PVSYST

PHOTOVOLTAIC SOFTWARE

Version 8

Pumping

Step by Step Tutorial

TABLE OF CONTENTS

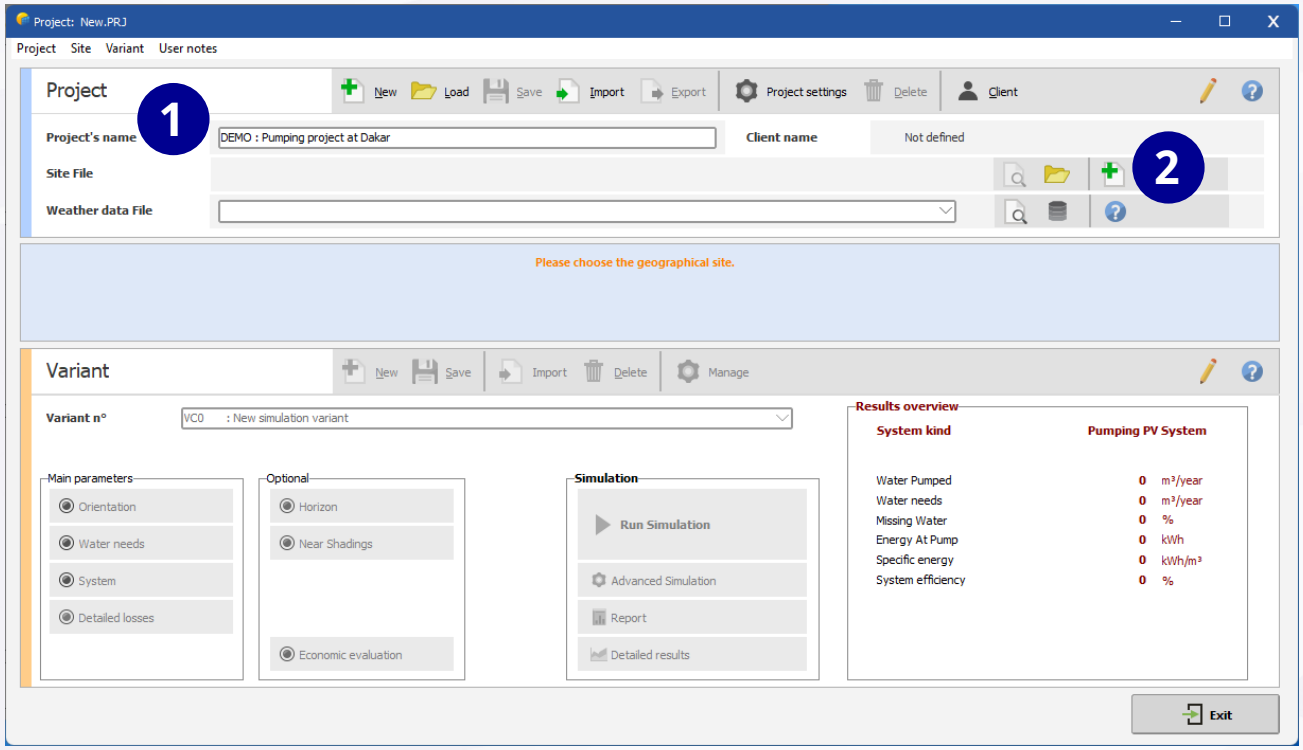
Chapter 1 : VC0 - Project Creation

1. Give a project name

2. Select a site from 2500 sites in the database by clicking on 

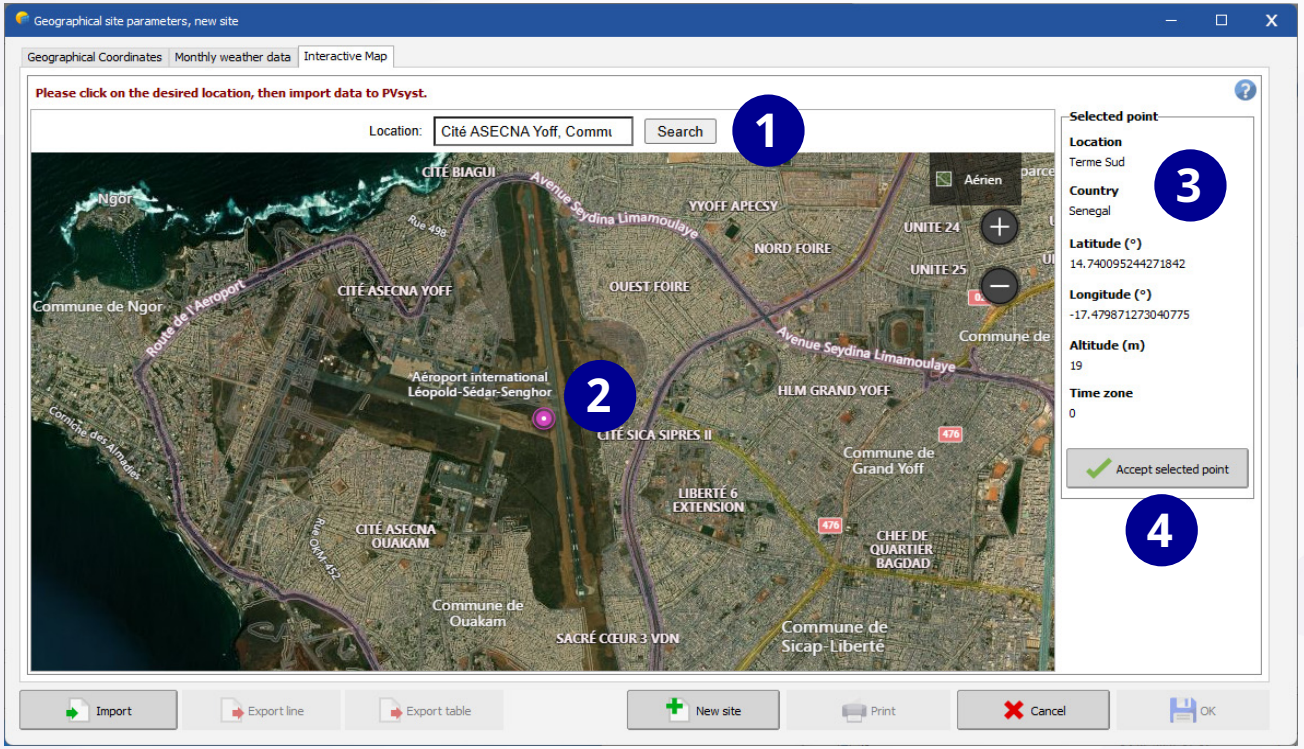
   or create your new site by clicking on 

   Click on create a new site



Chapter 1 : VC0 - Project Creation_Create a new site

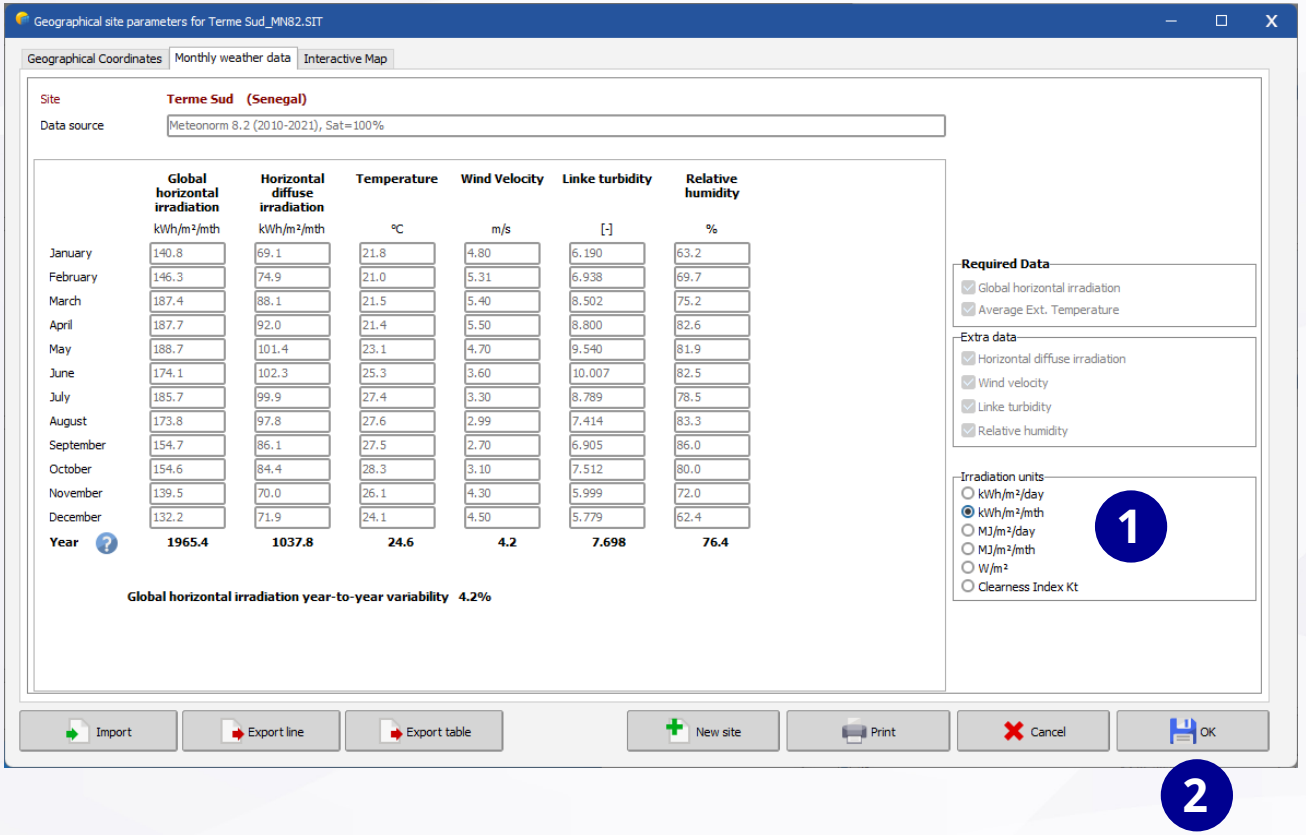
1. With the search bar
2. Or place the point on the map
3. Check the point information
4. Validate by clicking «Validate selected point»



Chapter 1 : VC0 - Imported Meteorological Data

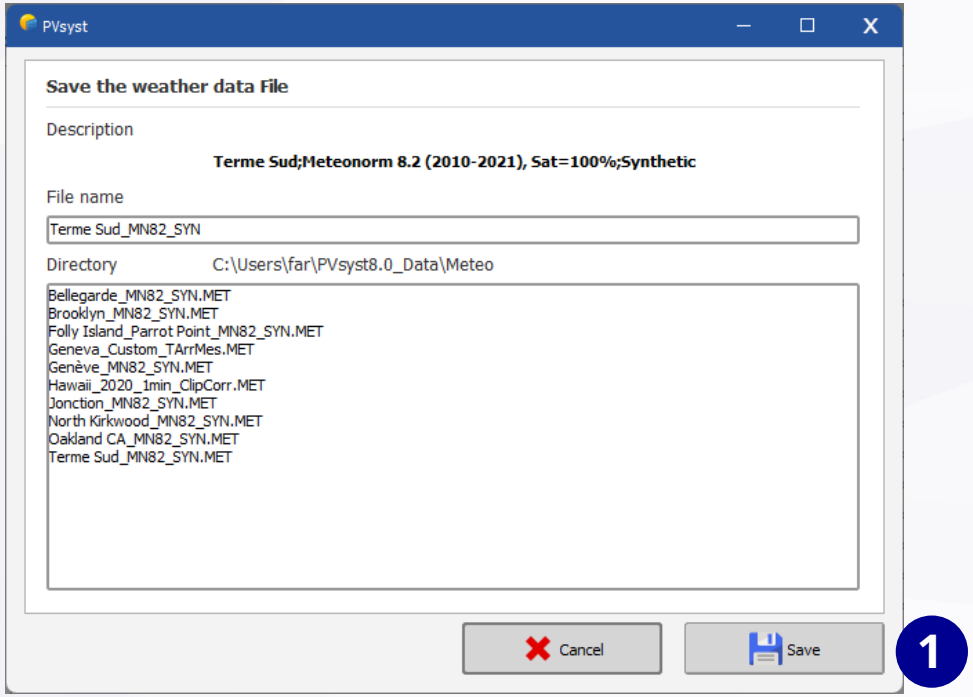
1. Select the irradiation units

2. Click «OK» to validate

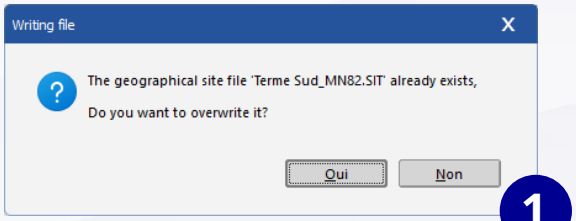


Chapter 1 : VC0 - Project Creation_Weather Data Saving (1)

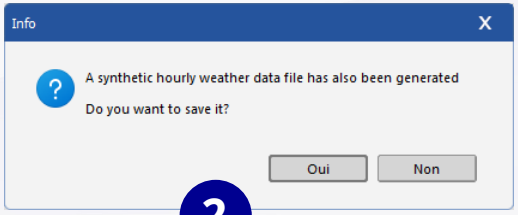
1 Click «Save» to confirm the recording



Chapter 1 : VC0 - Project Creation_Weather Data Saving (2)



1

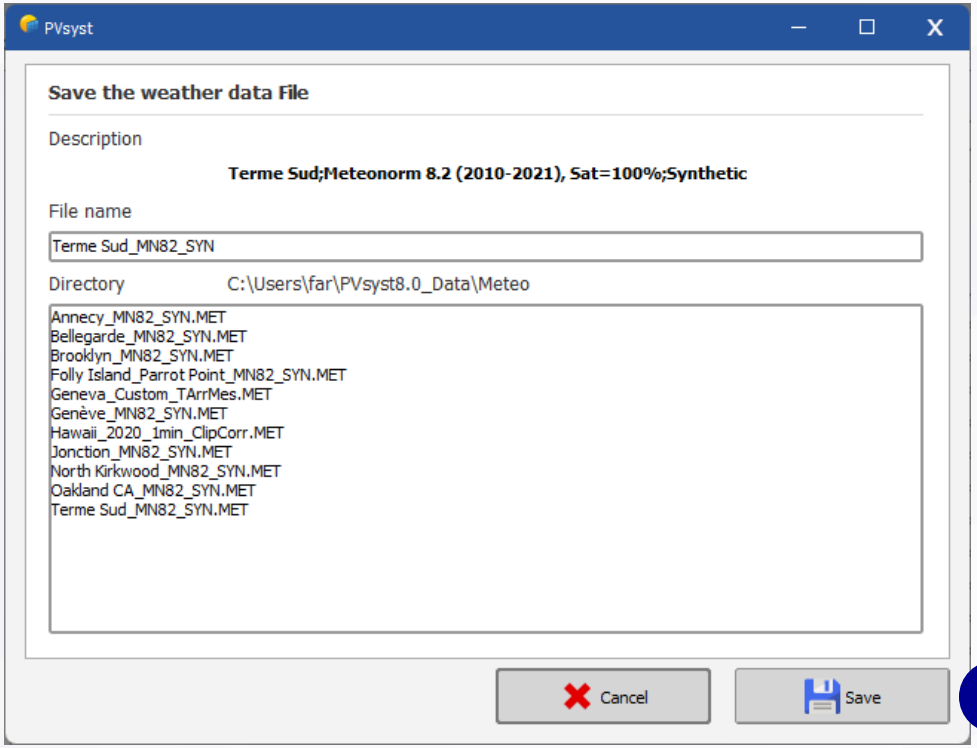


2

1 Click «OK»

2 Click «Yes» to create a synthetic hourly file for the simulation calculation

3 Save the synthetic weather file



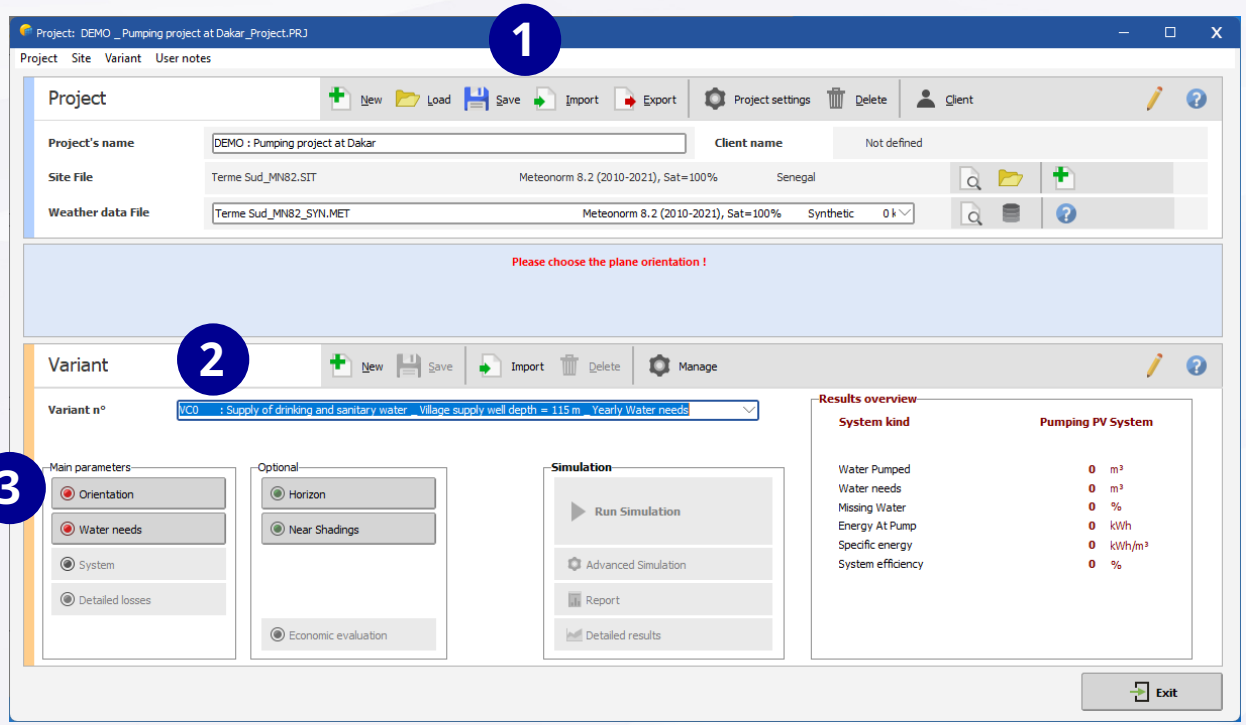
3

Chapter 1 : VC0 - Project Creation_Weather Data Saving

1. Save your project

2. Change the variant name to «Supply of drinking and sanitary water _ Village supply well depth = 115 m _ Yearly Water needs»

3. Set the orientation

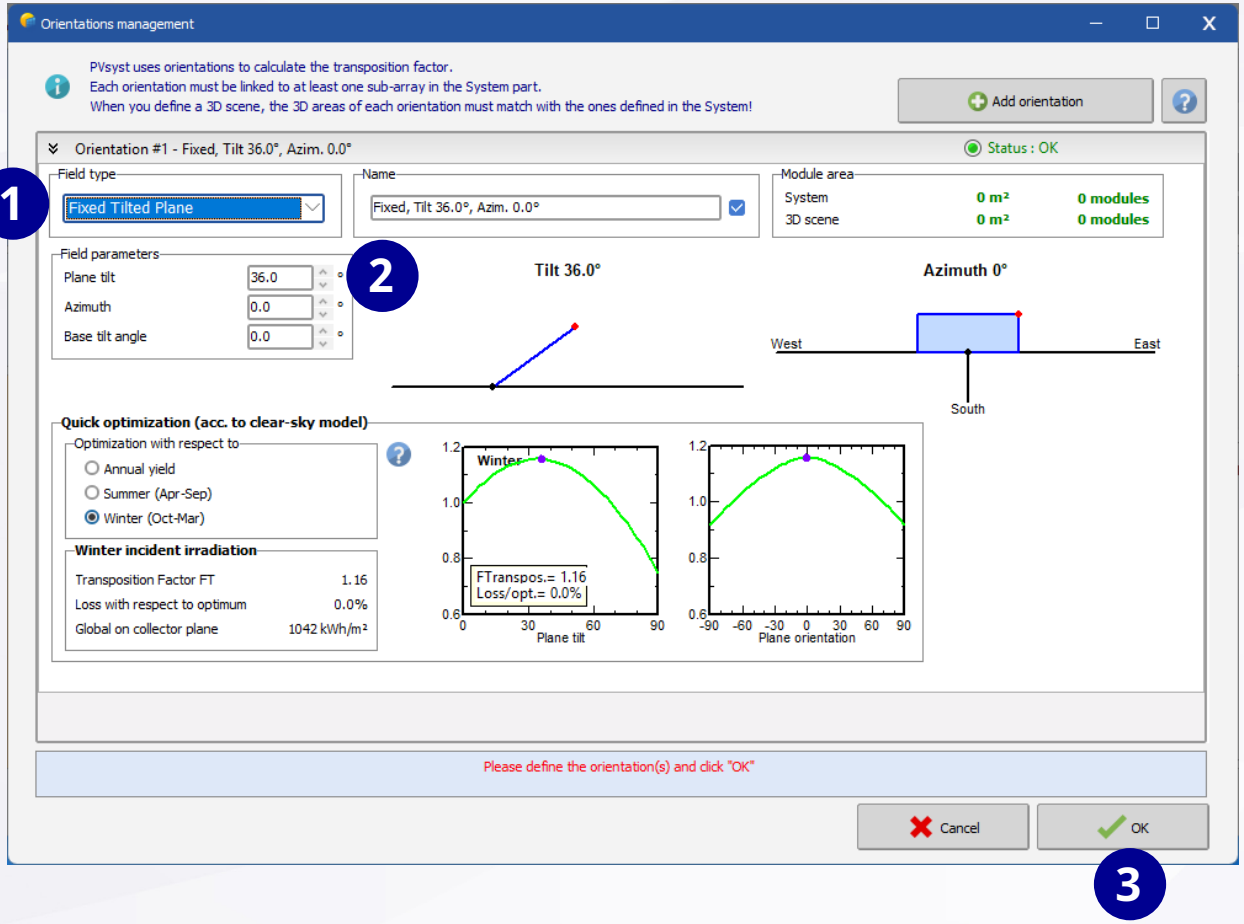


Chapter 1 : VC0 - Orientation Definition

1. Choice between several possible configurations:
select «Fixed tilted plane»

2. Set the field parameters: define the plane tilt at 36° and the azimuth at 0°

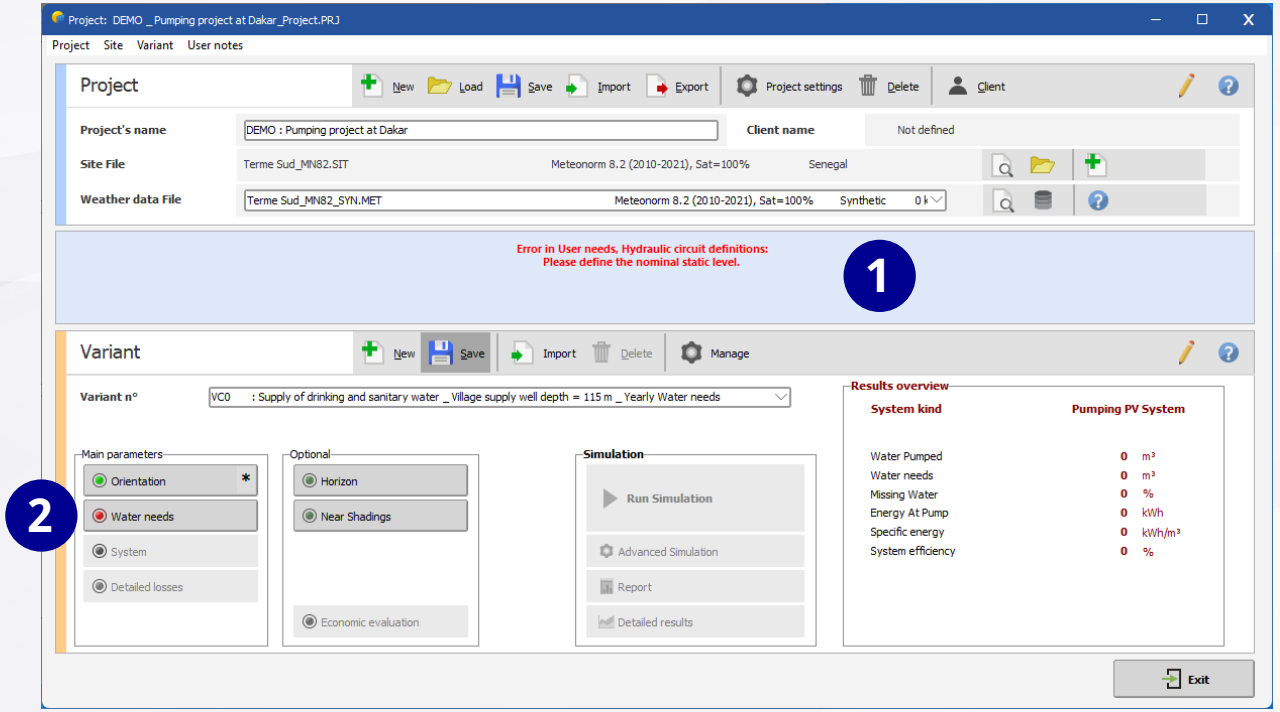
3. Click «OK»



Chapter 1 : VC0 - Water Needs

1. The red message means: that it is necessary to define the water needs in order to proceed with the simulation

2. Define the «Water Needs»



Chapter 1 : VC0 - Water Needs (1)

1 Define the borehole characteristics:

Static level	: -100.0 m
Drawdown	: -0.80 m
Minimum dynamic level	: -110.0 m
Pump level	: -115.0 m
Borehole diameter	: 20 cm

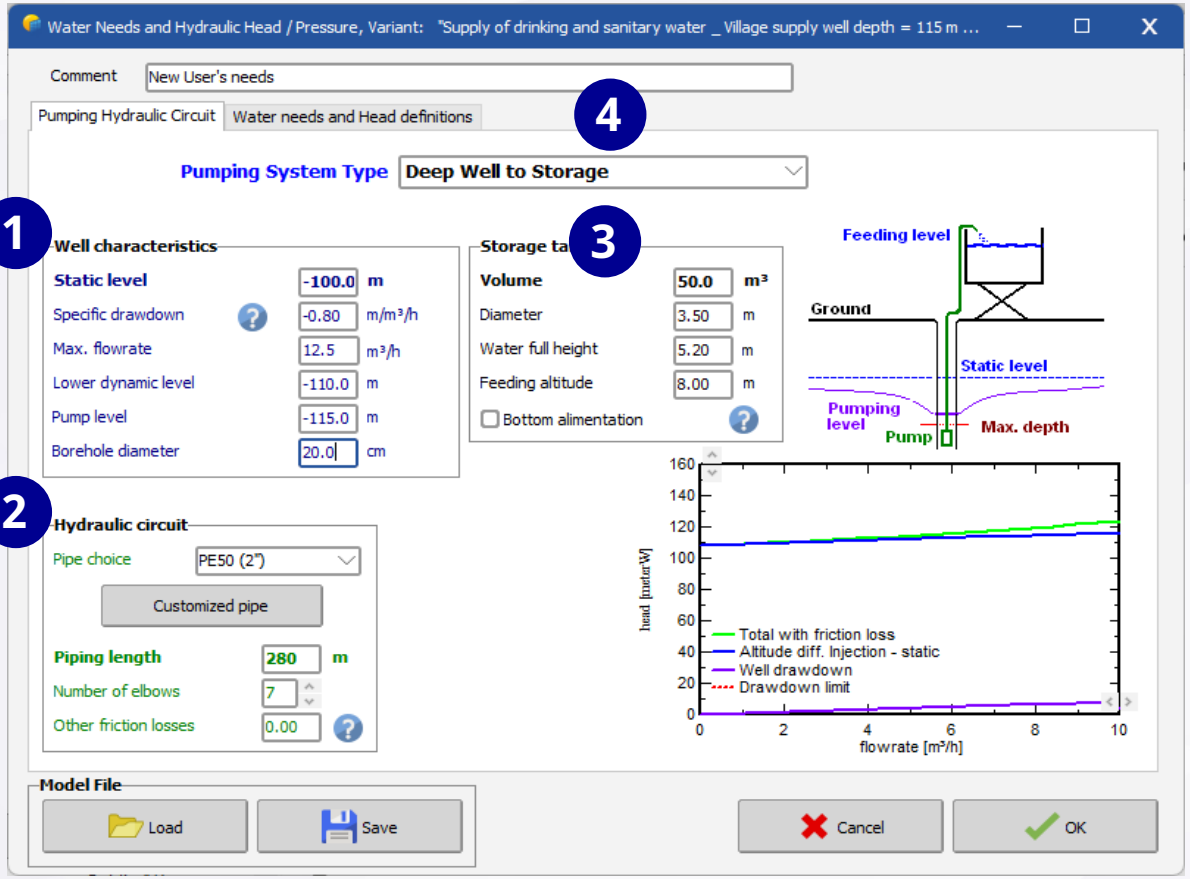
2 Define the hydraulic circuit:

Pipe selection	: PE50 (2'')
Pipe length	: 280 m
Number of bends	: 7
Other head losses	: 0.00

3 Define the tank:

Volume	: 50.0 m³
Diameter	: 3.50 m
Height (full)	: 5.20 m
Injection altitude	: 8.00 m

4 Click on «Definition of water needs and pressure»

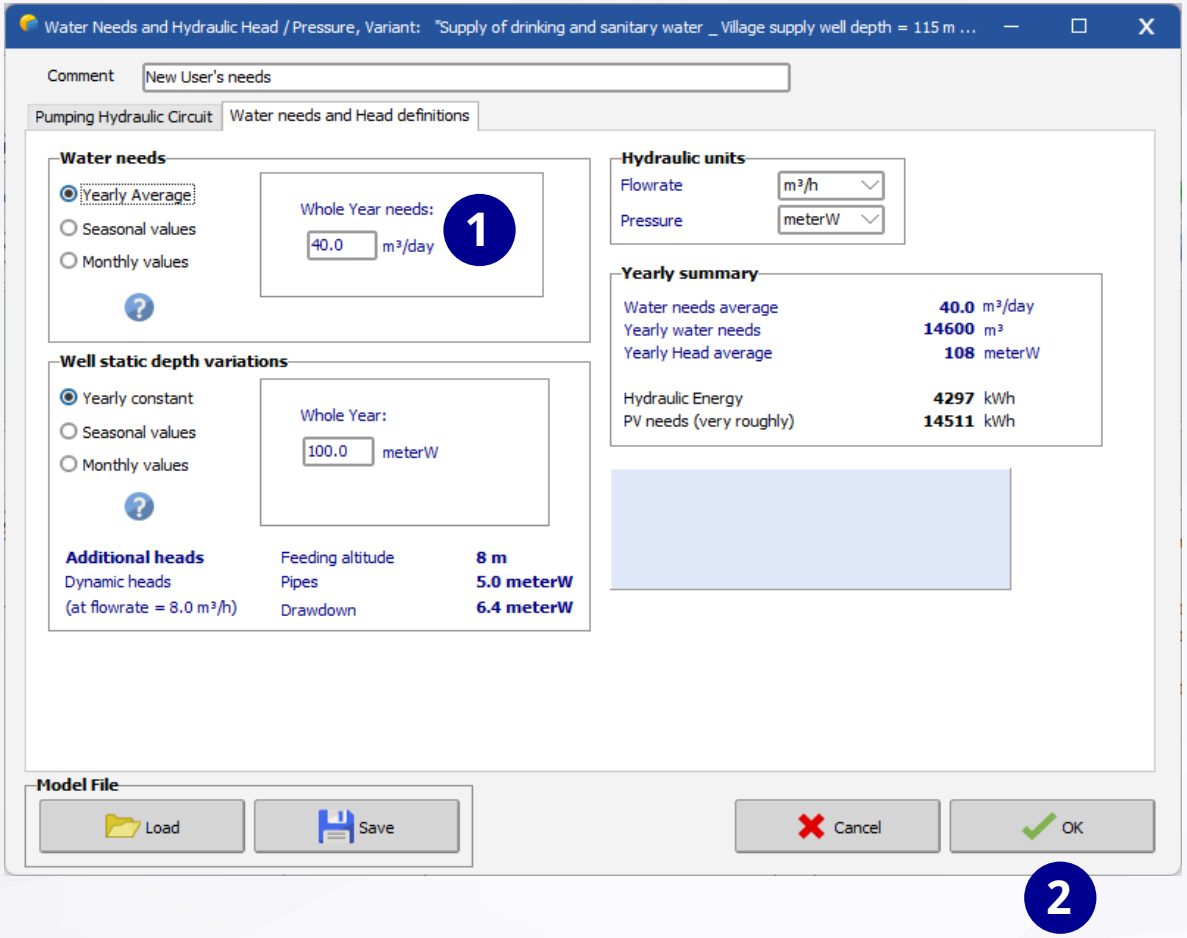


Chapter 1 : VC0 - Water Needs (2)

