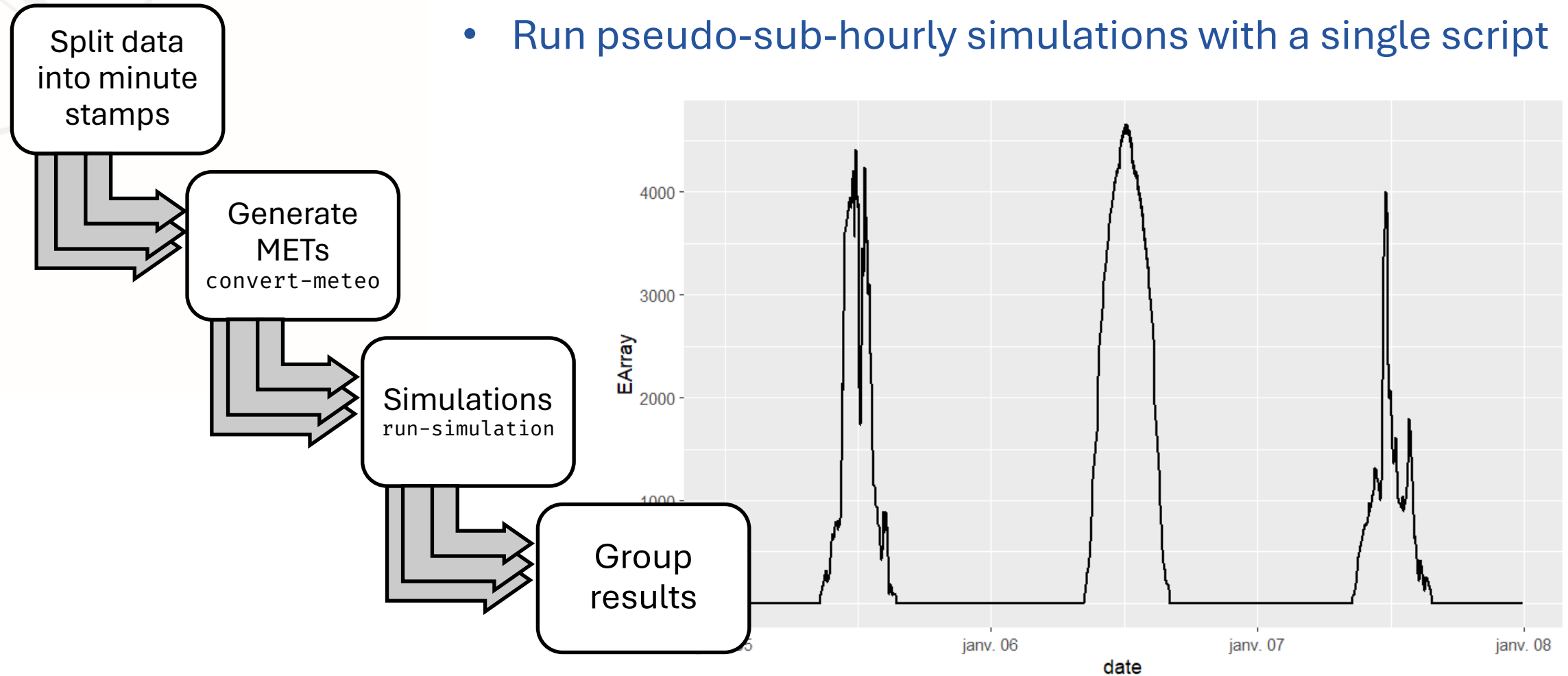
PVsystCLI: MET + simulation update

- Updated simulation results according to weather data updates



PVsystCLI: example with sub-hourly simulation

- Run pseudo-sub-hourly simulations with a single script



Outlook

Q3-Q4 2024

PVsyst 8

Full sub-hourly simulation

CLI + batch mode

3D bifacial model

Solar glare

Measured data analysis

Mismatch from orientations

and more...

 **Office hours on Thursday !**

 **Thank you !**

