



Solarius PV

**Photovoltaic Solar Systems
design with Solarius PV BIM**

How to design a PV system on an
inclined surface in a few steps
with the help of the BIM Editor

Photovoltaic Solar Systems design with Solarius PV BIM

(How to design a PV system on an inclined surface in a few steps with the help of the BIM Editor)



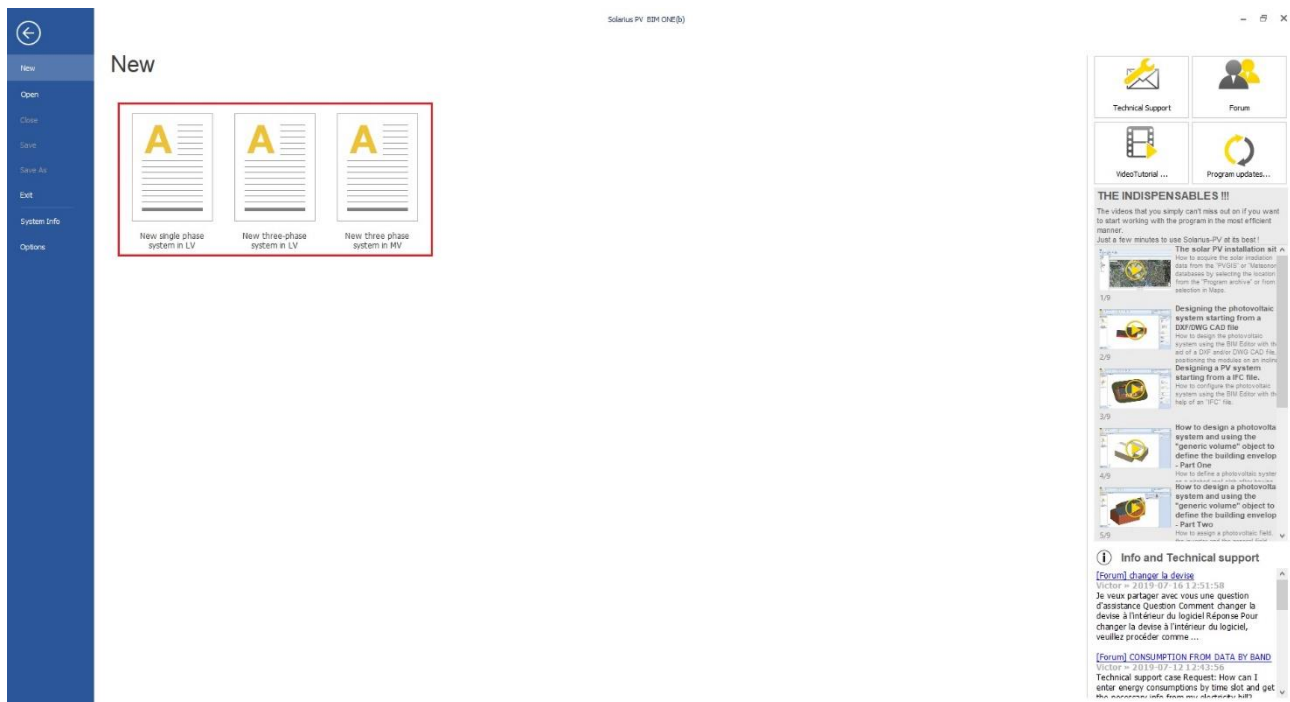
Solarus PV is the BIM software solution for a fully professional and reliable workflow with an innovative approach to photovoltaic systems design of any type and size together with a detailed output of technical documentation and financial analysis tools. The ideal solution for every situation and for all kinds of needs allowing you to model and design:

- PV system installations on new or existing buildings (retro-fit) or even large solar parks
- Choose each location (geolocation with reference climatic data)
- Consider any boundary conditions (near and far obstacles)
- Insert each type of module and inverter (archive supplied with thousands of different models)
- With all the advantages of 3D modelling (also starting from a DXF/DWG or IFC BIM Models)

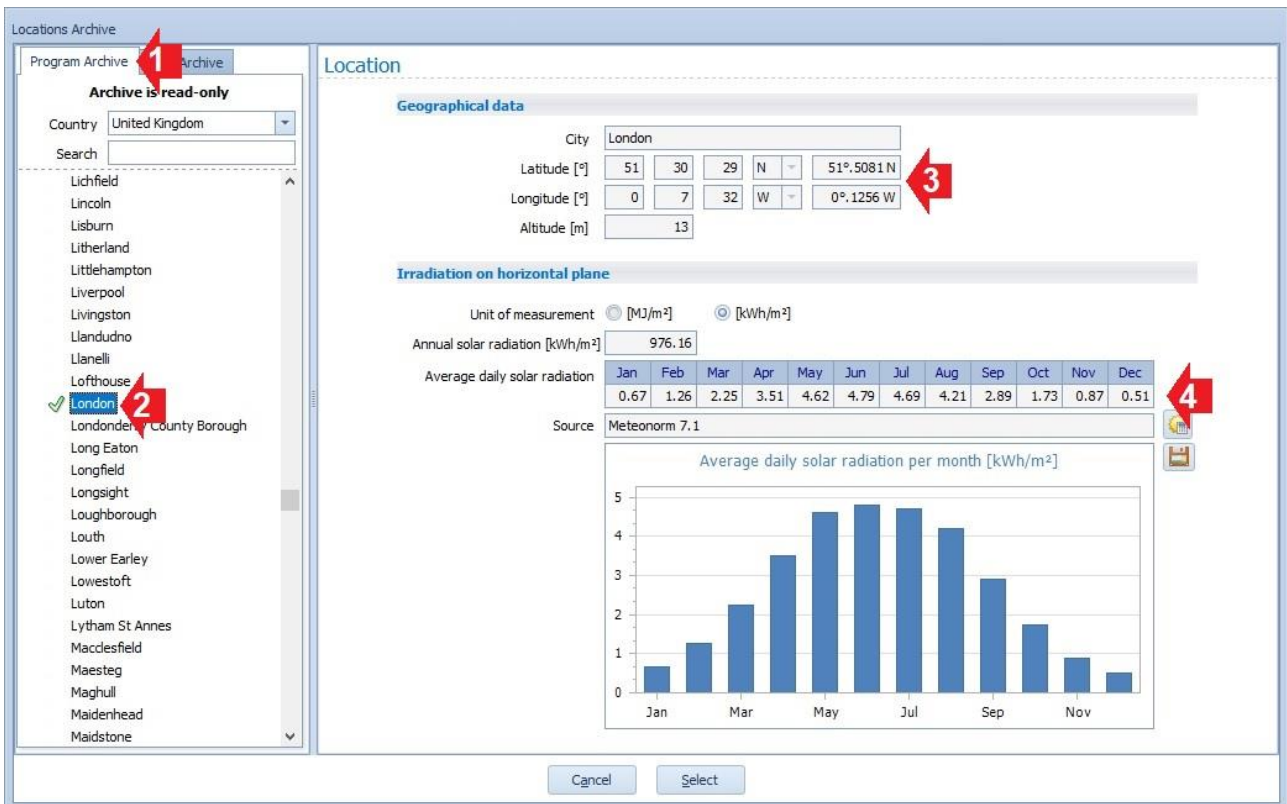
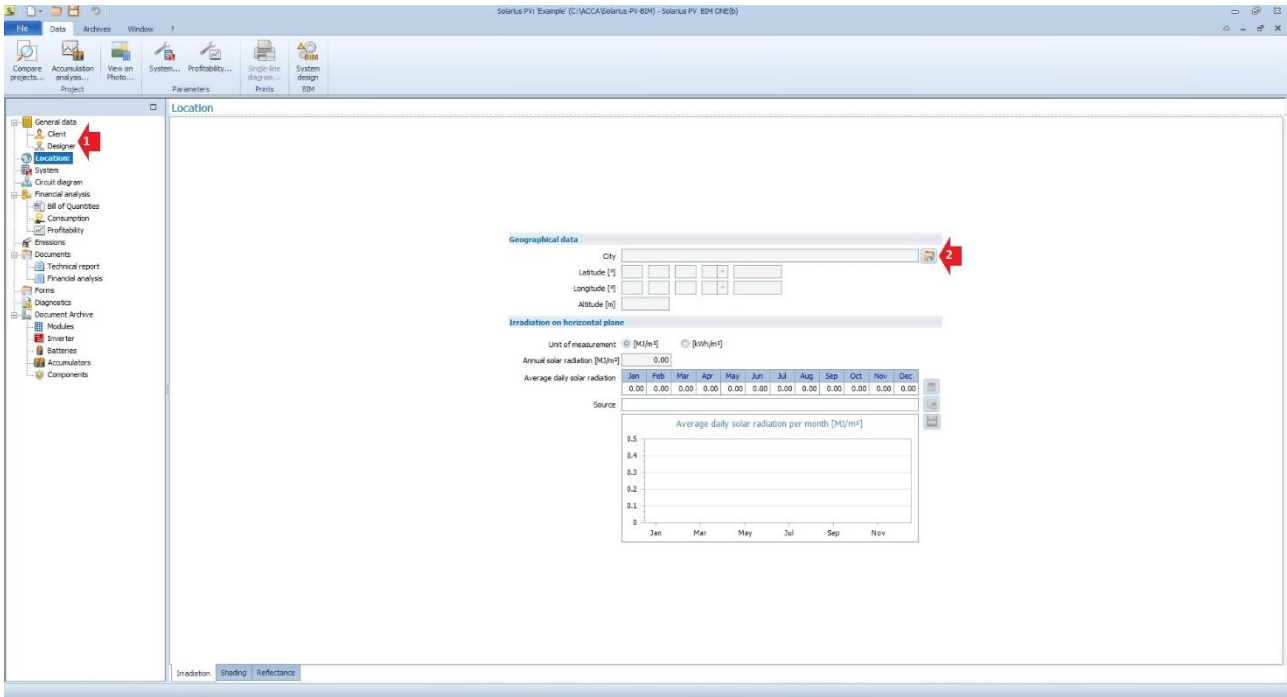
How to design the PV system in simple steps

1st phase [Create new file – Definition of General Data and installation site]

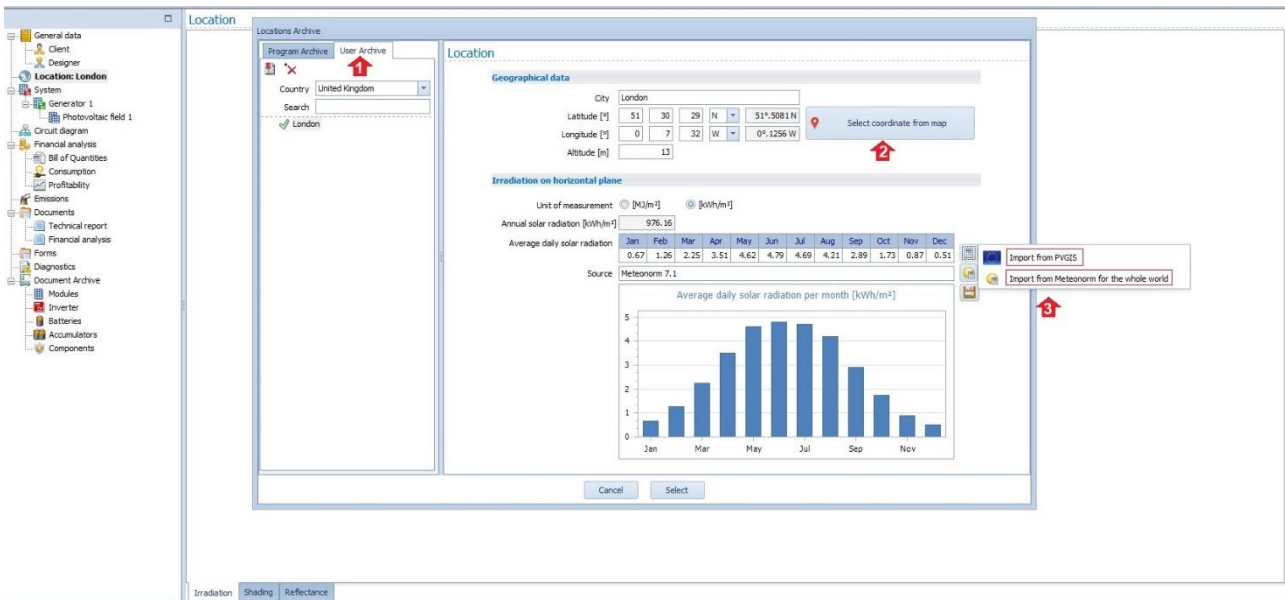
Create a new file choosing between "single phase LV", "Three phase LV" or " three phase MV " connections.