1. Define the water needs:

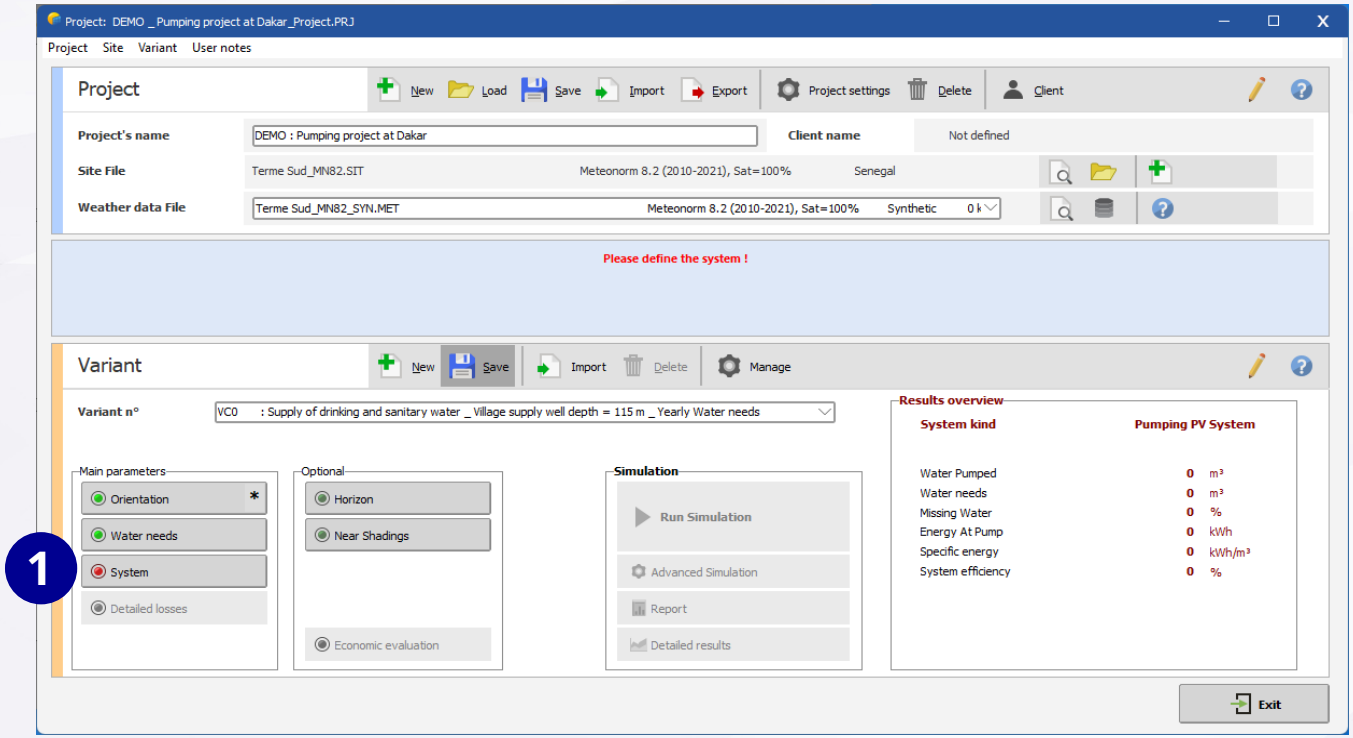
   Annual needs: 40.0 m³/day

2. Click «OK»



Chapter 1 : VC0 - System

1 Define the system, click on «System»

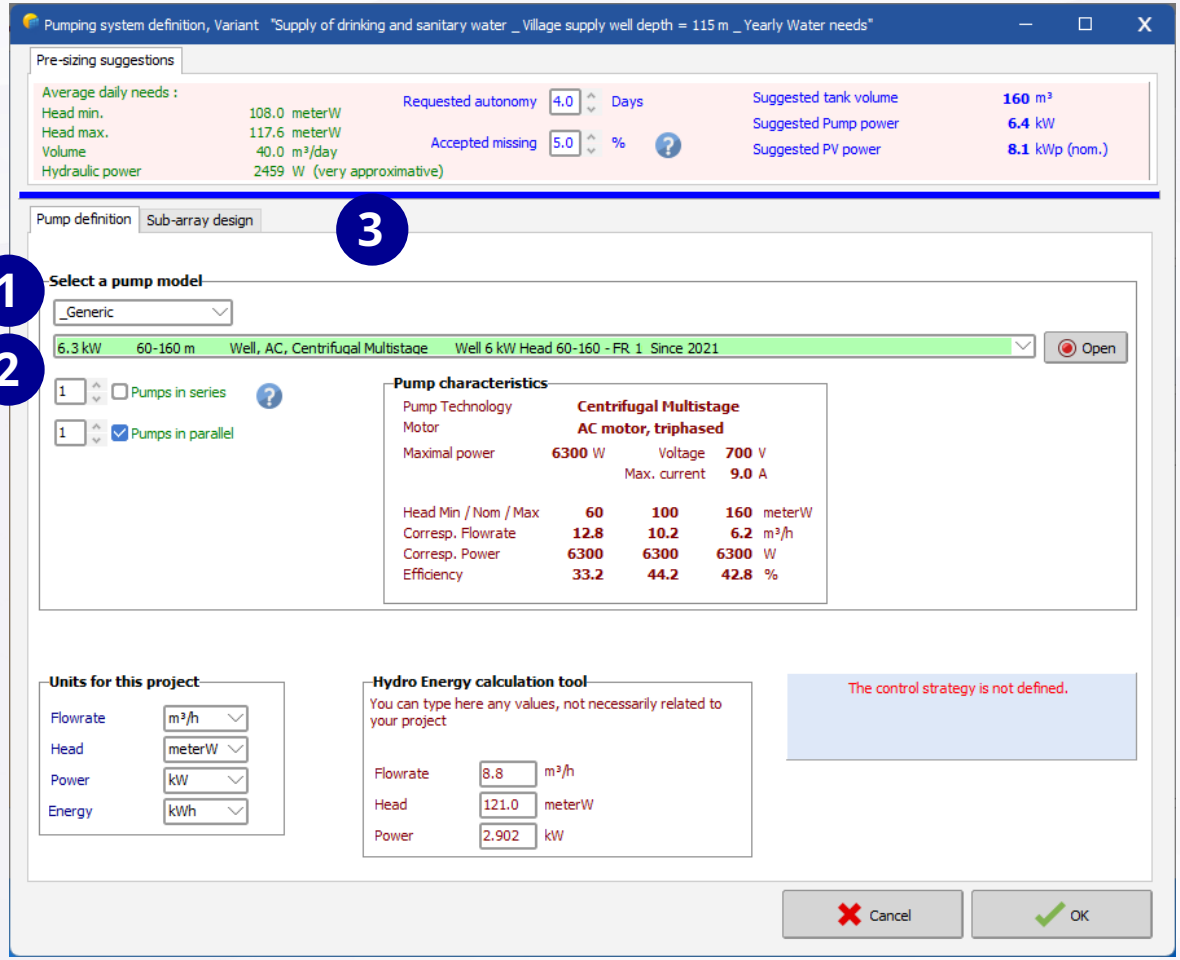


Chapter 1 : VC0 - Pump Definition

1. Choice between several possible manufacturers: select «_Generic»

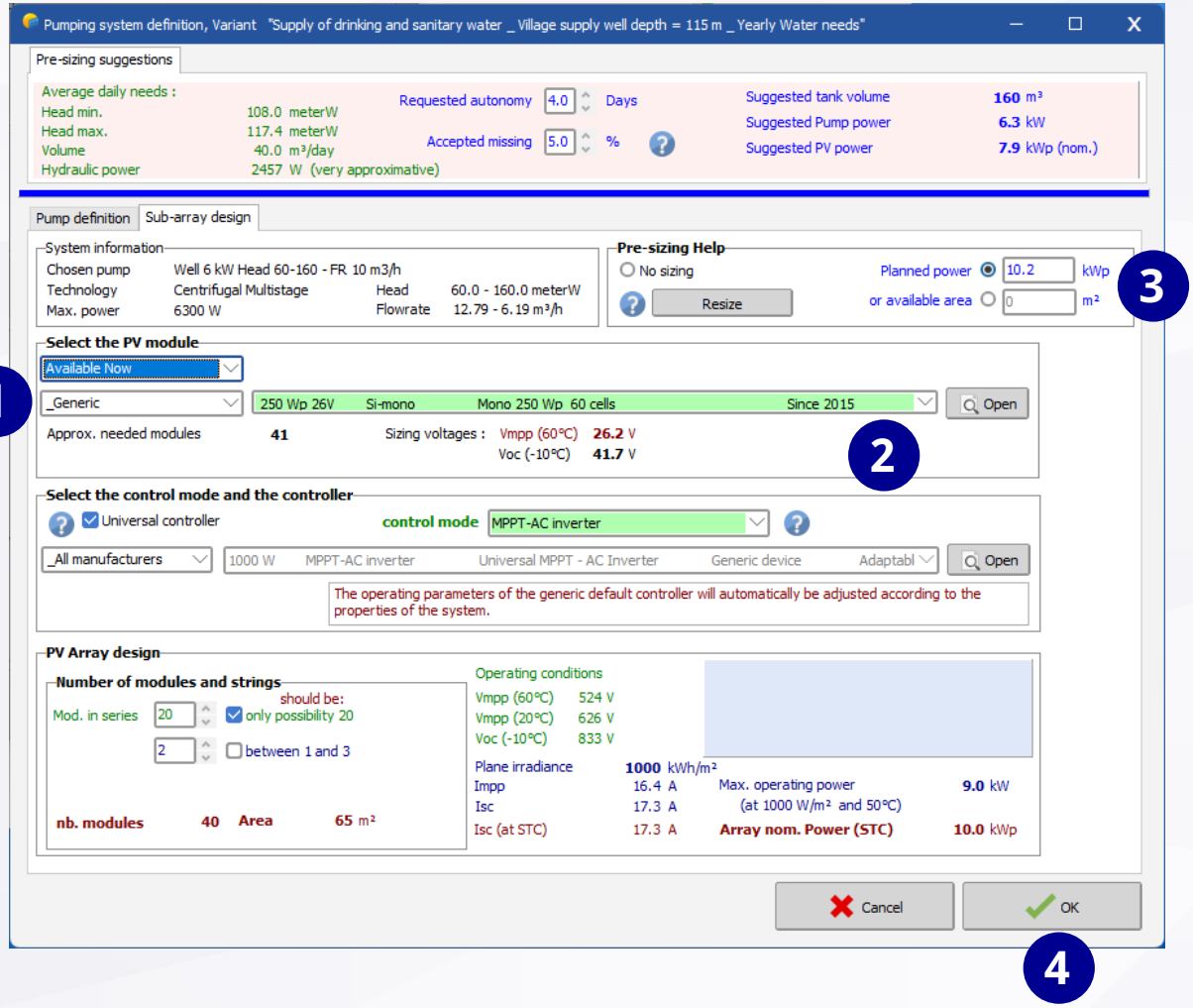
2. Select the model:
«6.3kW 60-160 m / Well 6 kW Head 60-160»

3. Click on «Sub-array design»



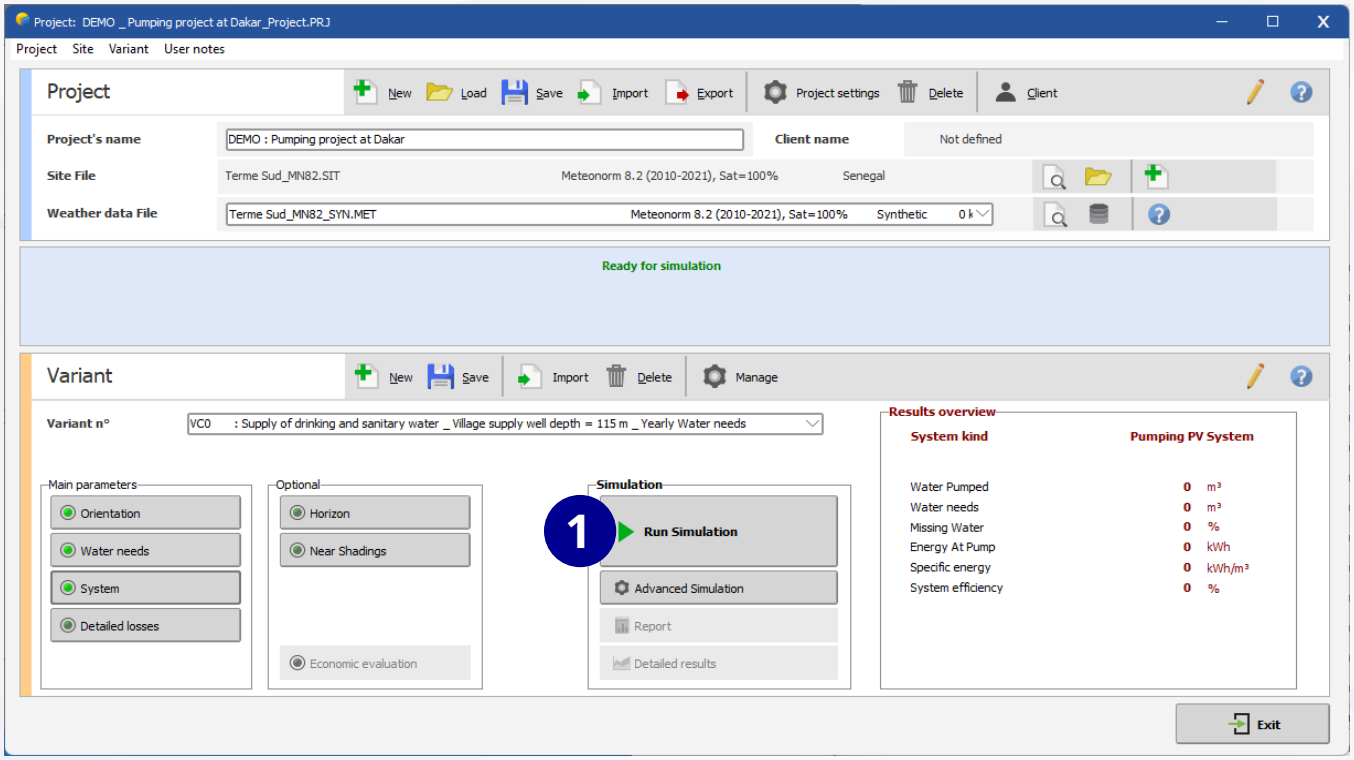
Chapter 1 : VC0 - Sub-array Design

1. Choice between several possible manufacturers: select «_Generic»
2. Select the model : «250 Wp 26V / Mono 250Wp 60 cells»
3. Set the desired Pnom : 10.2 kWp
4. Click «OK»



Chapter 1 : VC0 - Run the Simulation

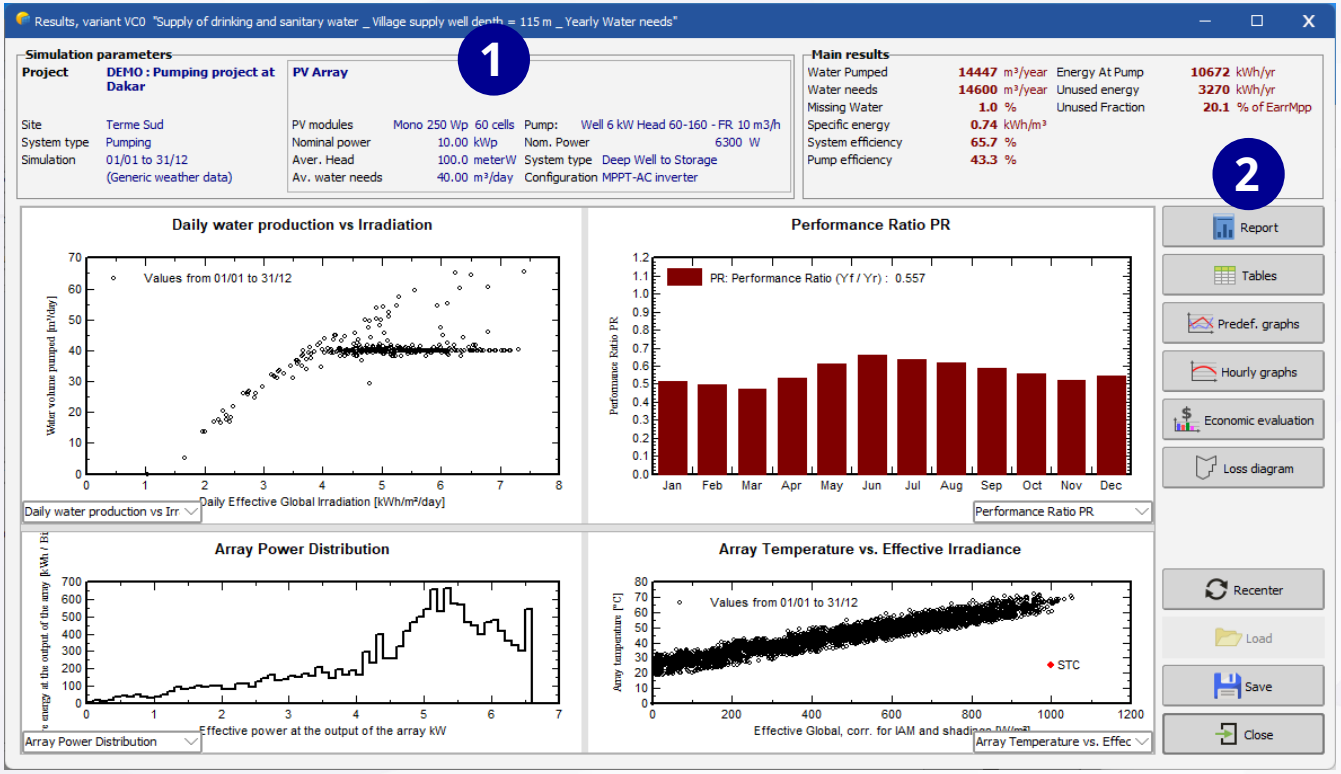
1 Click on : «Run simulation»



Chapter 1 : VC0 - Simulation Results

1. Main simulation results

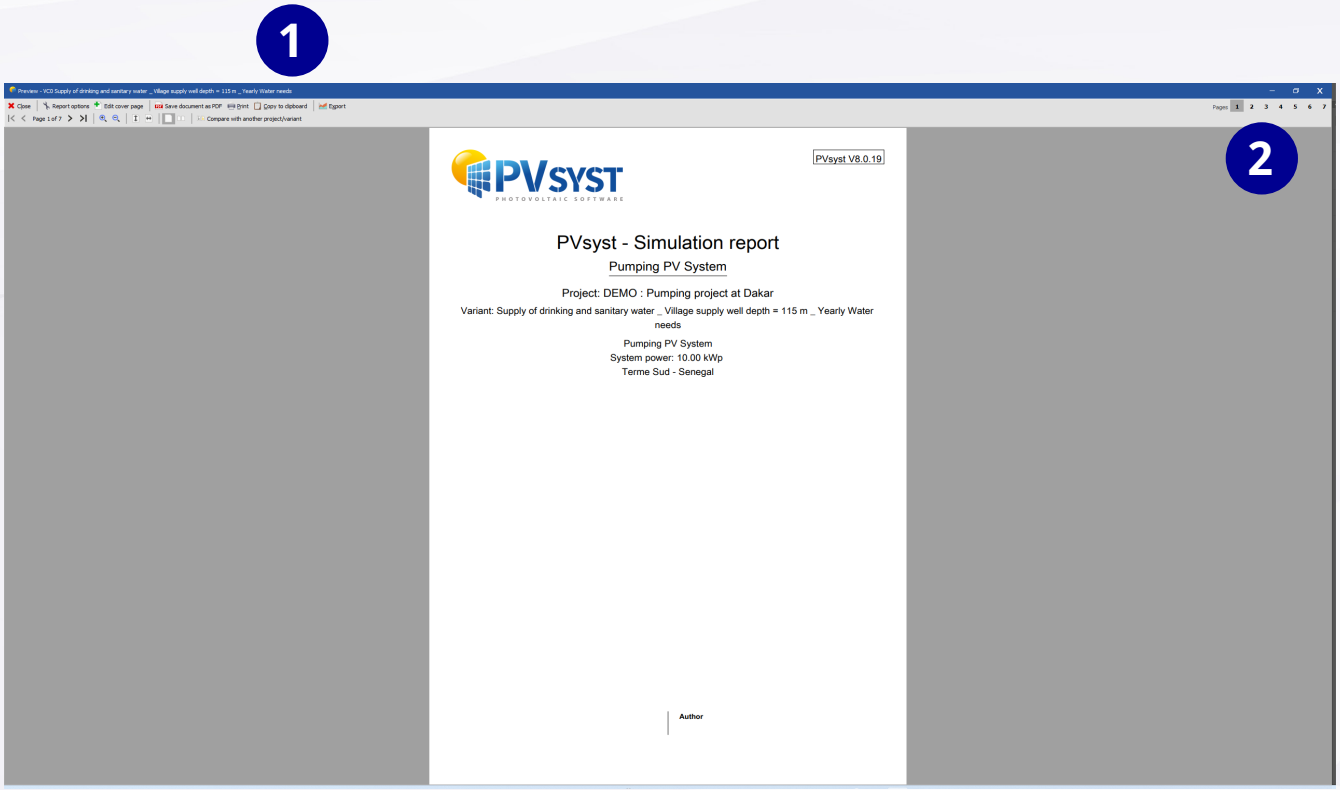
2. Click on «Report» to generate and view the simulation results report



Chapter 1 : VC0 - Simulation Result_Report

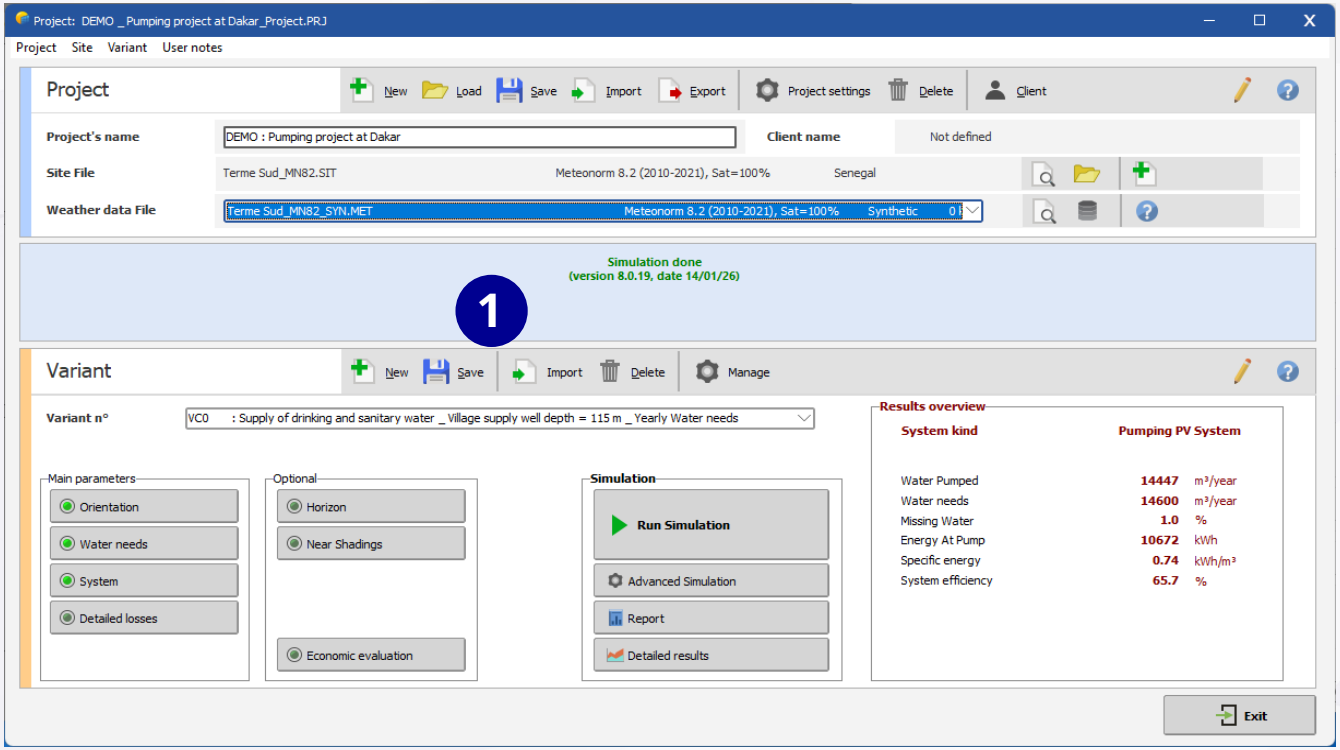
1. Save the PDF or print it

2. View the different pages of the report



Chapter 2 : VC1 - Project Creation

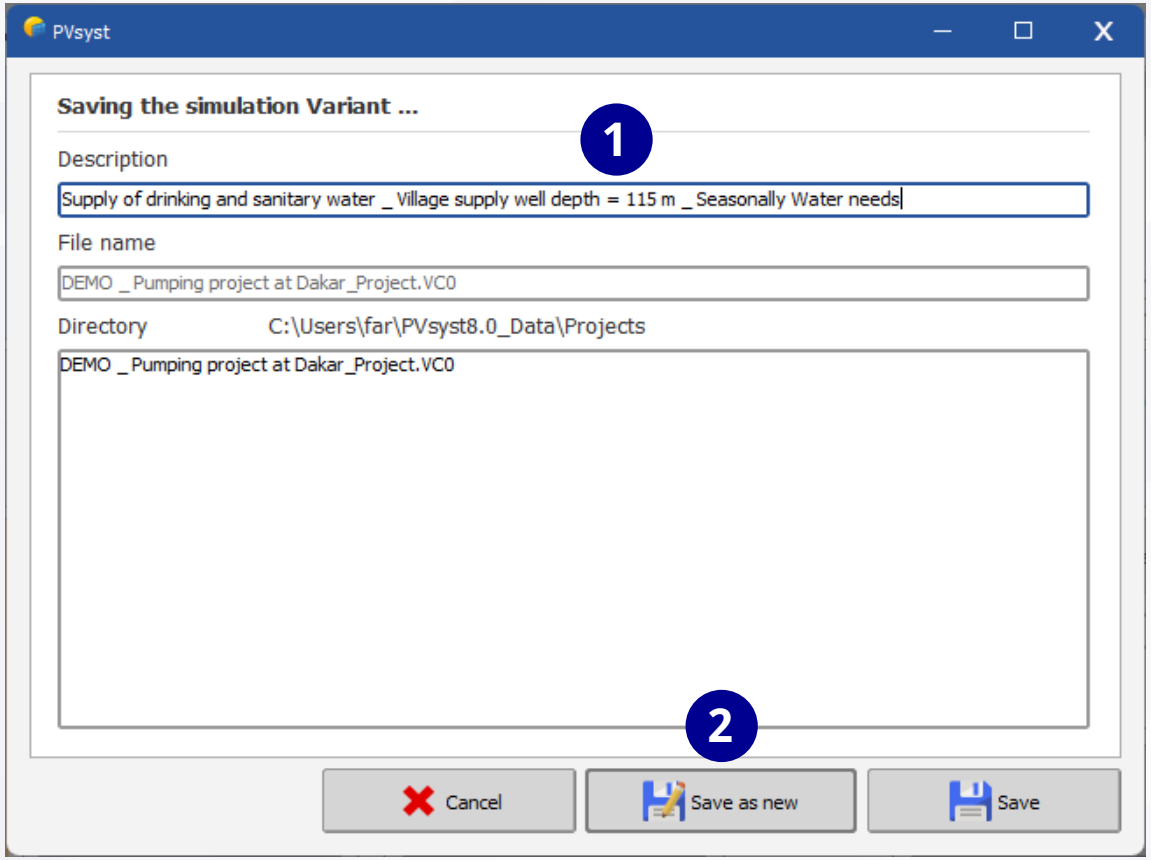
1 Click on «Save» to create a new variant.



Chapter 2 : VC1 - Project Creation

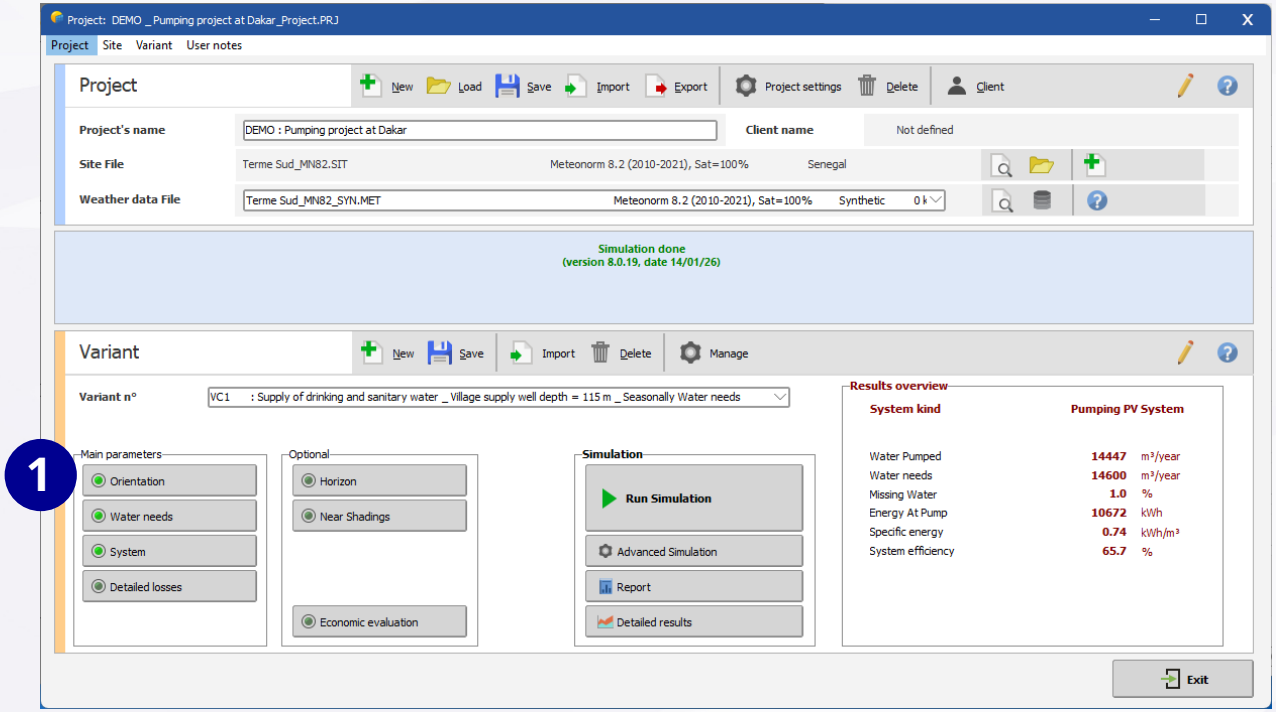
1. Give a new name to the new variant: «Supply of drinking and sanitary water _ Village supply well depth = 115 m _ Seasonally Water needs»

2. Click «Save as new» to create the new variant using the previous parameters



Chapter 2 : VC1 - Orientation Definition (1)

1 Set the orientation

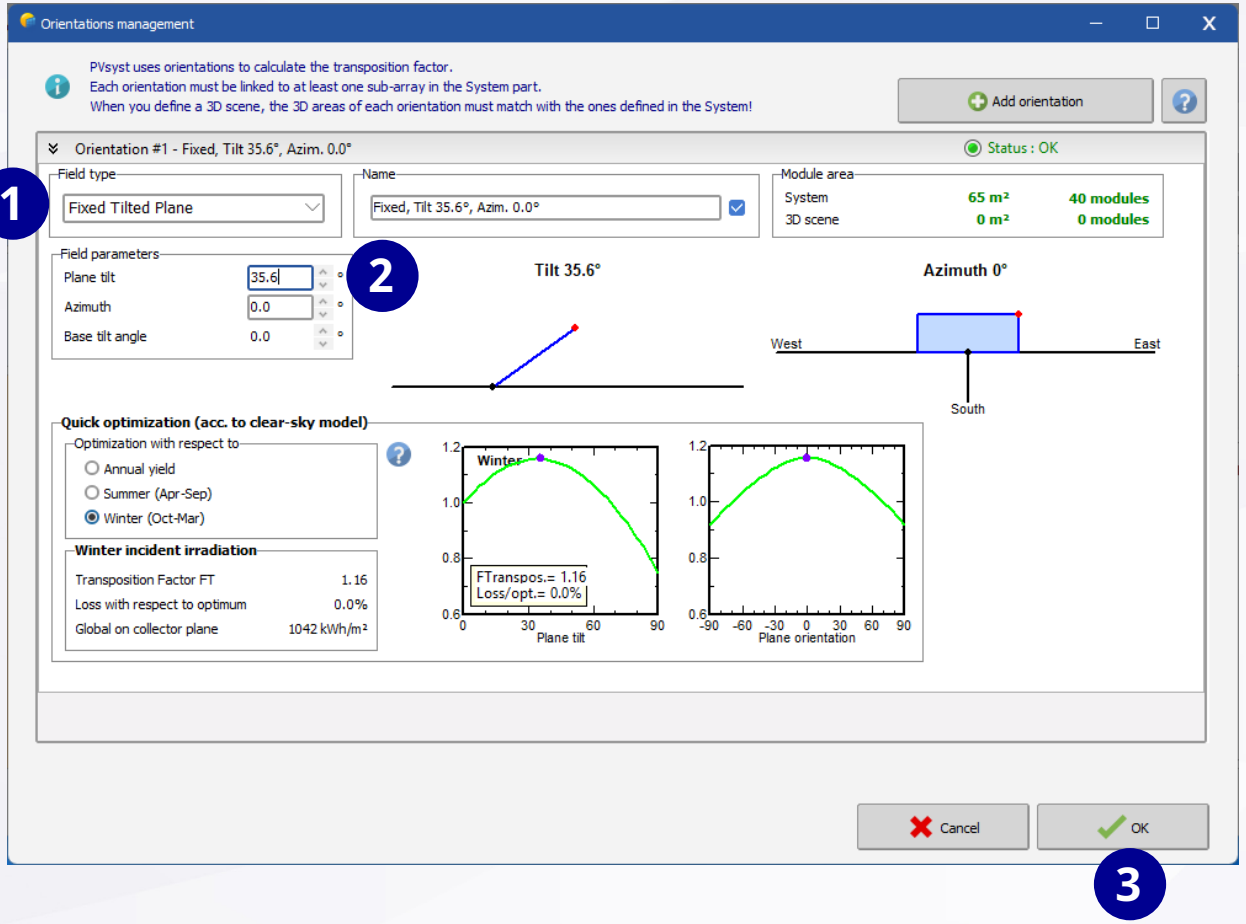


Chapter 2 : VC1 - Orientation Definition (2)

1. Choice between several possible configurations:
select «Fixed tilted plane»

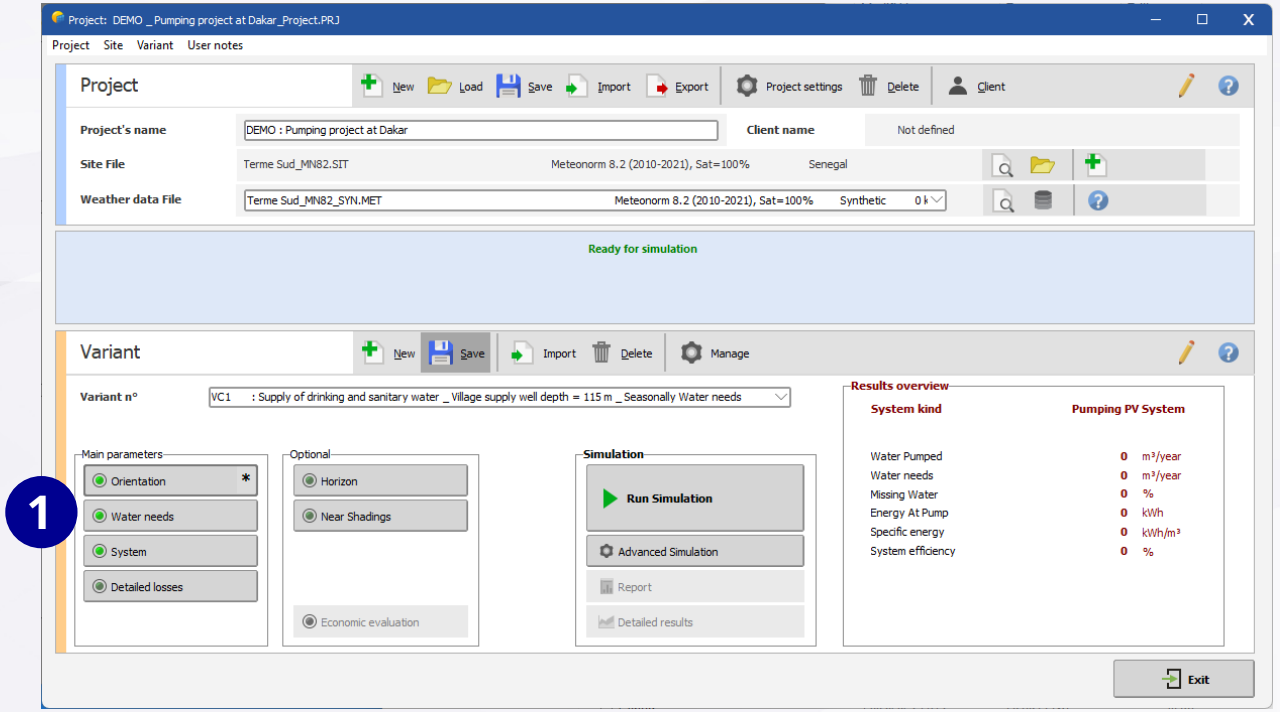
2. Set the field parameters: define the plane tilt at 35.6° and the azimuth at 0°

