New features and latest developments in PVsyst

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Overview

- String mismatch tool
- SolarEdge optimizers
- Multiple orientations management
- Thin object shadings
- IAM definitions, Module surface
- Pumping Systems
- Unlimited Trackers / Bifacial Tracking
- Lithium Ion batteries

New String Mismatch Tool

Mismatch losses in PVsyst

Mismatch causes:
- Shading
- Module variations (incl. ageing)
- Temperature gradients
- Non-uniform Wire length

Detailed hourly calculation

Fixed mismatch factor
(has to be estimated)

Module variations impact mainly on current (mismatch within one string)

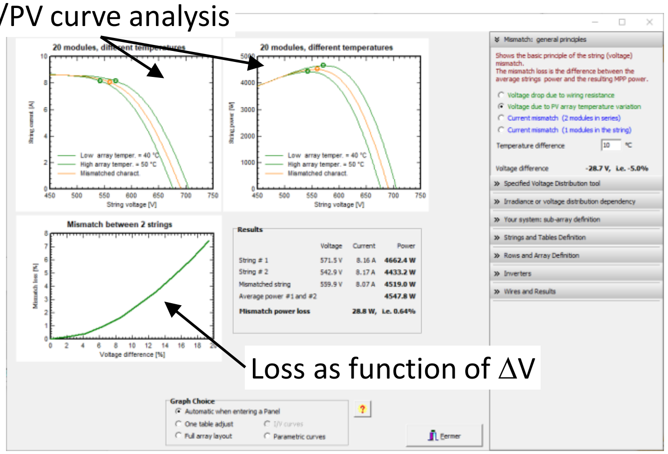
Temperature and wiring variations impact mainly on voltage (mismatch in between strings)

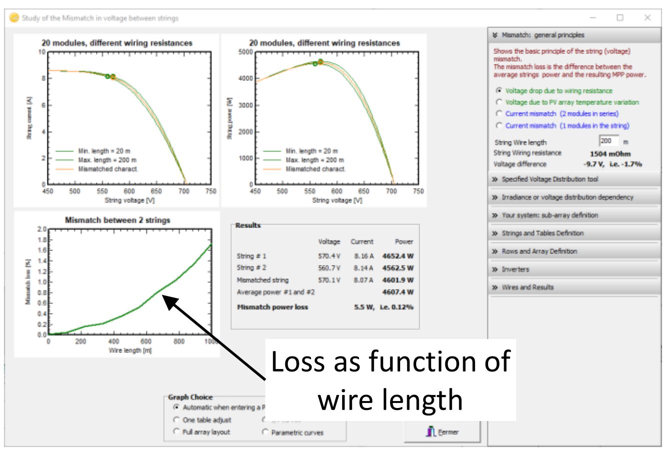
The new tool allows to estimate the mismatch losses in between strings (voltage)

Question: What are the possible benefits of string inverters compared to central inverters?