With the type of grid connection selected, the next step is to insert the "General Data" information (client and designer info) and the installation site location data. Geographical data can be obtained directly from the software archive or you can add a new locations importing the relevant solar irradiation data using the Google Maps integration to identify locations directly on a map to get PVGIS database and Meteonorm 7.1 irradiation data.



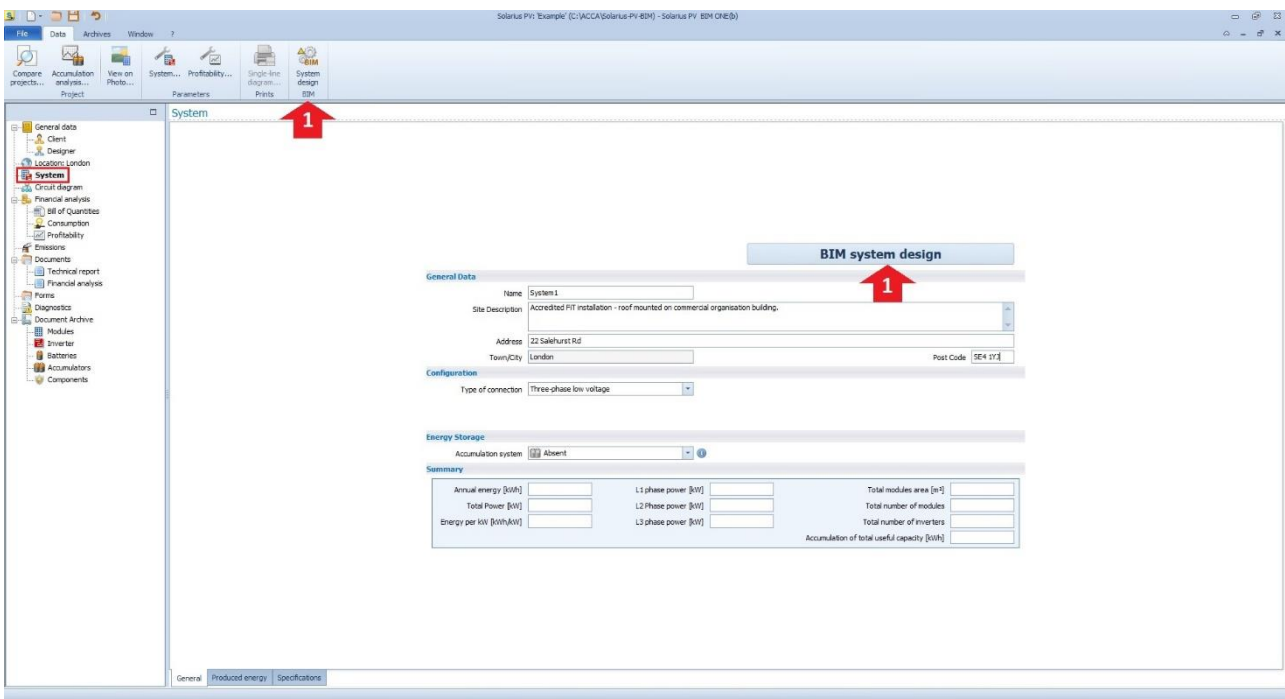
Note: the "Program Archive" contains worldwide country and city locations or order to define the PV system installation site and provide the "Average daily irradiation" data for productivity ratings.



Note: alternatively, by selecting the "User Archive" tab a new project location can be inserted. The site location can be selected, directly by using the map integration and the irradiation data which are calculated using the (PVGIS-Meteonorm) databases.

2th phase [BIM Editor – How to get access]

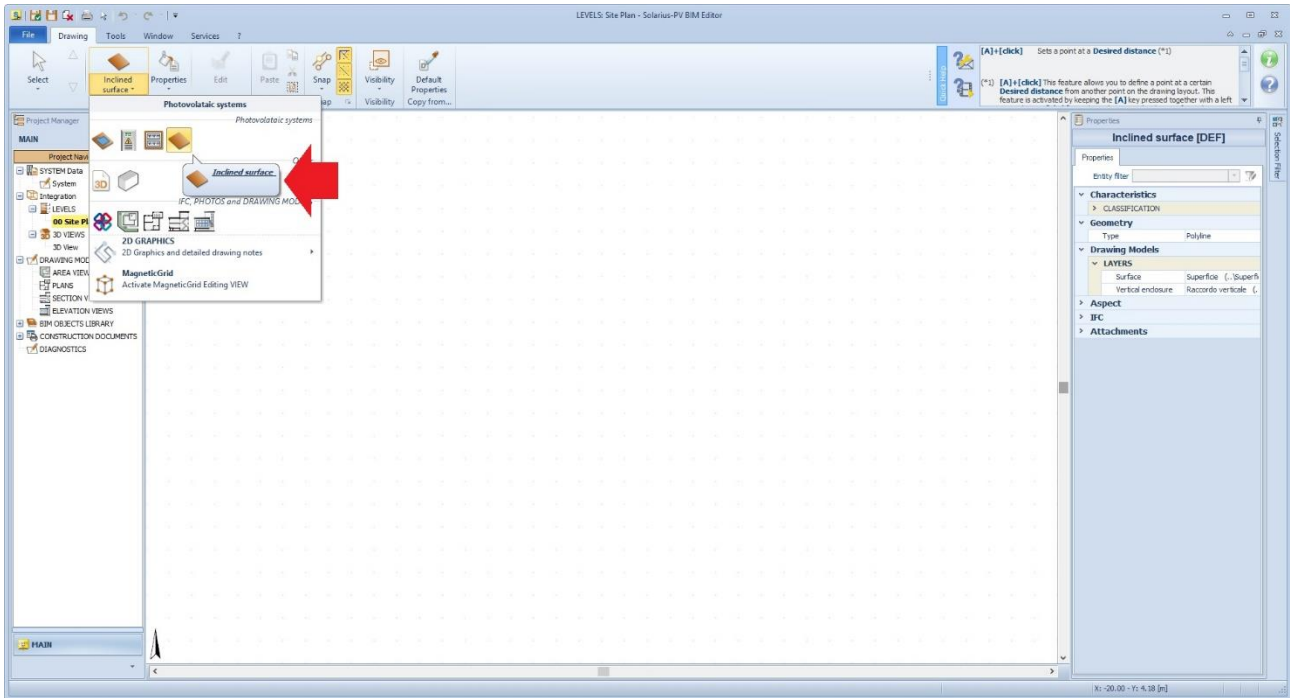
Accessing the BIM Editor by clicking the function: "BIM System Design" available in both the Ribbon or directly from the system workspace area.



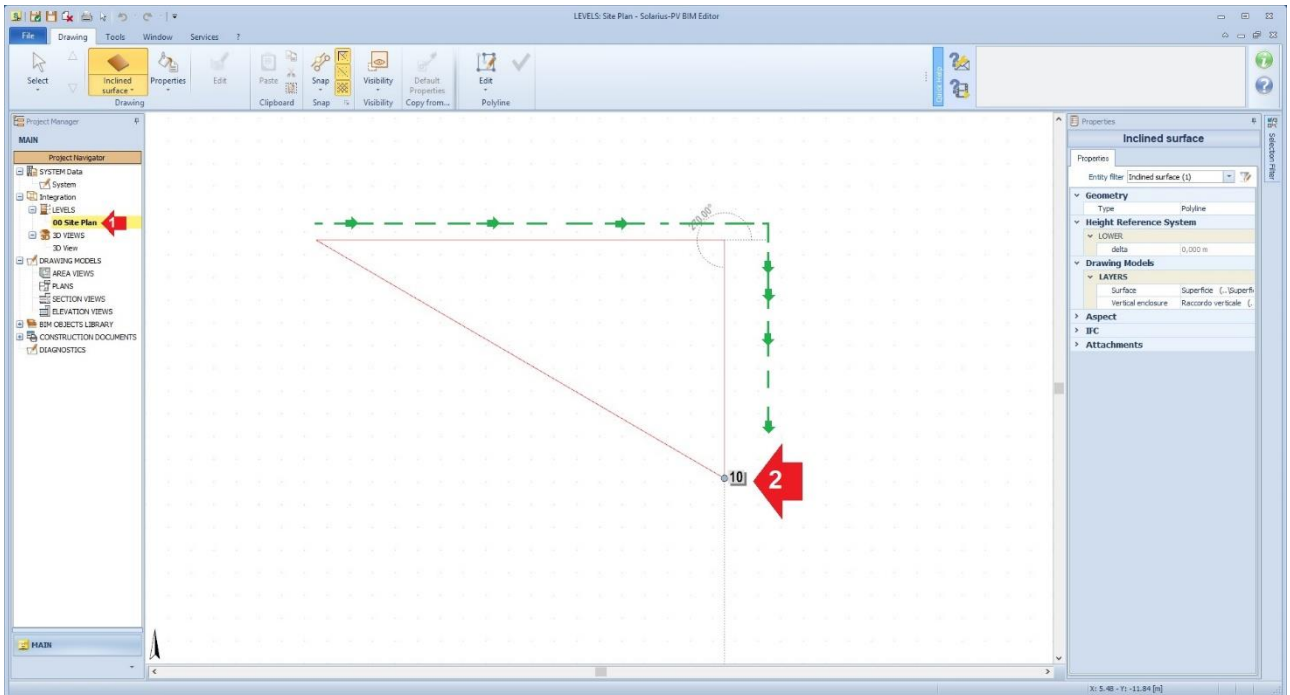
3th phase [BIM Editor, PV system design]

1st step (Defining the Photovoltaic area):

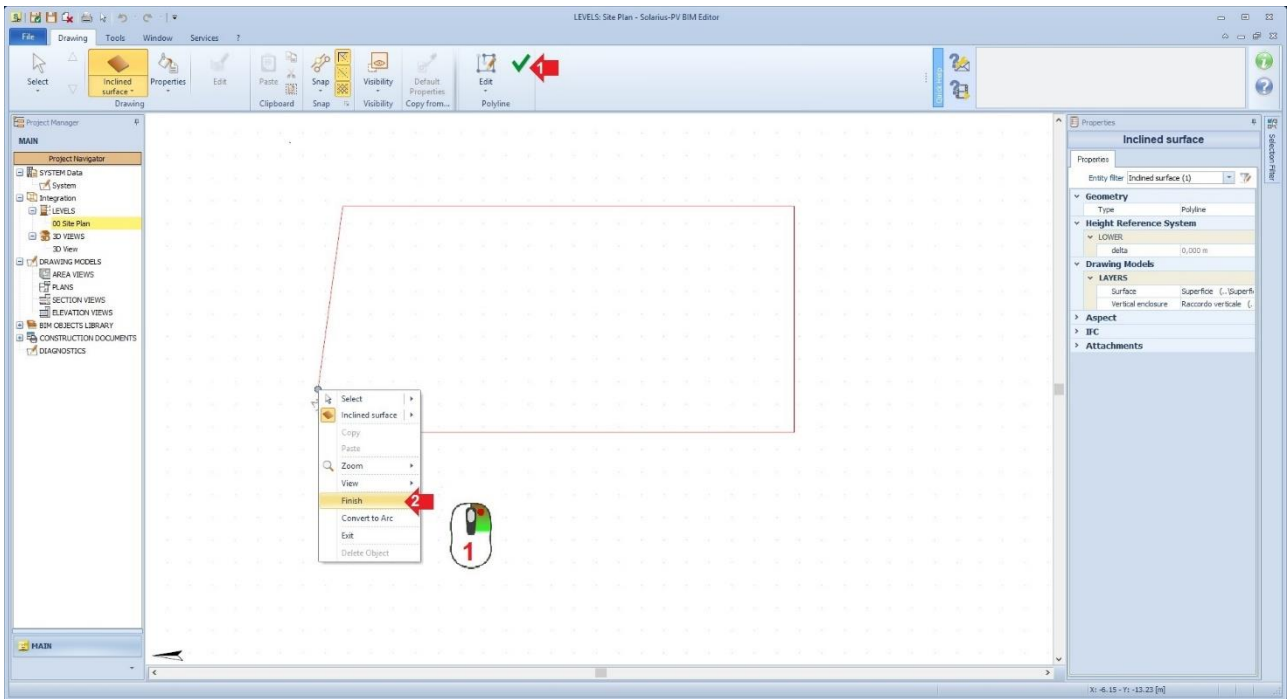
In this step, the system installation surface's needs to be defined, with the help of the "BIM objects". The first object to be used in order to obtain an inclined surface is the "**Inclined Surface**" drawing tool.



After selecting the tool, we'll draw the PV area by inserting vertex nodes in 2D view.