3. Click «OK»



Chapter 2: VC1 - Water Needs

1 Define the «Water Needs»



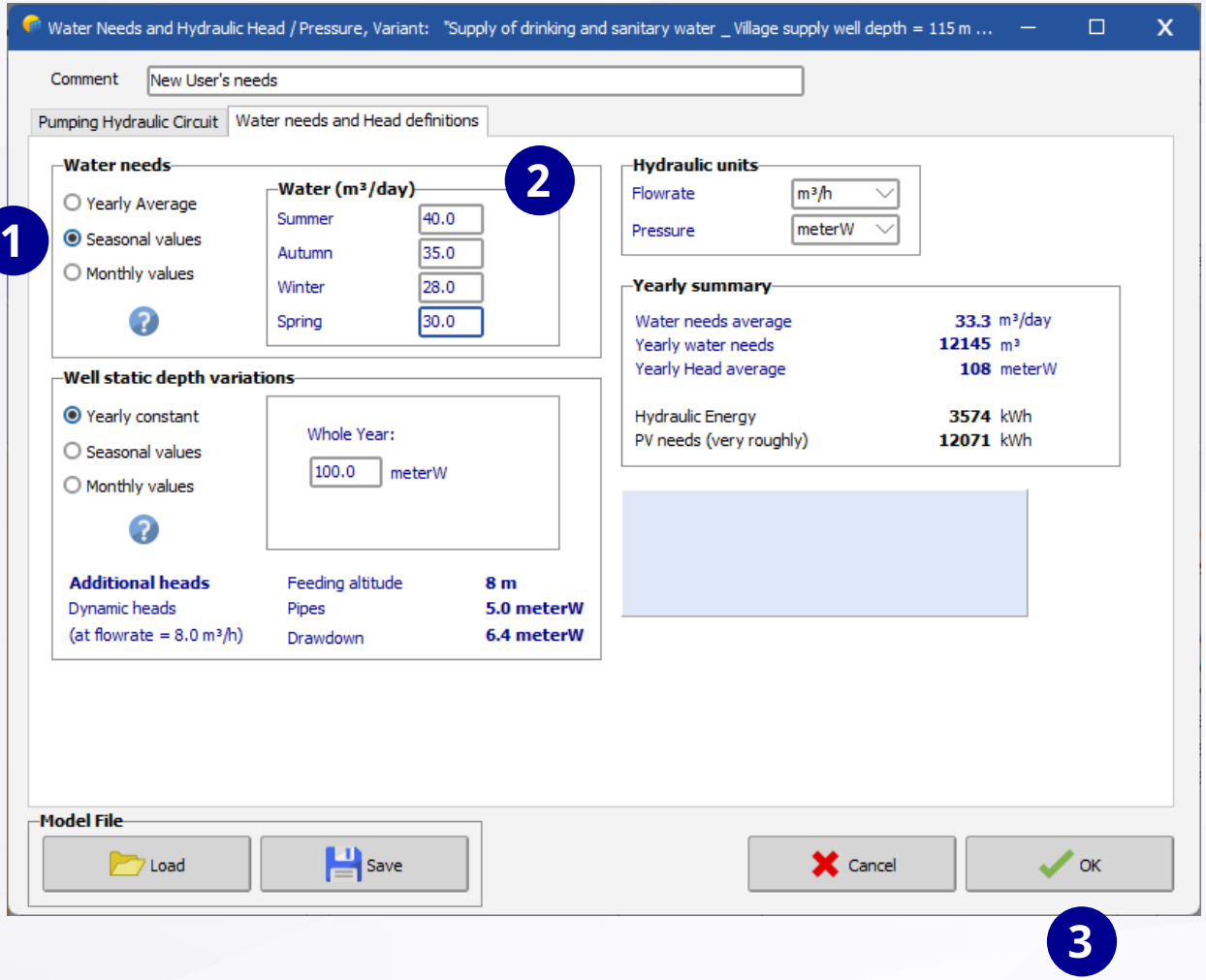
Chapter 2 : VC1 - Define the Water Needs

1. Choice between several possible configurations:
   select «Seasonal values»

2. Set the water parameters:

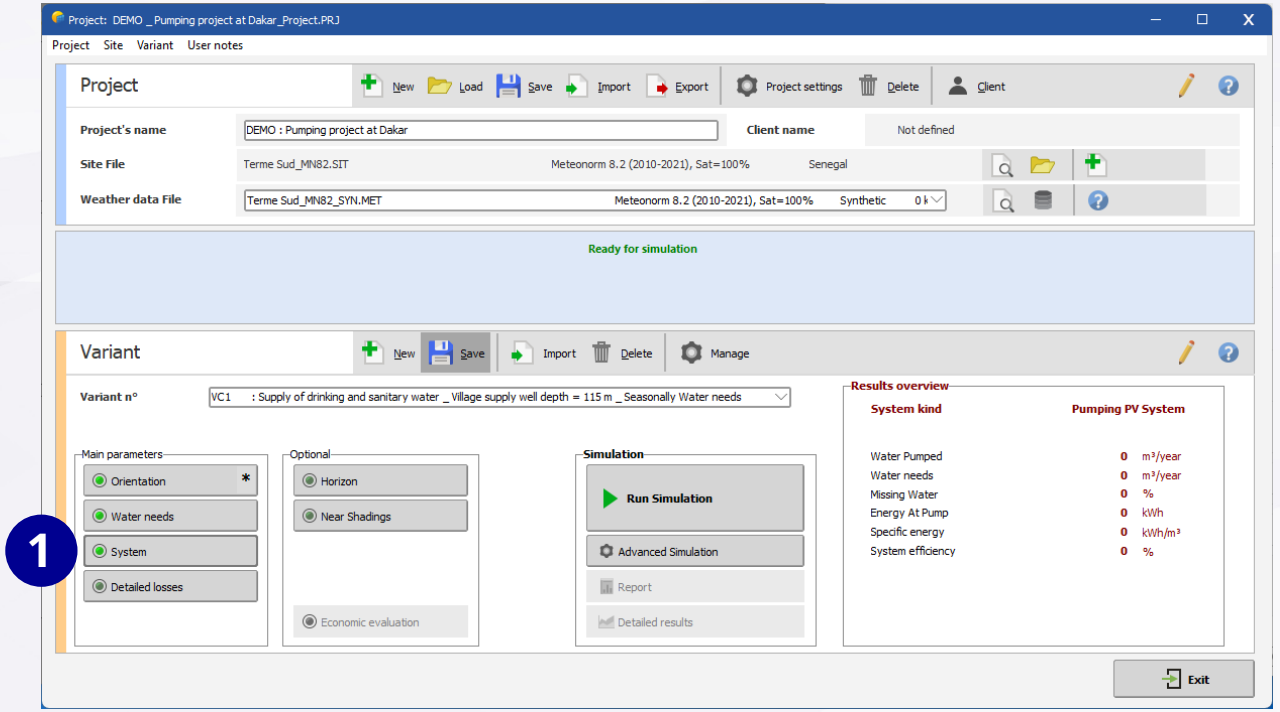
   Summer : 40.0
   Autumn : 35.0
   Winter : 28.0
   Spring : 30.0

3. Click «OK»



Chapter 2 : VC1 - System

1 Define the «System»



Chapter 2 : VC1 - Sub-array Design

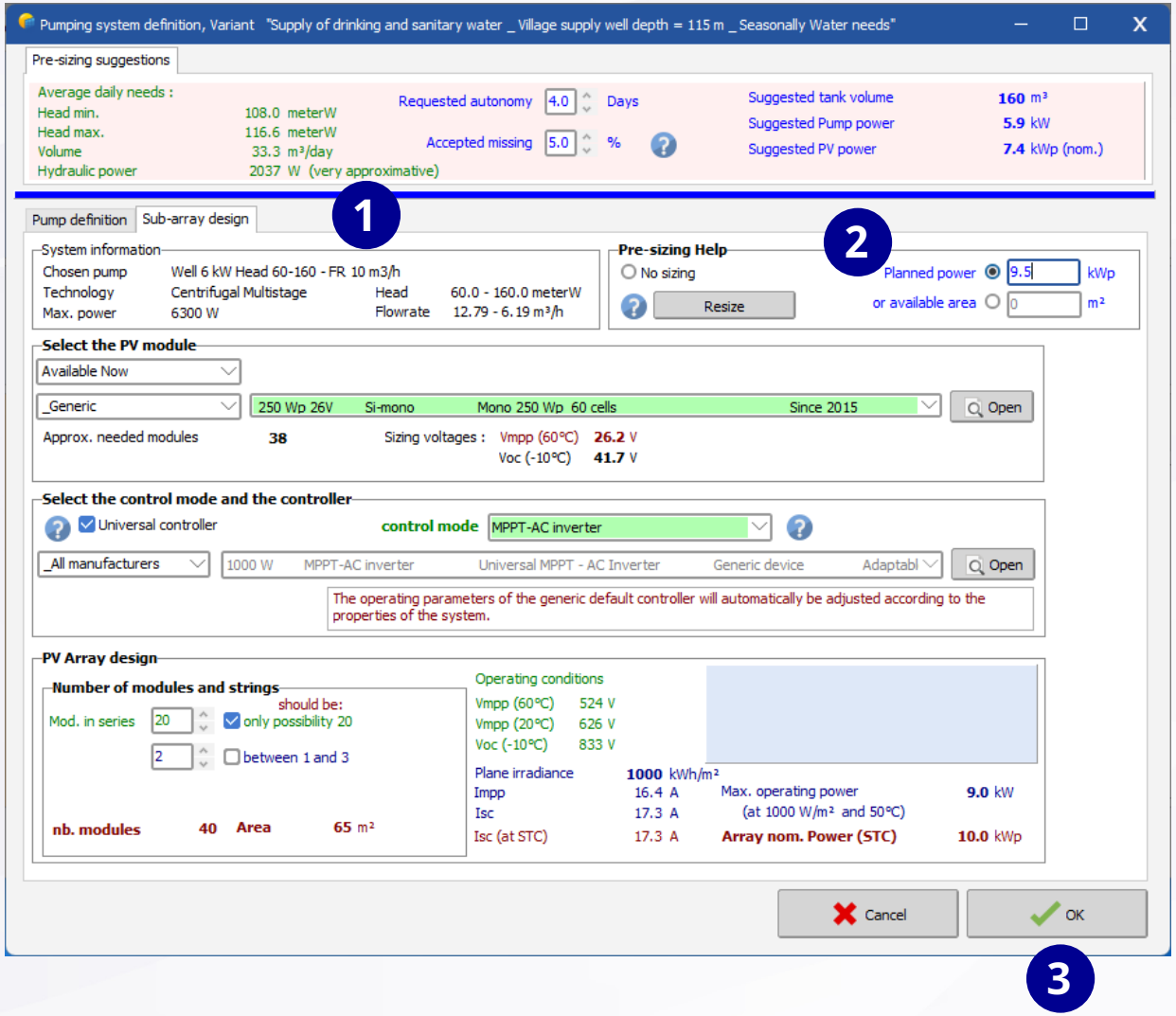
1. Click on the «Sub-array design» window

2. Set the sizing aid parameters:

   Desired Pnom : 9.5 kWp
   Available area : 0 m²

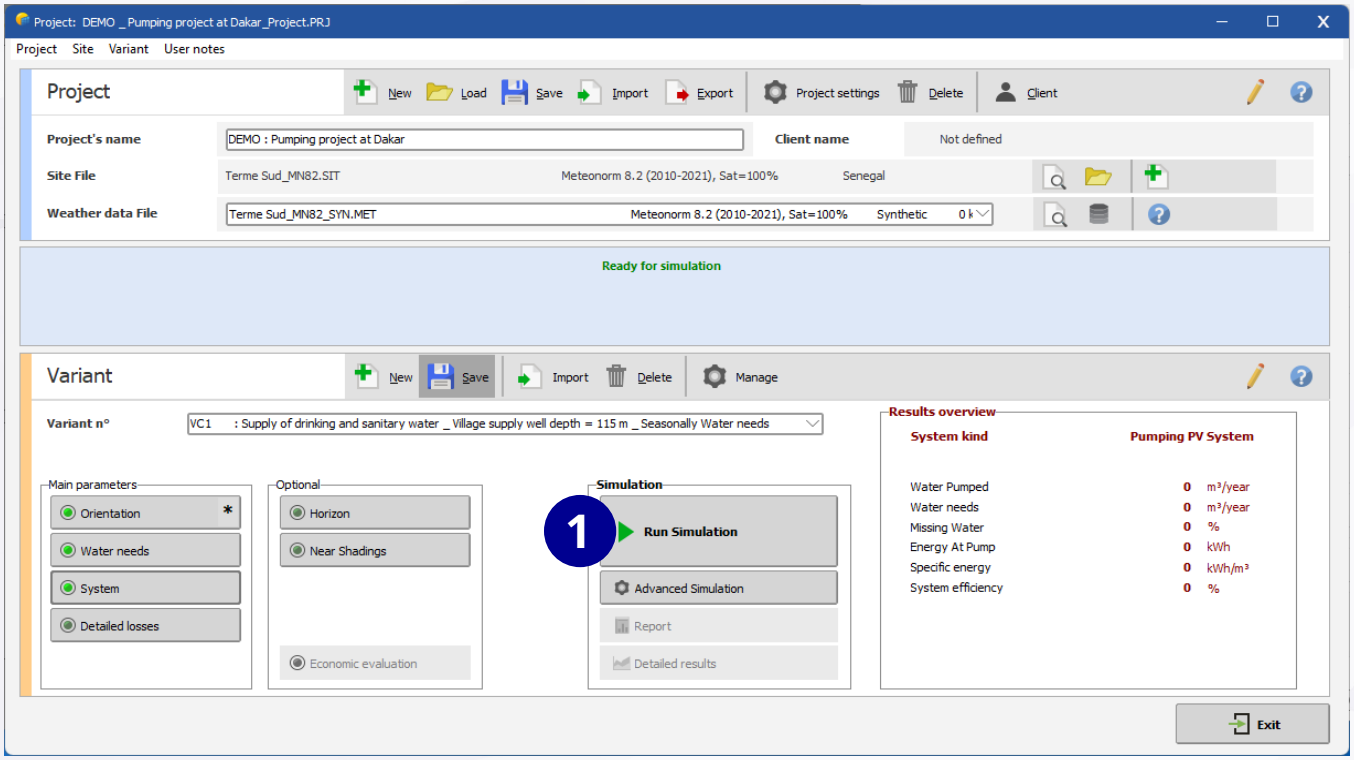
   Select «No pre-dim.»

3. Click «OK»



Chapter 2 : VC1 - Run the Simulation

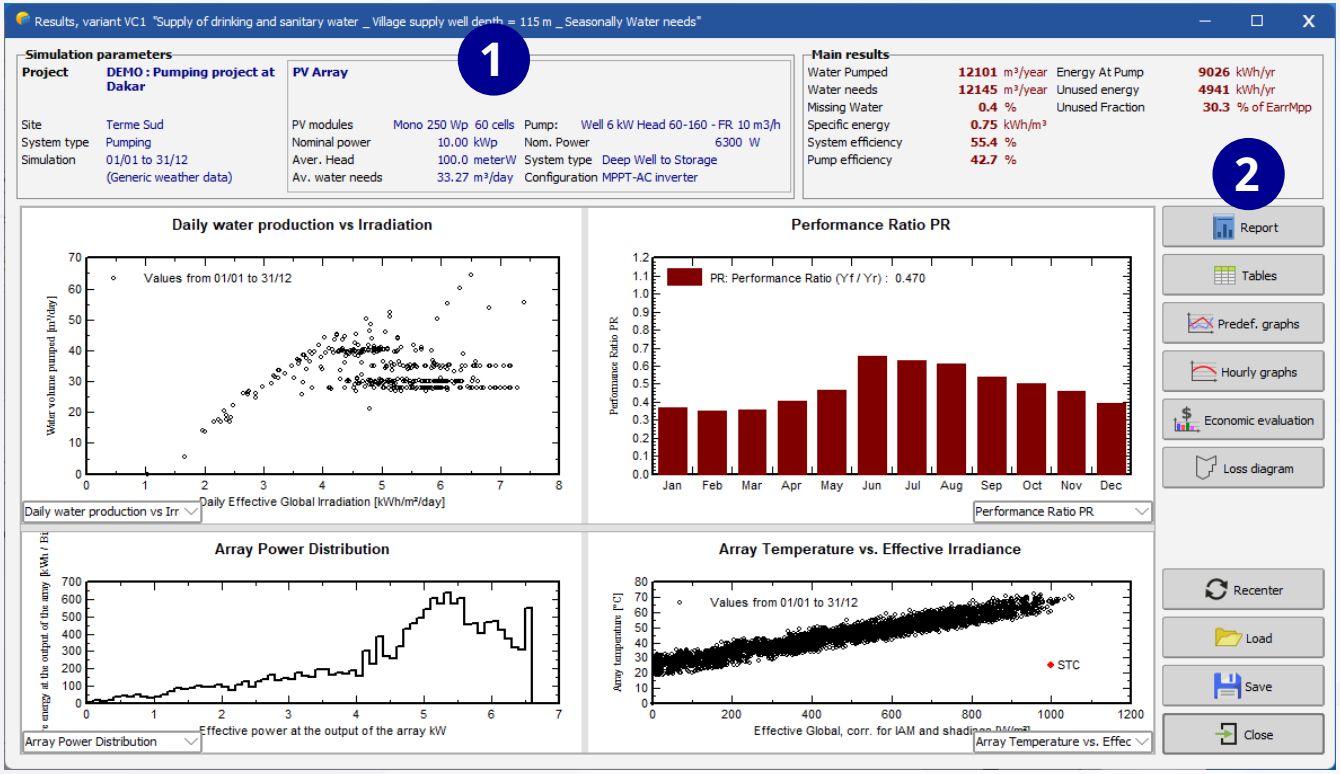
1 Click on: «Run simulation»



Chapter 2 : VC1 - Simulation Results

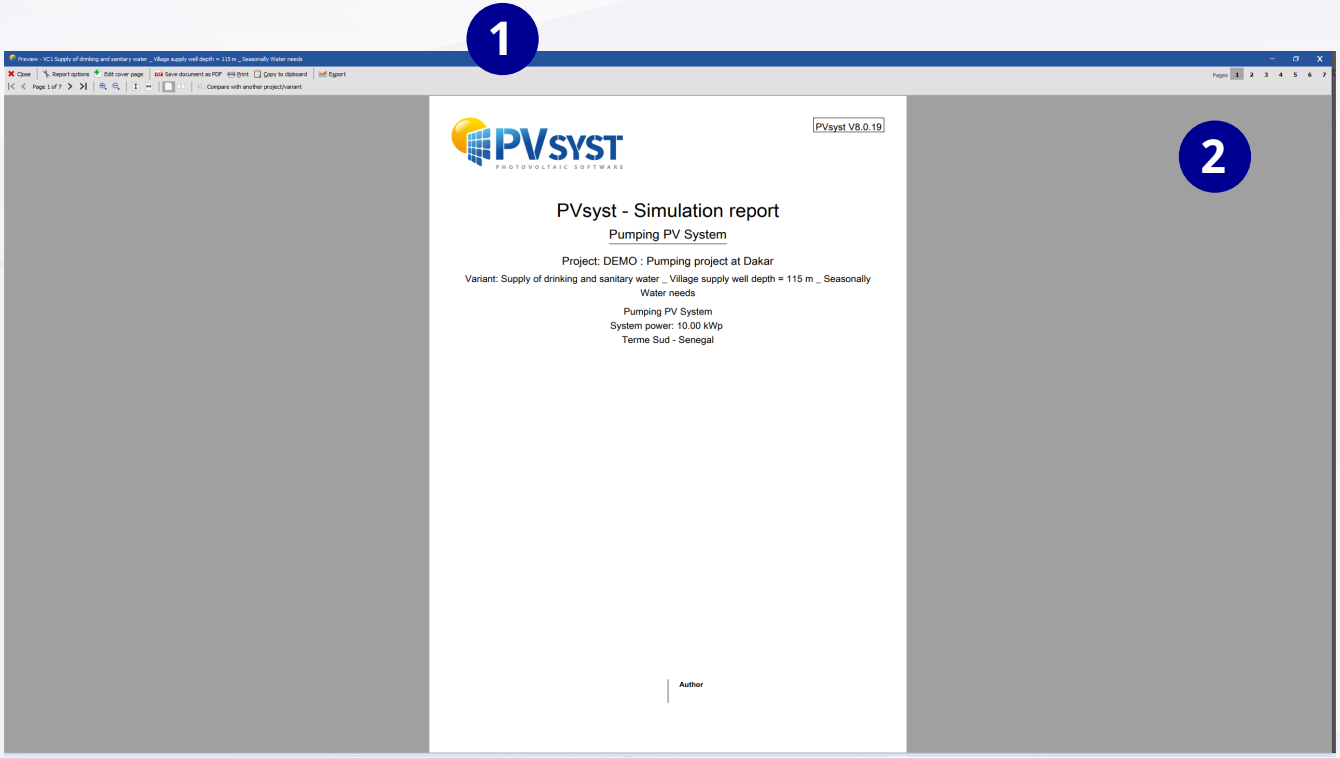
1. Main simulation results

2. Click on «Report» to generate and view the simulation results report



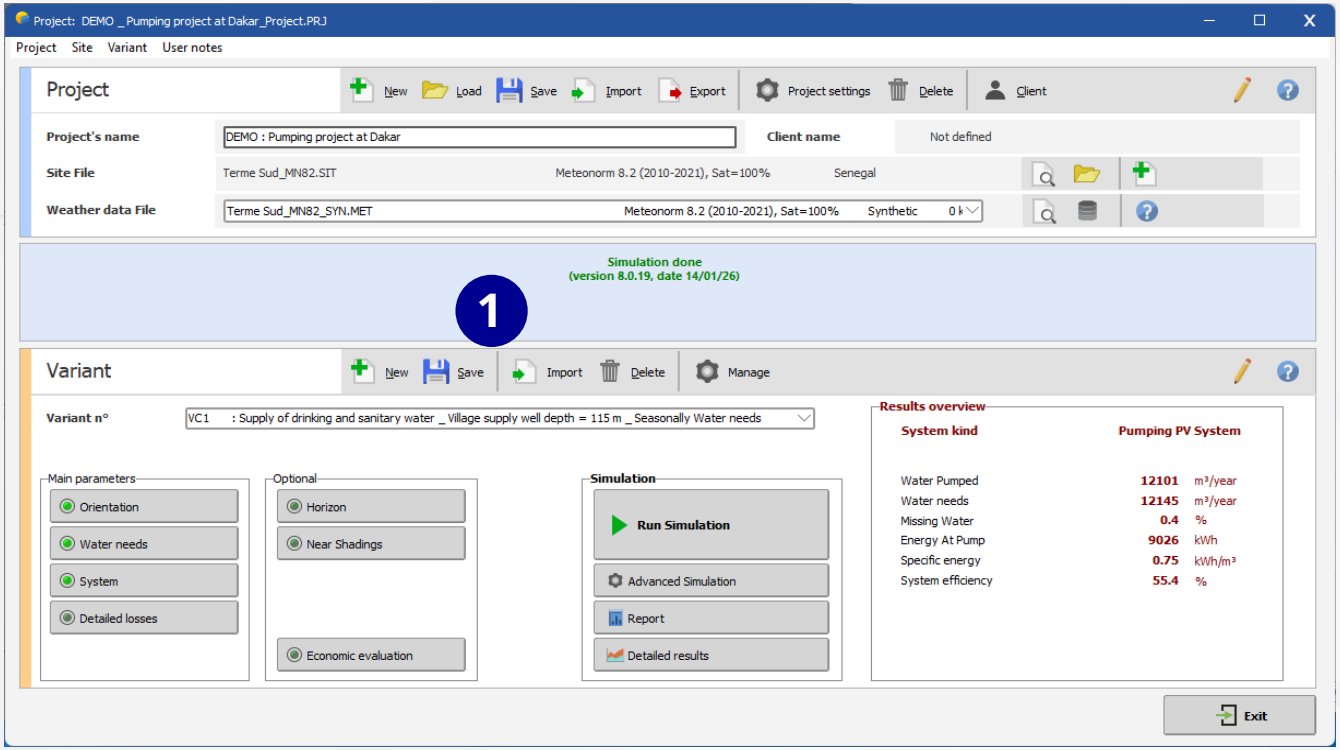
Chapter 2 : VC1 - Simulation Result_Report

1. Save the PDF or print it
2. View the different pages of the report



Chapter 3 : VC2 - Project Creation

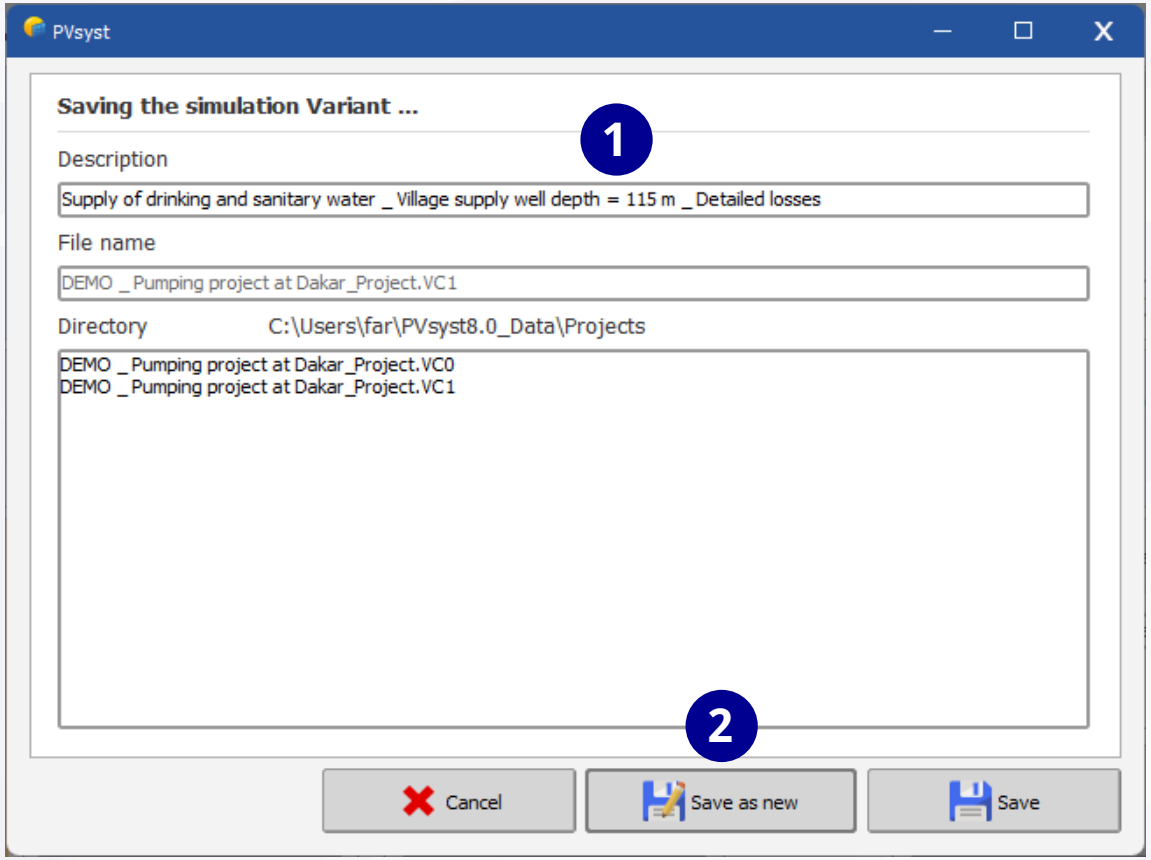
1 Click on «Save» to create a new variant.



Chapter 3 : VC2 - Project Creation

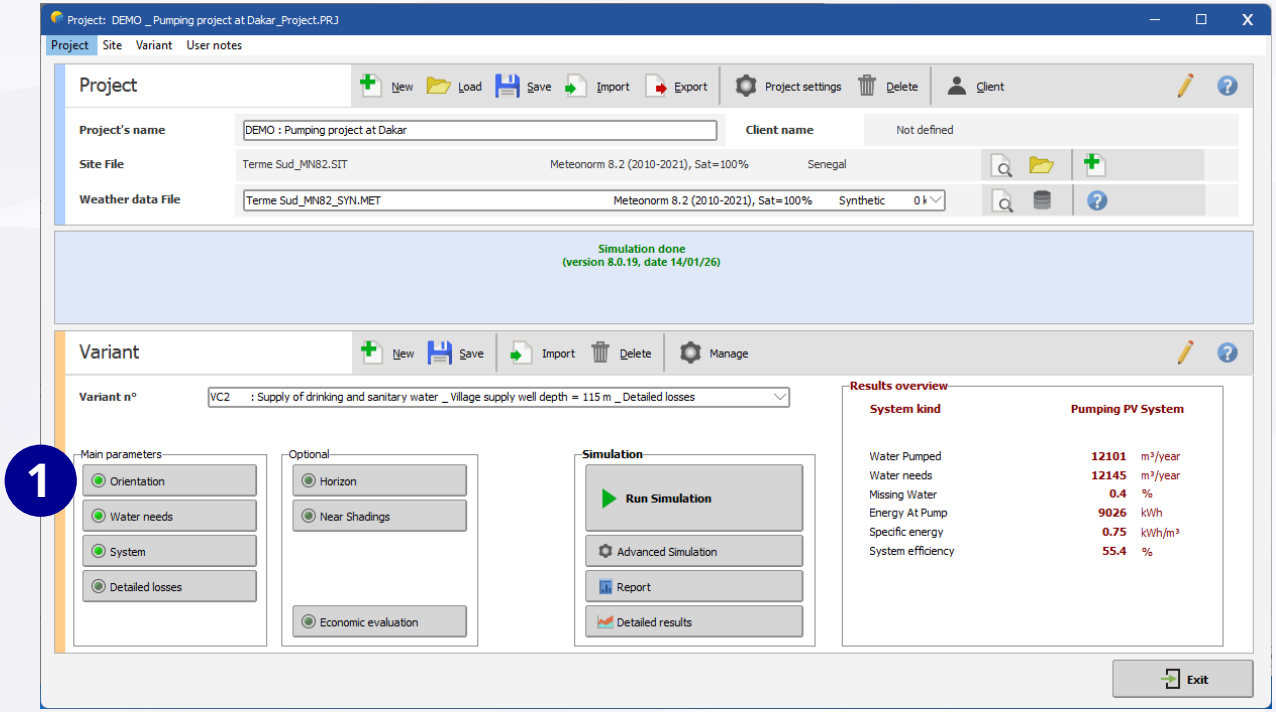
1. Give a new name to the new variant: «Supply of drinking and sanitary water _ Village supply well depth = 115 m _ Detailed losses»

2. Click «Save as new» to create the new variant using the previous parameters



Chapter 3 : VC2 - Orientation Definition (1)

1 Set the orientation

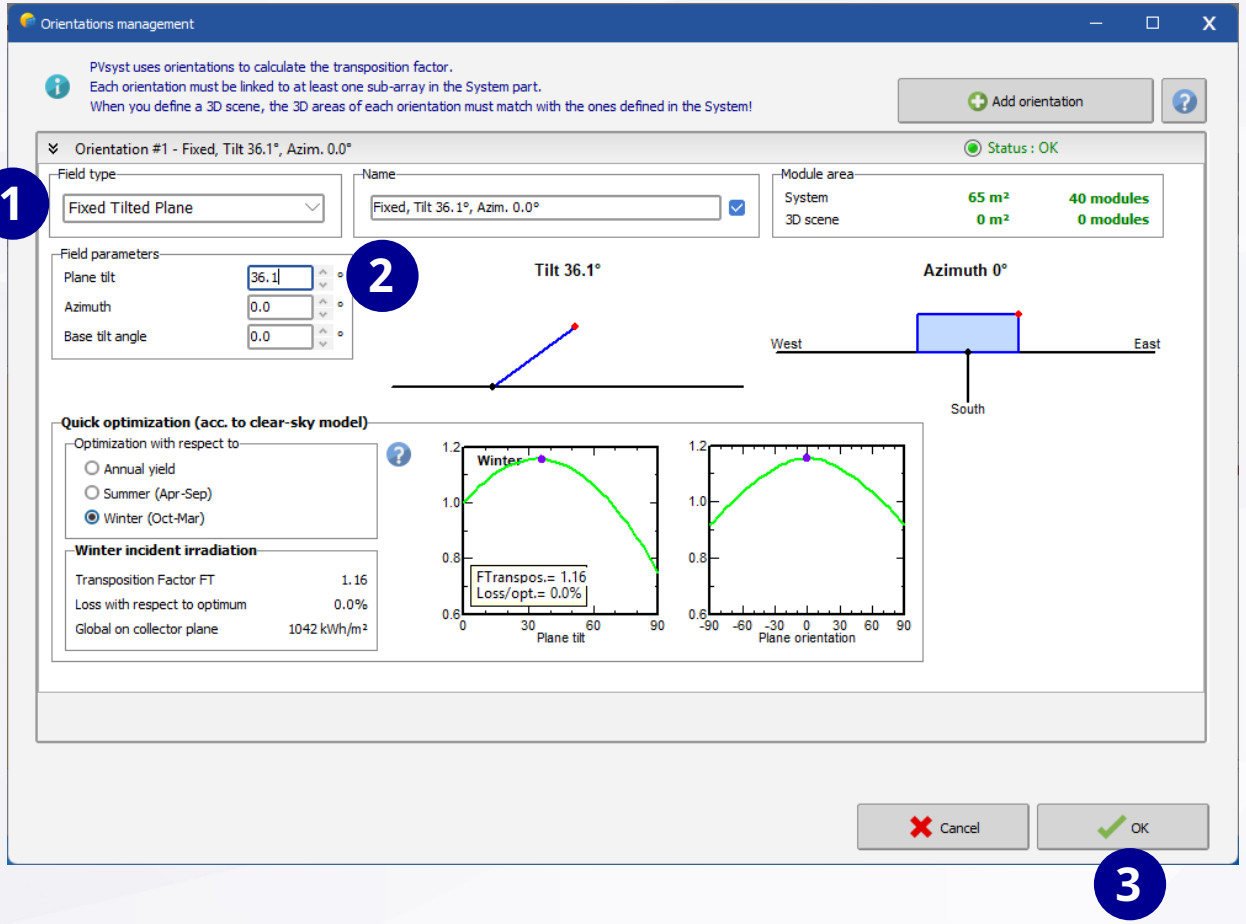


Chapter 3 : VC2 - Orientation Definition (2)