General comparison of voltage mismatch and current mismatch

IV/PV curve analysis

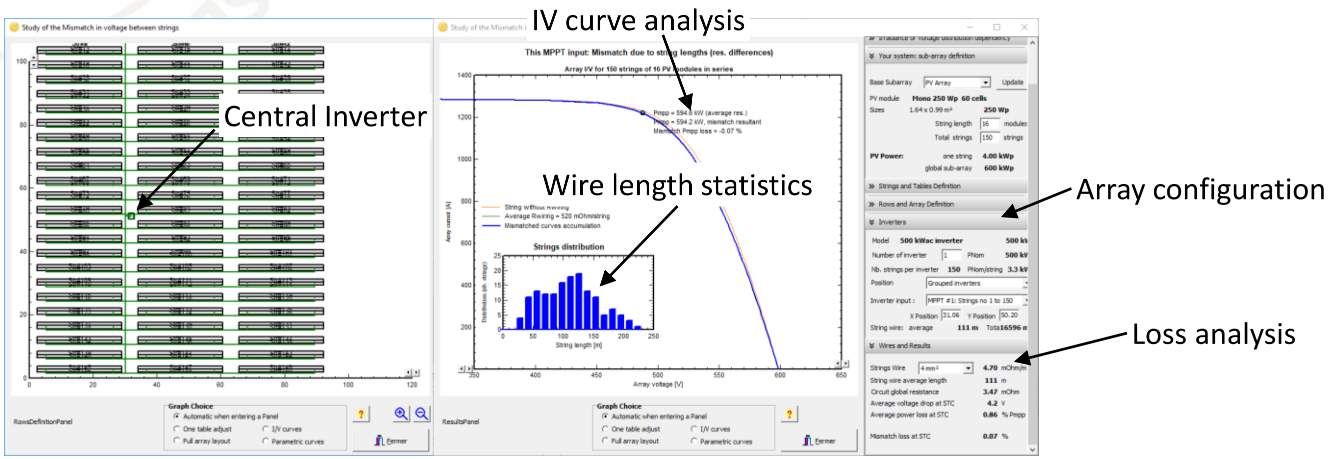


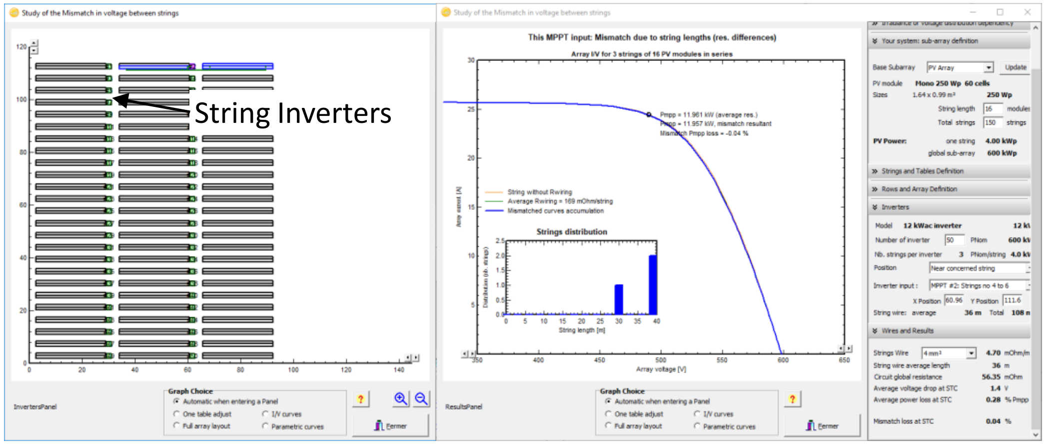


Voltage mismatch losses are generally much smaller that current mismatch losses

New String Mismatch Tool

Compare different wiring layouts

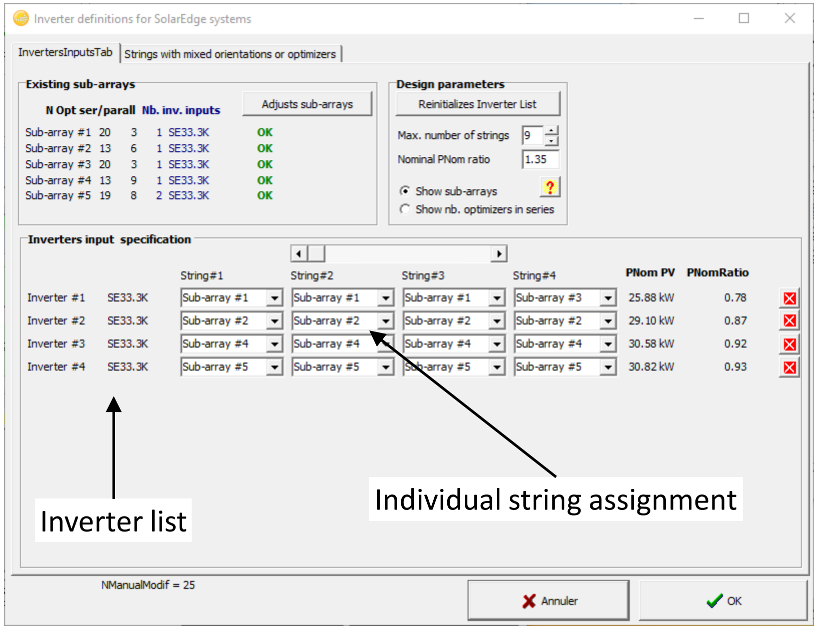


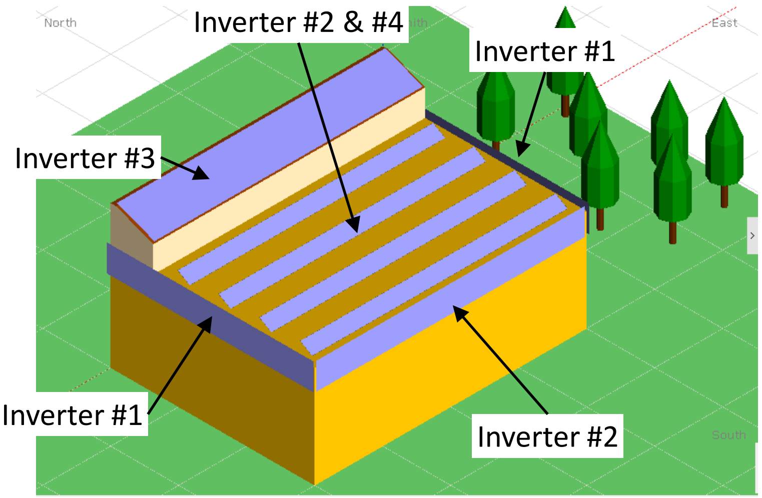