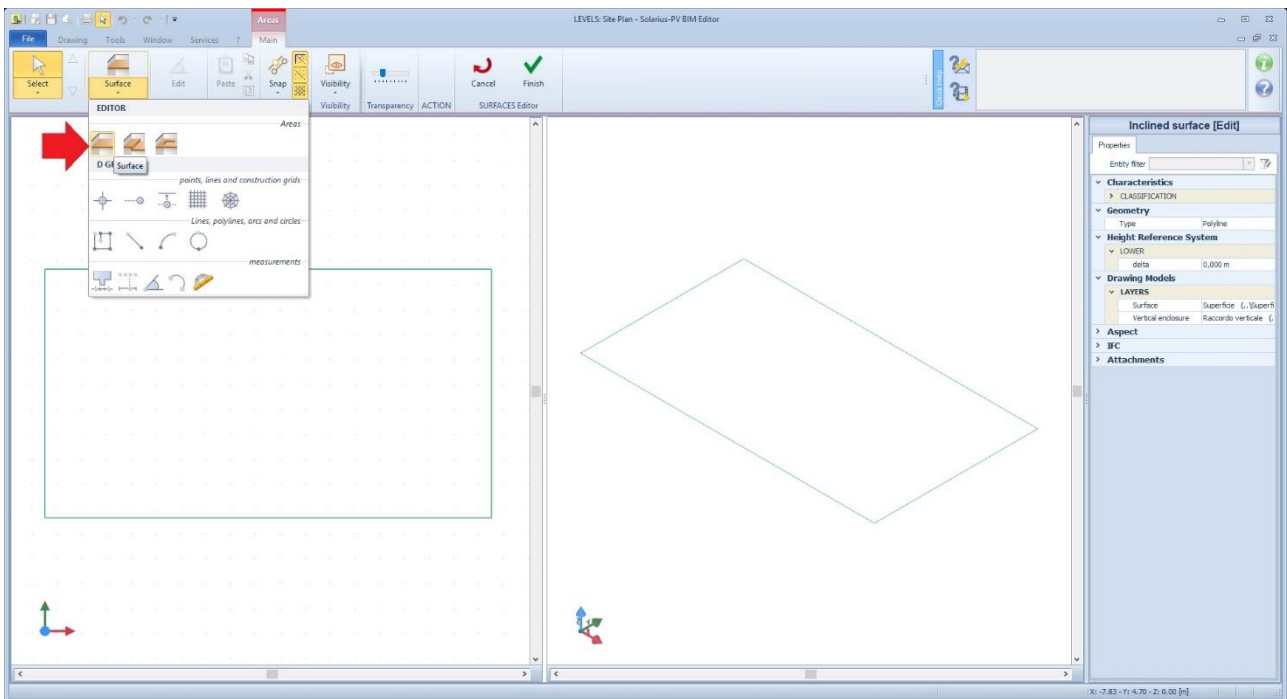


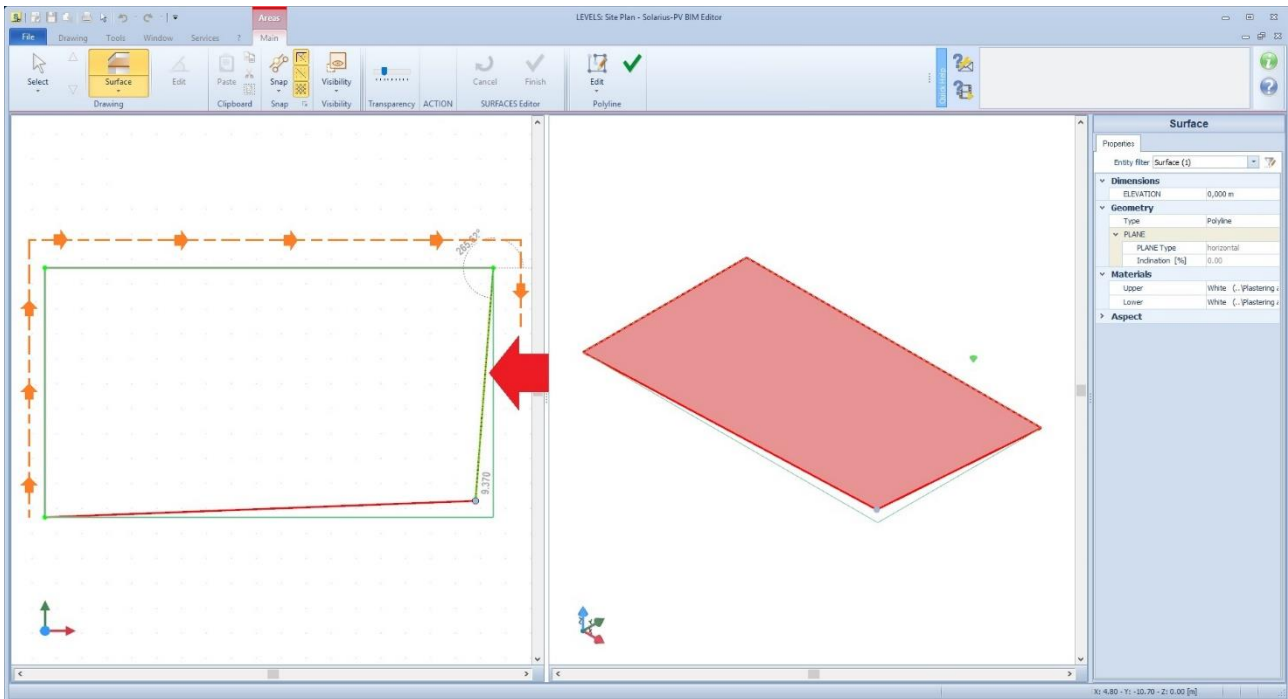
We'll then complete the drawing process by clicking the green check, or by selecting "finish" from the contextual menu, activated with a right-mouse click on the workspace.



Having completed the operation, a separated **Editor for the inclined surface** will open. We'll now define the area of the PV installation and the surface inclination.

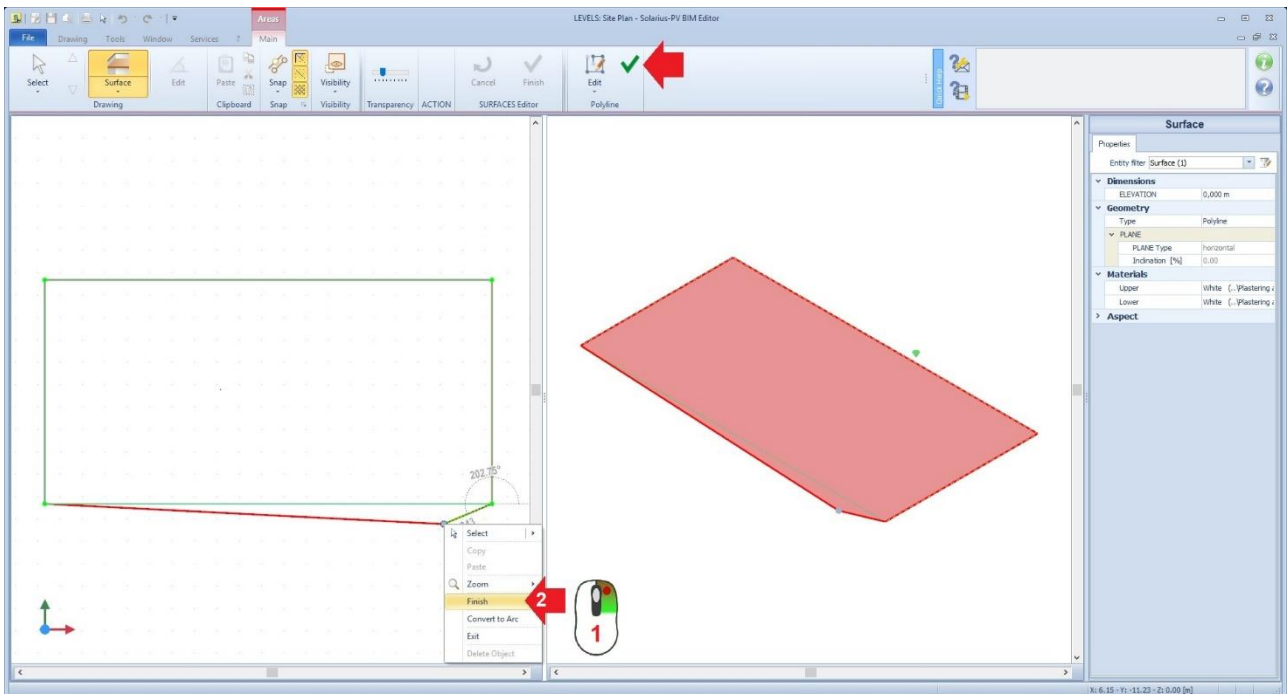
Now it is possible to draw the real system area inside the general field perimeter.



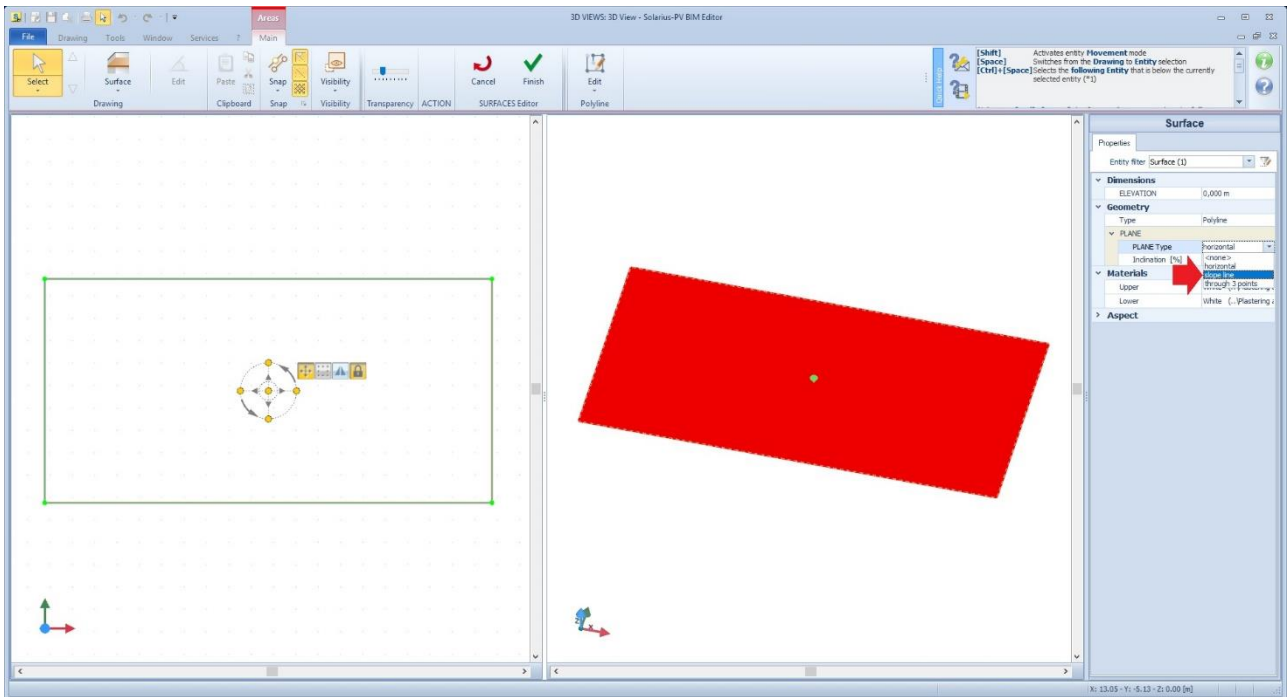


Note: in this phase the drawn area is traced. The identified surface is shown on the right side of the split screen editor.