1. Choice between several possible configurations:
select «Fixed tilted plane»

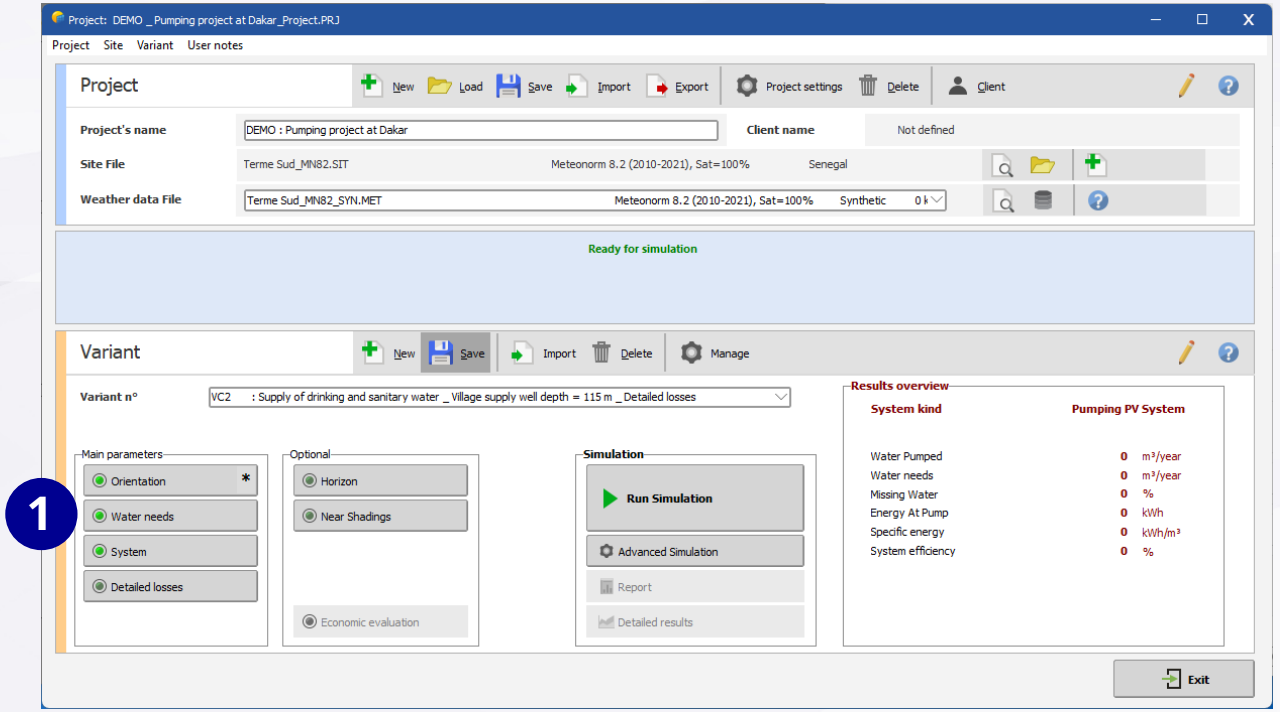
2. Set the field parameters: define the plane tilt at 36.1° and the azimuth at 0°

3. Click «OK»



Chapter 3 : VC2 - Water Needs

1 Define the «Water Needs»



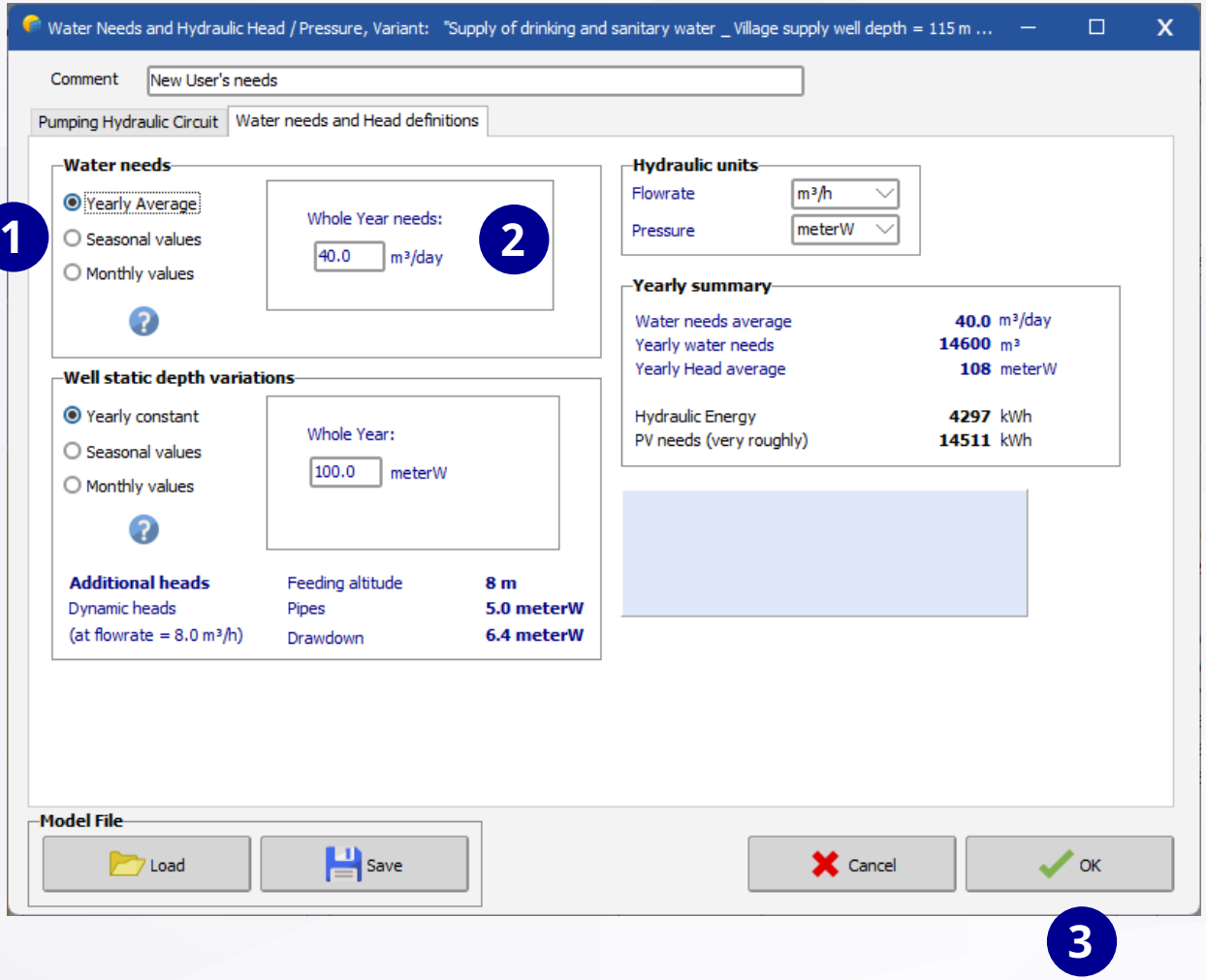
Chapter 3 : VC2 - Define the Water Needs

1. Choice between several possible configurations:
select «Yearly average»

2. Define the annual needs:

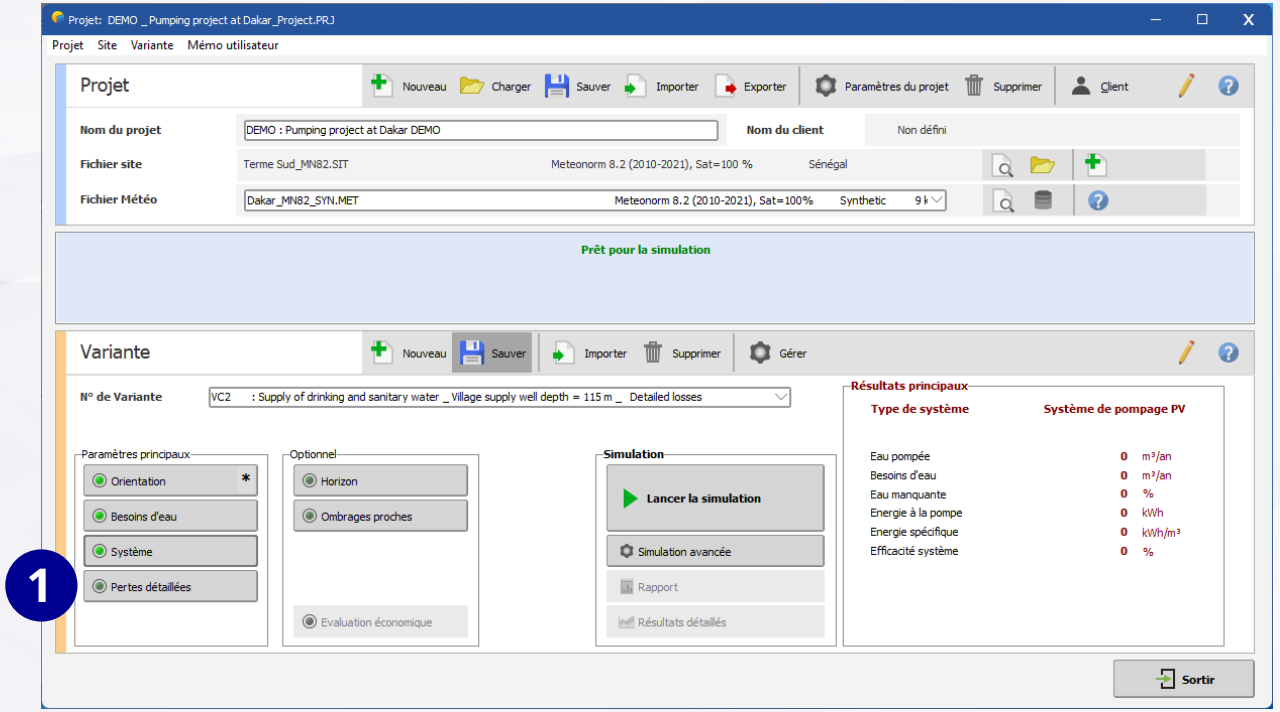
40.0 m³/day

3. Click «OK»



Chapter 3 : VC2 - Detailed Losses

1 Define the «Detailed Losses»



Chapter 3 : VC2 - Detailed Losses (1)

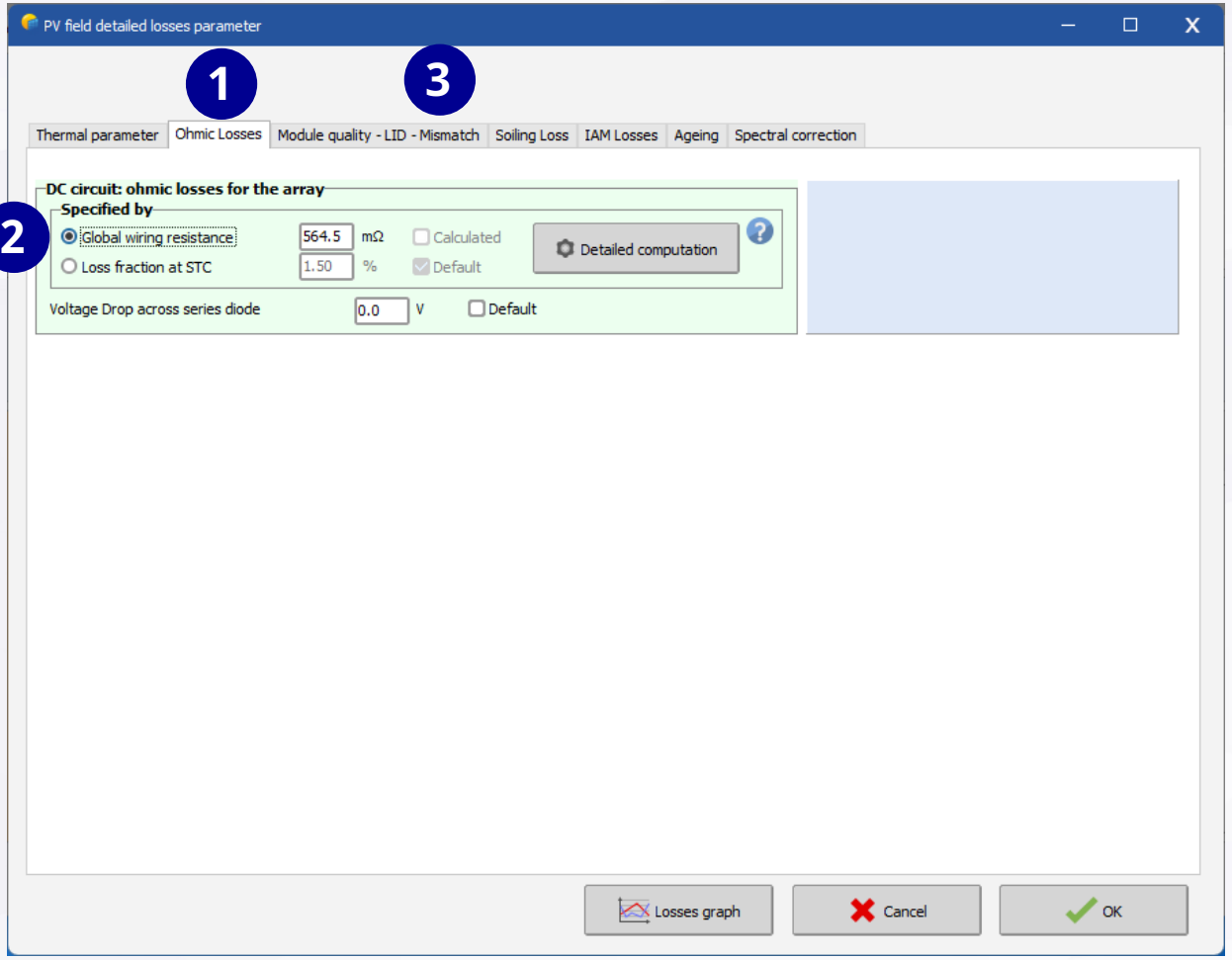
1. Open the «Ohmic Losses» window

2. Select: «Global wiring resistance»

   Then leave the value as it is.

3. Click on:

   «Module quality - LID - Mismatch»



Chapter 3 : VC2 - Detailed Losses (2)

1. Set «LID loss factor»:

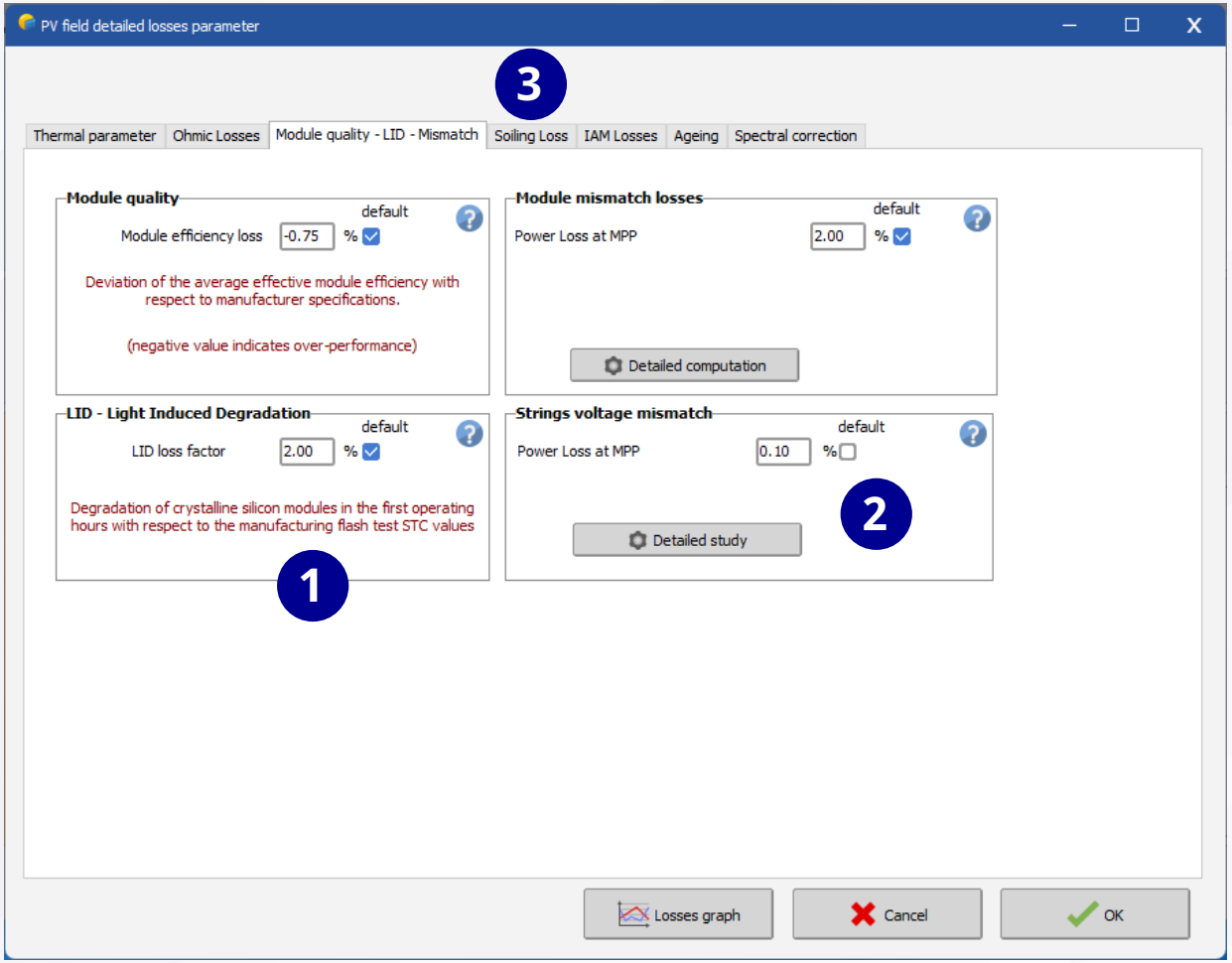
   2.0%

2. Set «Power loss at MPP»:

   0.10%

3. Click on:

   «Soiling loss»



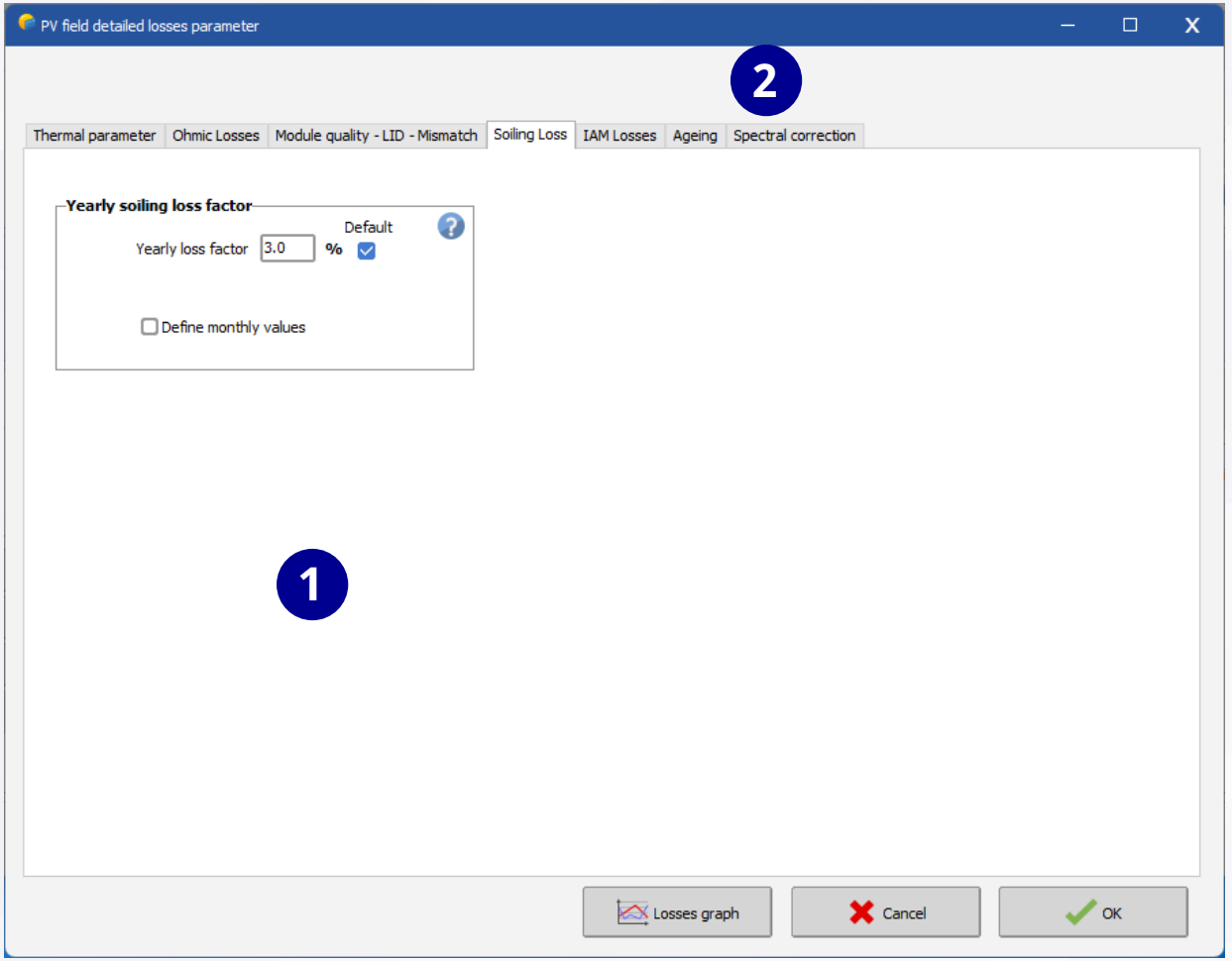
Chapter 3 : VC2 - Detailed Losses (3)

1. Set «Annual loss factor»:

   3.0%

2. Click on:

   «Aging»



Chapter 3 : VC2 - Detailed Losses (4)

1 Set «Parameters in the simulation»:

Simulation for year no : 10
Individual PV modules : 3.90%
(Global degradation factor)
Mismatch degradation factor : 1.32%

2 Set
«PV module aging parameters»:

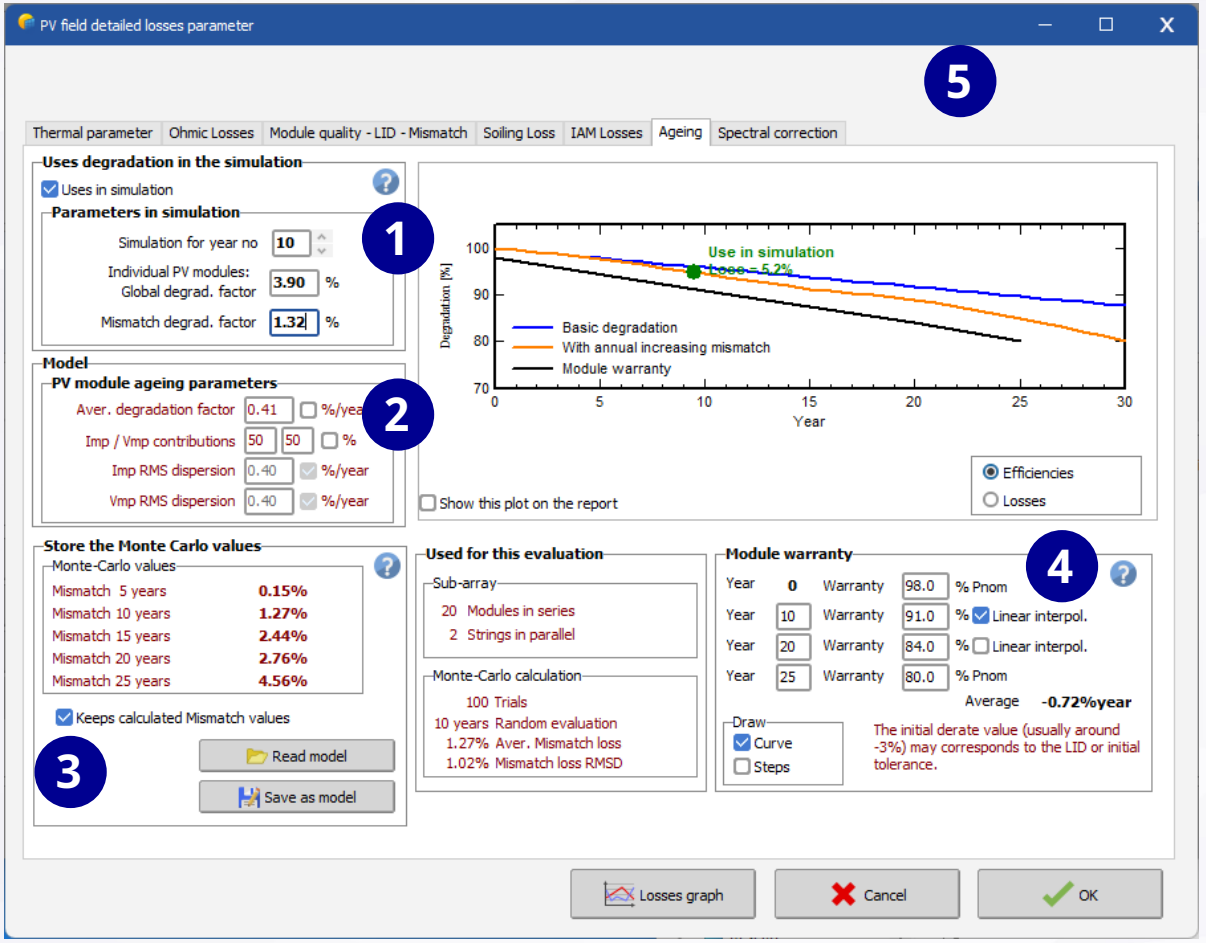
Average degradation factor : 0.40%
Imp/Vmp contribution : 50 - 50

3 Check the box: «Keep calculated mismatch values»

4 Set «Module warranty»:

Year 0 - Warranty: 98.0% Pnom
Year 10 - Warranty: 91.0% Linear interpolation
Year 20 - Warranty: 84.0%
Year 25 - Warranty: 80.0% Pnom

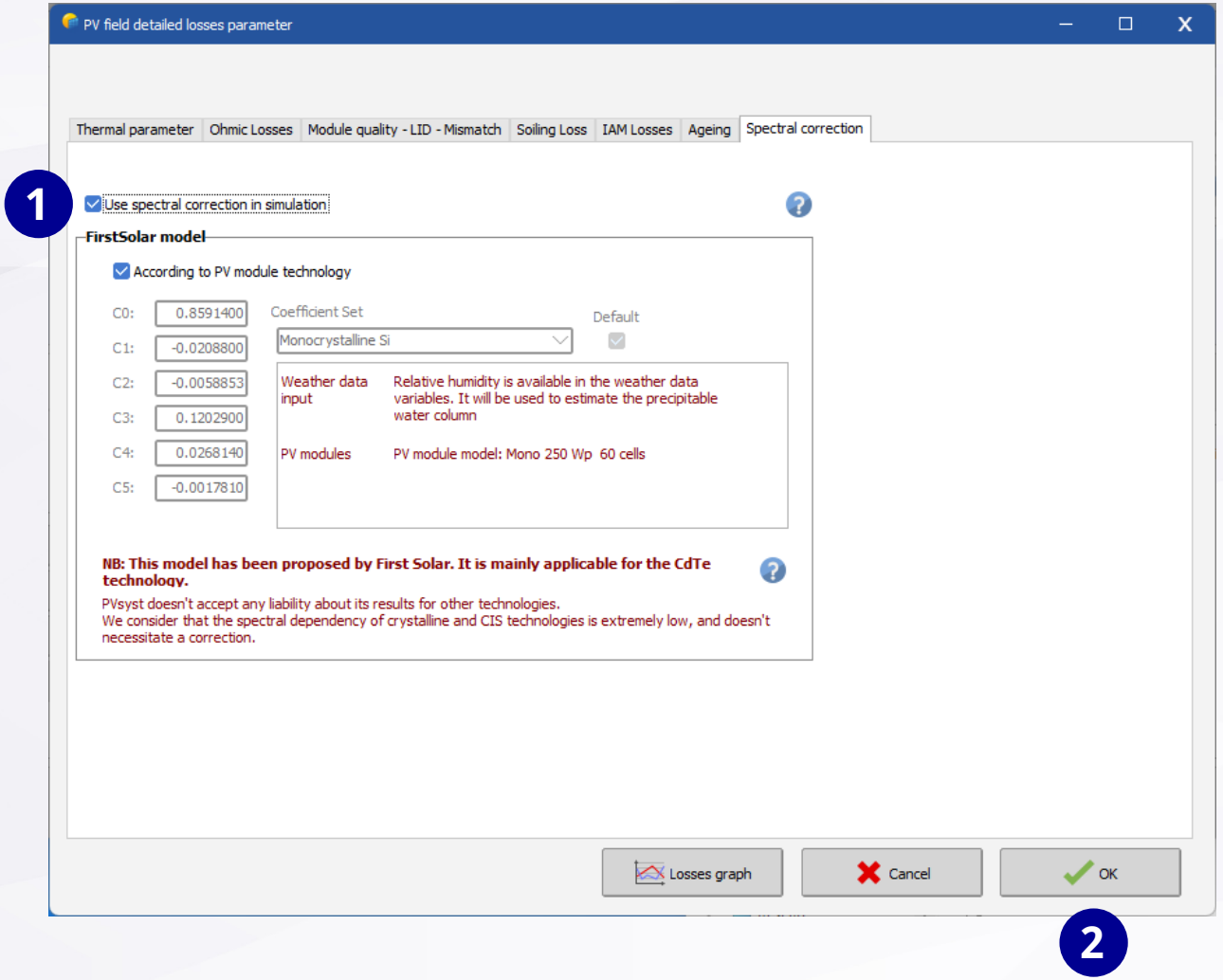
5 Click on: «Spectral correction»



Chapter 3 : VC2 - Detailed Losses (5)

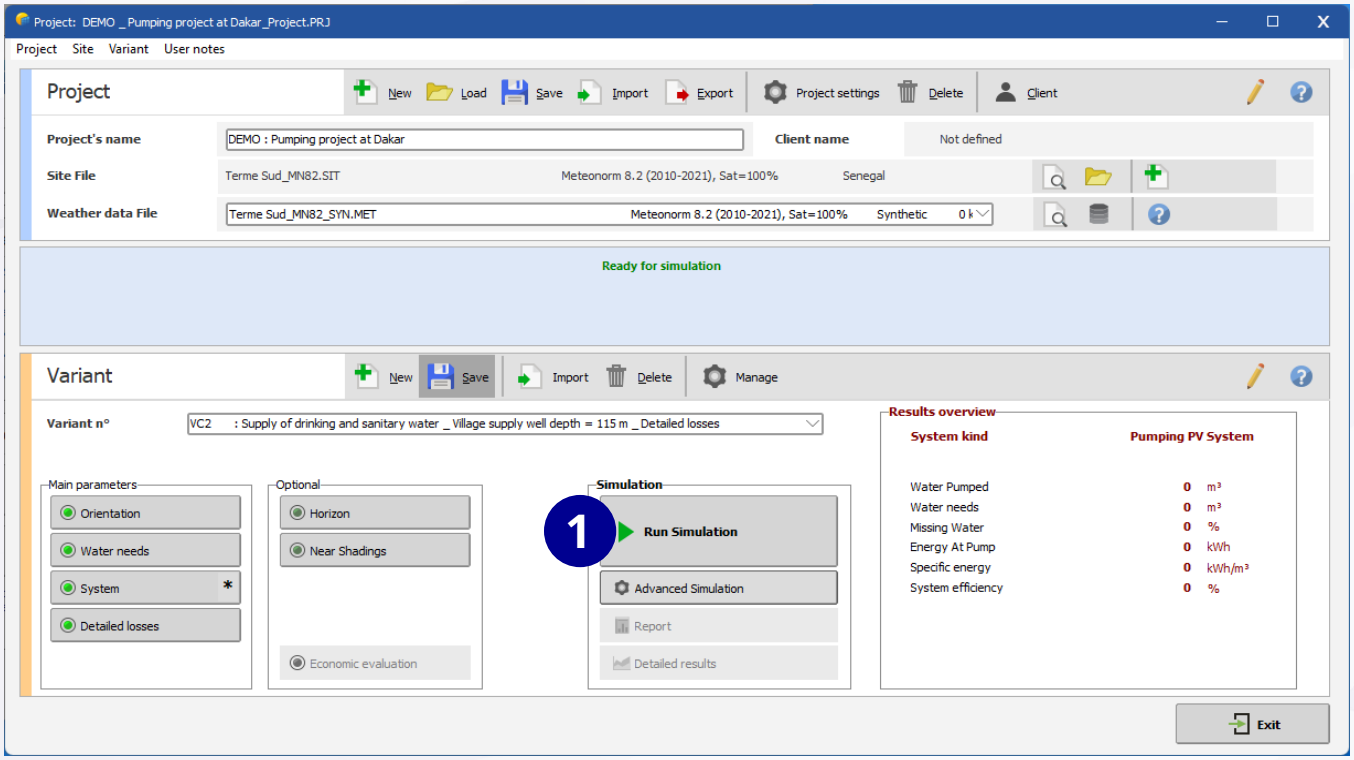
1. Check the box:
«Use spectral correction in the simulation»

2. Click «OK»



Chapter 3 : VC2 - Run the Simulation

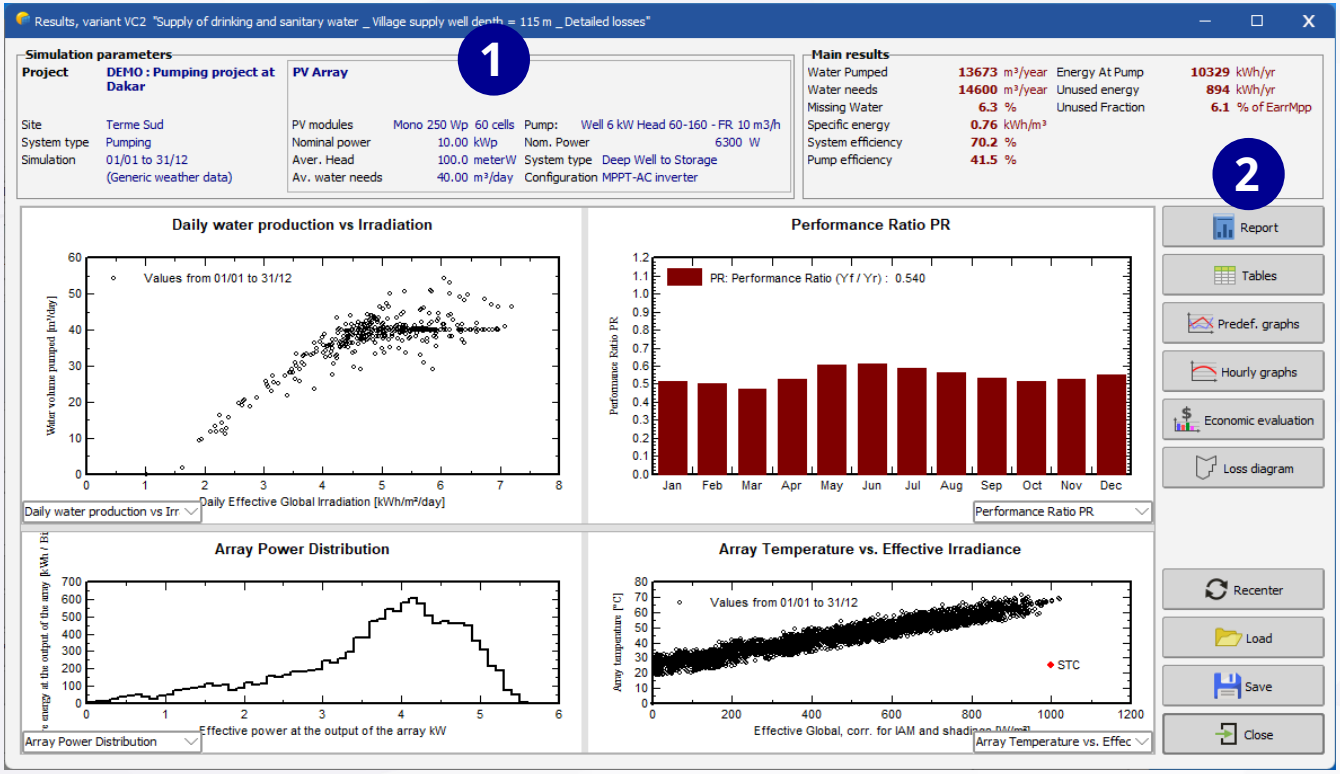
1 Click on: «Run simulation»