SolarEdge optimizers

More flexible configuration of SolarEdge architecture

Example:
Configuration with 4 inverters, 5 orientations, 3 string lengths

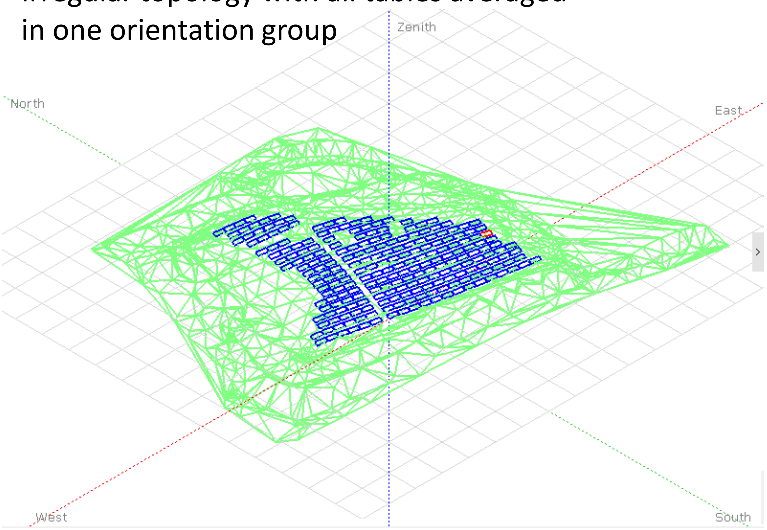


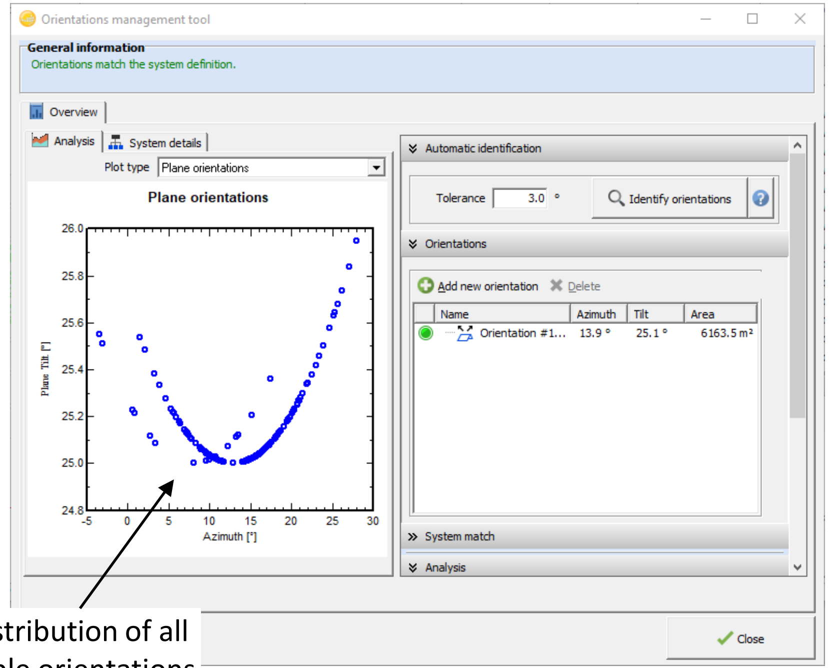


Multiple Orientations Management

PV modules with many different orientations may be grouped into 1-8 average orientations