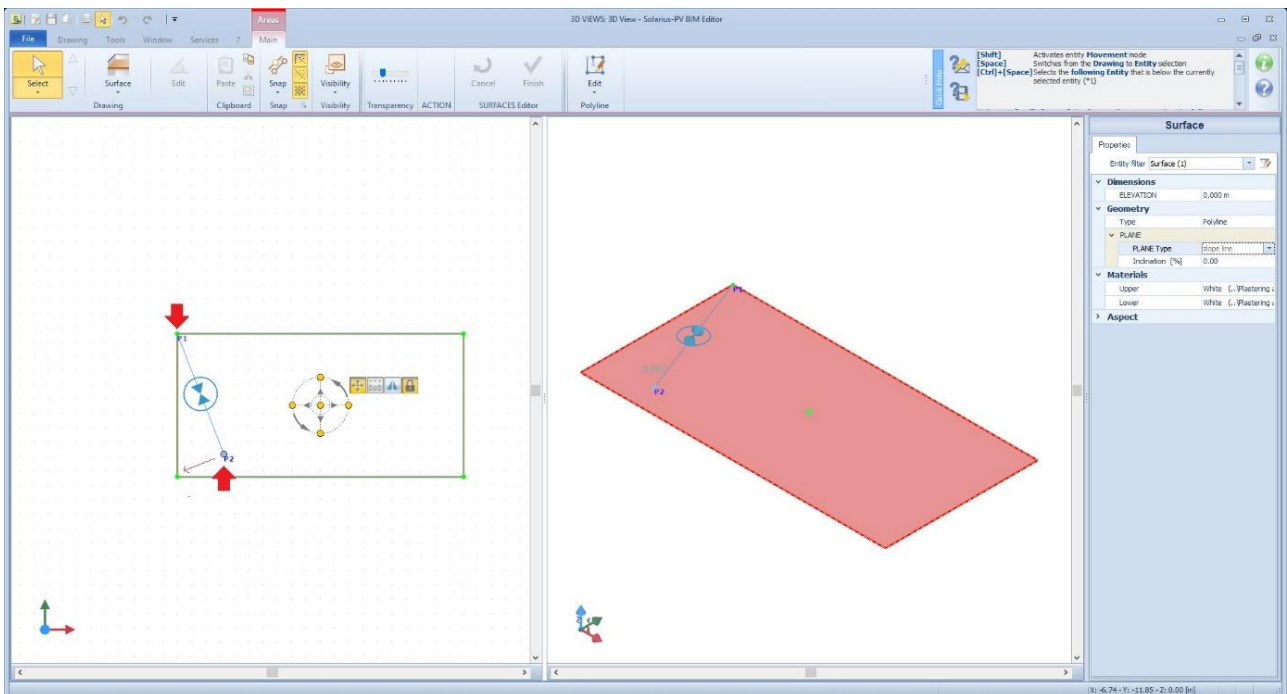
Having identified the installation area, the drawing process can be closed by using the "green check" present in the ribbon, or by selecting "Finish" from the context menu, activated by pressing the right-mouse button.

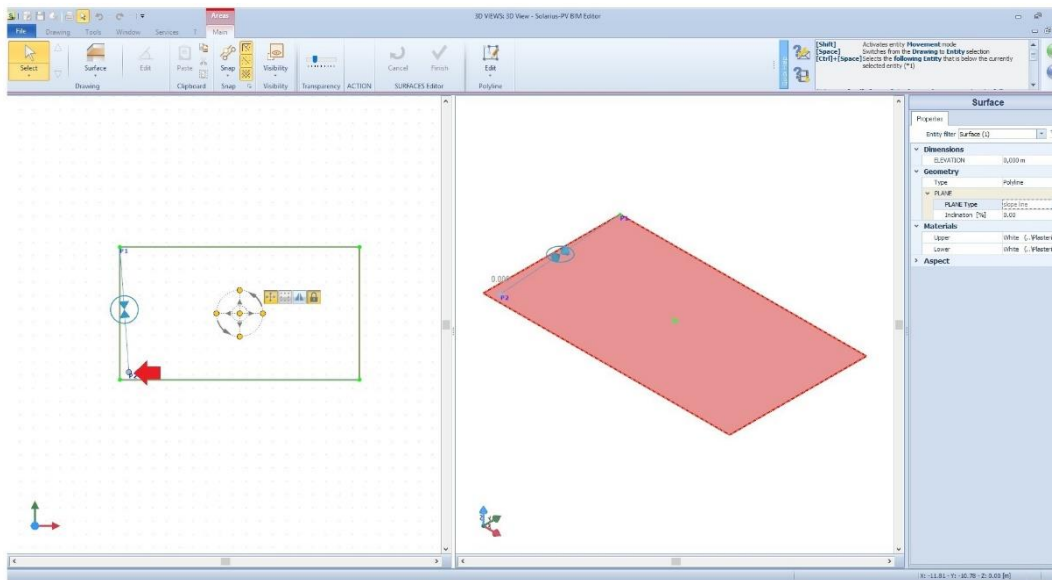
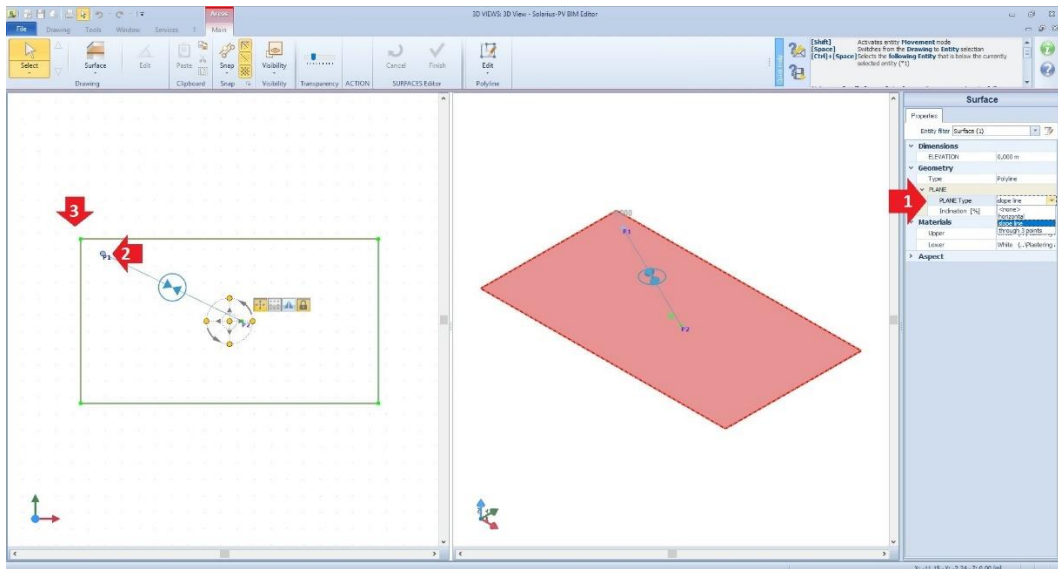


The next step is to define a possible inclination of the surface. In order to assign the inclination value select the surface, from the 3D view (right window). By selecting the plan (highlighted in red) in the properties box will become available some functions, now you can select the plan typology (sloping line through two points or pitching through three points) and eventually the inclination percentage. Having choose the method, you proceed to place the reference points. If you choose "slope line through two points", the left window will show, two points: P1 and P2 points to be repositioned on the surface.

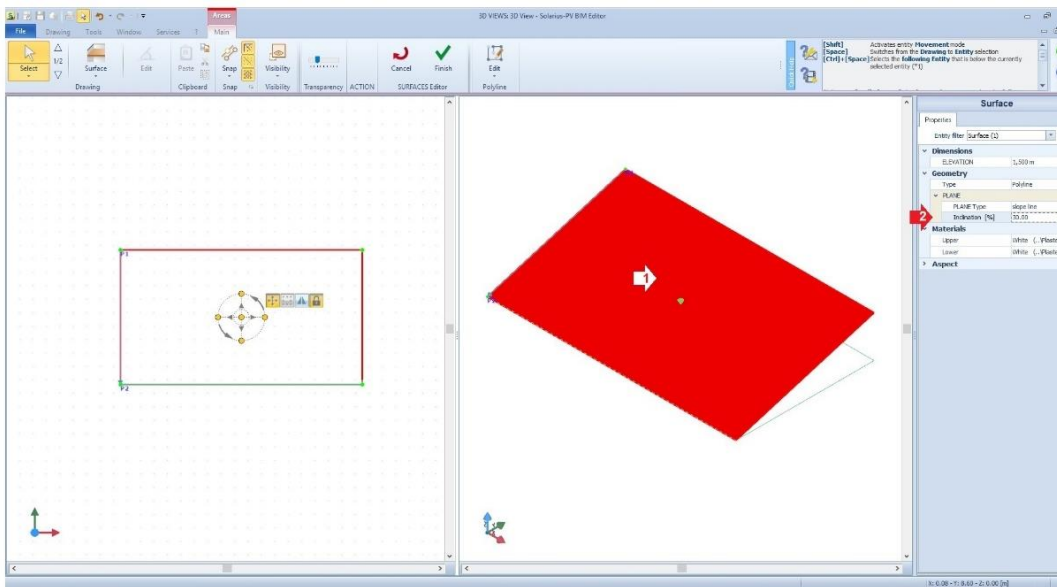


Manually move P1 and P2 over a reference line (could be also a segment of the perimeter) from the left window.



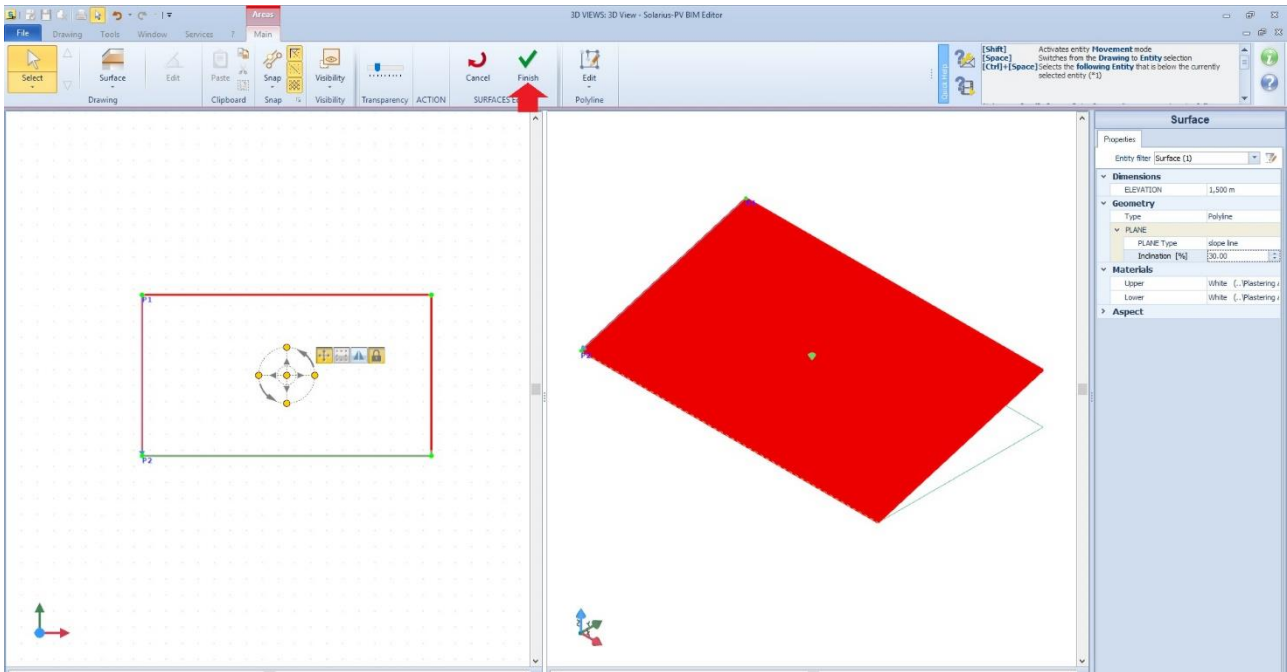


Once the positioning is finished, it is possible to assign the slope (%) to the surface ⁽¹⁾.



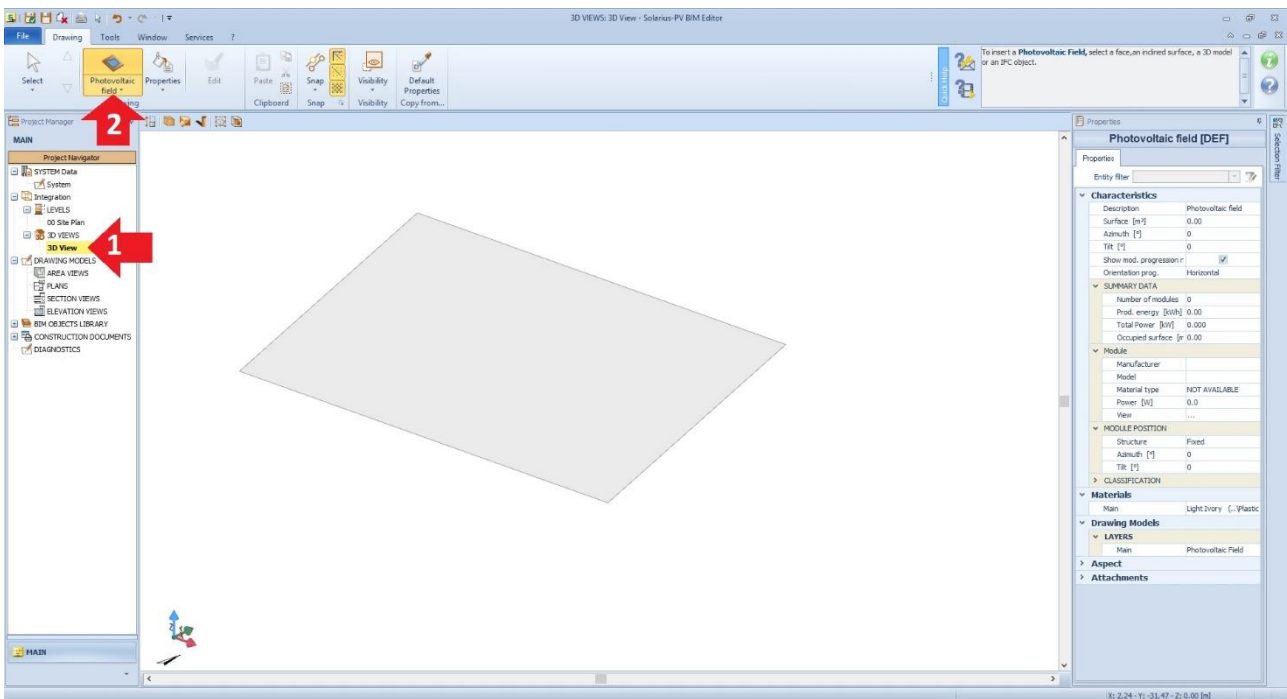
(1) For further information, see the discussion on the Forum "Inclination coefficient from percentage (%) to degrees (°) or vice versa": [How to convert the inclination factor \(gradient\) from degrees to percentage](#)

Having modelled the inclined surface click on "finish" to exit the editor.