Chapter 3 : VC2 - Simulation Results

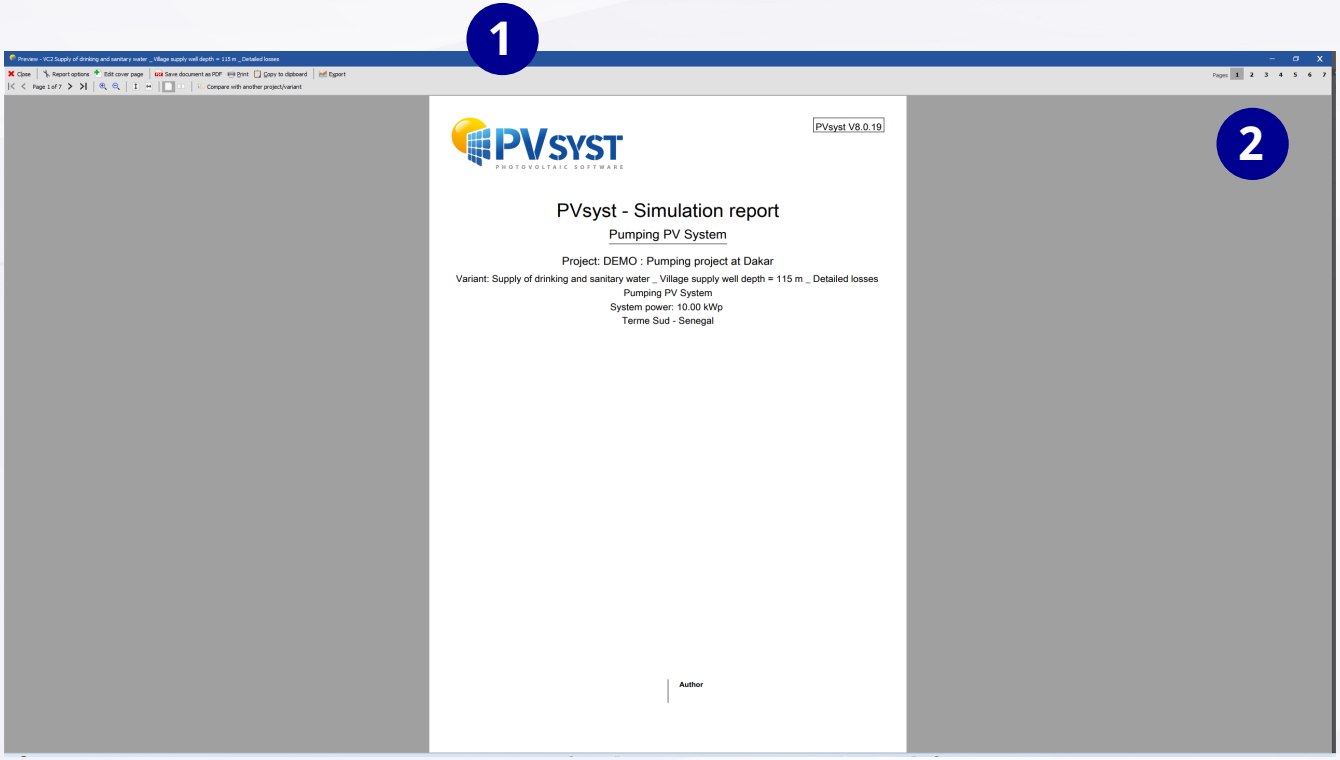
1. Main simulation results

2. Click on «Report» to generate and view the simulation results report



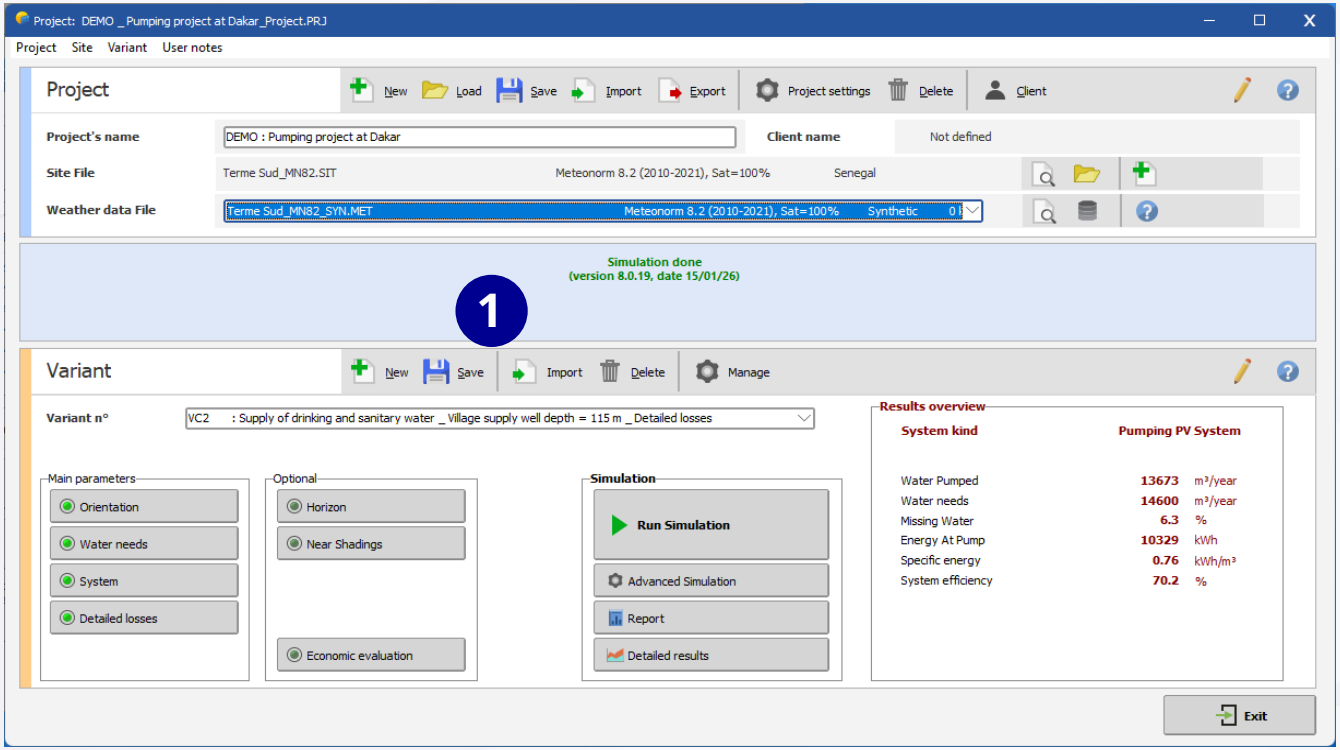
Chapter 3 : VC2 - Simulation Result_Report

1. Save the PDF or print it
2. View the different pages of the report



Chapter 4 : VC3 - Project Creation

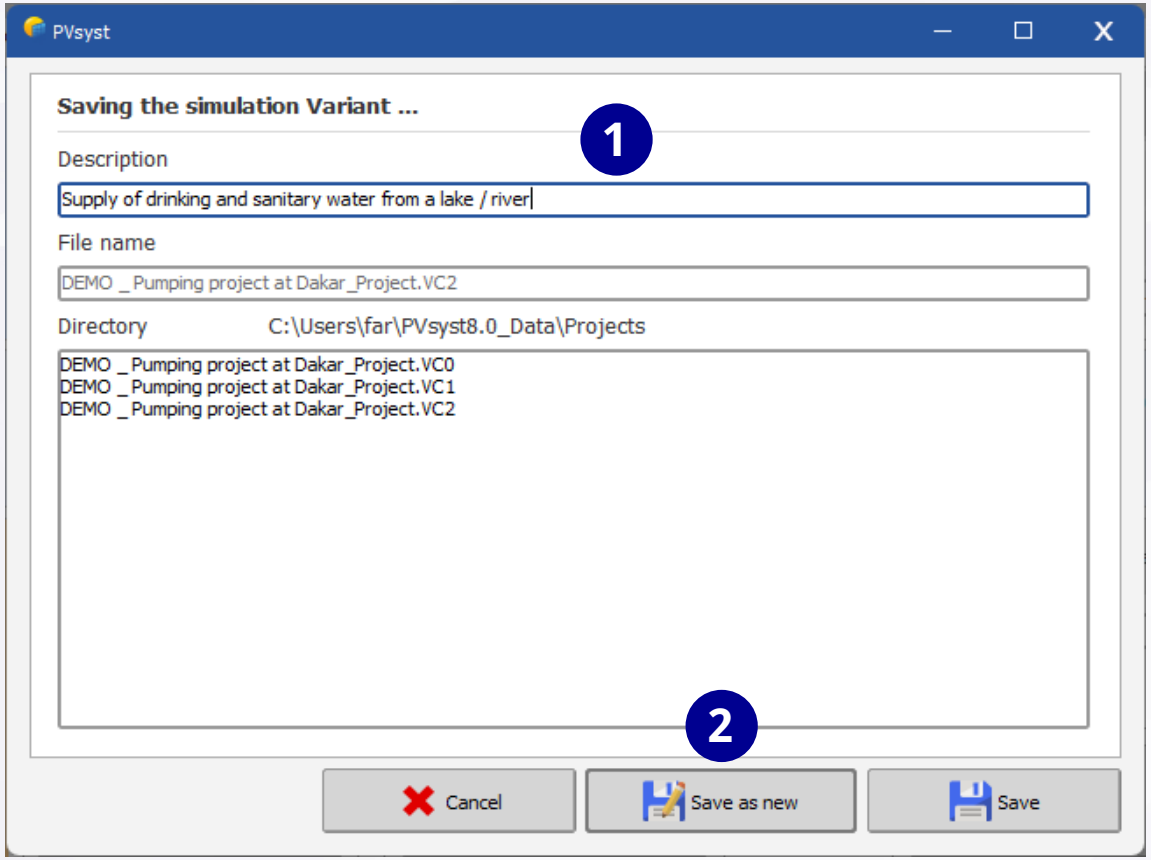
1 Click on «Save» to create a new variant.



Chapter 4 : VC3 - Project Creation

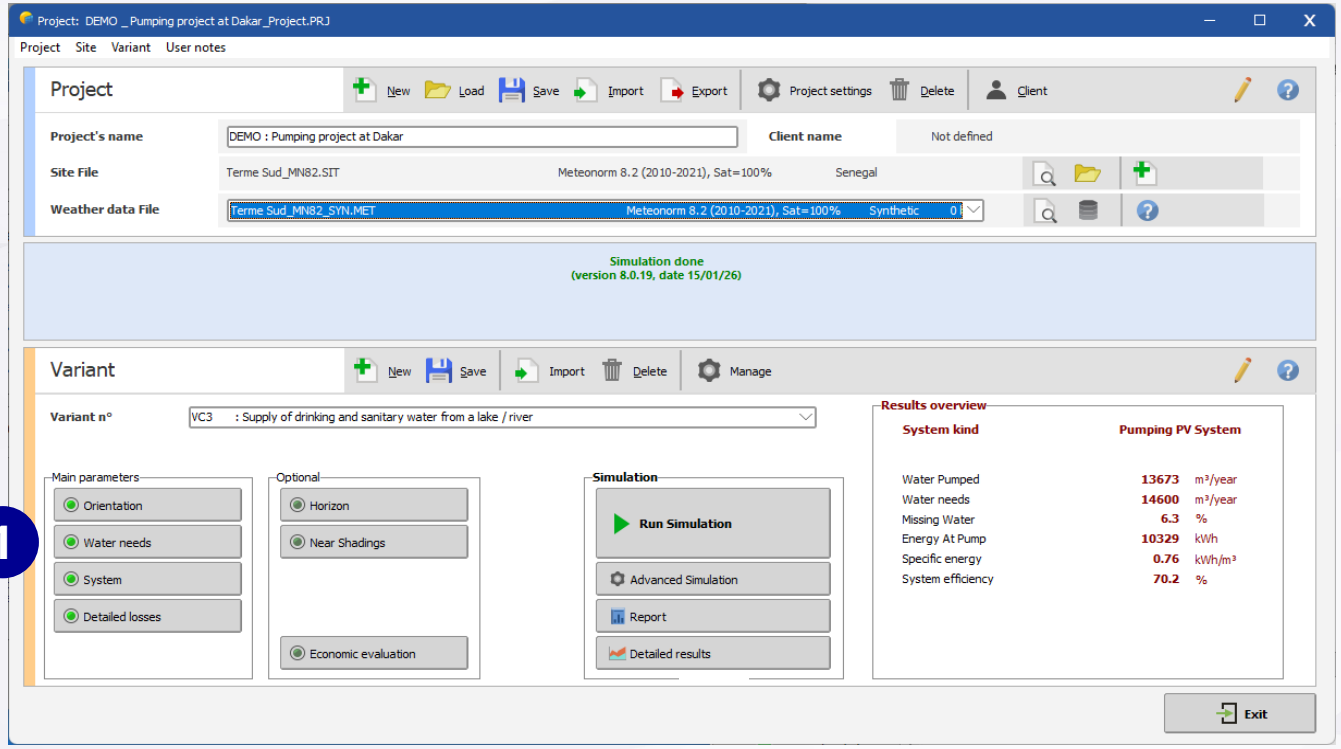
1. Give a new name to the new variant: «Supply of drinking and sanitary water from a lake / river»

2. Click «Save as new» to create the new variant using the previous parameters



Chapter 4 : VC3 - Water Needs

1 Define the water needs



Chapter 4 : VC3 - Water Needs

1. Select the system type: «Lake or river to tank»

2. Define the lake or river characteristics:

   Water level : -4.0 m
   Pump level : -23.0 m

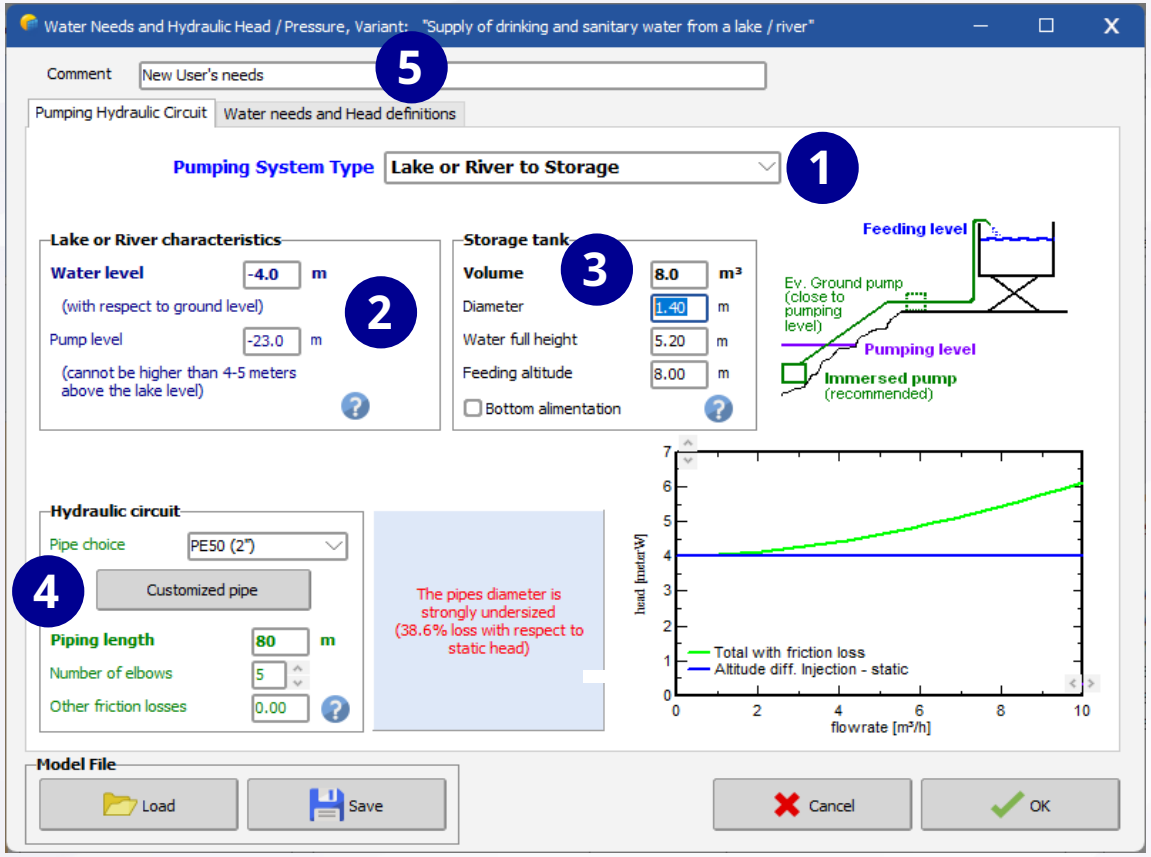
3. Define the tank characteristics:

   Volume : 8.0 m³

4. Define the hydraulic circuit:

   Pipe length : 80 m
   Number of bends : 5

5. Click on:
   «Definition of water needs and pressure»



Chapter 4 : VC3 - Water Needs

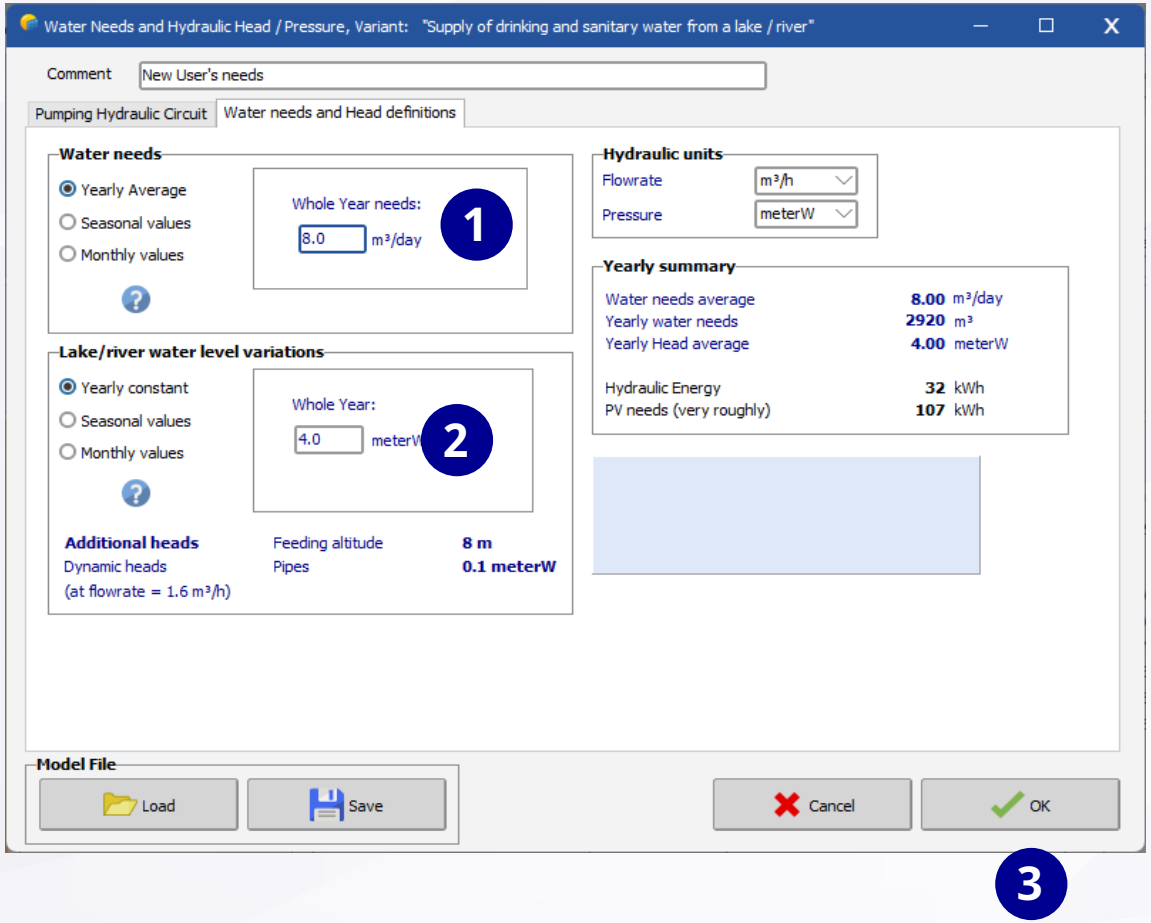
1. Select the water needs:

   Check «Annual average»
   Set 8.0 m³/day

2. Define the lake or river level variations:

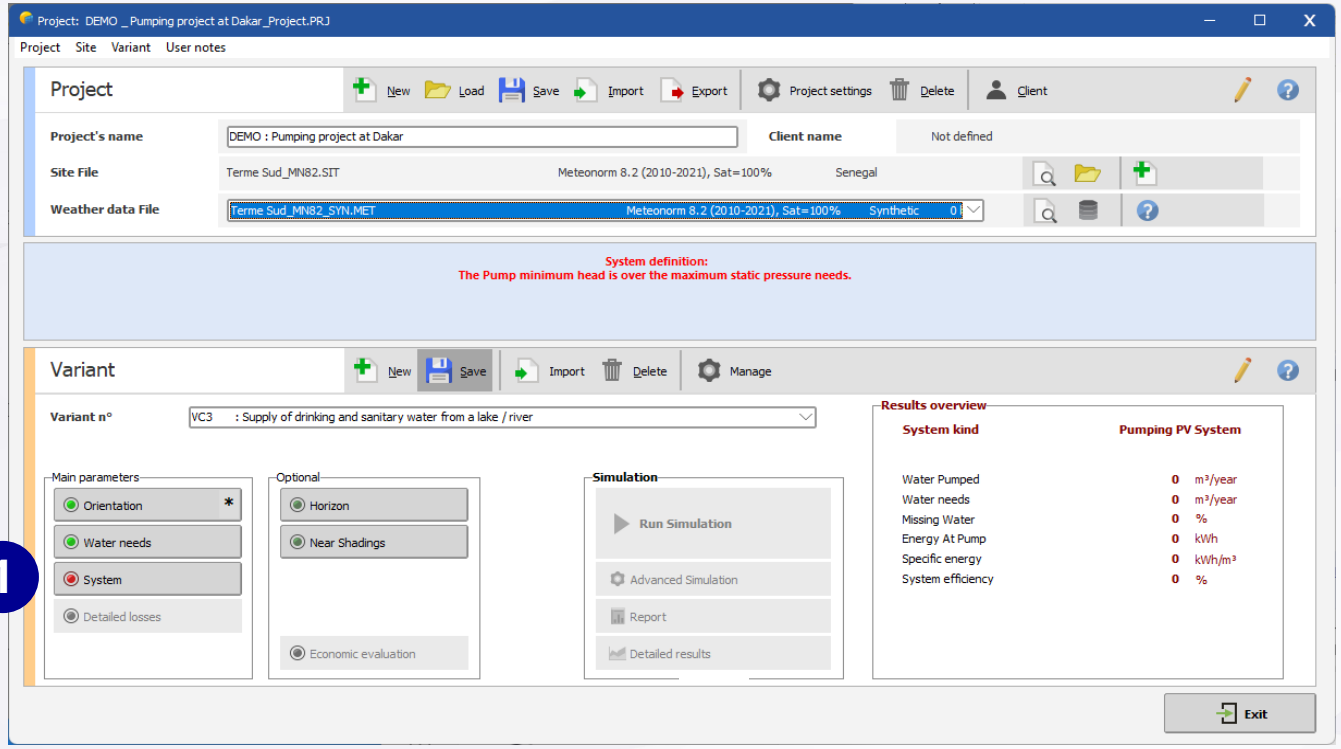
   Check «Constant over the year»
   Set 4.0 mWC

3. Click «OK»



Chapter 4 : VC3 - System

1 Define the system



Chapter 4 : VC3 - System (1)

1 Pump model selection:

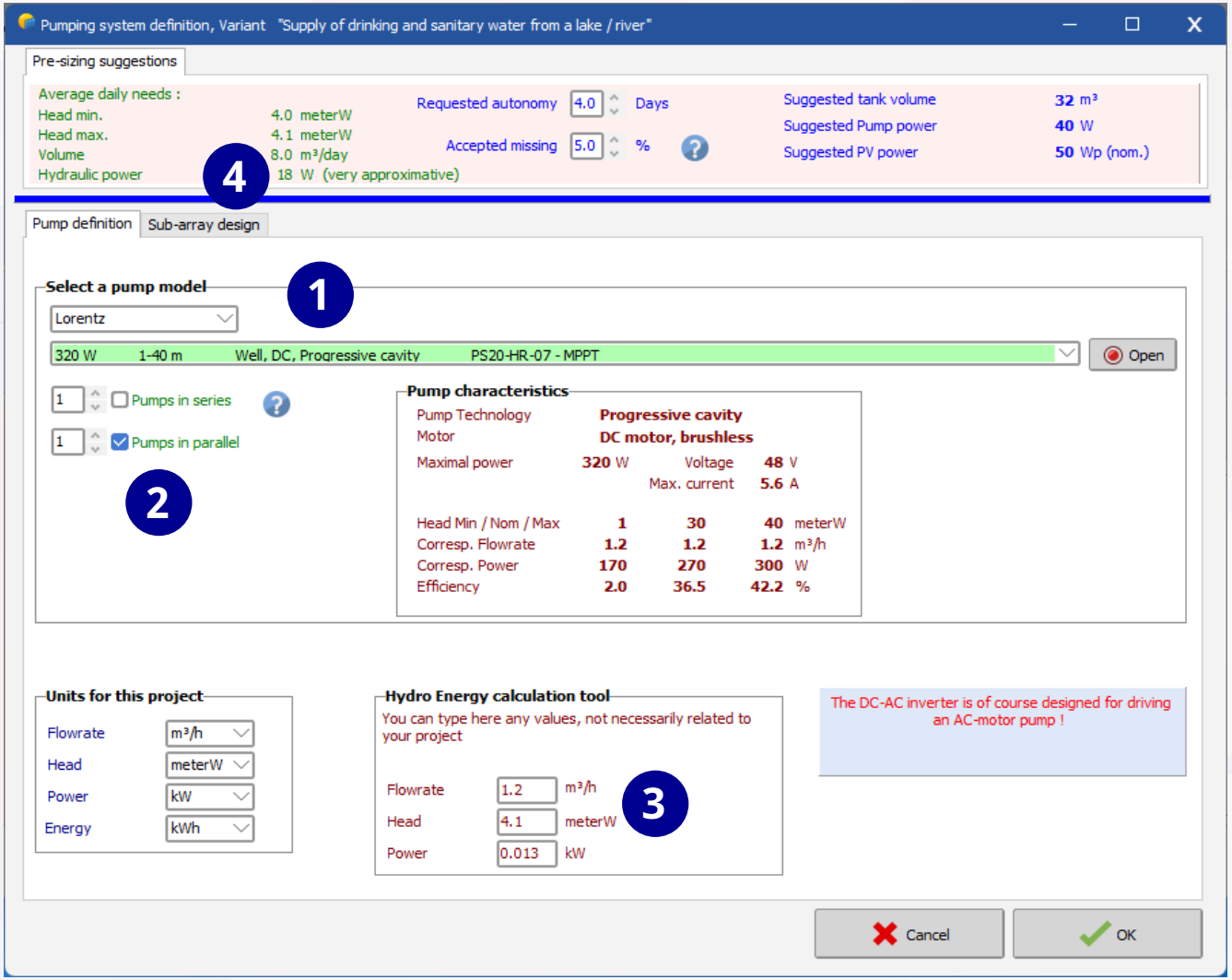
Select : «Lorentz»
Select model : «320W / 1-40m...»

2 Check only «Pumps in parallel» and set «1».

3 Set the following values:

Flow rate : 1.2 m³/h
Pressure : 4.1 mWC
Power : 0.013 kW

4 Click on «Sub-array design»



Chapter 4 : VC3 - System (2)

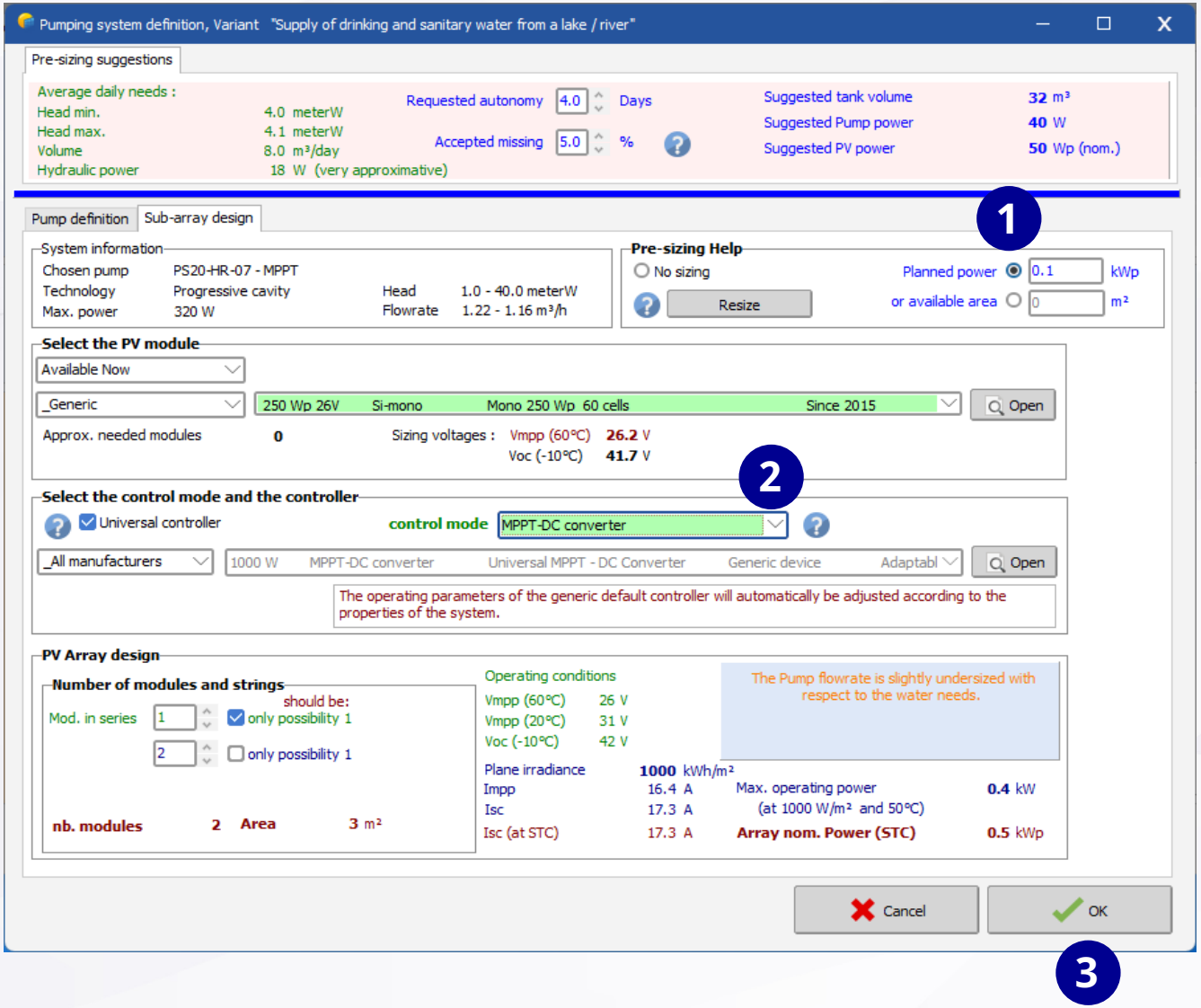
1. Check «Desired Pnom»

   Set «0.1» kWp

2. Set the «Control mode»

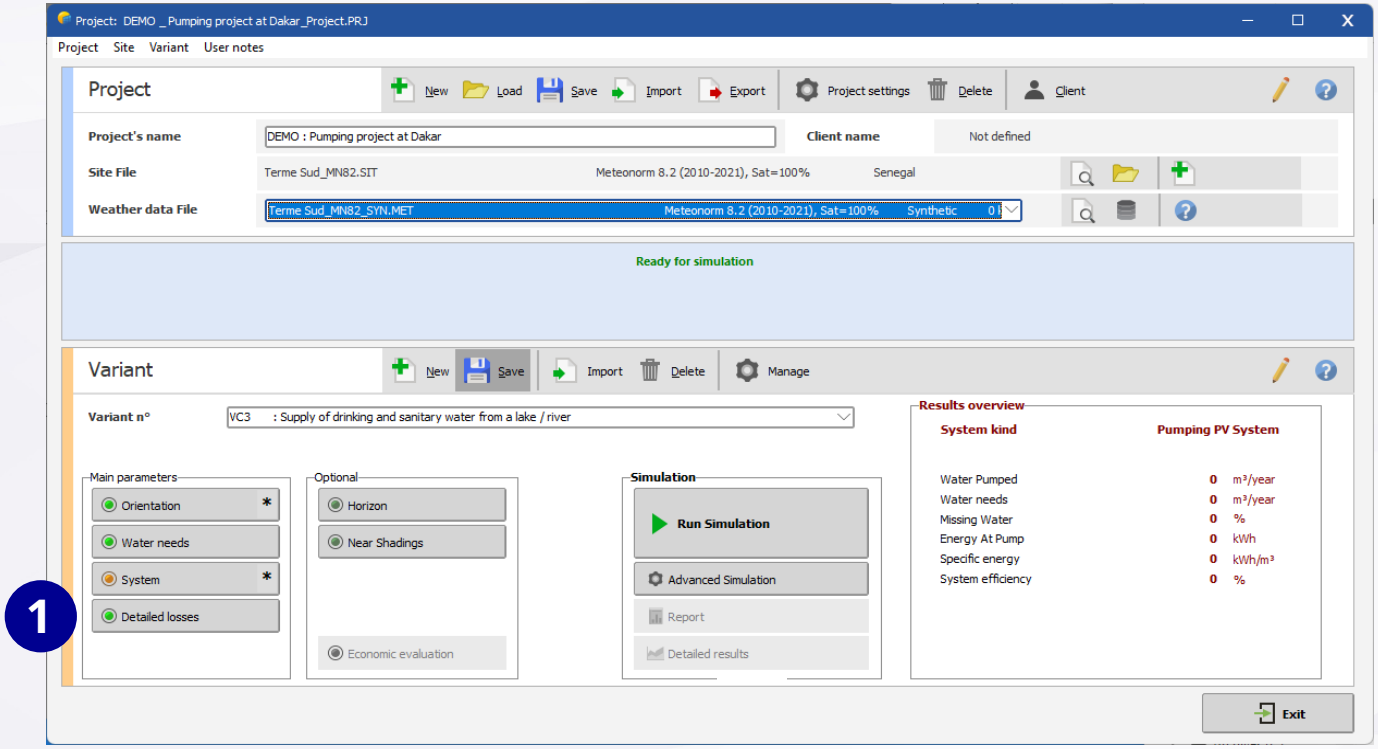
   Select «MPPT-DC converter»