Example 1:
Irregular topology with all tables averaged in one orientation group



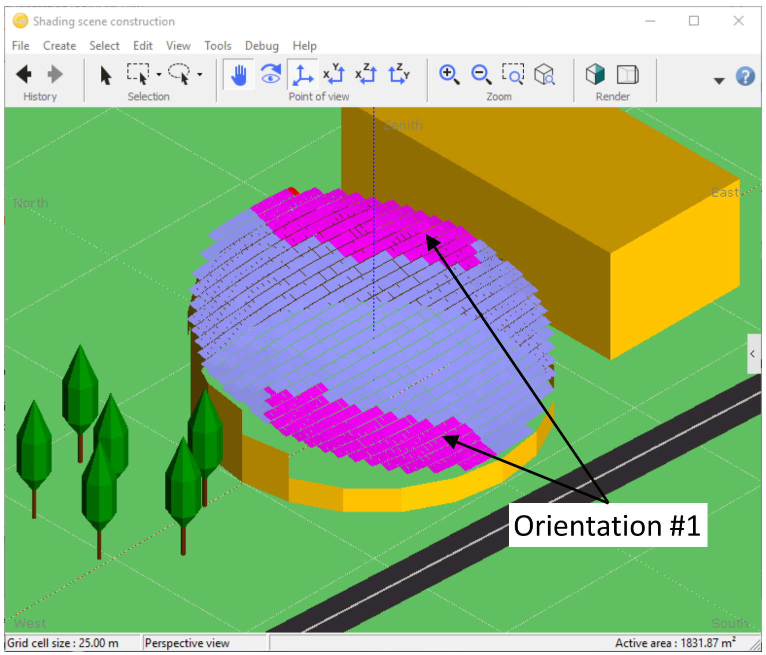


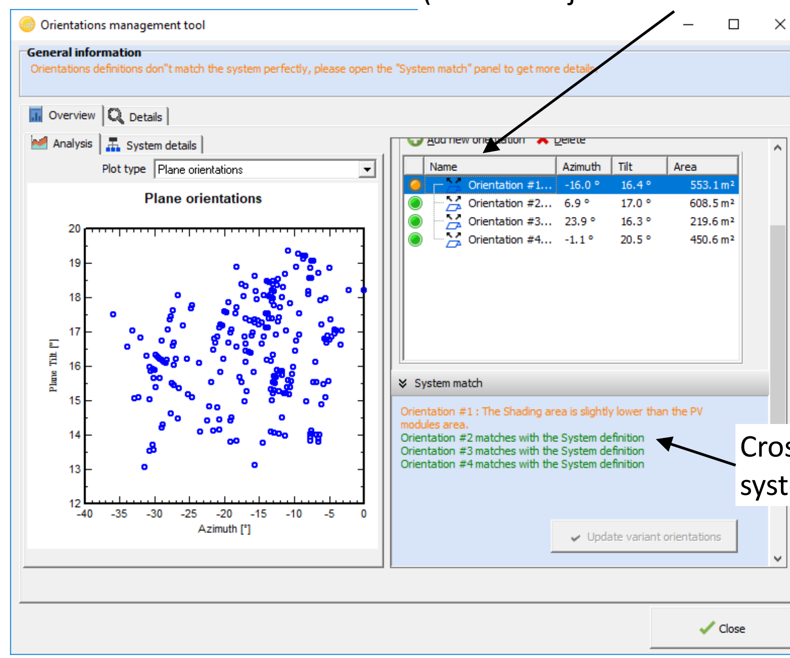
Distribution of all table orientations

Multiple Orientations Management

Example 2:
Non-flat roof that was automatically grouped

Orientations were automatically grouped into 4 average orientations (manual adjustments are still possible)