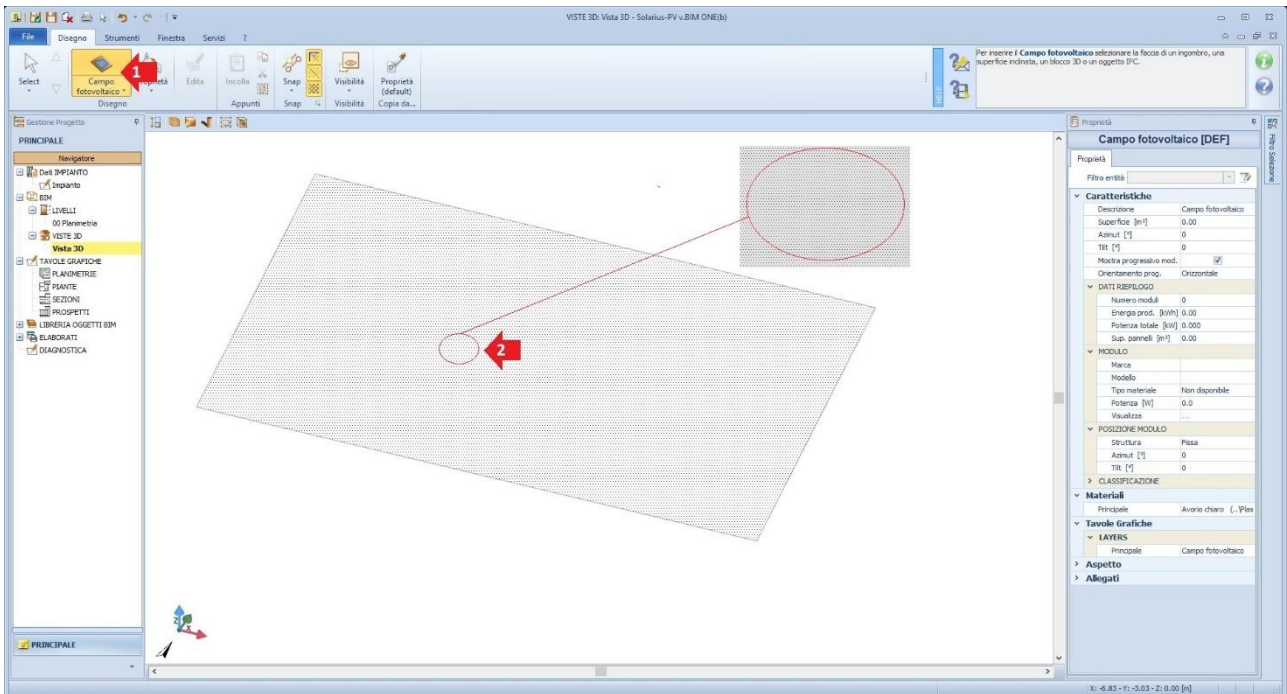


2th Step: (PV Field Assignment and PV modules placement)

The second key step is placing the photovoltaic modules on our drawing area using the "PV Field" command.

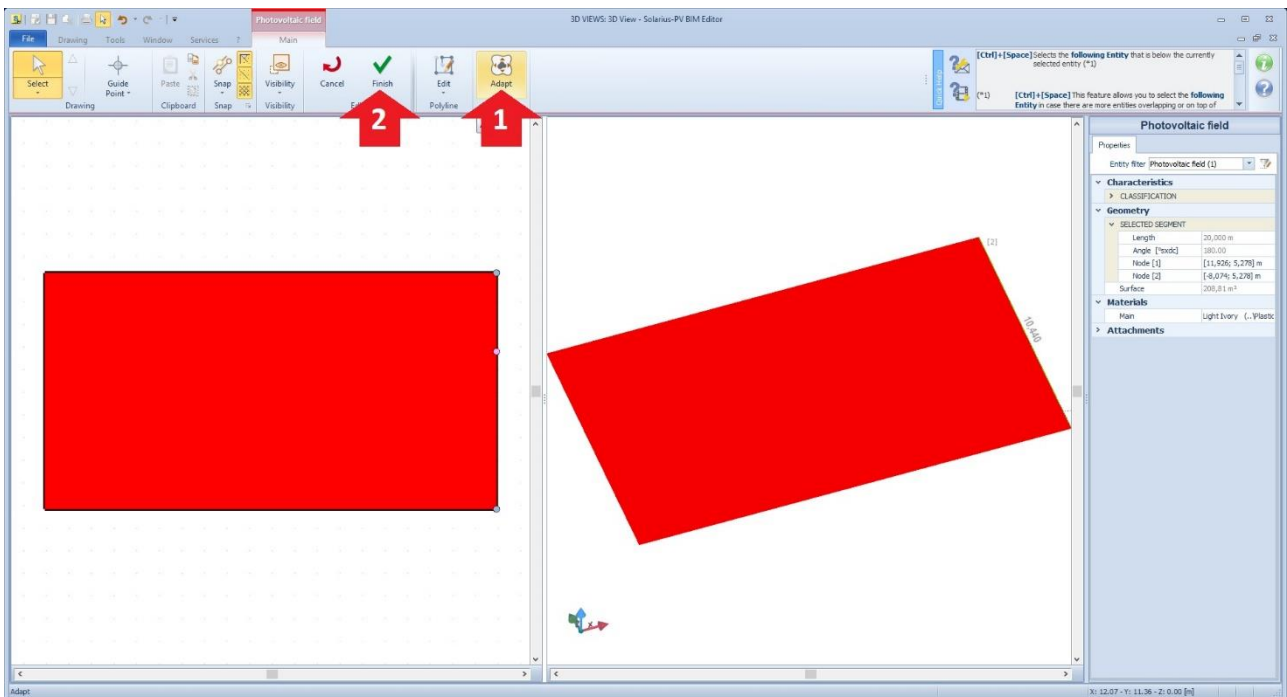


Selecting the object while zooming the drawn area, the software shows us the area represented in dots.



In order to completely identify the area where the PV system lays, we click on the specific surface and manage it entirely from the PV Field editor.

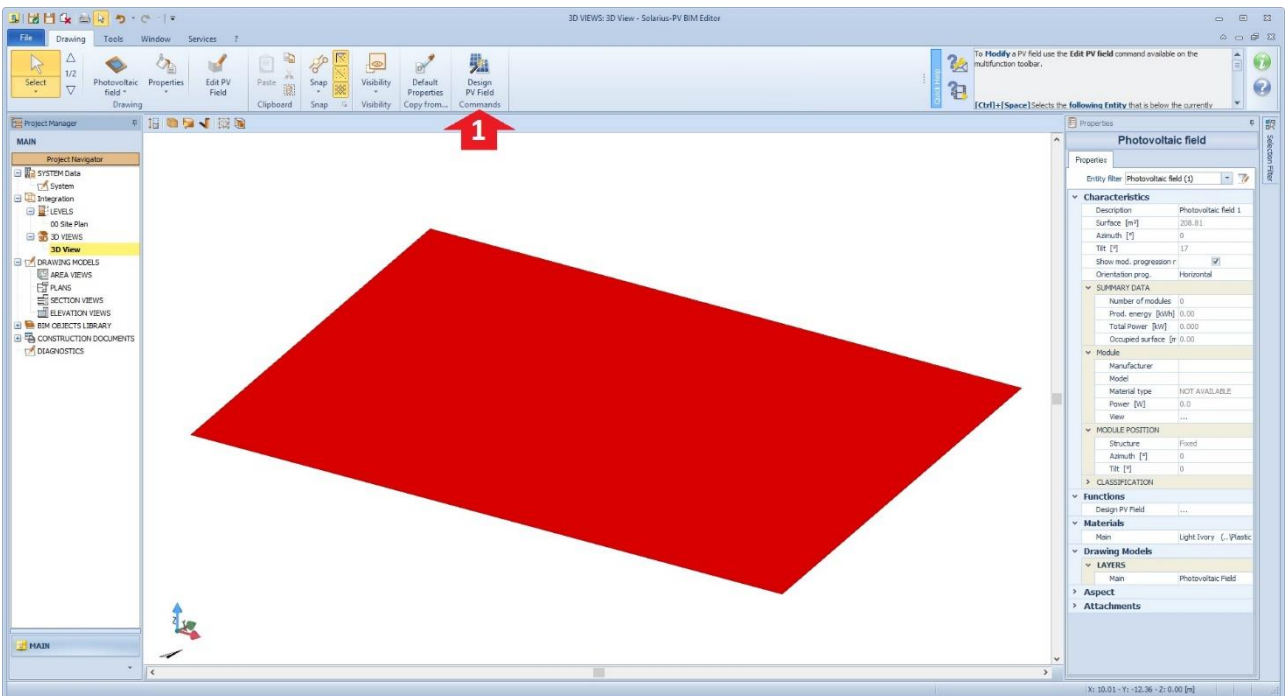
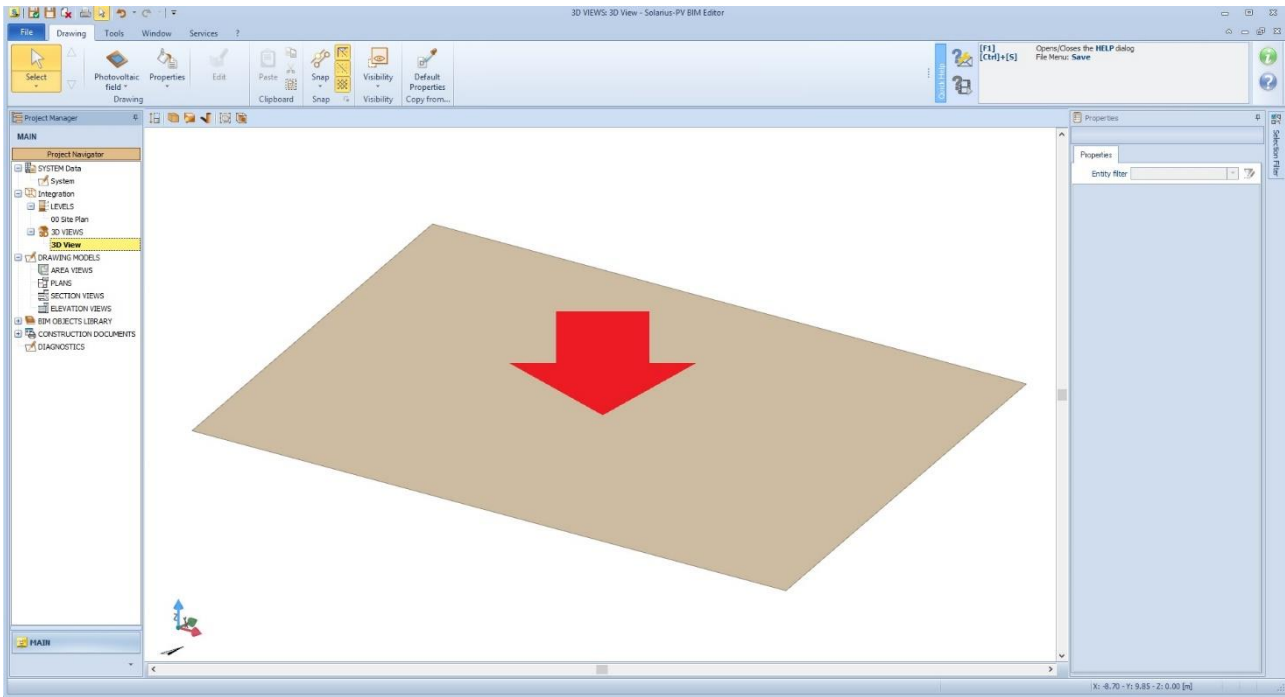
In the PV Field Editor we can remodel its area or customise it to any surface using the proper commands on the toolbar. In the pictures below: command "Customise" – no.1, command "Finish" - no.2.