3. Click «OK»



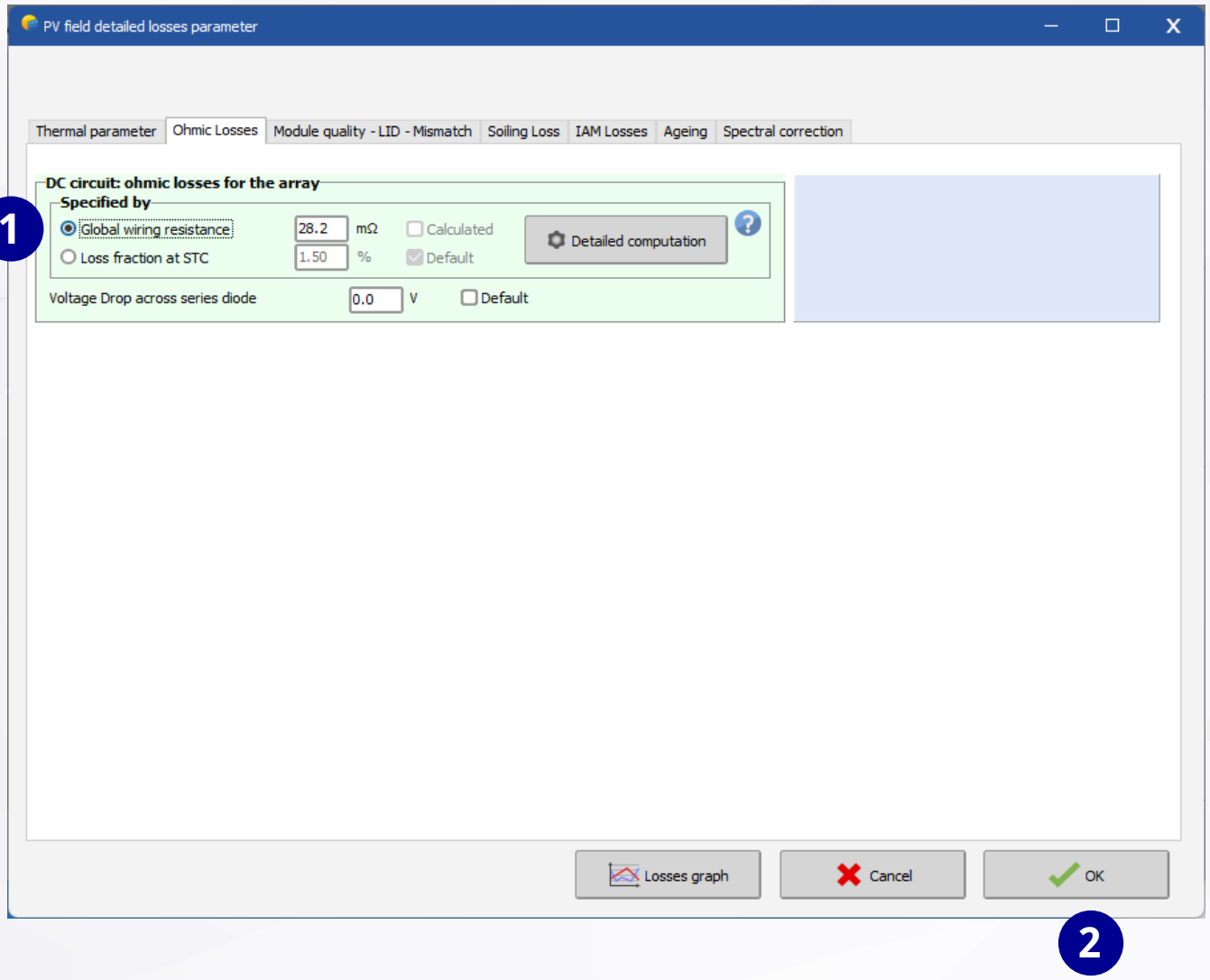
Chapter 4 : VC3 - Detailed Losses

1 Click on «Detailed losses»



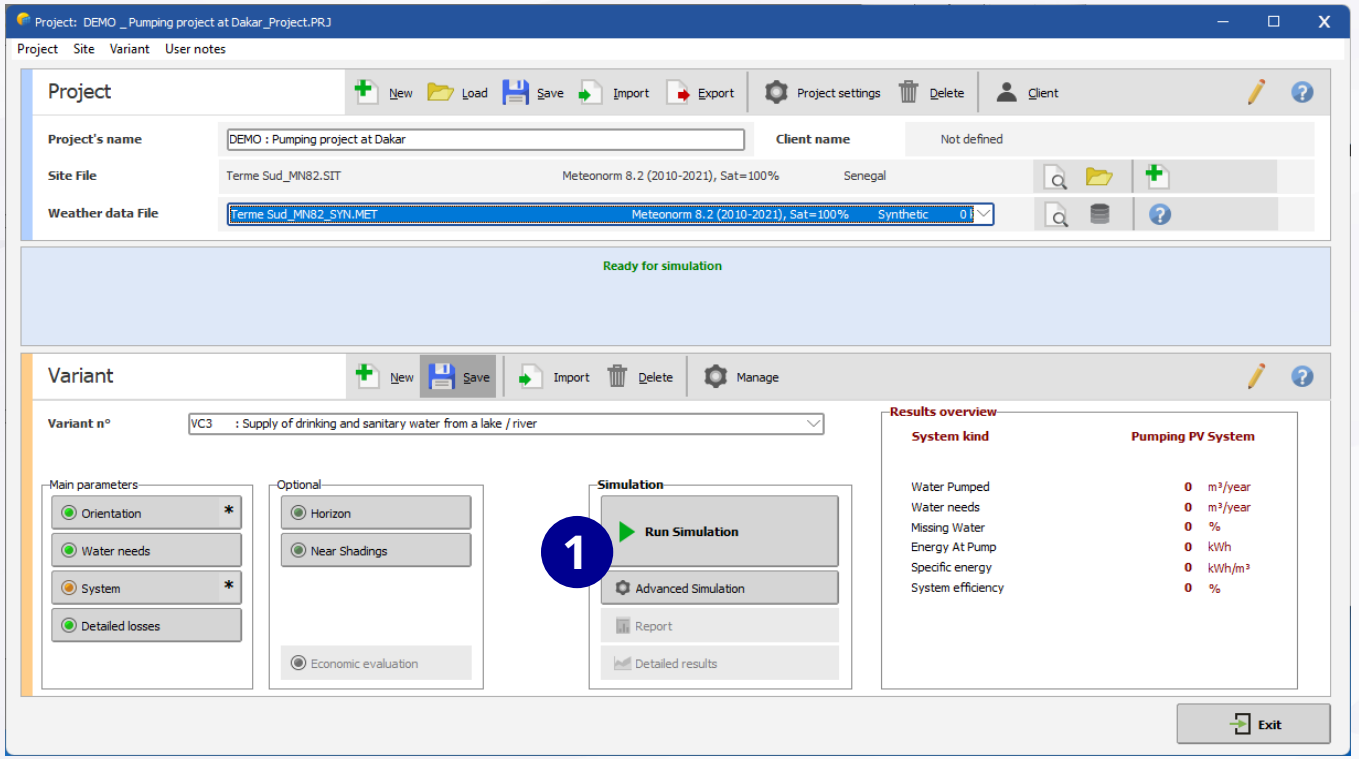
Chapter 4 : VC3 - Detailed Losses

1. In the «Ohmic losses» window, Select «Global wiring resistance»
2. Click «OK»



Chapter 4 : VC3 - Run the Simulation

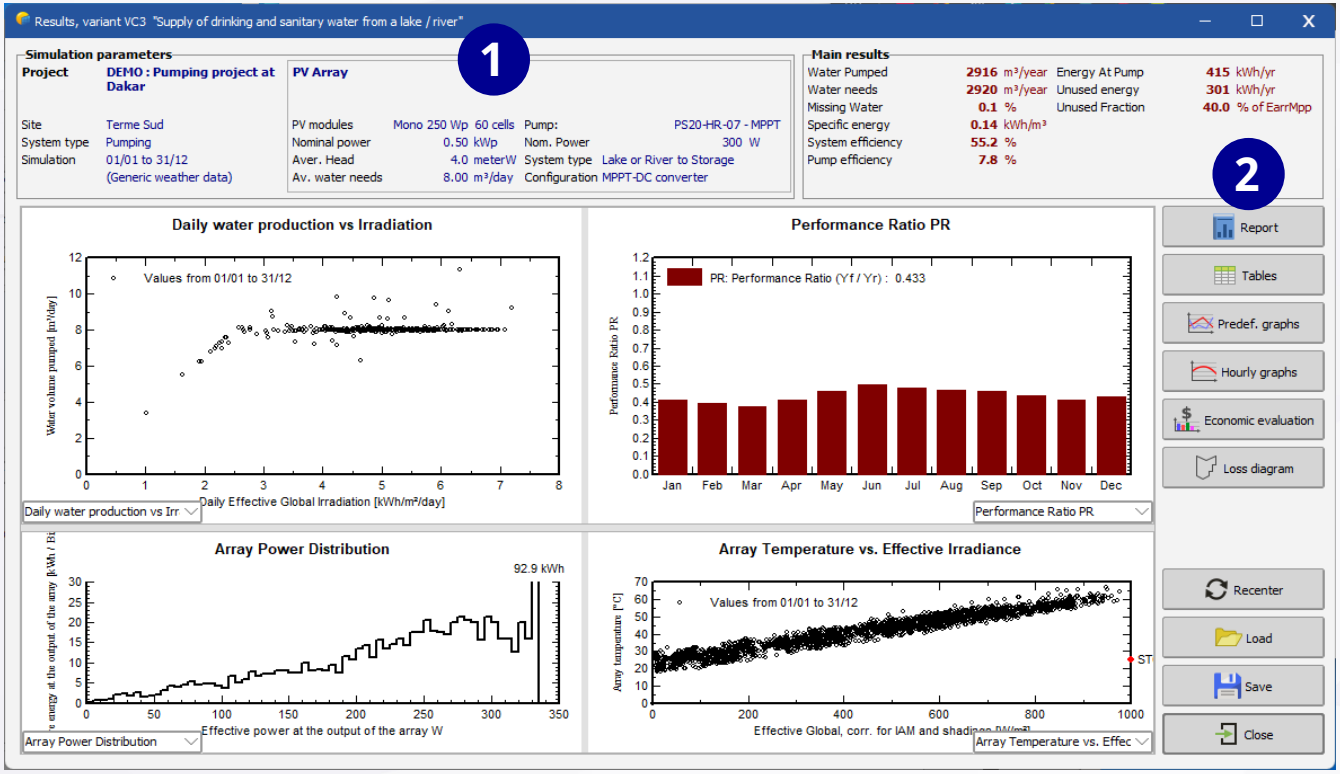
1 Click on: «Run simulation»



Chapter 4 : VC3 - Simulation Results

1. Main simulation results

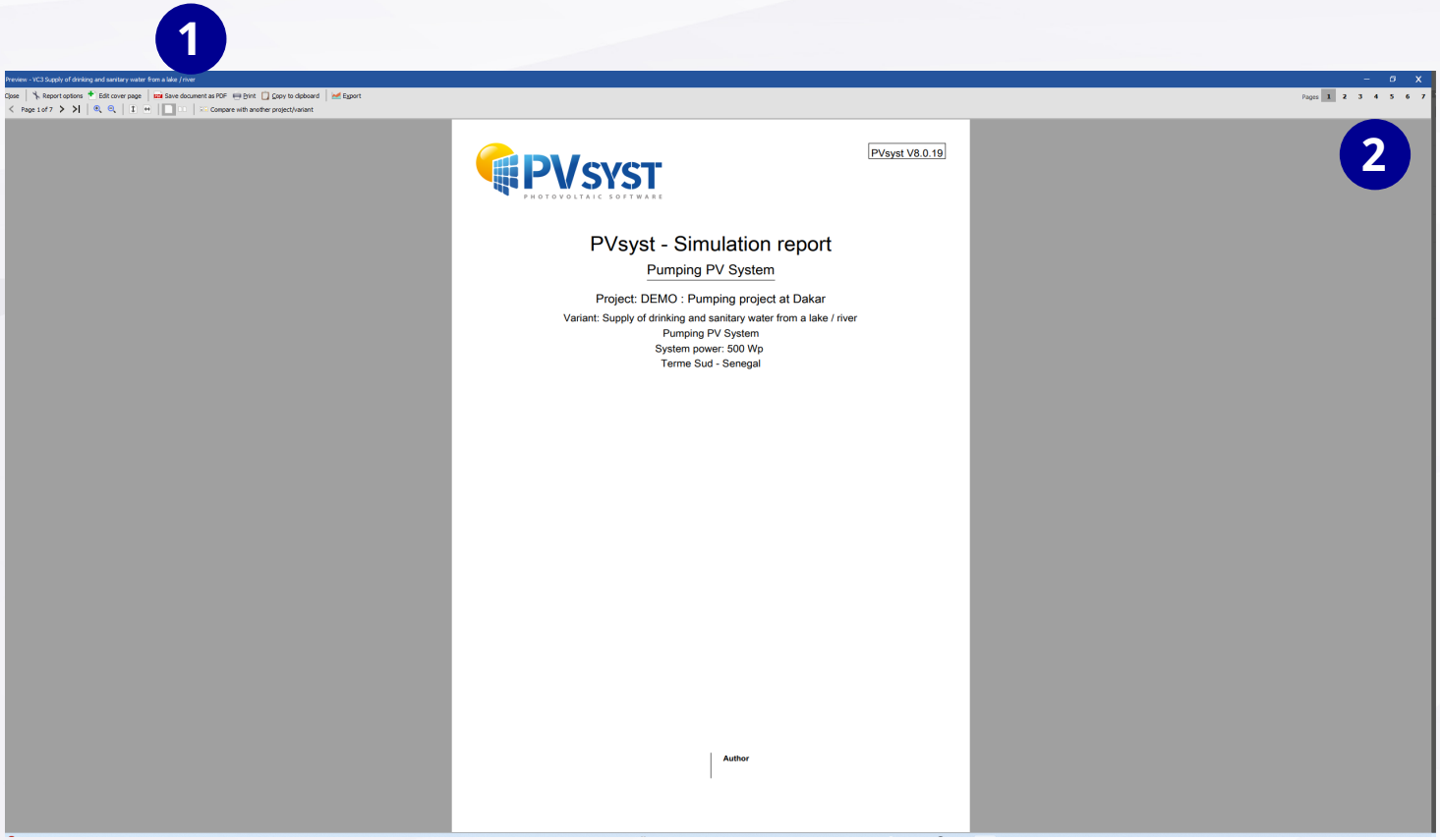
2. Click on «Report» to generate and view the simulation results report



Chapter 4 : VC3 - Simulation Result_Report

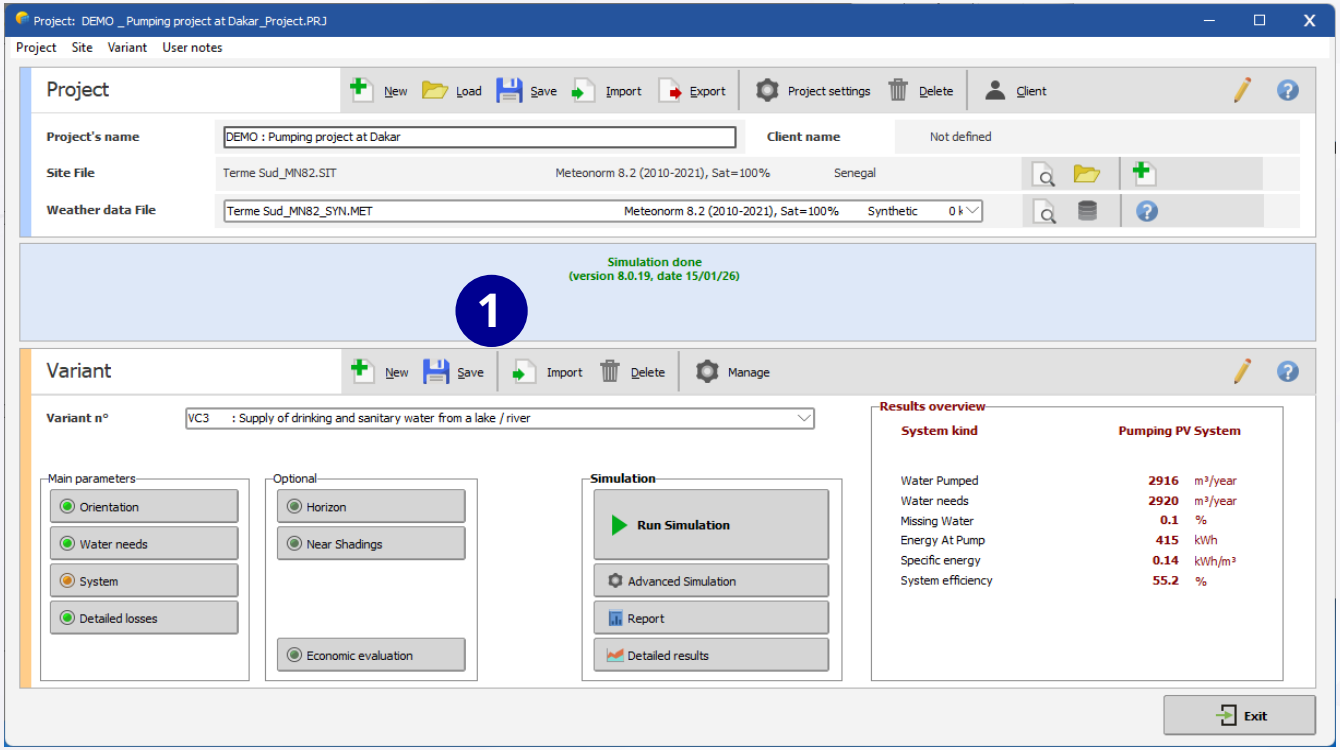
1. Save the PDF or print it

2. View the different pages of the report



Chapter 5 : VC4 - Project Creation

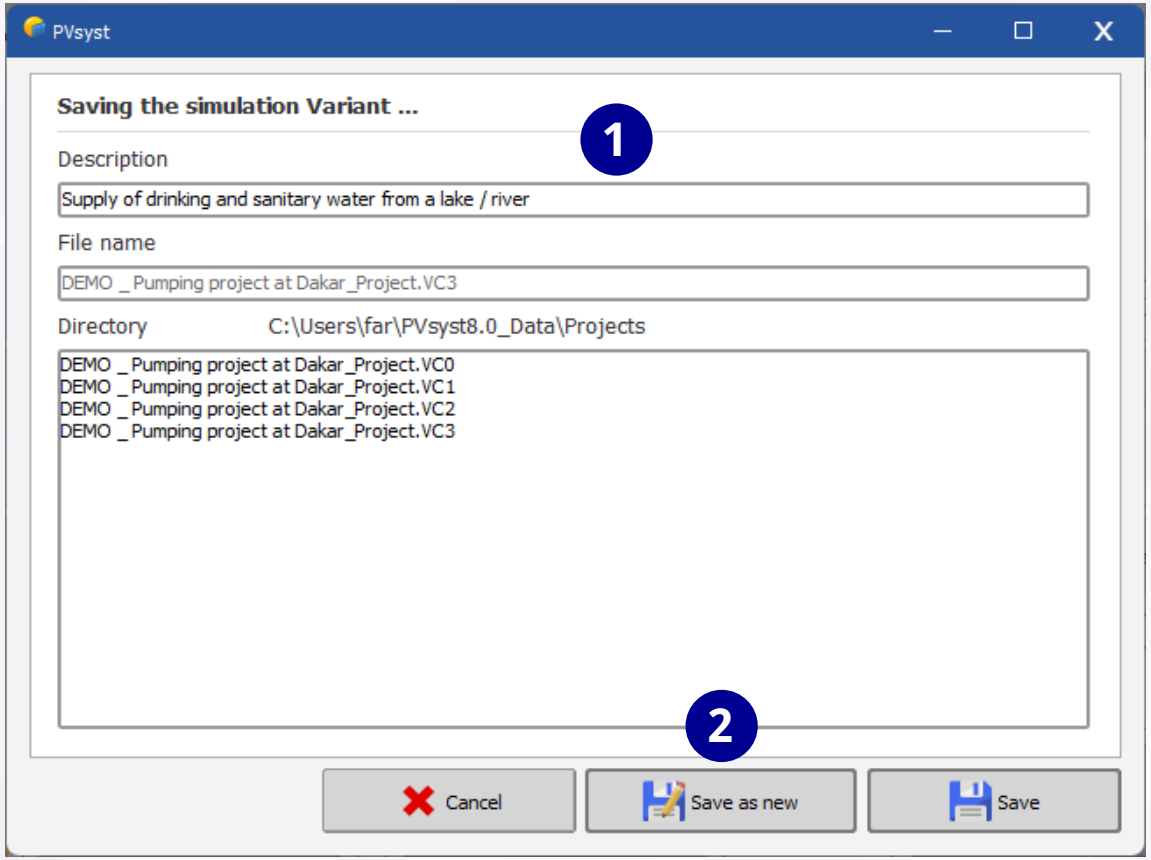
1 Click on «Save» to create a new variant.



Chapter 5 : VC4 - Project Creation

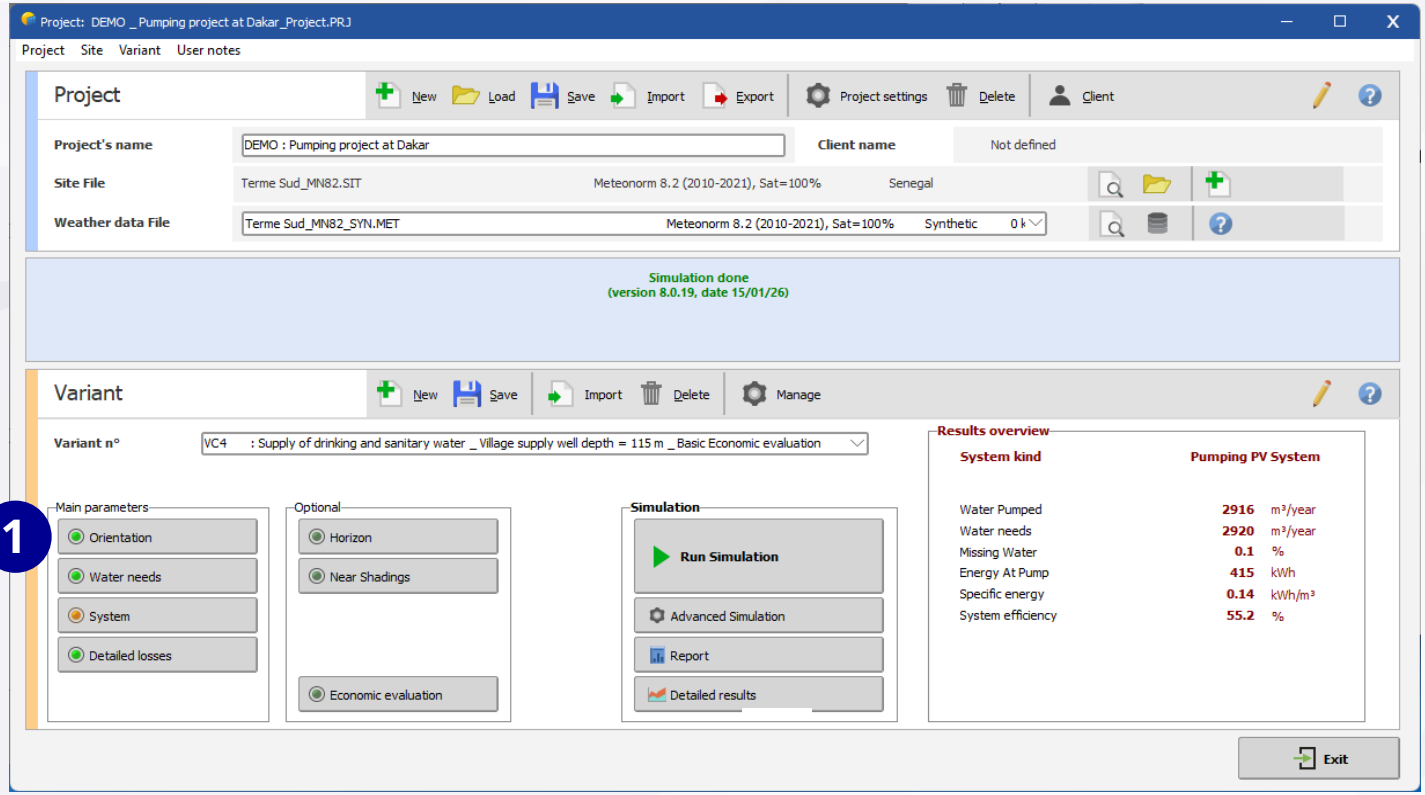
1. Give a new name to the new variant: «Supply of drinking and sanitary water _ Village supply well depth = 115 m _ Basic Economic evaluation»

2. Click «Save as new» to create the new variant using the previous parameters



Chapter 5 : VC4 - Orientation Definition (1)

1 Set the orientation

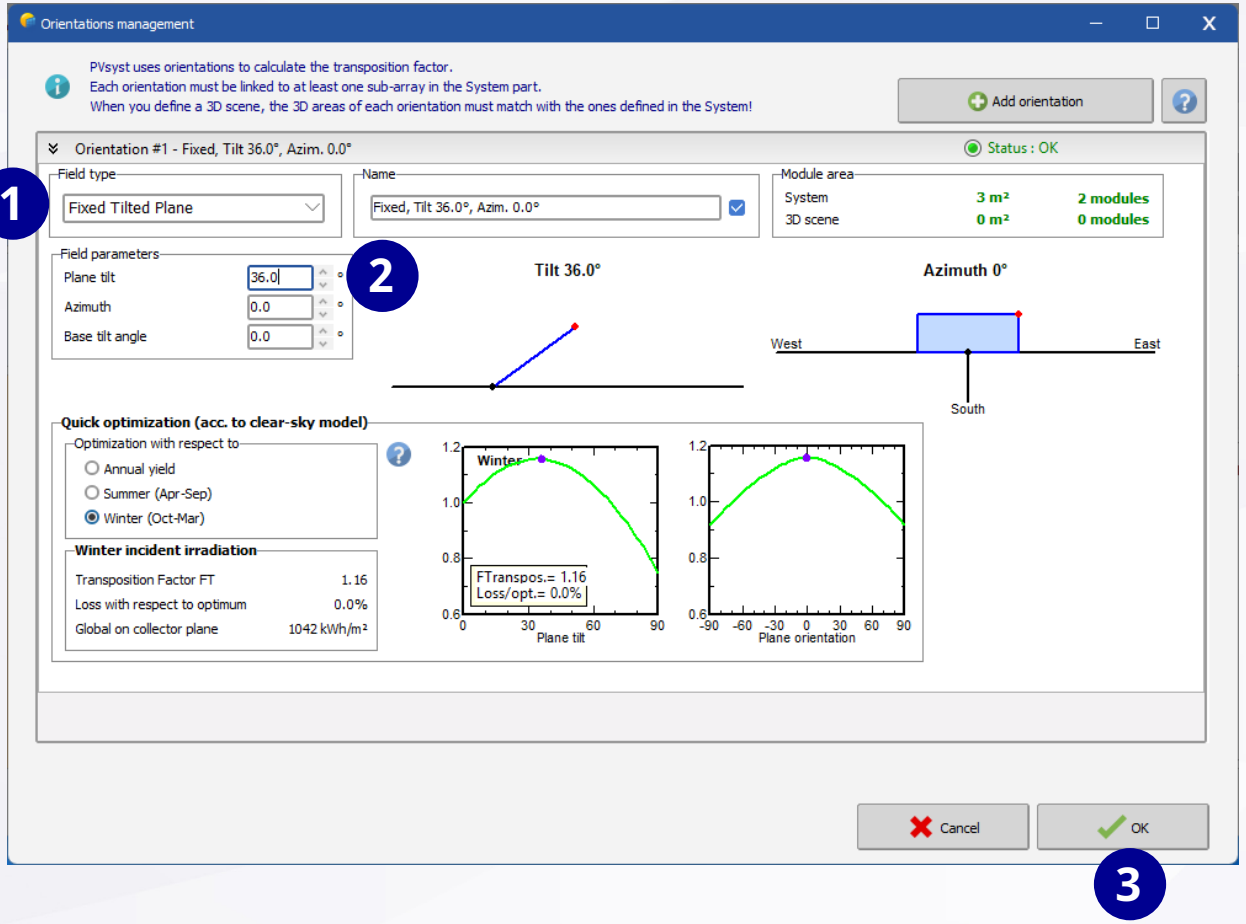


Chapter 5 : VC4 - Orientation Definition (2)

1. Choice between several possible configurations:
   select «Fixed tilted plane»

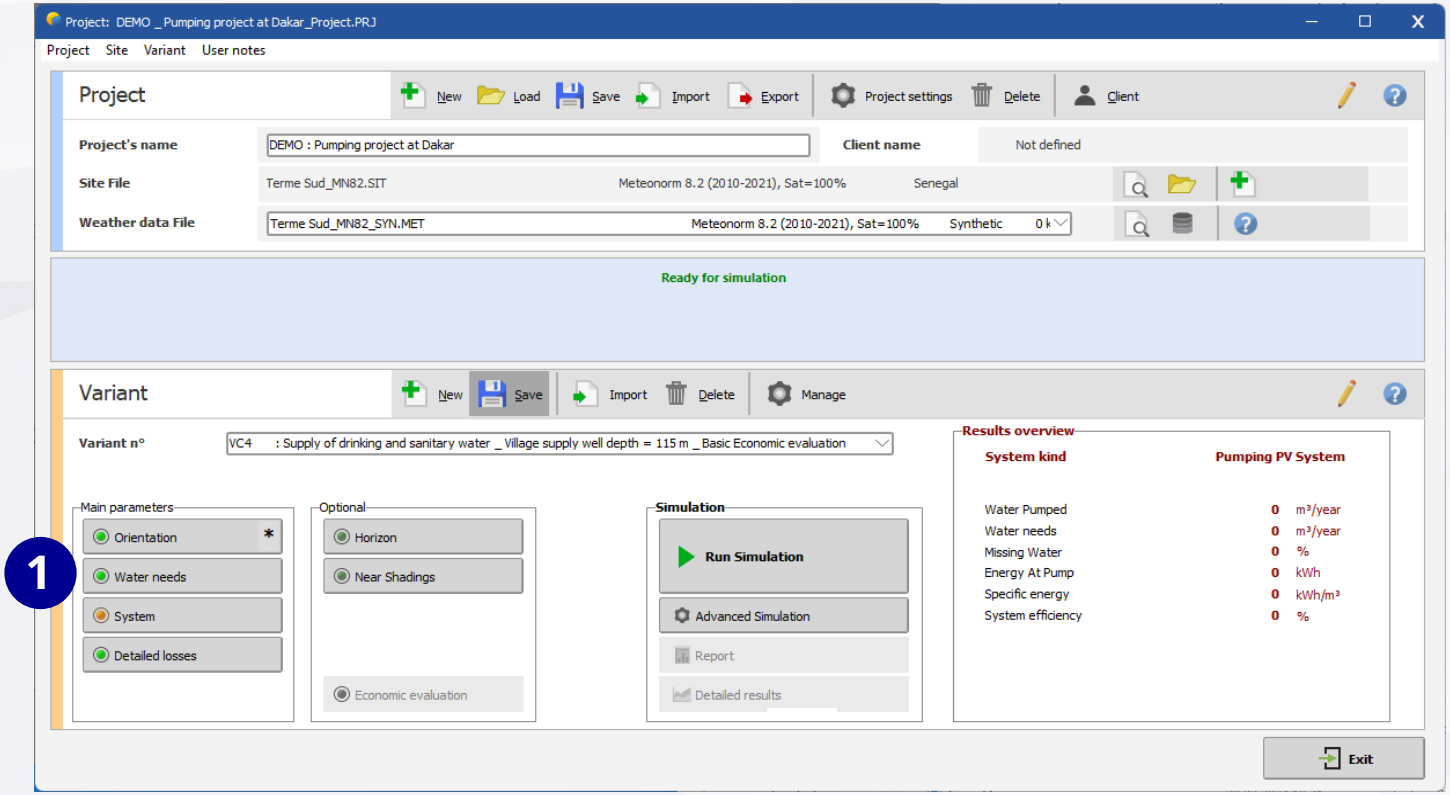
2. Set the field parameters: define the plane tilt at 36.0° and the azimuth at 0°

3. Click «OK»



Chapter 5 : VC4 - Definition of Water Needs

1 Define the water needs



Chapter 5 : VC4 - Water Needs (1)

1 Select the system type: «Deep Well to Storage»

2 Define the lake or river characteristics:

Static level : -100 m
Drawdown level : -0.80 m/m³/h
Maximum flow rate : 12.5 m³/h

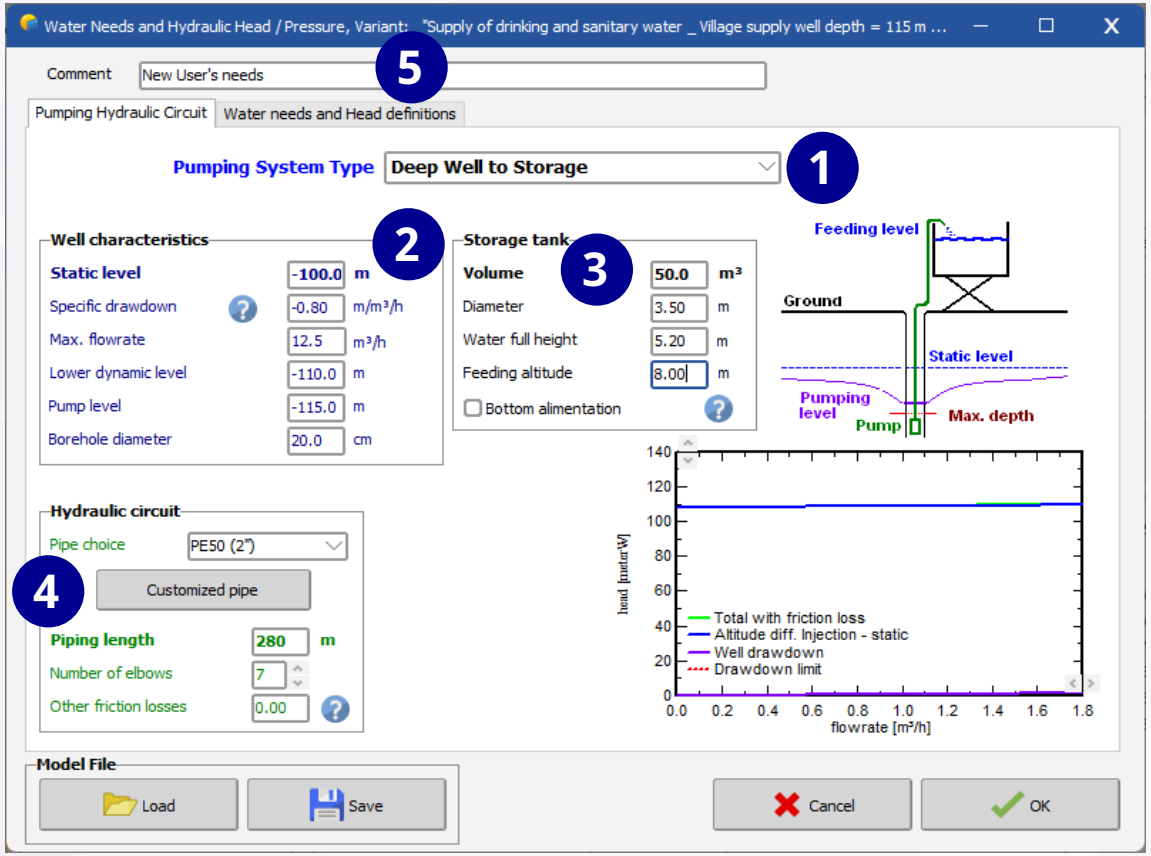
3 Define the tank characteristics:

Volume : 50 m³
Diameter : 3.50 m

4 Define the hydraulic circuit:

Pipe length : 280 m
Number of bends : 7

5 Click on:
«Definition of water needs and pressure»



Chapter 5 : VC4 - Water Needs (2)