Cross-check with
system definitio

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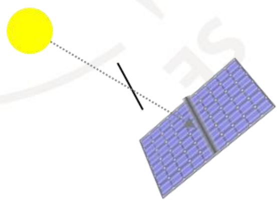
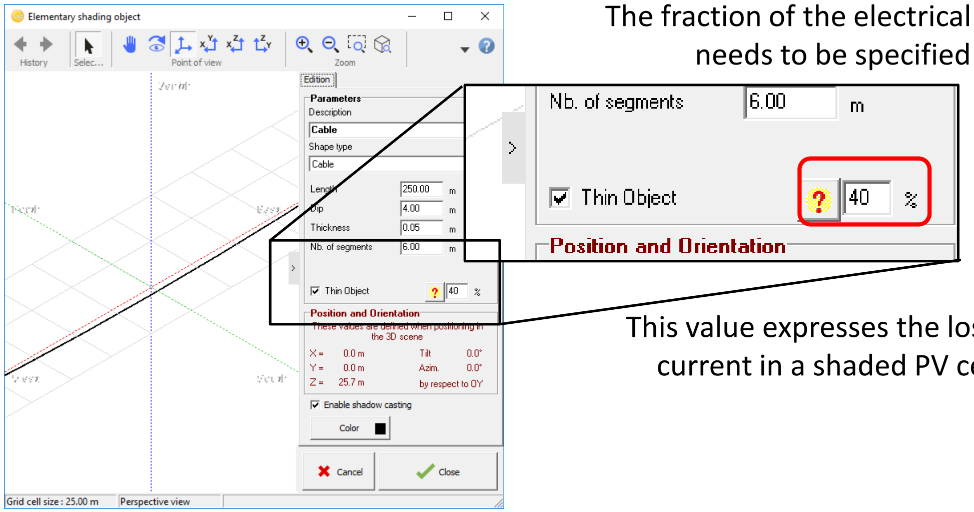
Thin object shading

Thin objects do not cast sharp shades



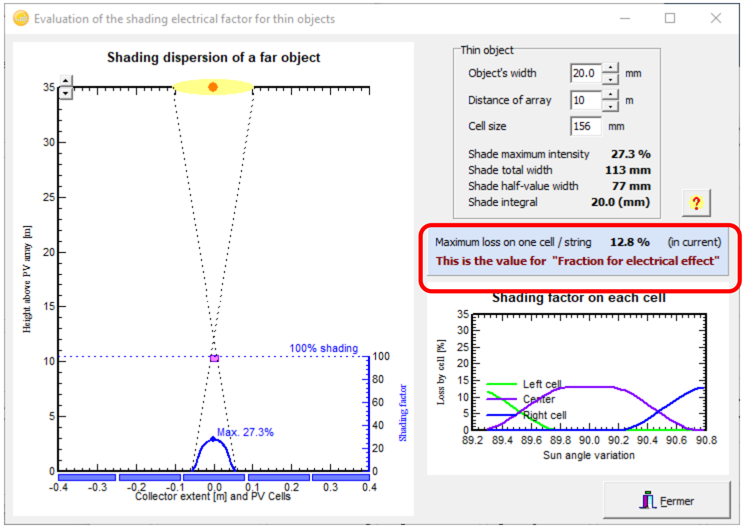
If width of shadow > cell width
the electrical shading effect will be reduced