Once we exit the Editor, we get the actual location of our PV Field.

3th Step (Enabling "Wizard" modules placing)

In order to place the modules, the Wizard can be enabled by selecting the PV Field area and clicking "PV Field design" on the ribbon. There are three stages:



First stage, we are unable to choose whether our PV Field will be coplanar or not to our designed surface. In case of a non-coplanar field, we will need to choose the axis (on one axis, horizontal or vertical, on two axis) (2).

(2) For further information: [SUPPORTING STRUCTURES](#)

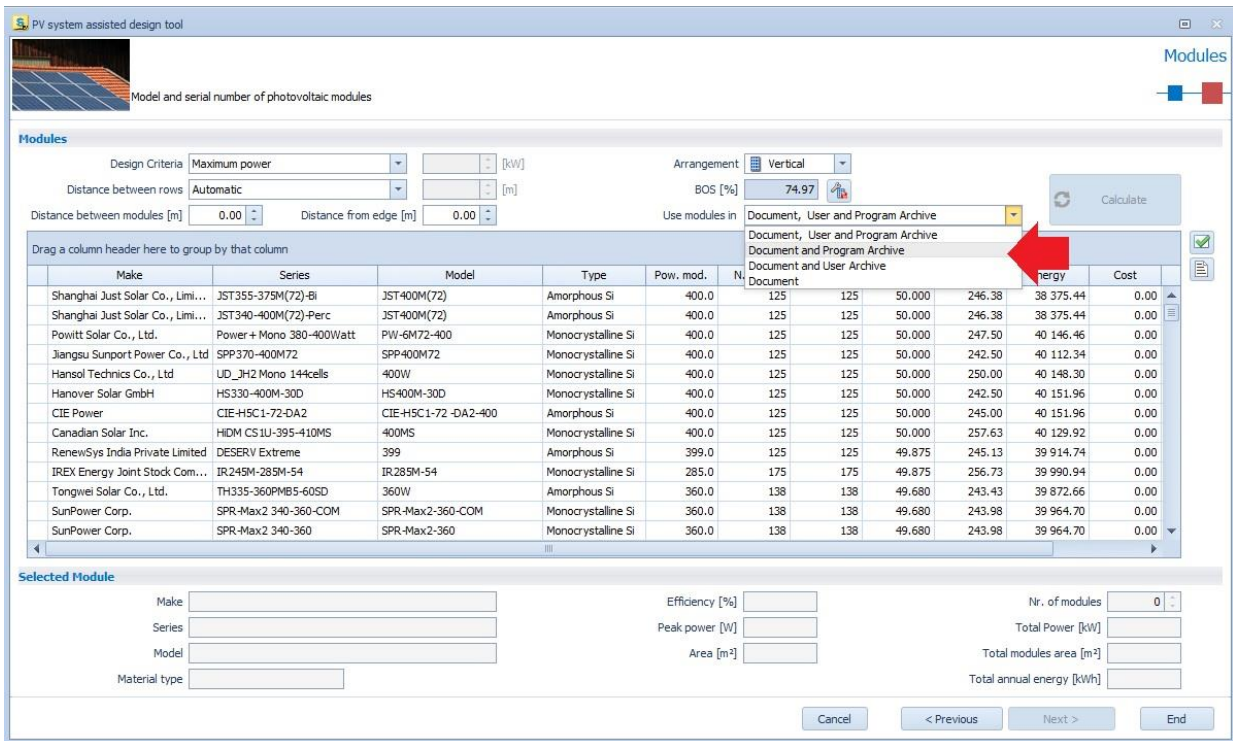
In the second stage, we develop our own criteria, in other words we choose which type our design will be and which module (formless, monocrystalline, polycrystalline) we will use:

- **Maximum power type:** based on the chosen module, Wizard will draw up the maximum number of modules to cover the PV Field area to match the chosen criteria. The number of modules will depend on the PV Field size (sqm).
- **Specific power type:** based on the chosen modules, Wizard will draw up the appropriate amount of modules to match the chosen criteria. In this specific case the number of modules will mirror the design criteria not the size of the area.
- **Maximum annual power type:** based on the chosen module, Wizard will draw up the maximum number of modules to cover the PV area. The number of modules will depend on the size of the area.
- **Specific annual power type:** based on the chosen module, Wizard will draw up the appropriate number of modules to match the chosen criteria. In this case the number of modules will depend on the chosen design not on the size of the area.

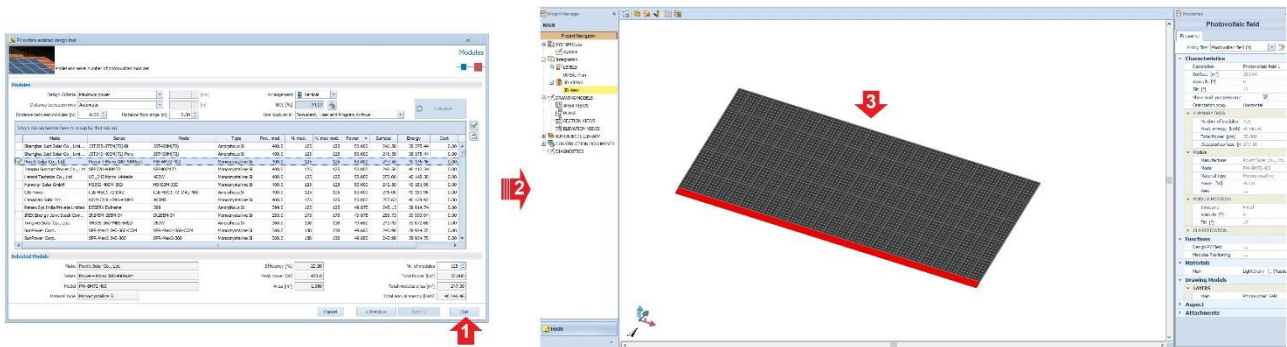
The screenshot shows the 'PV system assisted design tool' interface. The 'Modules' section is active, displaying a table of photovoltaic modules. A red arrow points to the 'Design Criteria' dropdown menu, which is set to 'Maximum power'. Below the table, the 'Selected Module' section contains input fields for Make, Series, Model, Material type, Efficiency [%], Peak power [W], Area [m²], Nr. of modules, Total Power [kW], Total modules area [m²], and Total annual energy [kWh]. Buttons for 'Calculate', 'Cancel', '< Previous', 'Next >', and 'End' are visible at the bottom.

Make	Series	Model	Type	Pow. mod.	N. mod.	N. max mod.	Power	Surface	Energy	Cost
Megasol Energie AG	M403-60-t BF GG2	403	Amorphous Si	403.0	120	120	48.360	197.28	59 840.52	0.00
Megasol Energie AG	M403-60-t BF GG	403	Amorphous Si	403.0	120	120	48.360	193.32	58 639.10	0.00
Megasol Energie AG	M397-60-t BF GG	397W	Amorphous Si	397.0	120	120	47.640	197.28	58 876.08	0.00
RenewSys India Private Limited	DESERV Extreme	475	Amorphous Si	475.0	100	100	47.500	196.10	57 922.66	0.00
Kewell Technology Developm...	Sunpower semi-flexible solar ...	KWM-150W-F	Monocrystalline Si	150.0	315	315	47.250	185.22	53 237.80	0.00
RenewSys India Private Limited	DESERV Extreme	456	Amorphous Si	456.0	100	100	45.600	196.10	55 596.66	0.00
Megasol Energie AG	M397-60-t BF GG NICER	397W	Amorphous Si	397.0	114	114	45.258	196.31	58 583.66	0.00
Prism Solar Technologies Inc.	Bi60-362,-368,-375BSTC	Bi60-375BSTC	Amorphous Si	375.0	120	120	45.000	200.16	55 083.18	0.00
Lubi Electronics	LE24M355-375	LE24M375	Amorphous Si	375.0	120	120	45.000	195.12	46 036.98	0.00
SunPower Corp.	X-Series X21-460-470-COM	SPR-X21-470-COM	Monocrystalline Si	470.0	95	95	44.650	205.39	54 512.92	0.00
Megasol Energie AG	M403-60-t BF GG2	372	Amorphous Si	372.0	120	120	44.640	197.28	55 256.72	0.00
Megasol Energie AG	M403-60-t BF GG	372	Amorphous Si	372.0	120	120	44.640	193.32	54 145.52	0.00
Lubi Electronics	LE24M355-375	LE24M370	Amorphous Si	370.0	120	120	44.400	195.12	45 414.92	0.00

Once the criterion has been chosen, we can select one between the referring Libraries: User Library, Document Library, Software Library. In detail, the User Library can be implemented directly by the user, by adding in new modules, new inverters, new locations, and new devices. The Software Library contains all the data-base regarding modules, inverters, usage profiles, devices, etc. previously loaded onto the software itself. Lastly, Document Library contains all the elements used in the "current project".

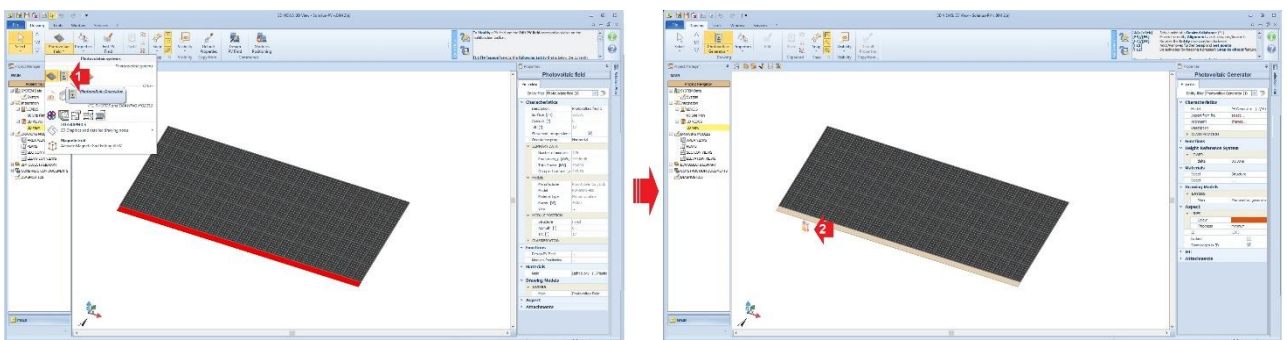


By selecting the chosen module, the PV Field computer assisted design is completed, obtaining the placement of our PV Field according to our chosen criteria.