1. Select the water needs:

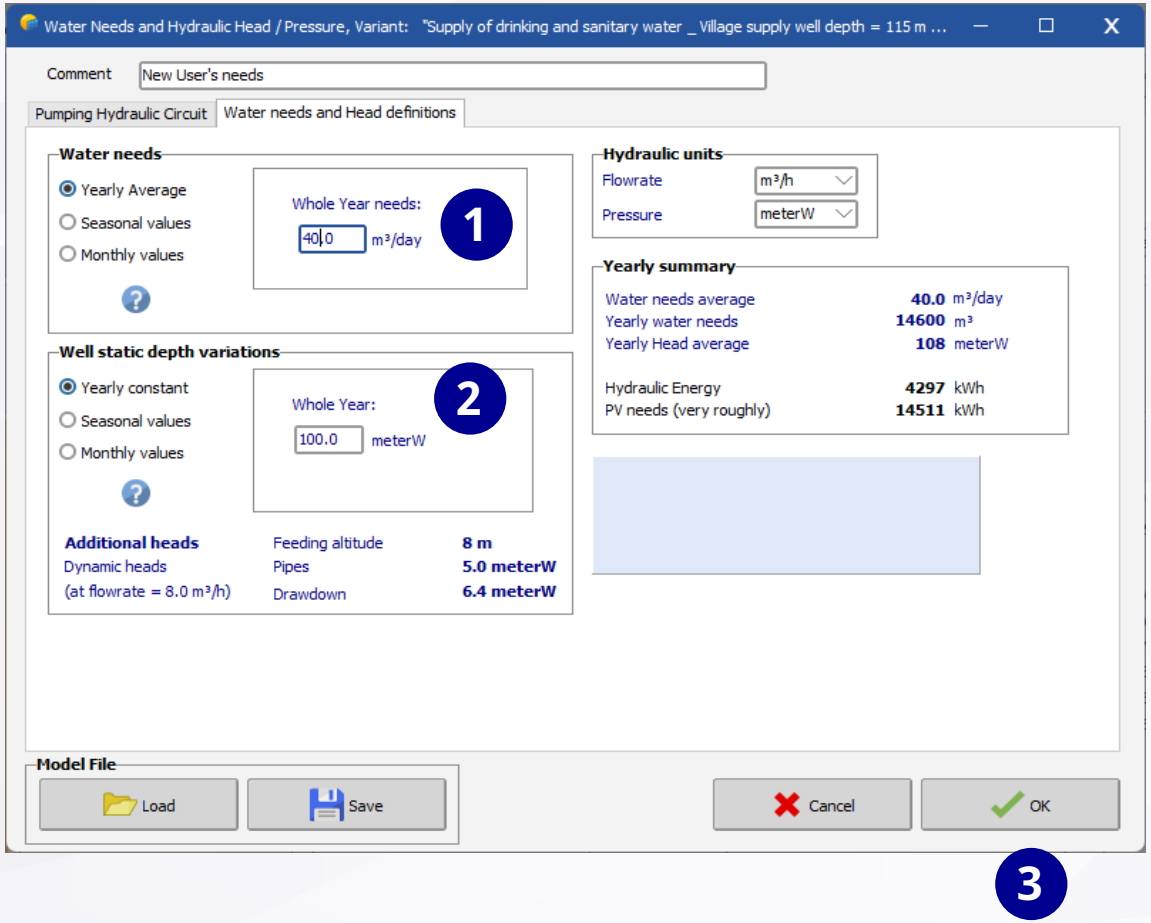
   Check «Annual average»
   Set 40.0 m³/day

2. Define the lake or river level variations:

   Check «Constant over the year»

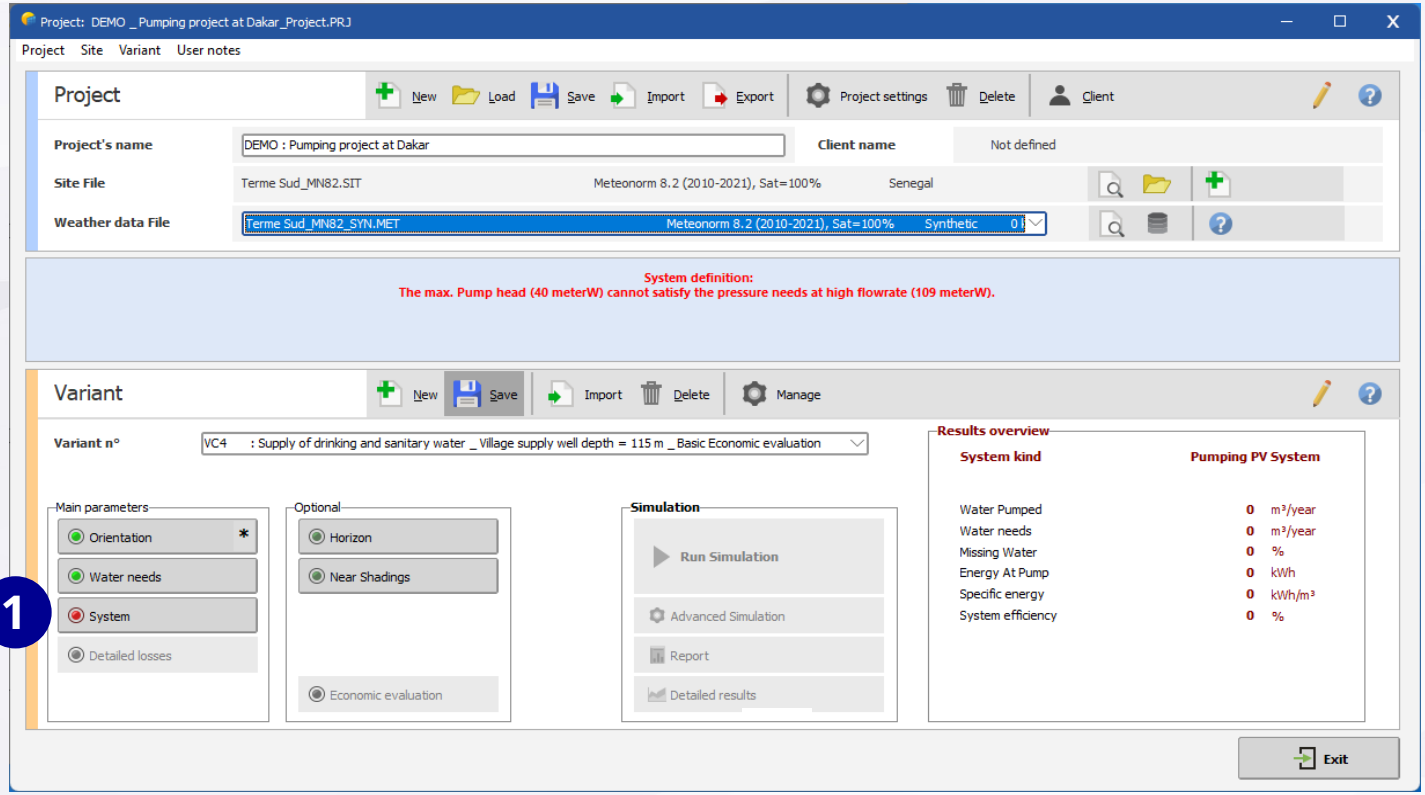
   Set 100 mWC

3. Click «OK»



Chapter 5 : VC4 - System Definition

1 Define the system



Chapter 5 : VC4 - System Definition (1)

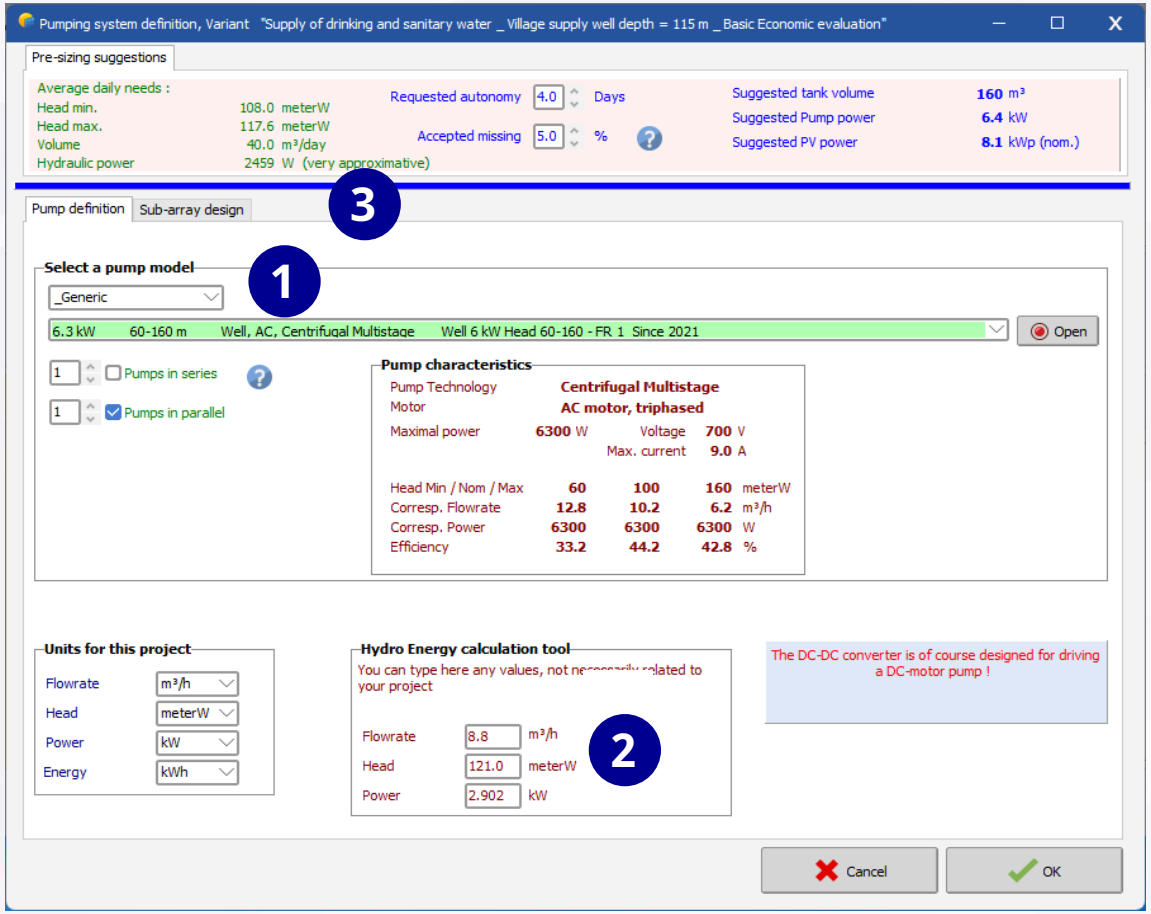
1 Pump model selection:

Select : «_Generic»
Select model : «6.3kW / 60-160m...»

2 Set the following values:

Flow rate : 8.8 m³/h
Pressure : 121.0 mWC
Power : 2.904 kW

3 Click on «Sub-array design»



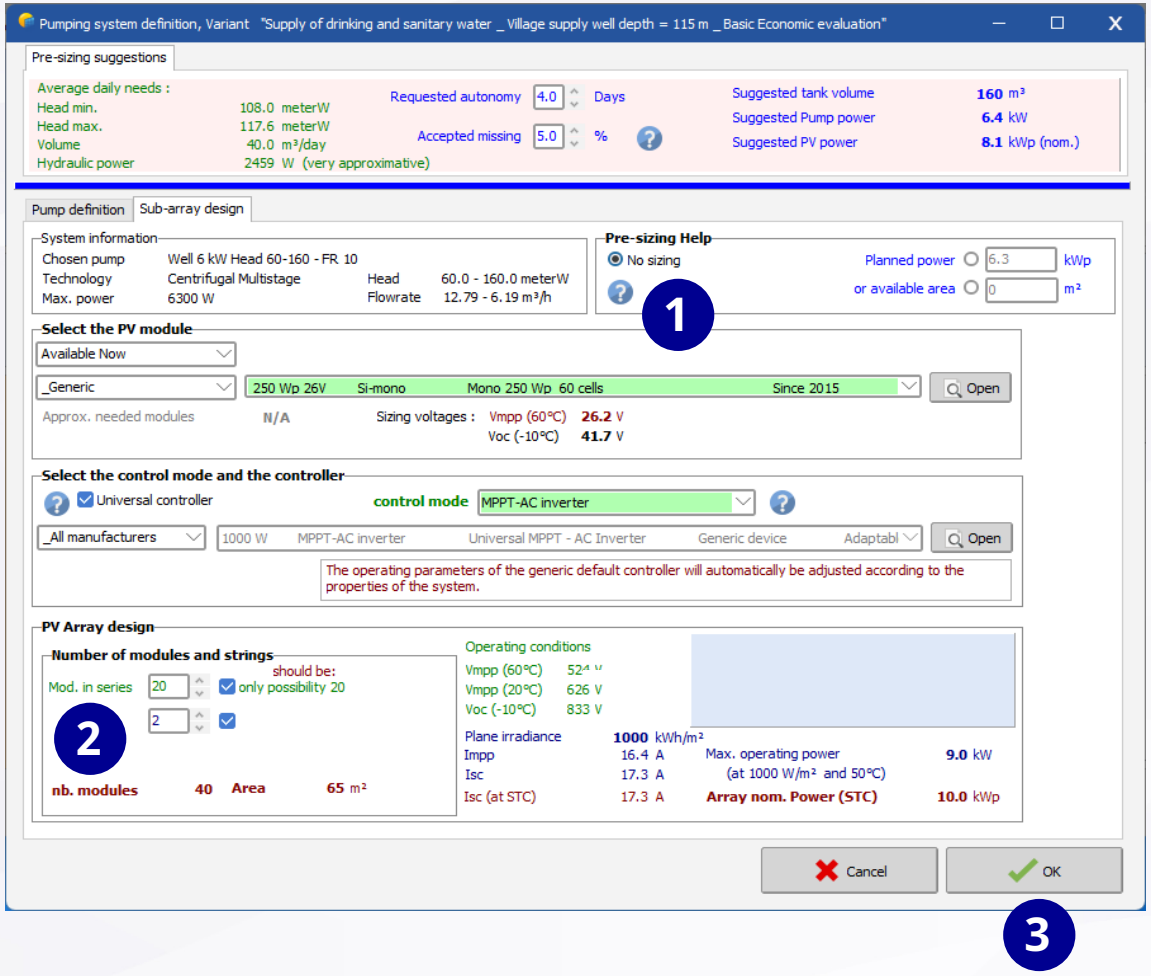
Chapter 5 : VC4 - System Definition (2)

1. Check «No pre-dimensioning»

2. Set the number of modules and strings:

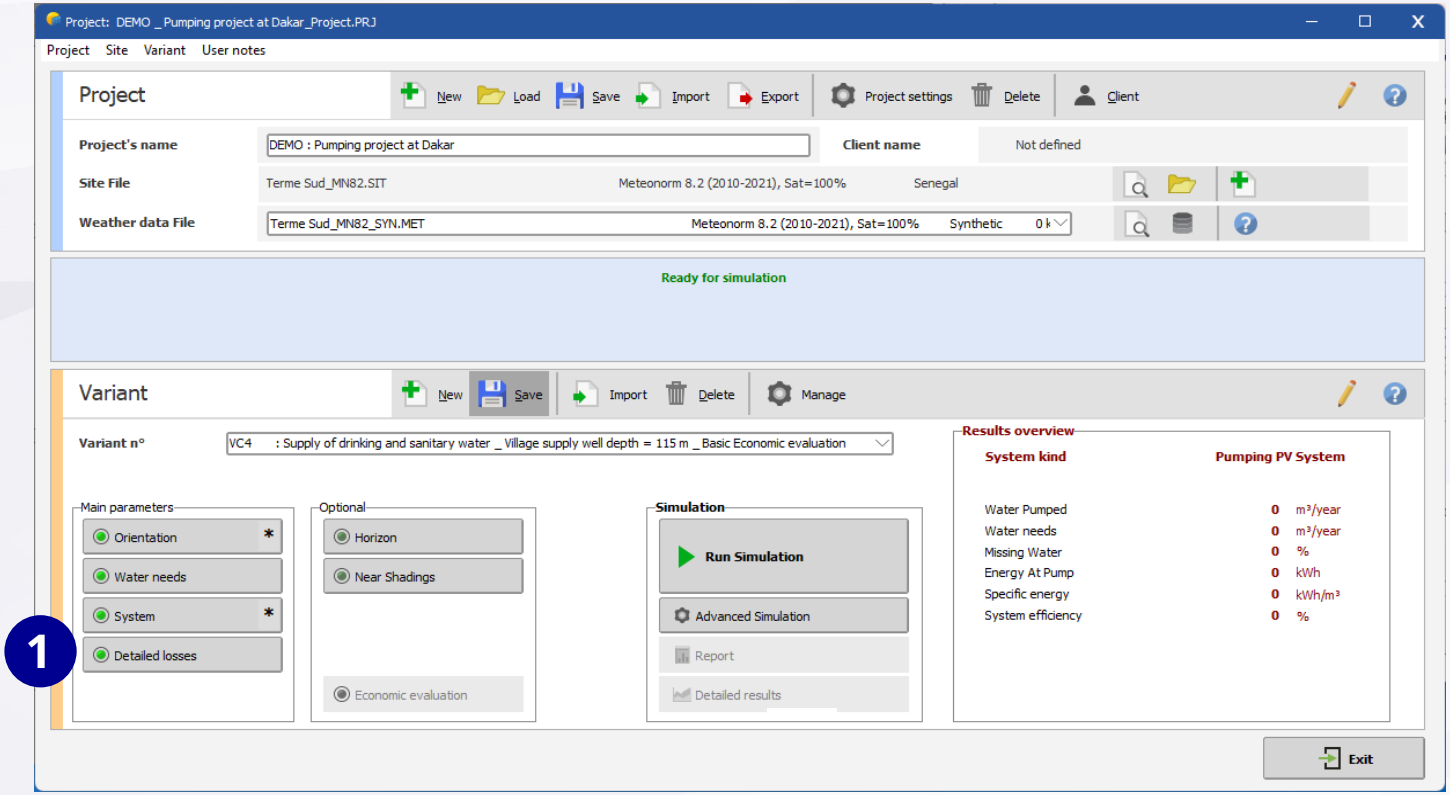
   Modules in series : 20
   Strings : 2

3. Click «OK»



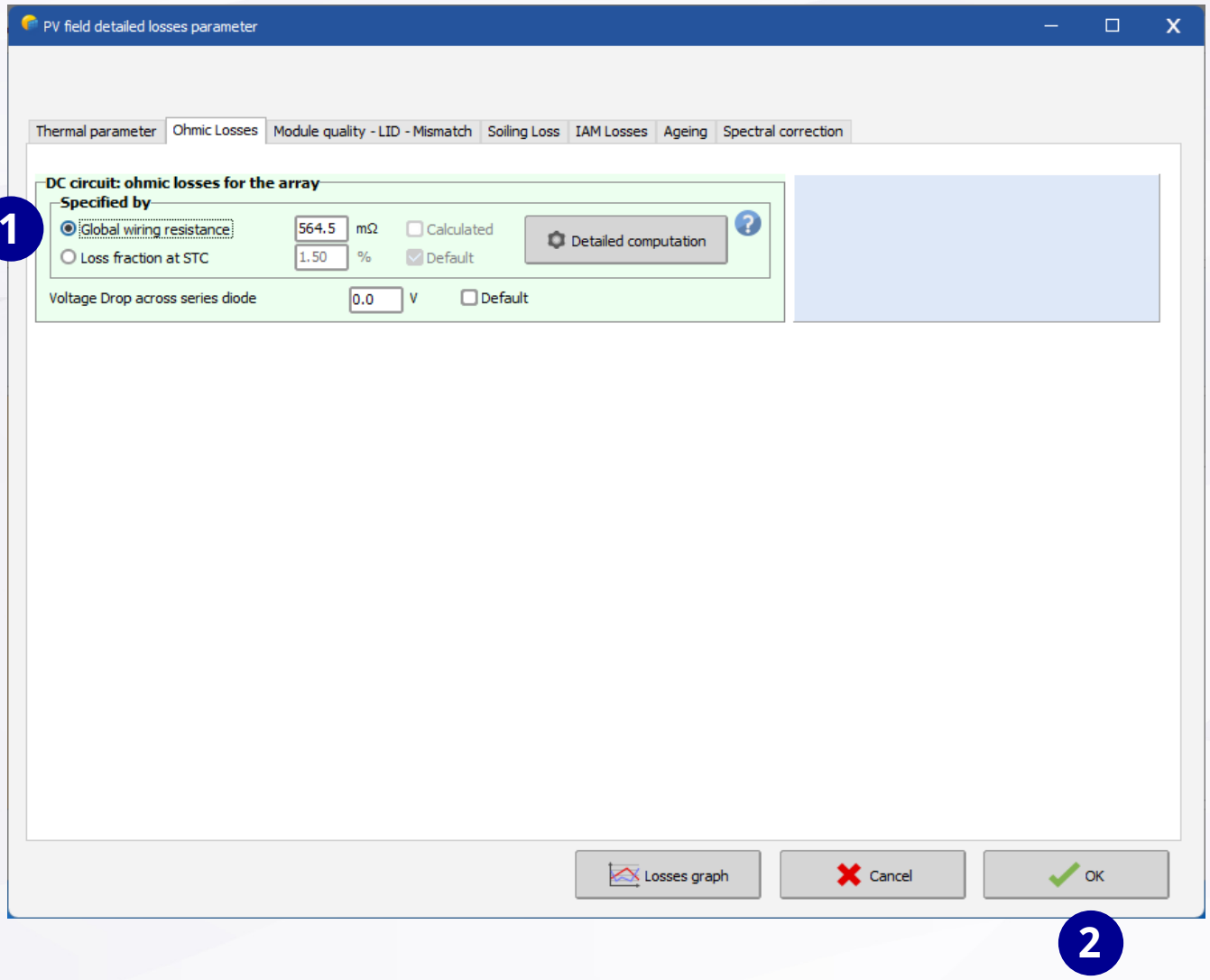
Chapter 5 : VC4 - Definition of Detailed Losses

1 Define the detailed losses



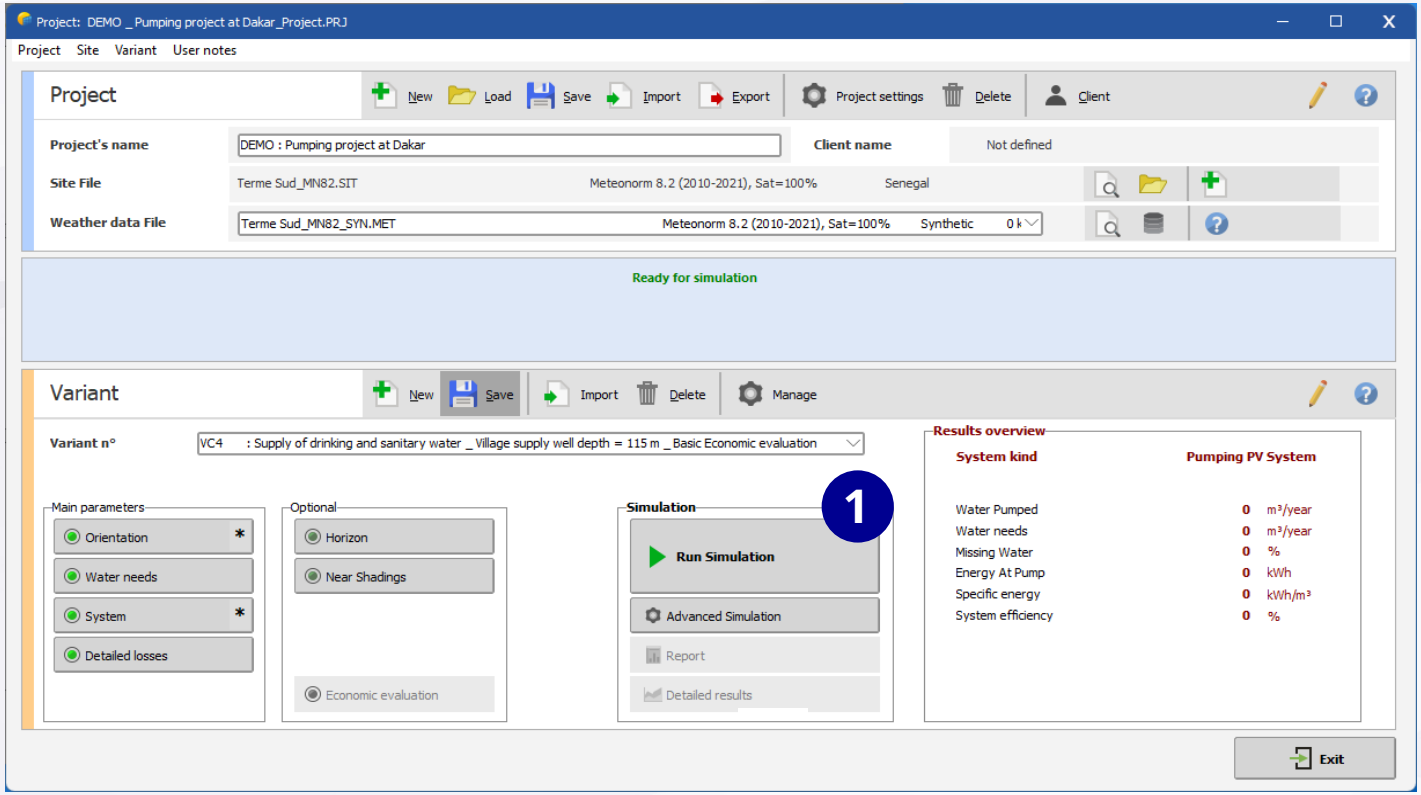
Chapter 5 : VC4 - Detailed Losses

1. In the «Ohmic losses» window, Select «Global wiring resistance»
2. Click «OK»



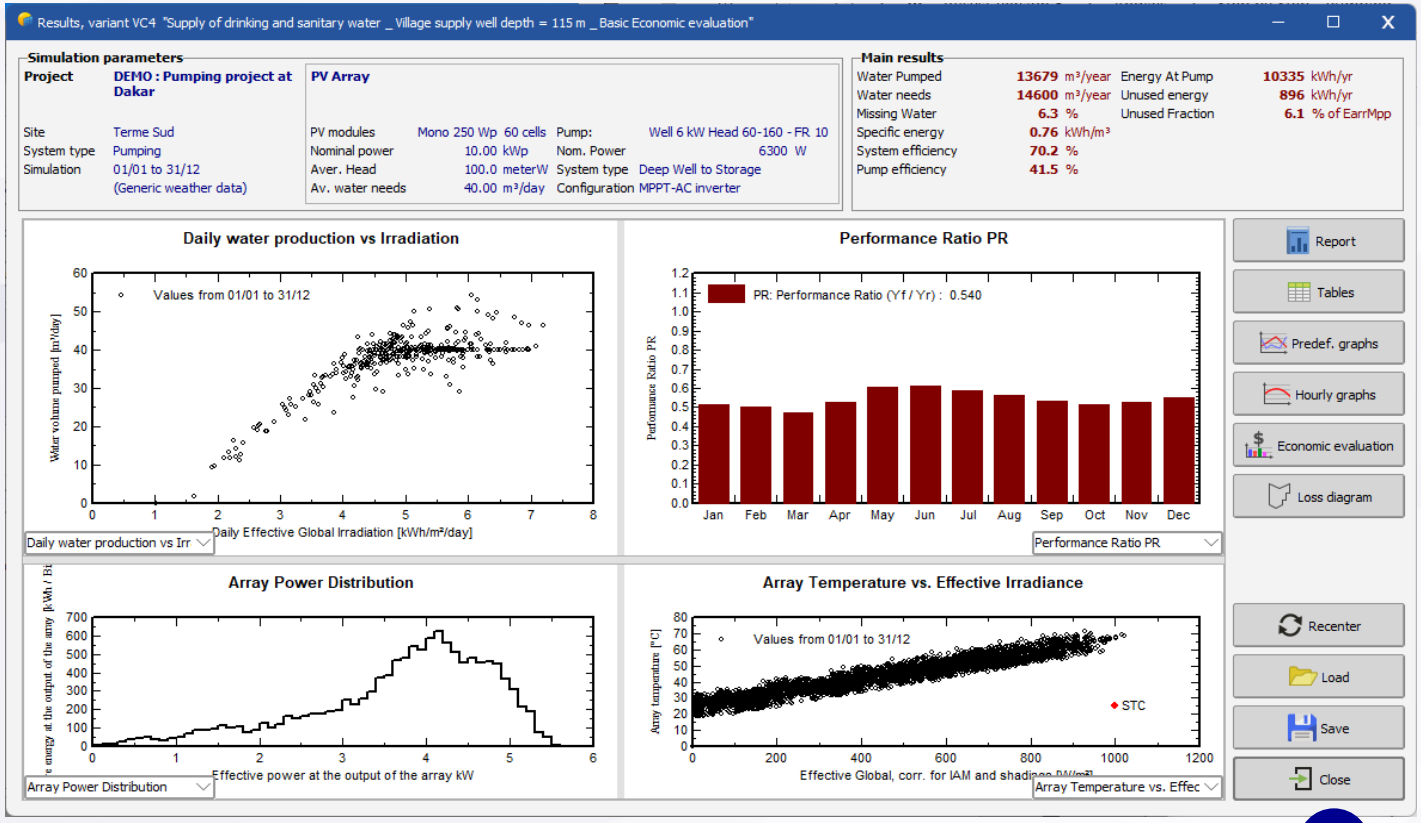
Chapter 5 : VC4 - Run the Simulation

1 Click on «Run simulation»



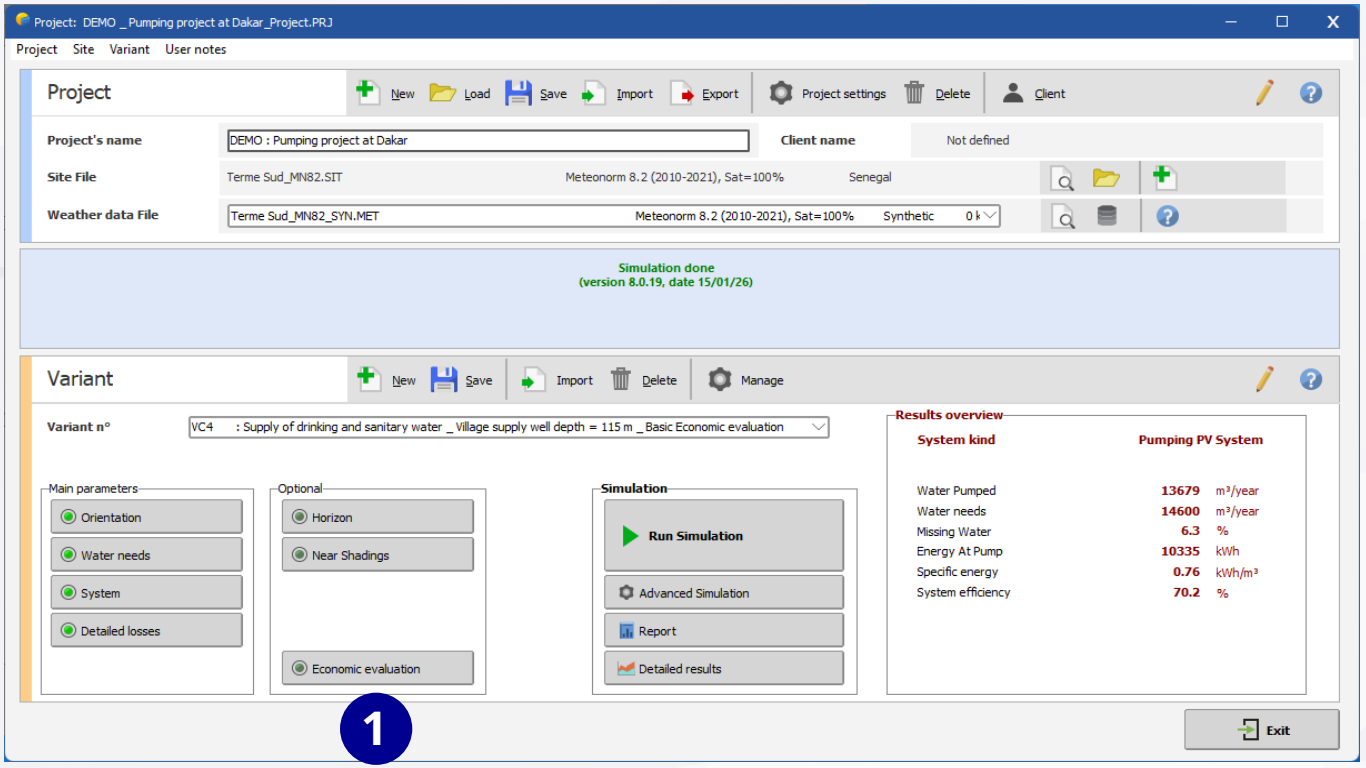
Chapter 5 : VC4 - Run the Simulation

1 Click «Close»



Chapter 5: VC4 - Economic Evaluation

1 Click on «Economic evaluation»



Chapter 5: VC4 - Economic Evaluation (1)

1 Enter the following values:

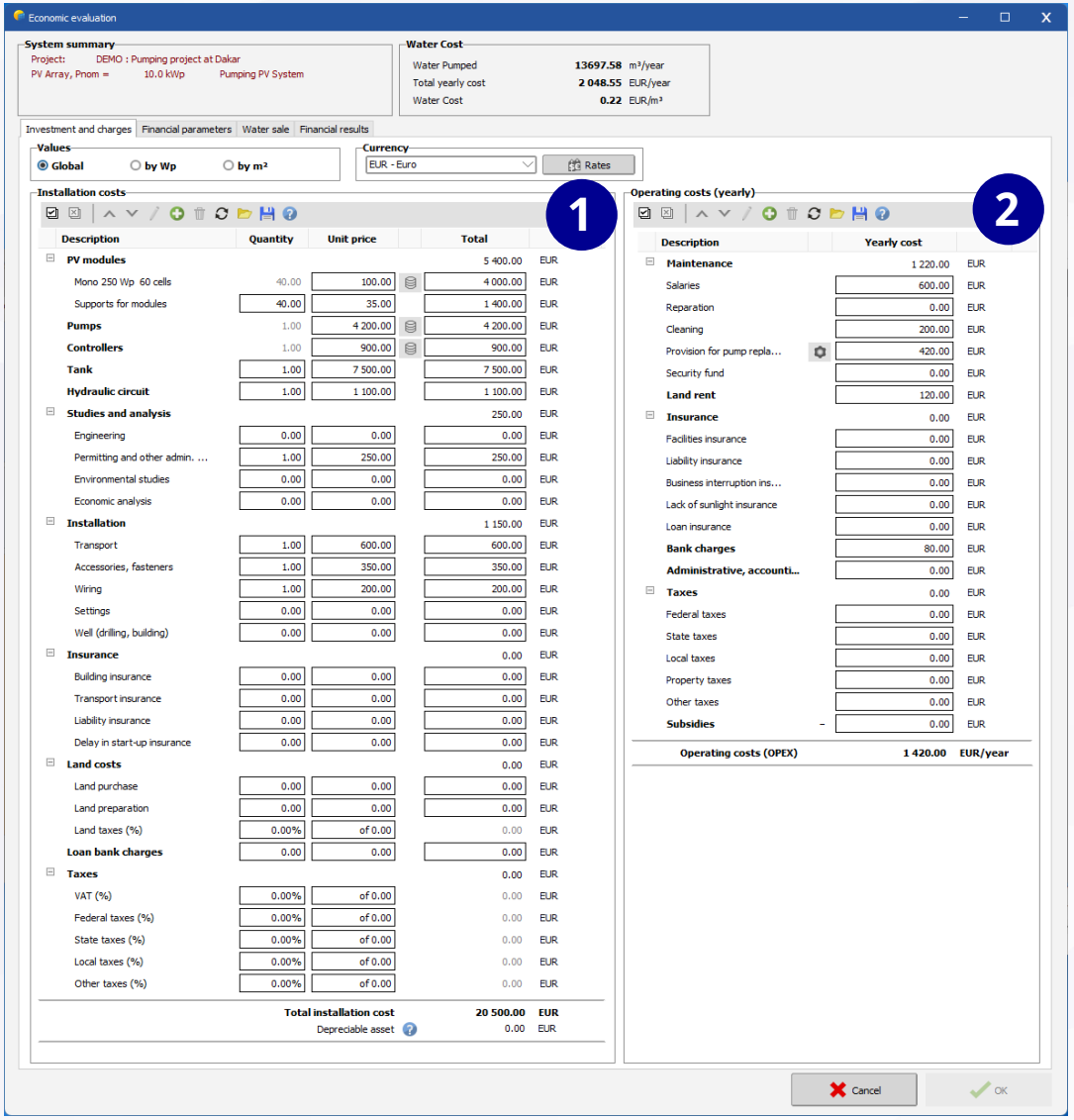
Mono 250 Wp 60 cells	: 4,000.00
Module supports	: 1,400.00
Pumps	: 4,200.00
Tank	: 900.00
Hydraulic circuit	: 7,500.00
Controllers	: 1,100.00
Permits and other fees	: 250.00