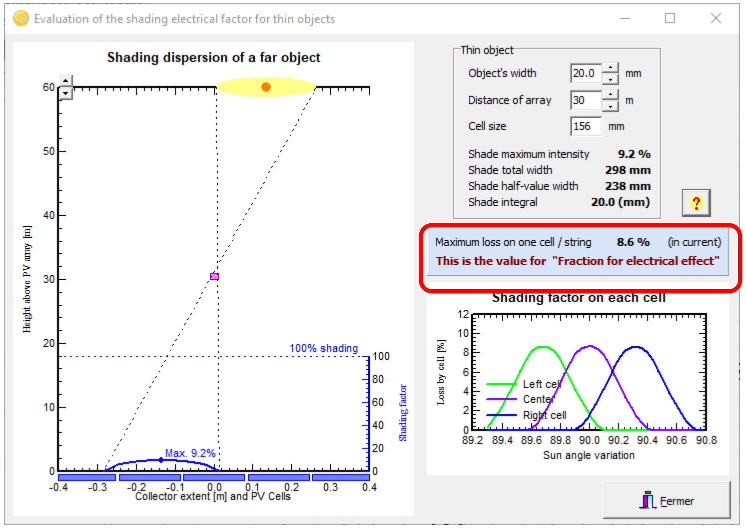


The fraction of the electrical effect needs to be specified

This value expresses the loss of current in a shaded PV cell

The new tool allows to estimate the Fraction of Electrical Effect

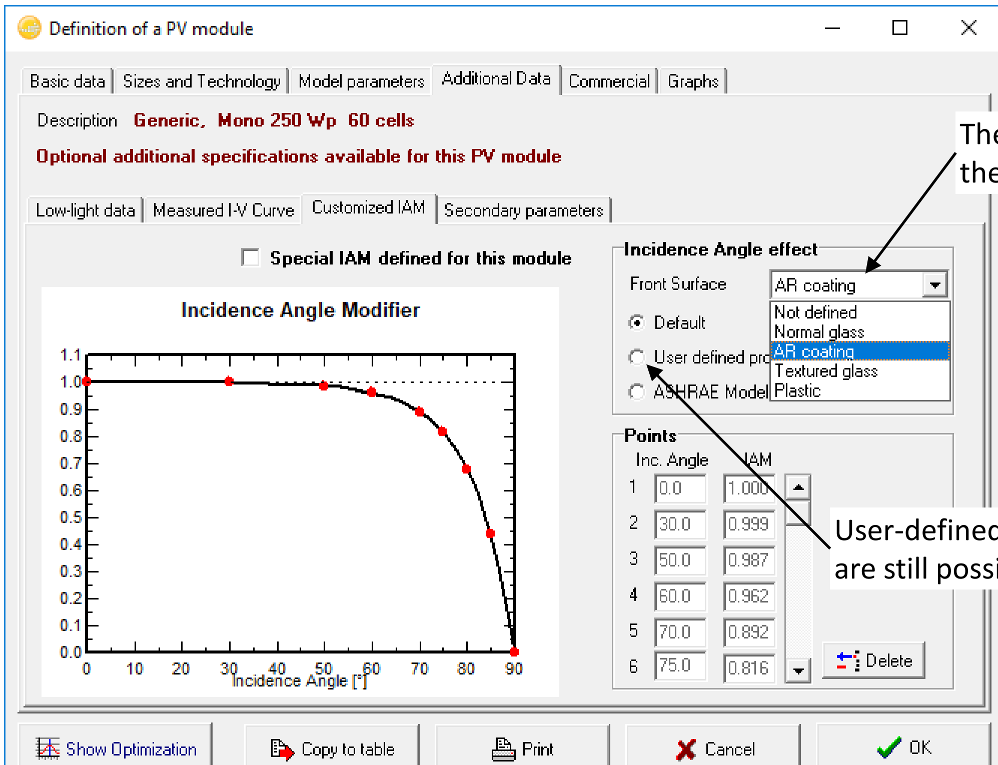




IAM definitions, Module surface

IAM: Incidence Angle Modifier
Describes the angular reflection properties of the PV module surface
In the past, the PVsyst default was to use the ASHRAE model (empirical)