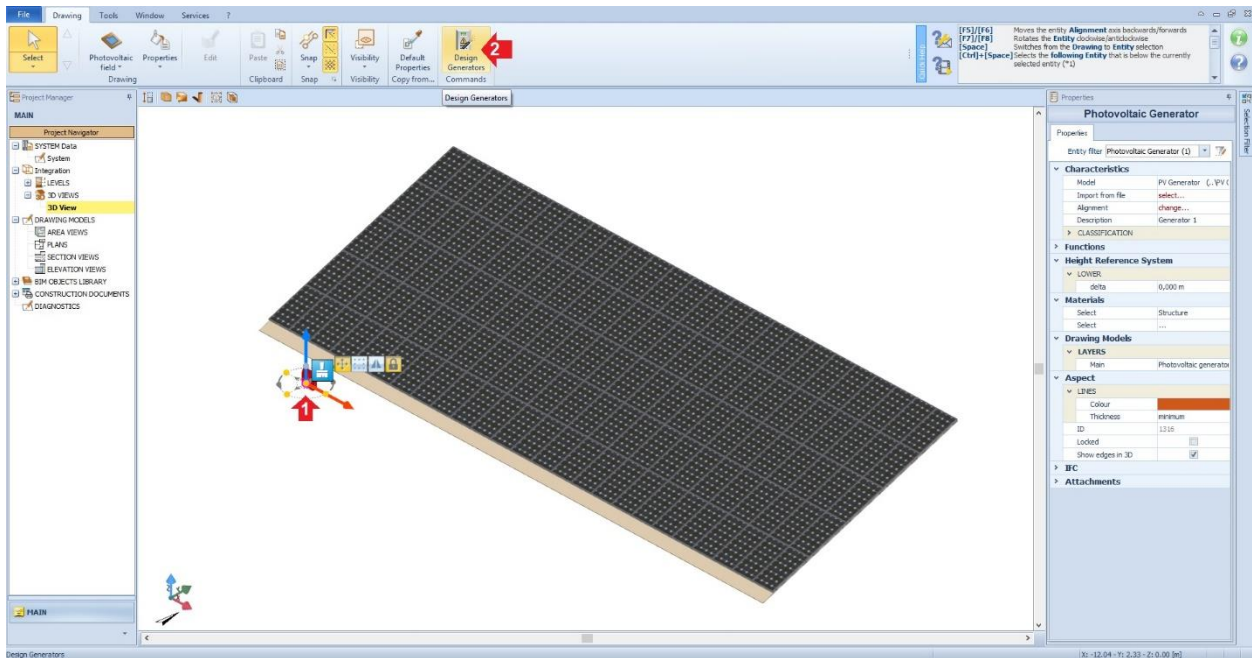


4th phase: Using the Wizard to select and place a compatible Inverter

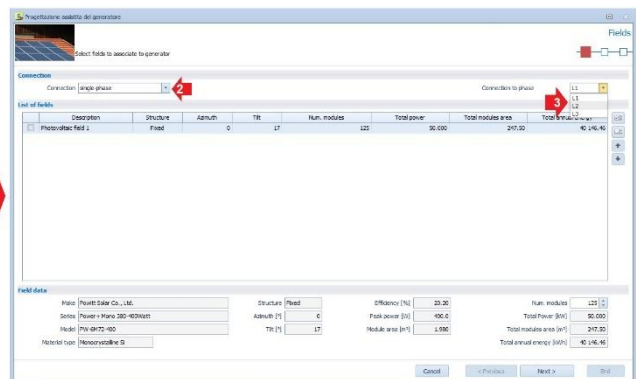
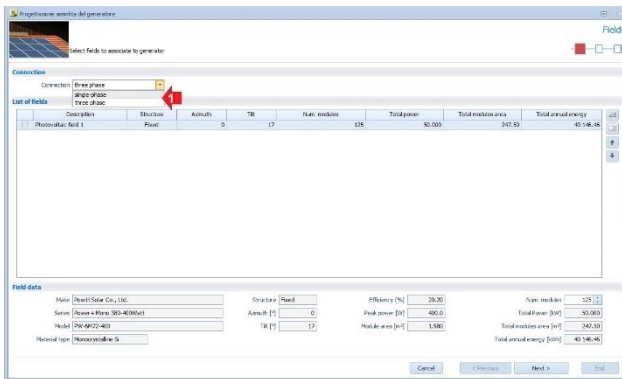
After creating the Photovoltaic Field, you can proceed to assign the **Compatible Inverter**. The procedure begins selecting the **Photovoltaic Generator** and placing it in the specific area on you own drawing.



Locate the BIM Object **Photovoltaic Generator**, select and launch the Wizard (one click on the button – (Red arrow nr.2) in order to choose and assign the **Compatible Inverter** to the PV field.

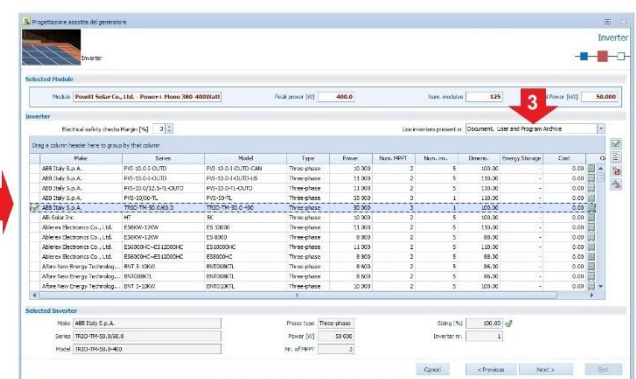
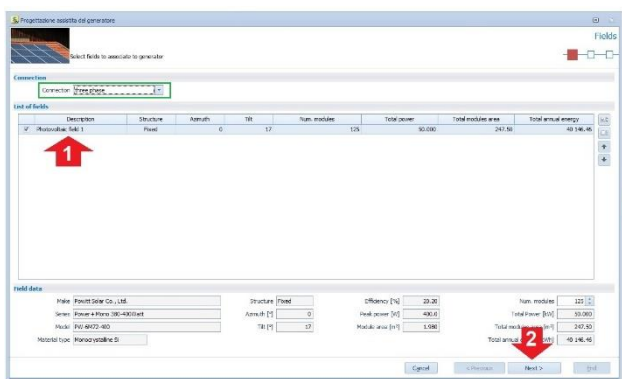


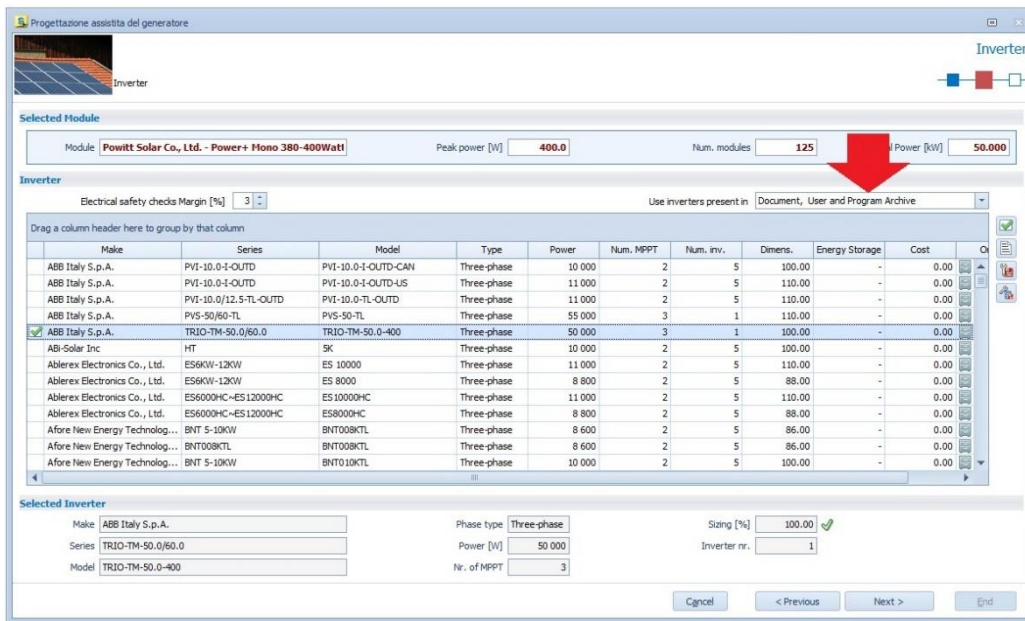
Once the **Wizard Inverter** is activated, you will be able to manage the single-phase and/or three-phase connections; in detail, if the format file is a "three-phase", you can connect the entire PV system to the three-phase system through single single-phase connections or, you can choose a three-phase connection and your three-phase Inverter will be connected and automatically balanced on phases L1, L2 and L3.



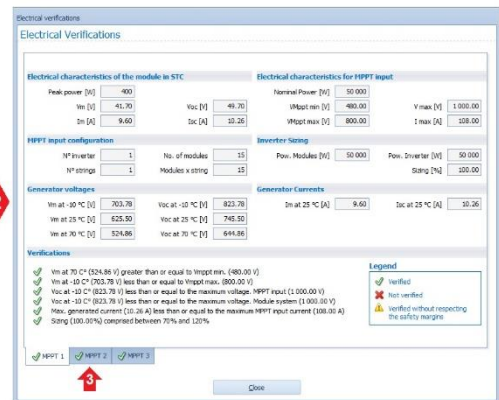
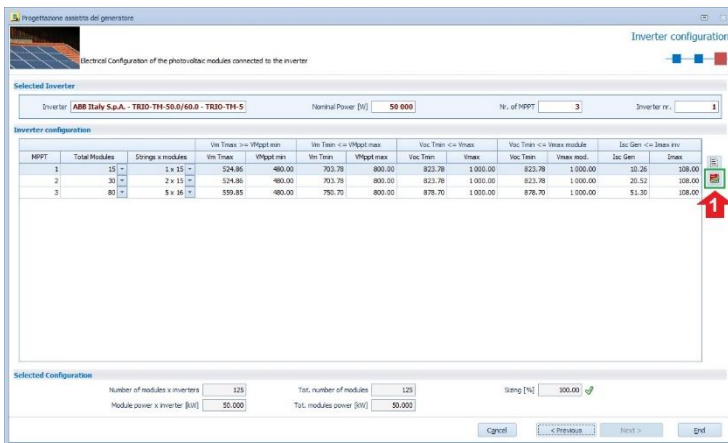
We are now able to proceed and design the connection of a balanced three-phase system, in other words we can choose the **Compatible Inverter** starting from a three-phase connection.

No.3 in the picture below. The next phase is choosing the reference archive from which we get a list of any inverter compatible with your designed PV field.



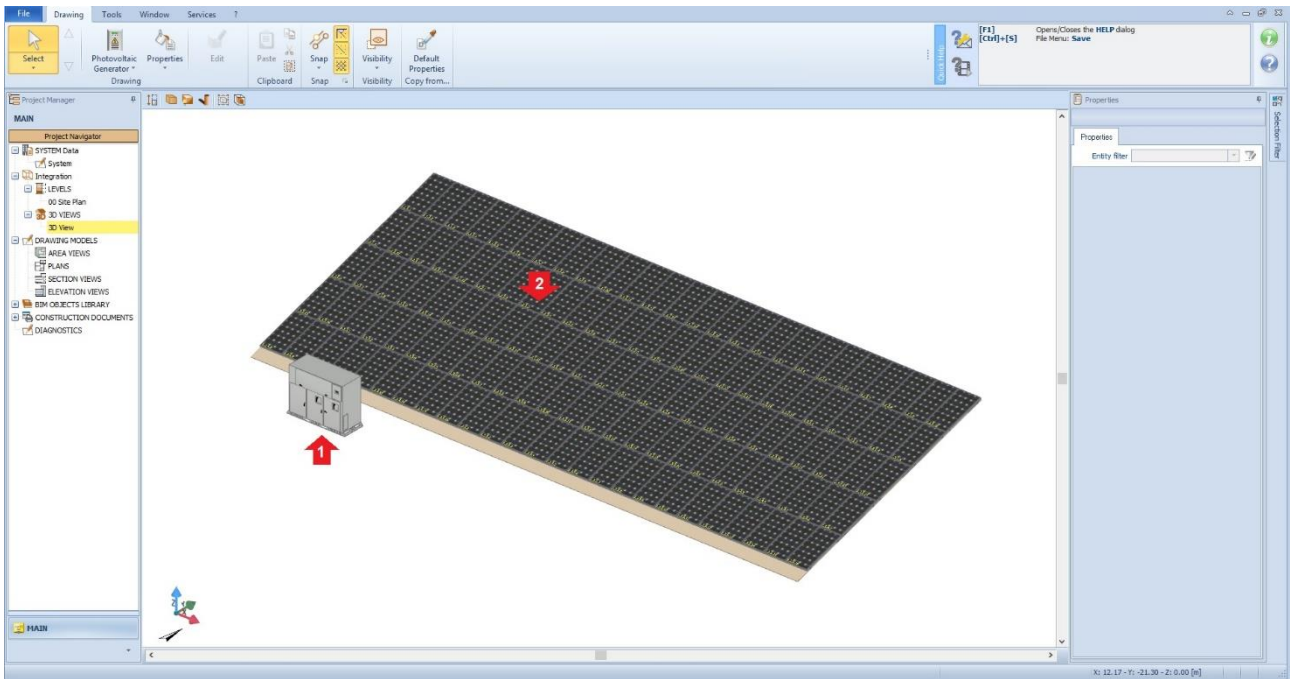


Before ending this computer aided design, the software summarises all the electric compatibilities for each designed MPPT.