New: IAM default function is given according to PV module front surface

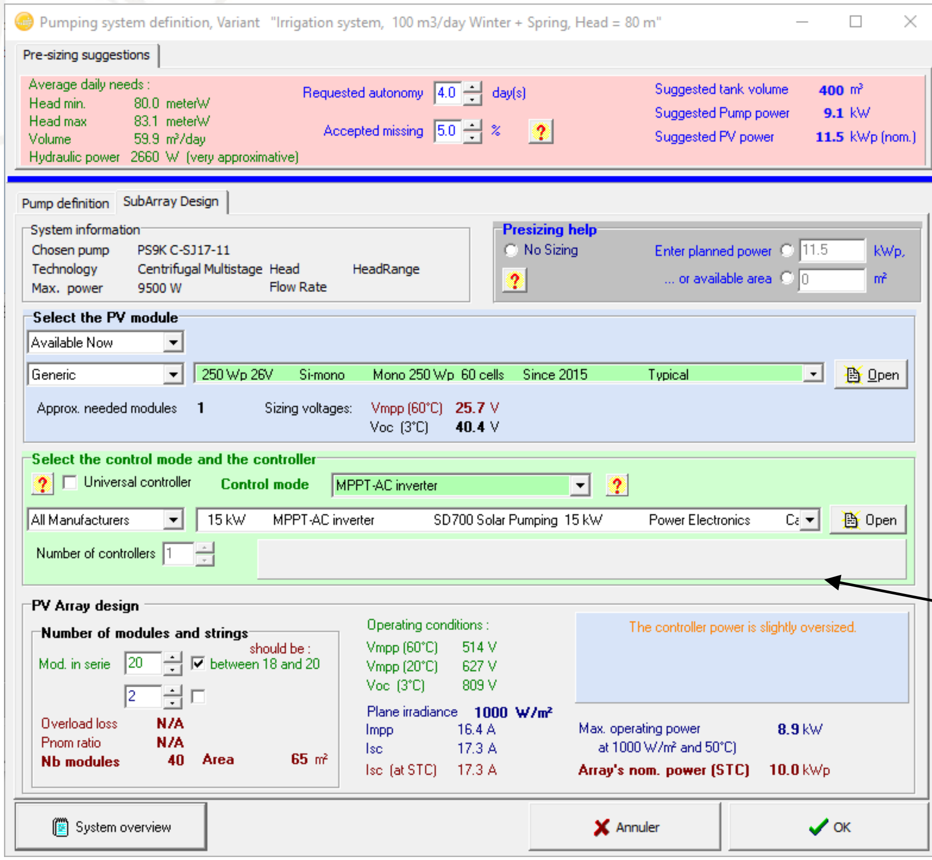


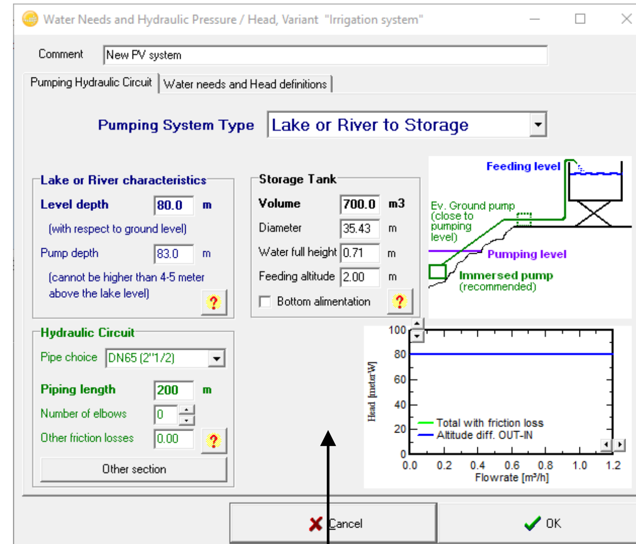
The surface material defines the IAM function

User-defined profiles are still possible

The IAM function is now modeled according to Fresnel refraction laws.

Pumping Systems





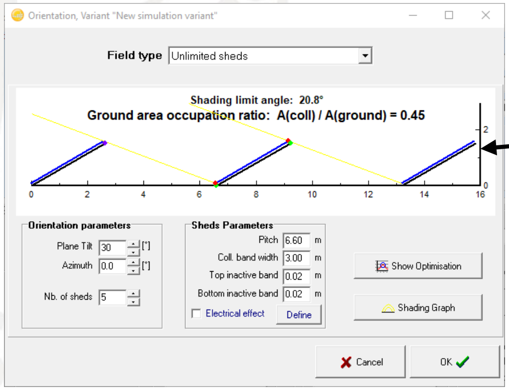
New dialogue for pumping systems
In line with dialogues of grid-tied and standalone systems

The simulation of pumping systems was reviewed and adapted also to larger systems (few 100 kW)

Unlimited Trackers / Bifacial Tracking

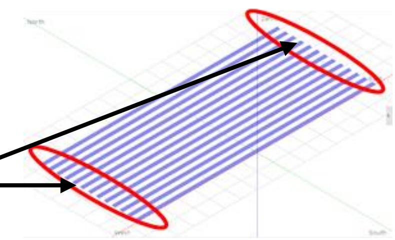
2-dimensional approach for long rows

PVsyst 'Unlimited Sheds' model
for long rows with fixed tilt

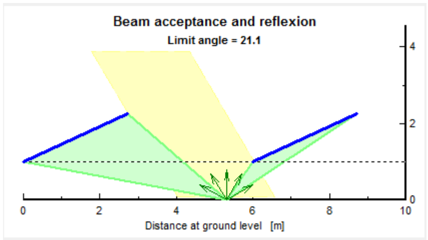


2-dimensional model

neglects border effects of the rows



Bifacial model
for fixed tilt sheds
available (since V6.6.0)



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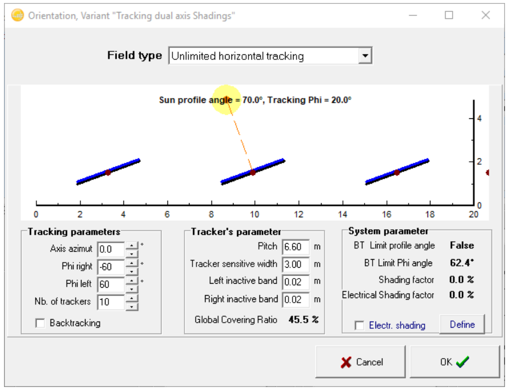
Unlimited trackers:
first step towards
horizontal bifacial tracking model
(since V6.6.7)



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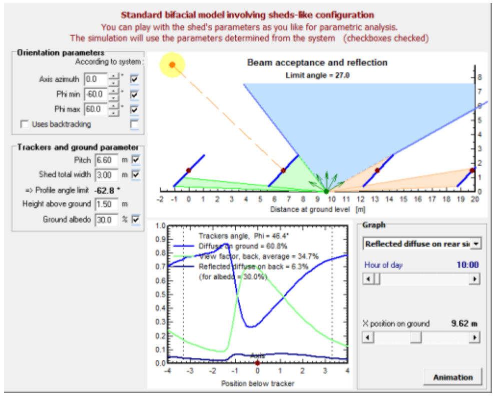
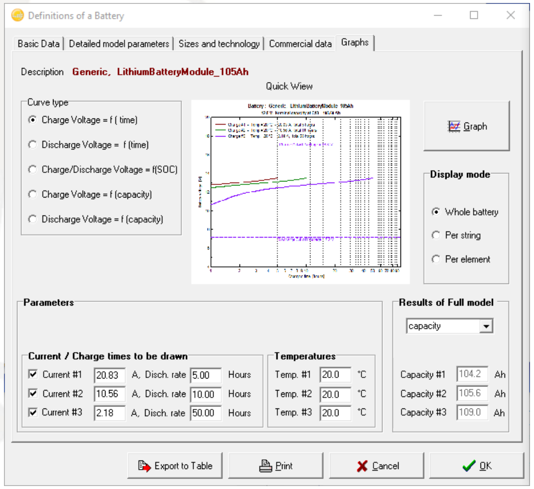
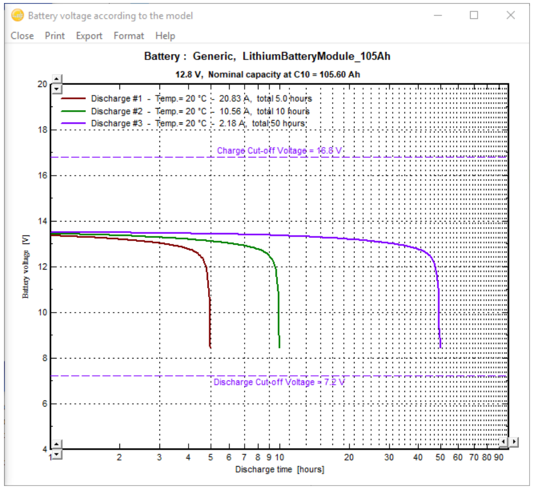
Bifacial tracking
for horizontal axis
close to publishing



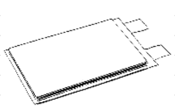
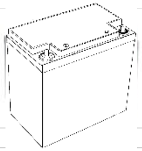
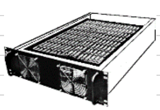
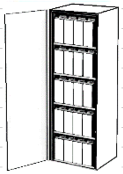
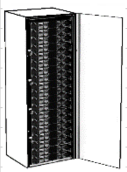
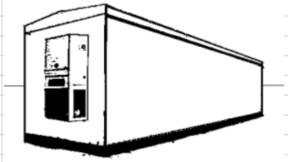
Lithium Ion batteries

Model for Li-Ion Batteries





Composition Hierarchy

Main Category	Cells		Modules		Cabinets&Racks		Containers
CategoryLevel	1	1	2	2	3	3	4
Category	Cylindrical cell	Pouch cell	Battery module	Rack mount module	Cabinet	Rack	Container
Base element	cell	cell	cell	cell	Battery module	Rack mount module	Rack
Photo							

Allows to build easily large battery packs out of smaller components

In a next step it will be possible to combine battery storage with grid-tied systems

Summary and Outlook

- New features in current PVsyst Version
  - String mismatch tool
  - More possibilities for SolarEdge optimizers
  - Improved multiple orientations management
  - Tool to study thin object shadings
  - IAM definitions, Module surface
  - Larger Pumping Systems became possible
  - Simplified calculation for single horizontal axis trackers

- New features in upcoming versions
  - Bifacial Tracking for horizontal axis
  - Lithium Ion batteries
  - Grid-tied PV systems with battery storage