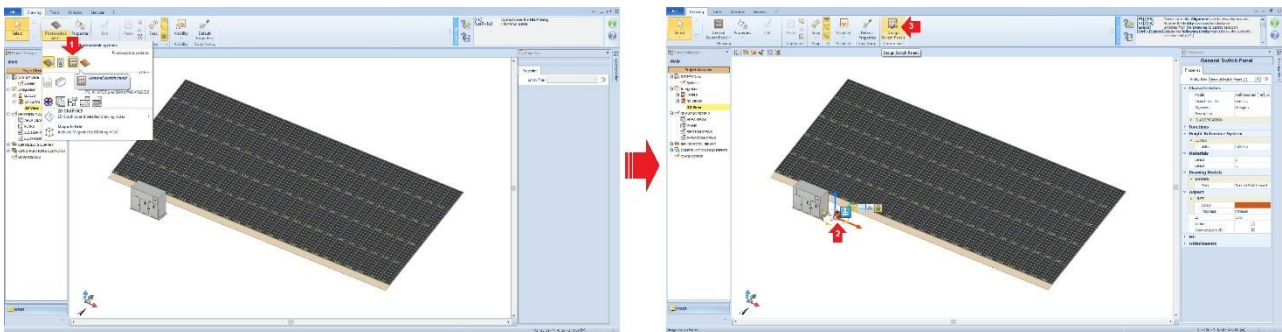


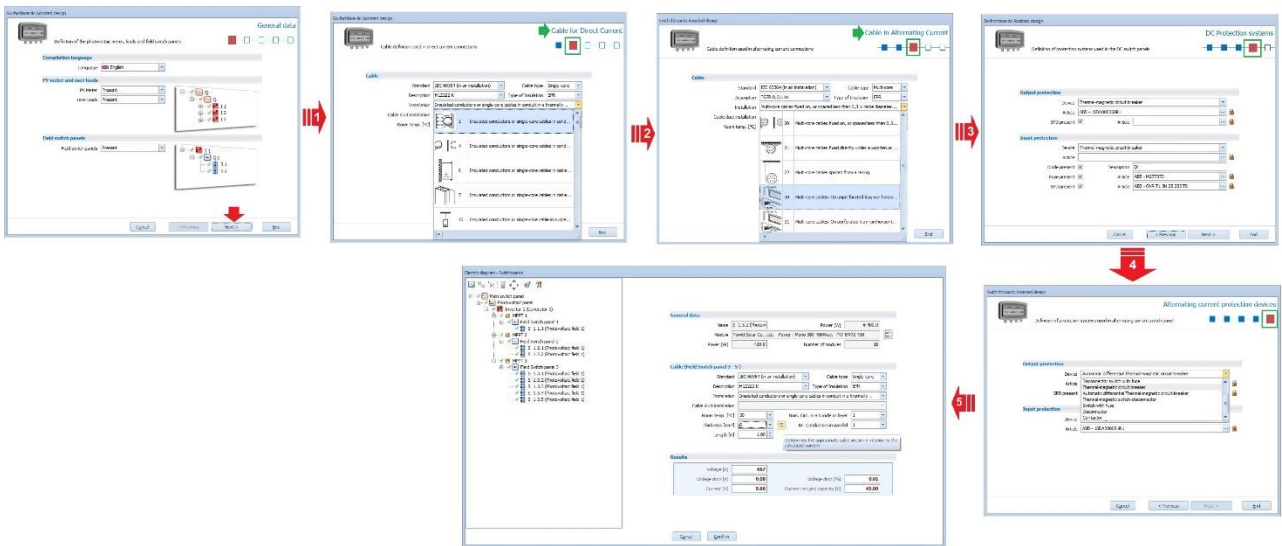
As a last step, we get the Inverter location connected to the PV field. A tag will appear on each module indicating the specific connection to the Inverter (3).

(3) For further information: [Photovoltaic Module Labelling](#)

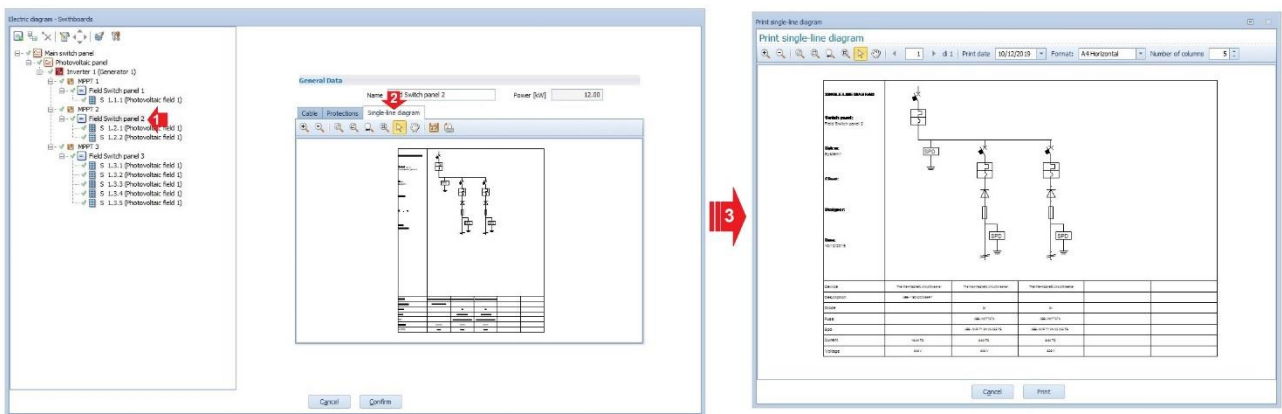


Another object to locate in order to complete the PV project is the assignment of the **Main Switch Panel** and all the sub-panels in AC and DC. You can manage them all by using the BIM object **"Main Panel"**. Place the BIM object into your own drawing and select it. Click the **"Design Panel"** button on the ribbon, this activates Wizard and you can choose your protections in output or input, and cables automatic sizing. The steps are shown in the figure below.

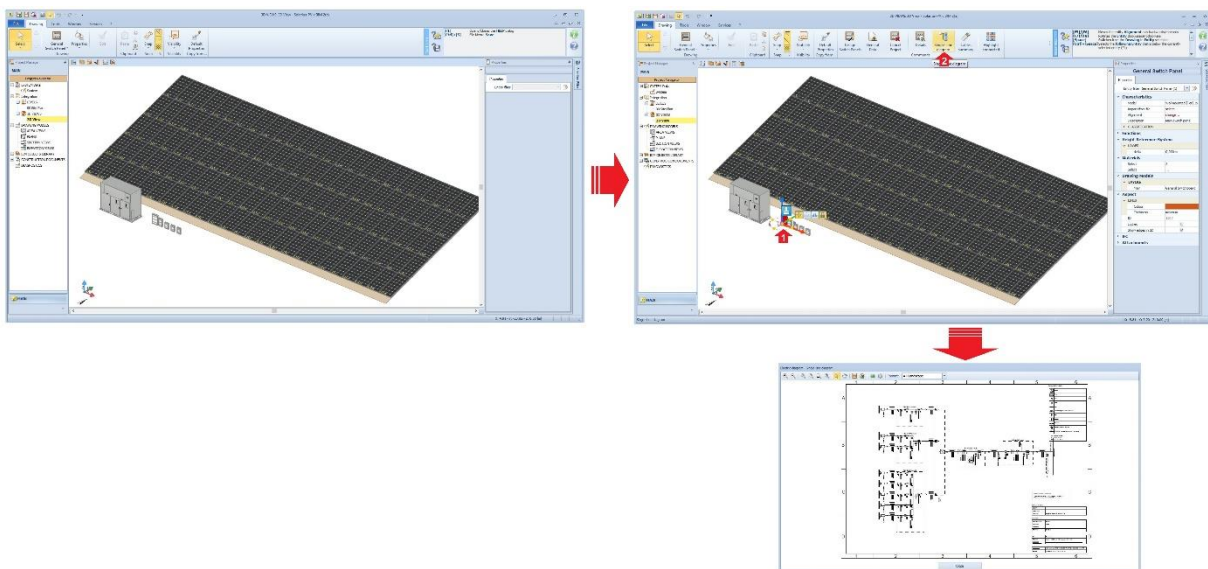




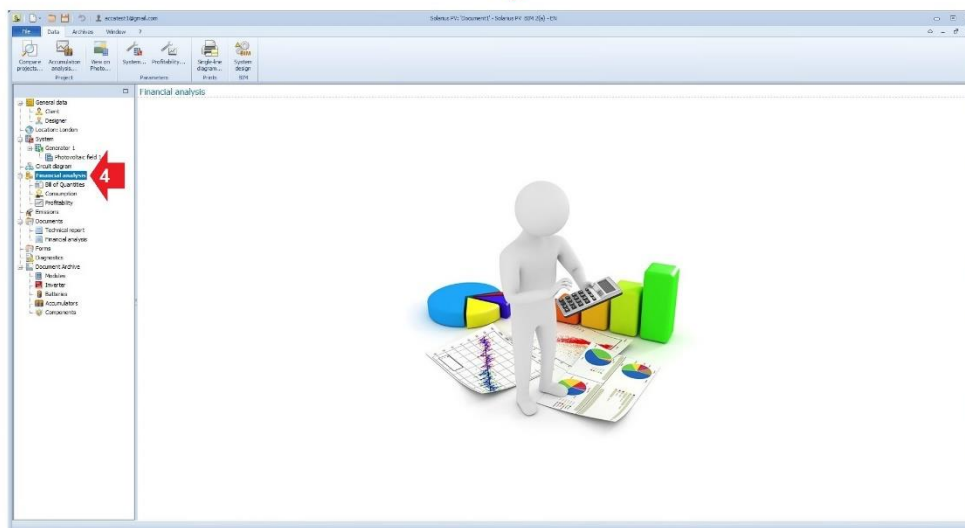
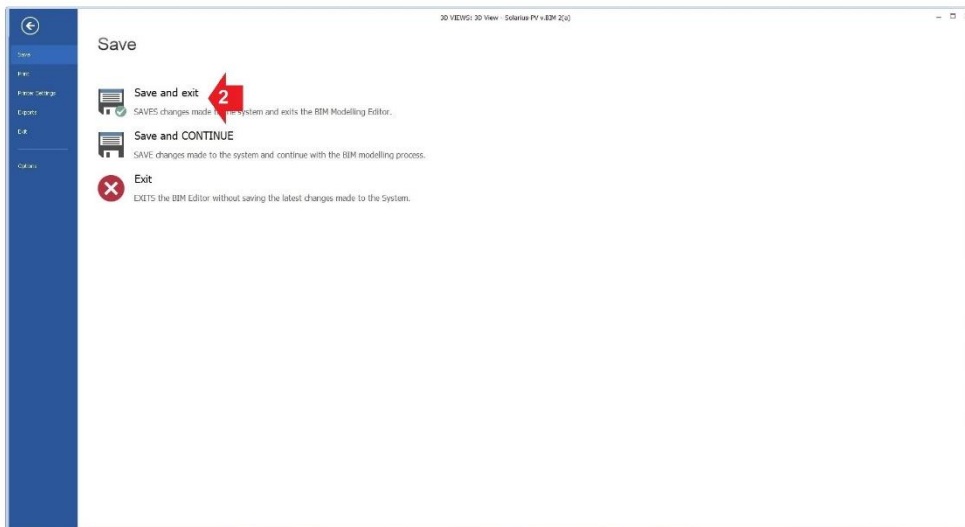
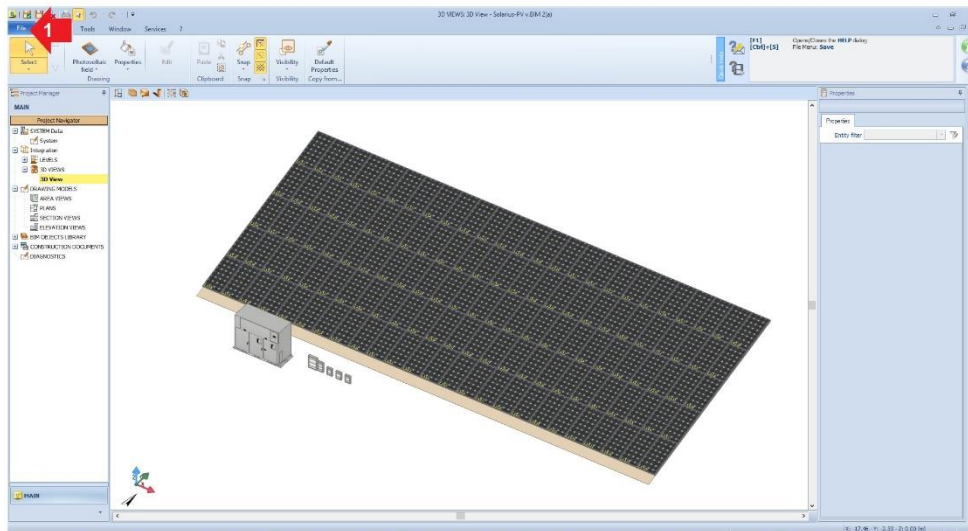
Once all the choices about AC and DC, size and location of your cable are taken, in the Panel window you can select the junctions where any single-wire diagram is present.



Once the Modelling Phase is finished, it is possible to visualise the **single-wire scheme** just selectin **Main Panel** and clicking the button single-wire diagram on the ribbon of the **Drawing Menu**.



Save the project and continue with the Economic Analysis.



For further information, please check the Training section:

- [Technical Support cases and PV system design examples](#)