Installation cost;

per module	: 600.00
per inverter	: 350.00
Transport	: 200.00

2 Enter the following values:

Salaries	: 600.00
Cleaning	: 200.00
Replacement provision	: 420.00
Land rental	: 120.00
Bank fees	: 80.00



Chapter 5: VC4 - Economic Evaluation (2)

1 Enter the following values:

Project duration : 20 years
Starting year : 2021
Inflation : 1.00 %/year
Discount rate : 0.50 %/year

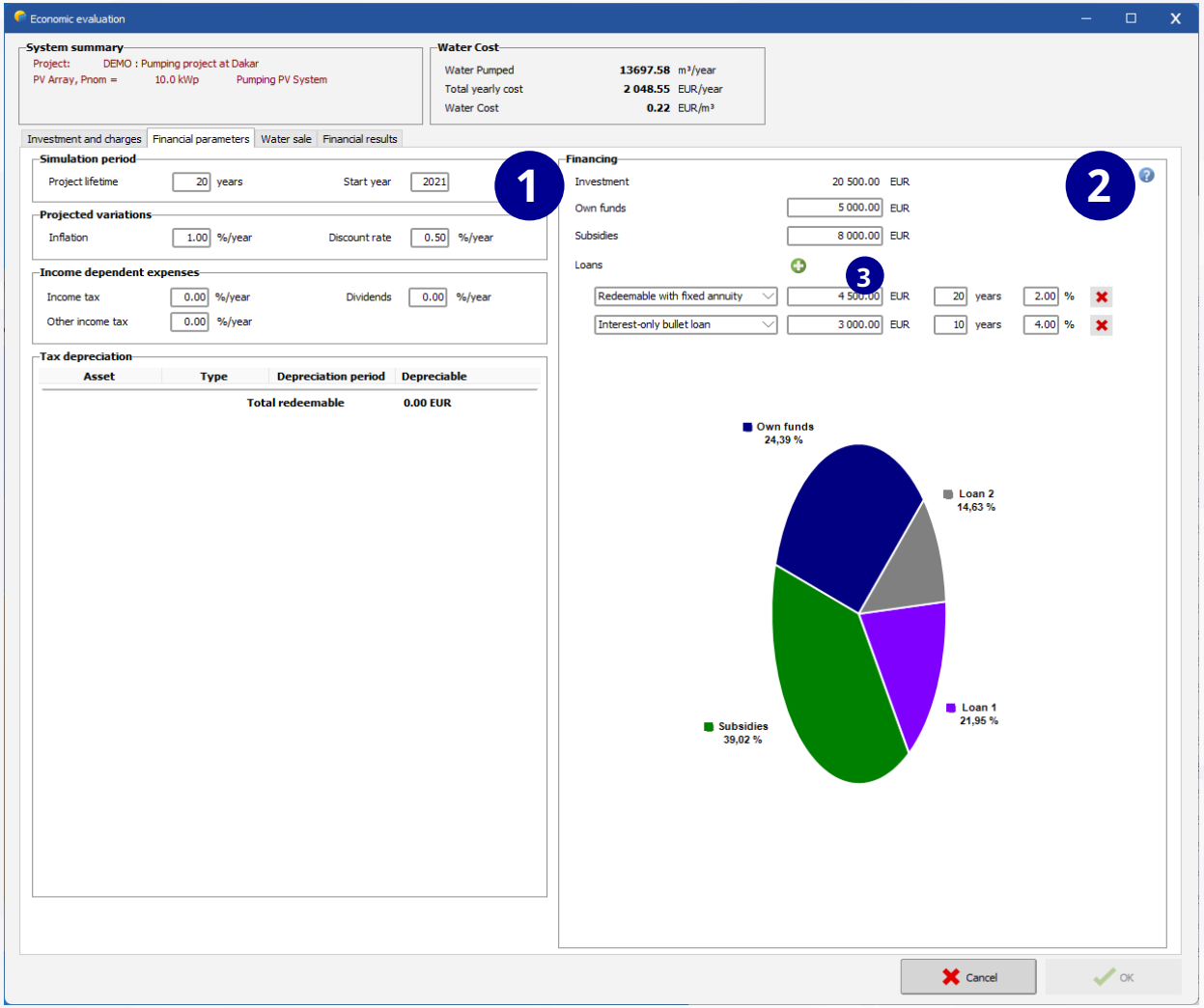
2 Enter the following values:

Equity capital : 5,000.00
Subsidies : 8,000.00

3 Click on the «Add» icon,

then add:

Constant annuity : 4,500.00 / 20 years / 2.00 %
In fine : 3,000.00 / 10 years / 4.00 %



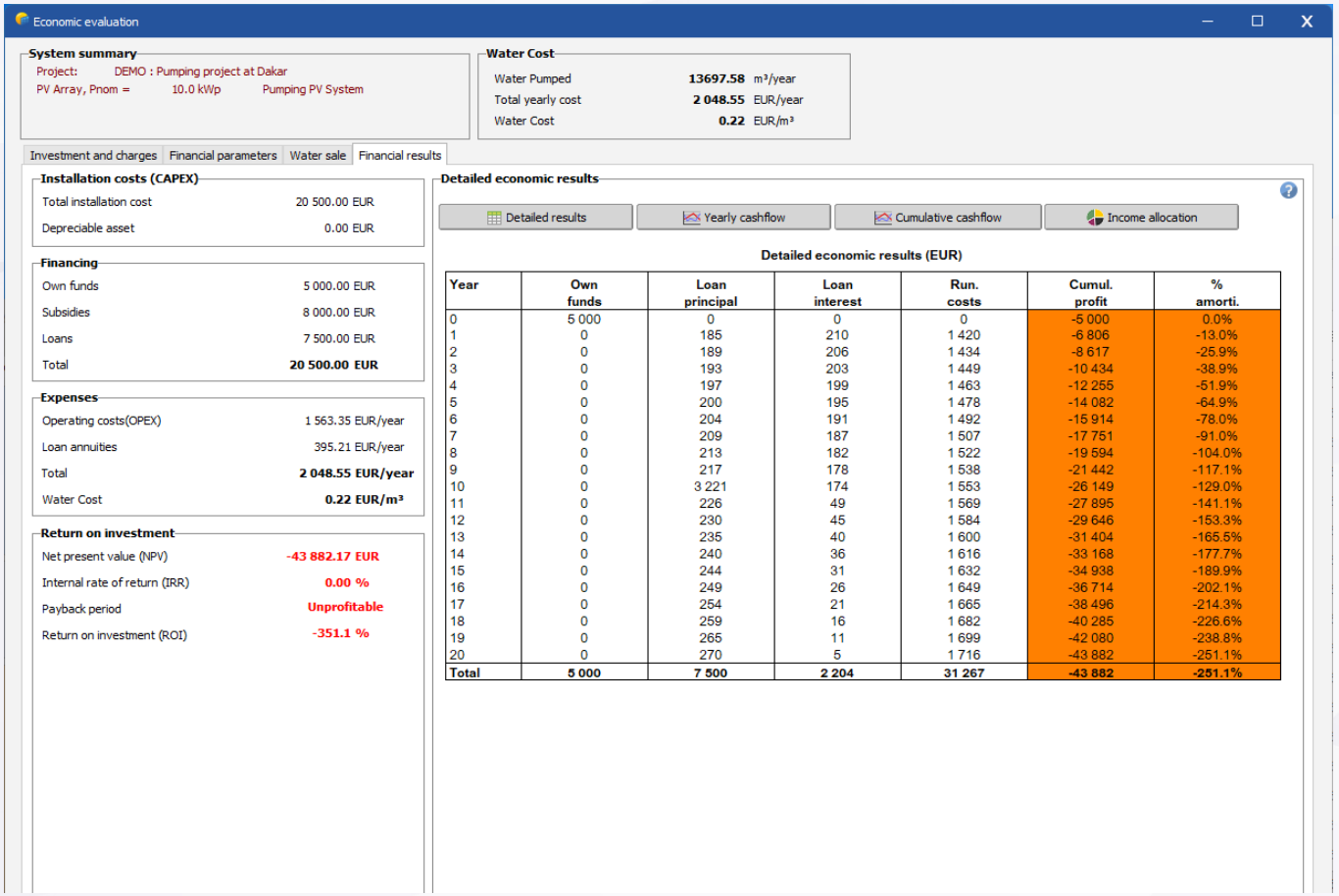
Chapter 5 : VC4 - Economic Evaluation

1

The financial results are available in the window:

«Financial results»

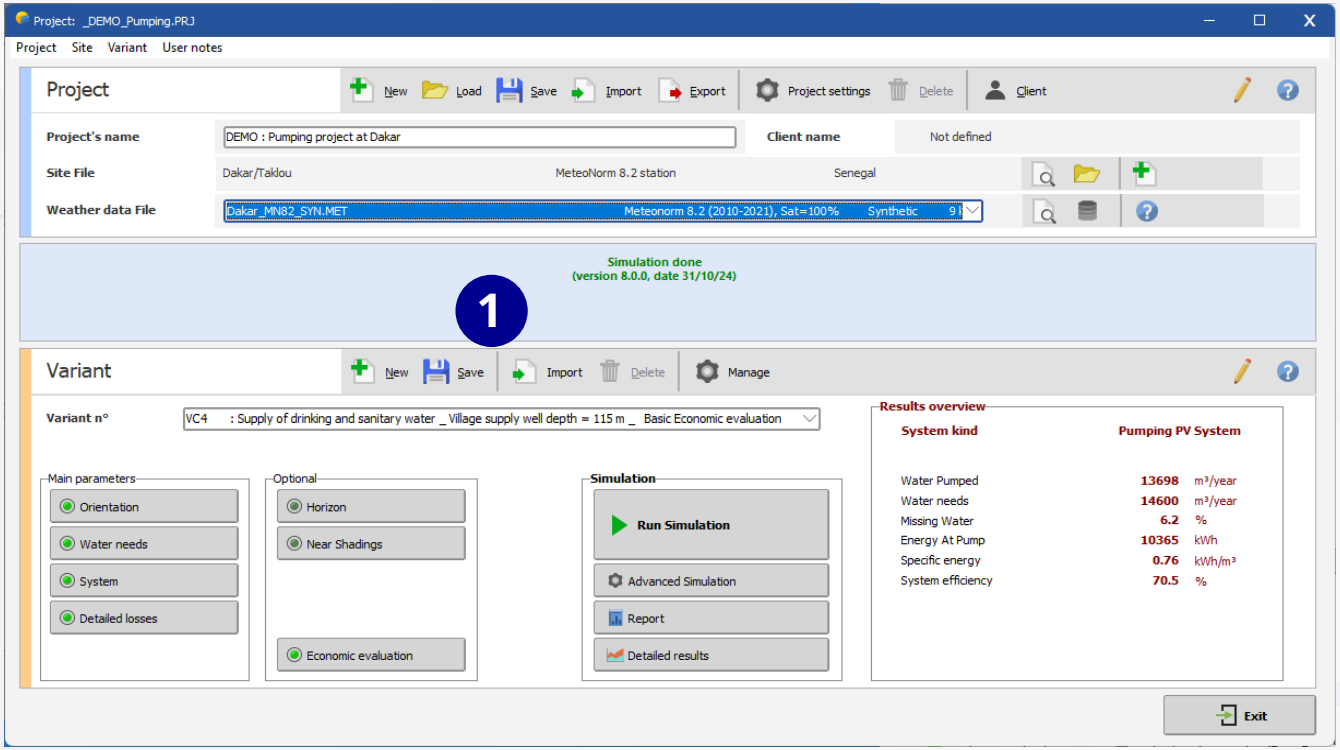
1



Year	Own funds	Loan principal	Loan interest	Run. costs	Cumul. profit	% amorti.
0	5 000	0	0	0	-5 000	0.0%
1	0	185	210	1 420	-6 806	-13.0%
2	0	189	206	1 434	-8 617	-25.9%
3	0	193	203	1 449	-10 434	-38.9%
4	0	197	199	1 463	-12 255	-51.9%
5	0	200	195	1 478	-14 082	-64.9%
6	0	204	191	1 492	-15 914	-78.0%
7	0	209	187	1 507	-17 751	-91.0%
8	0	213	182	1 522	-19 594	-104.0%
9	0	217	178	1 538	-21 442	-117.1%
10	0	3 221	174	1 553	-26 149	-129.0%
11	0	226	49	1 569	-27 895	-141.1%
12	0	230	45	1 584	-29 646	-153.3%
13	0	235	40	1 600	-31 404	-165.5%
14	0	240	36	1 616	-33 168	-177.7%
15	0	244	31	1 632	-34 938	-189.9%
16	0	249	26	1 649	-36 714	-202.1%
17	0	254	21	1 665	-38 496	-214.3%
18	0	259	16	1 682	-40 285	-226.6%
19	0	265	11	1 699	-42 080	-238.8%
20	0	270	5	1 716	-43 882	-251.1%
Total	**5 000**	**7 500**	**2 204**	**31 267**	**-43 882**	**-251.1%**

Chapter 6 : VC5 - Project Creation

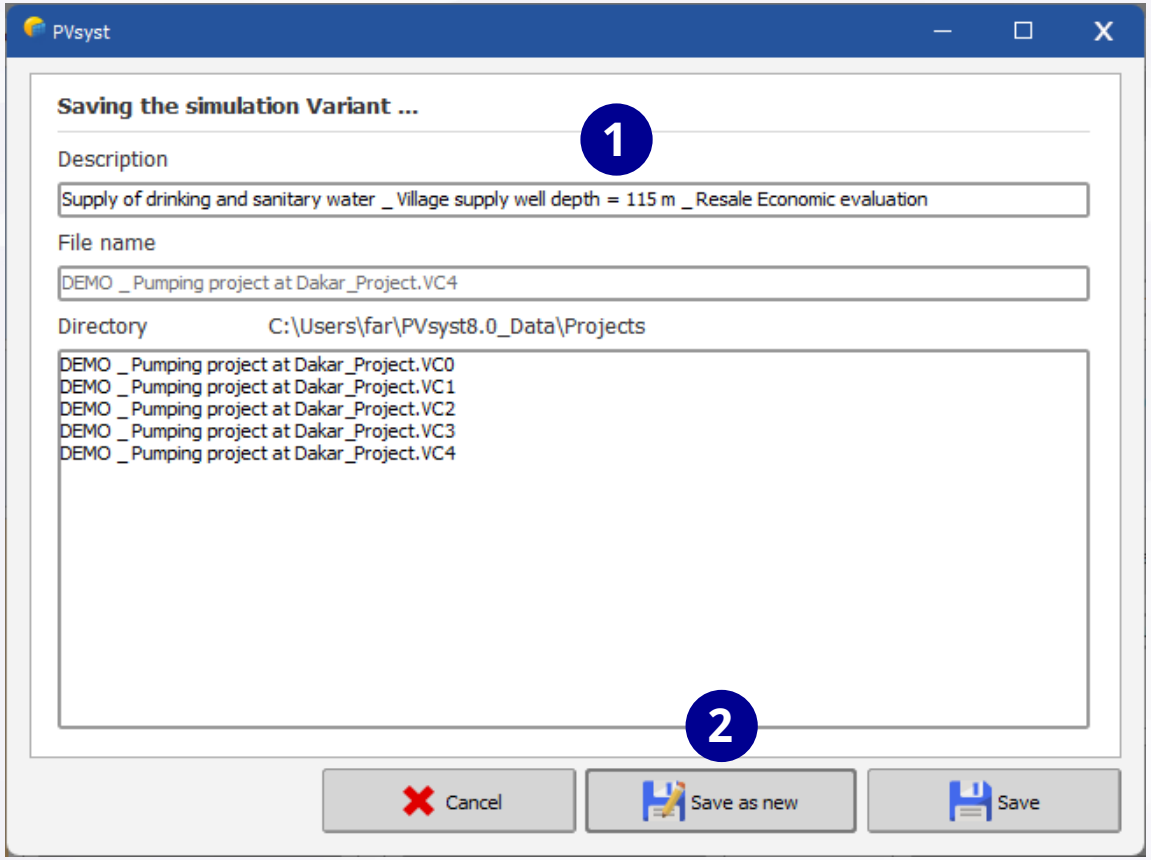
1 Click on «Save» to create a new variant.



Chapter 6 : VC5 - Project Creation

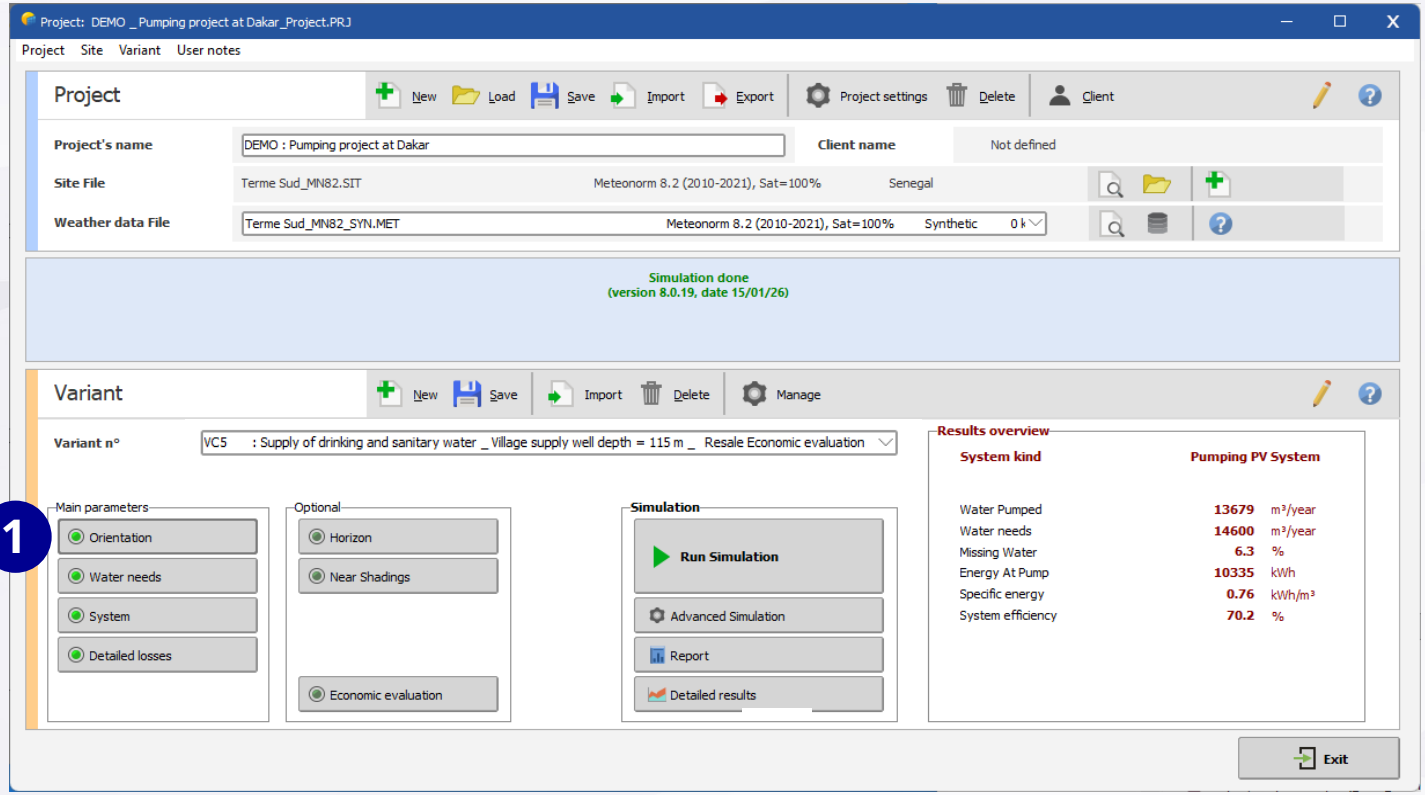
1. Give a new name to the new variant: «Supply of drinking and sanitary water _ Village supply well depth = 115 m _ Resale Economic evaluation»

2. Click «Save as new» to create the new variant using the previous parameters



Chapter 6 : VC5 - Orientation Definition (1)

1 Set the orientation

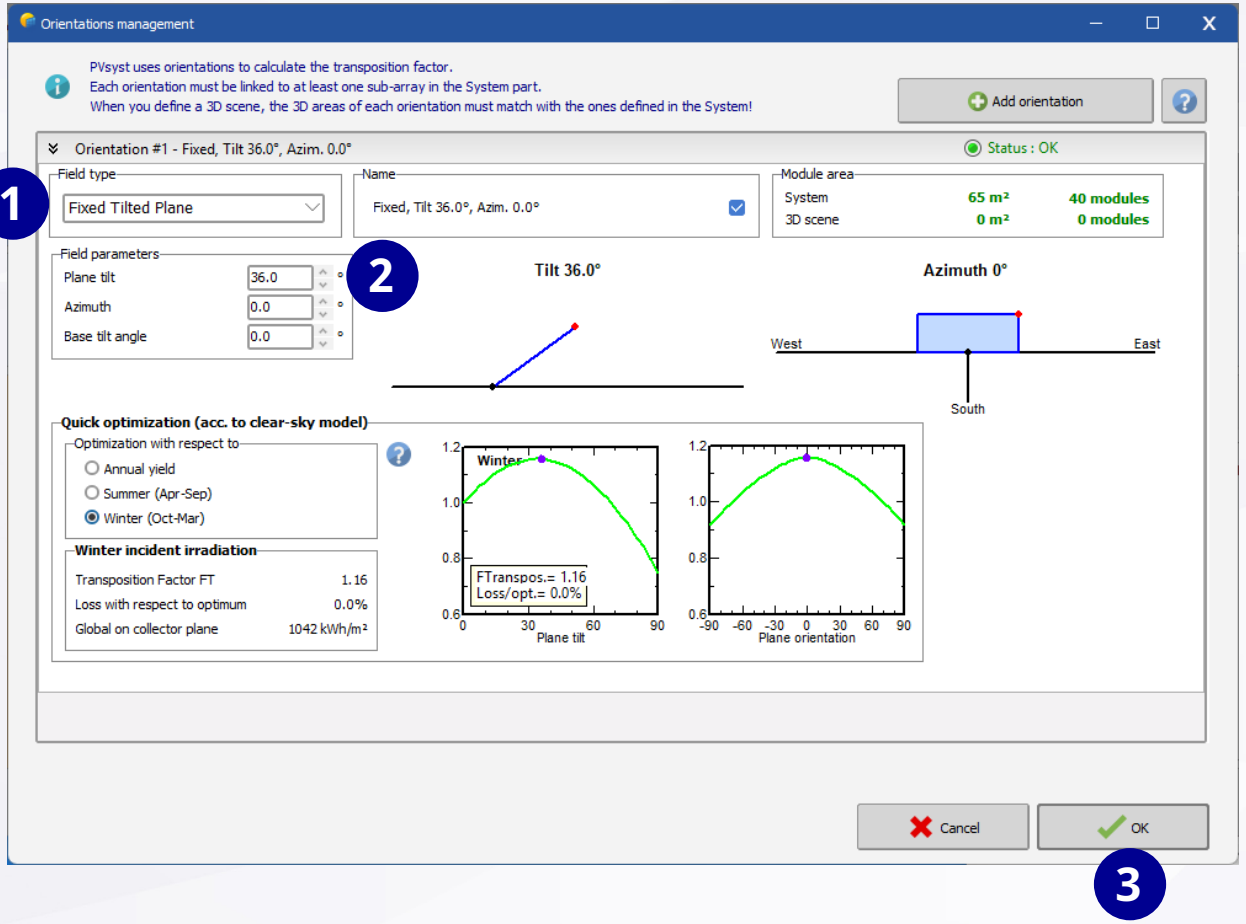


Chapter 6 : VC5 - Orientation Definition (2)

1. Choice between several possible configurations:
select «Fixed tilted plane»

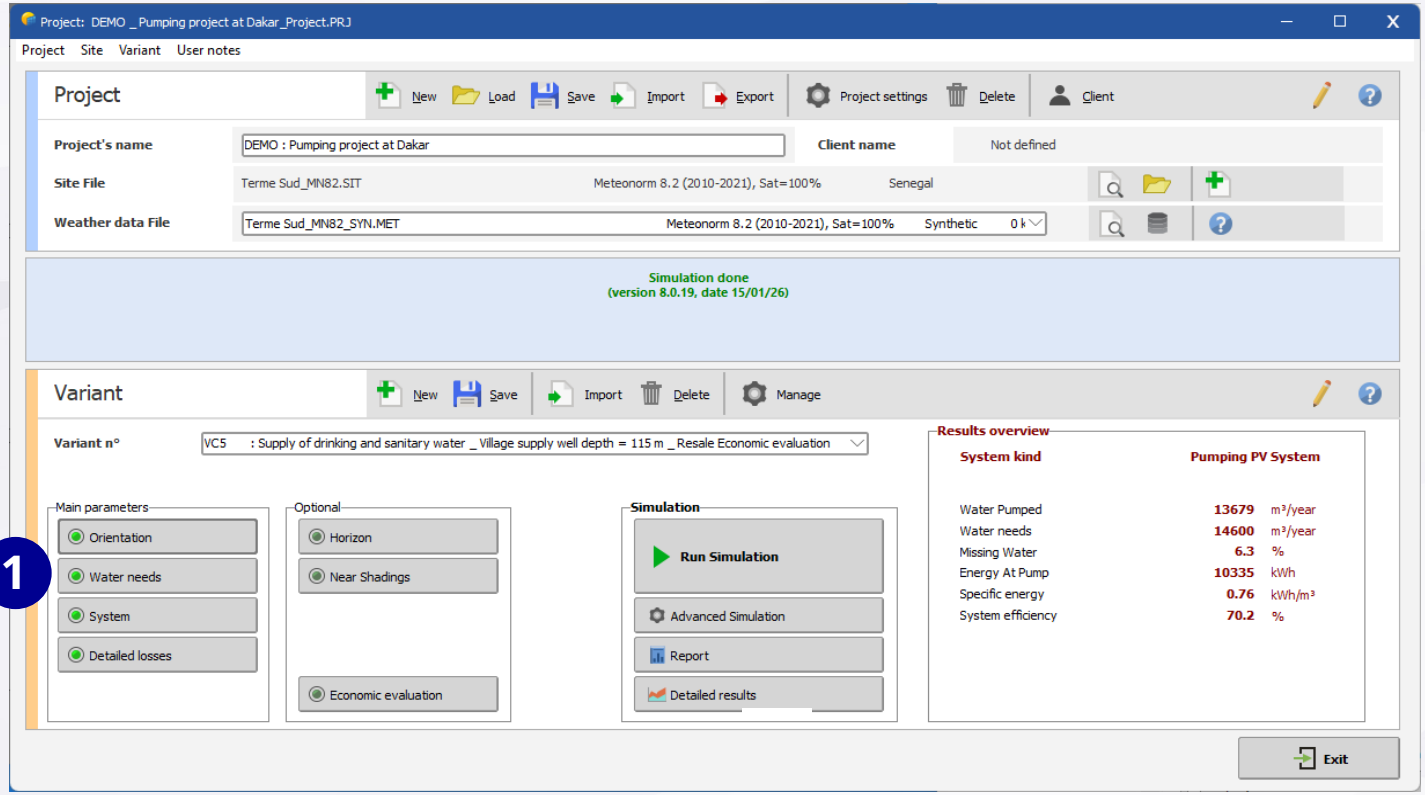
2. Set the field parameters: define the plane tilt at 36.0° and the azimuth at 0°

3. Click «OK»



Chapter 6 : VC5 - Definition of Water Needs

1 Define the water needs



Chapter 6 : VC5 - Water Needs (1)

1 Select the system type : «Borehole to tank»

2 Define the lake or river characteristics:

Static level : -100 m
Drawdown level : -0.80 m/m³/h
Maximum flow rate : 12.5 m³/h

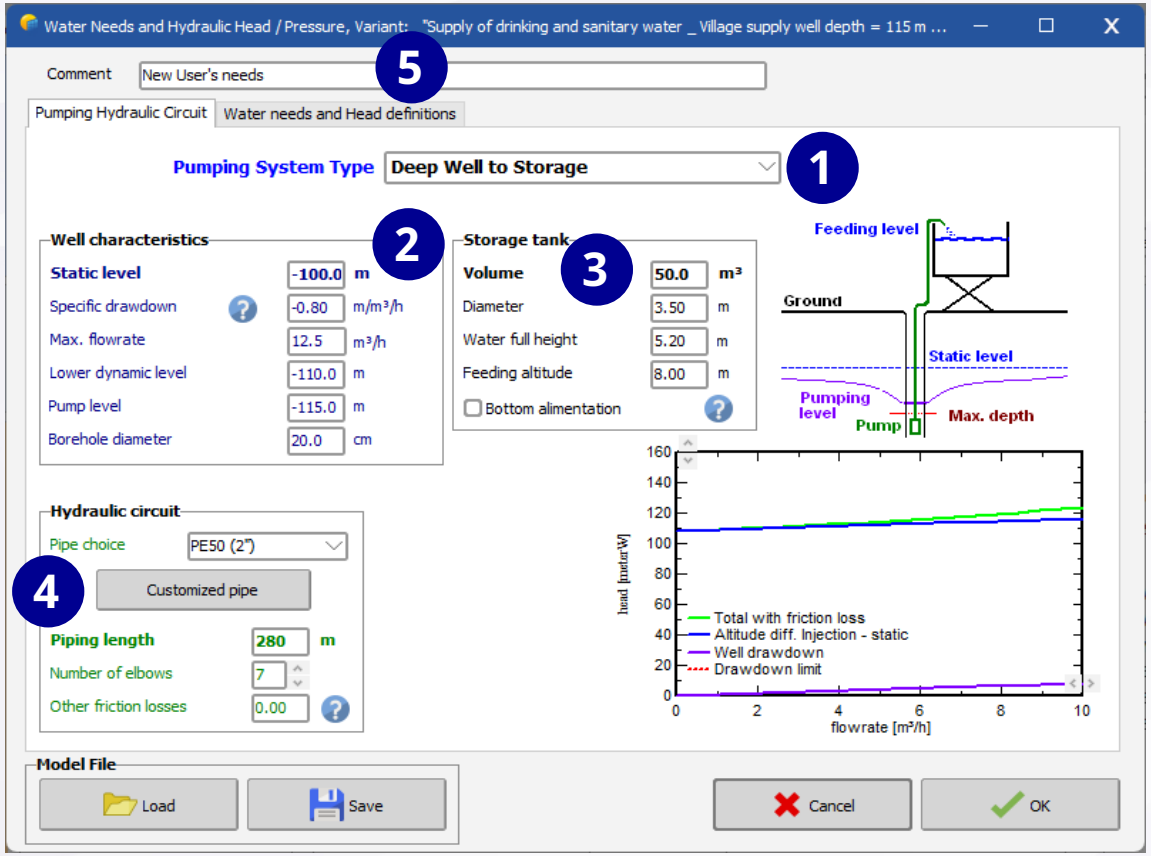
3 Define the tank characteristics:

Volume : 50 m³
Diameter : 3.50 m

4 Define the hydraulic circuit:

Pipe length : 280 m
Number of bends : 7

5 Click on:
«Definition of water needs and pressure»



Chapter 6 : VC5 - Water Needs (2)

1. Select the water needs:

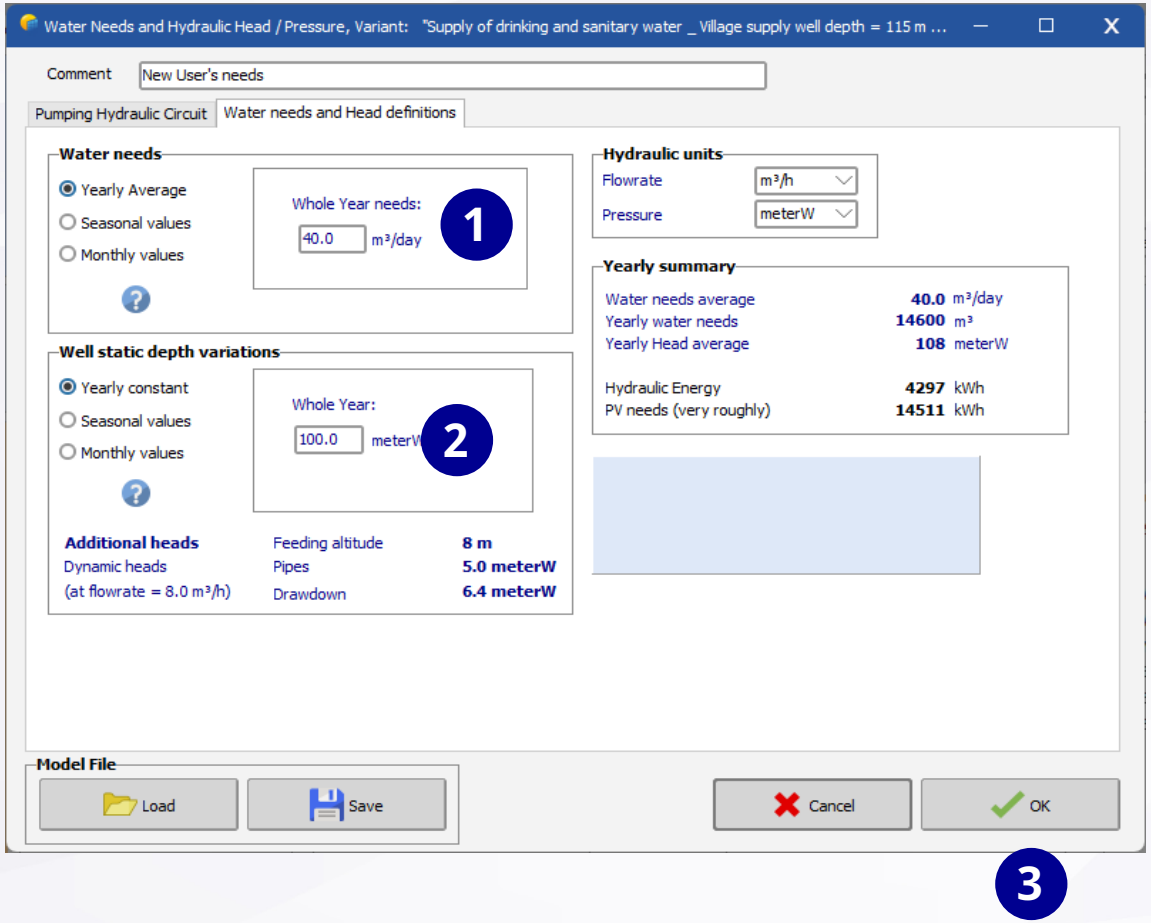
   Check «Annual average»
   Set 40.0 m³/day

2. Define the lake or river level variations:

   Check «Constant over the year»

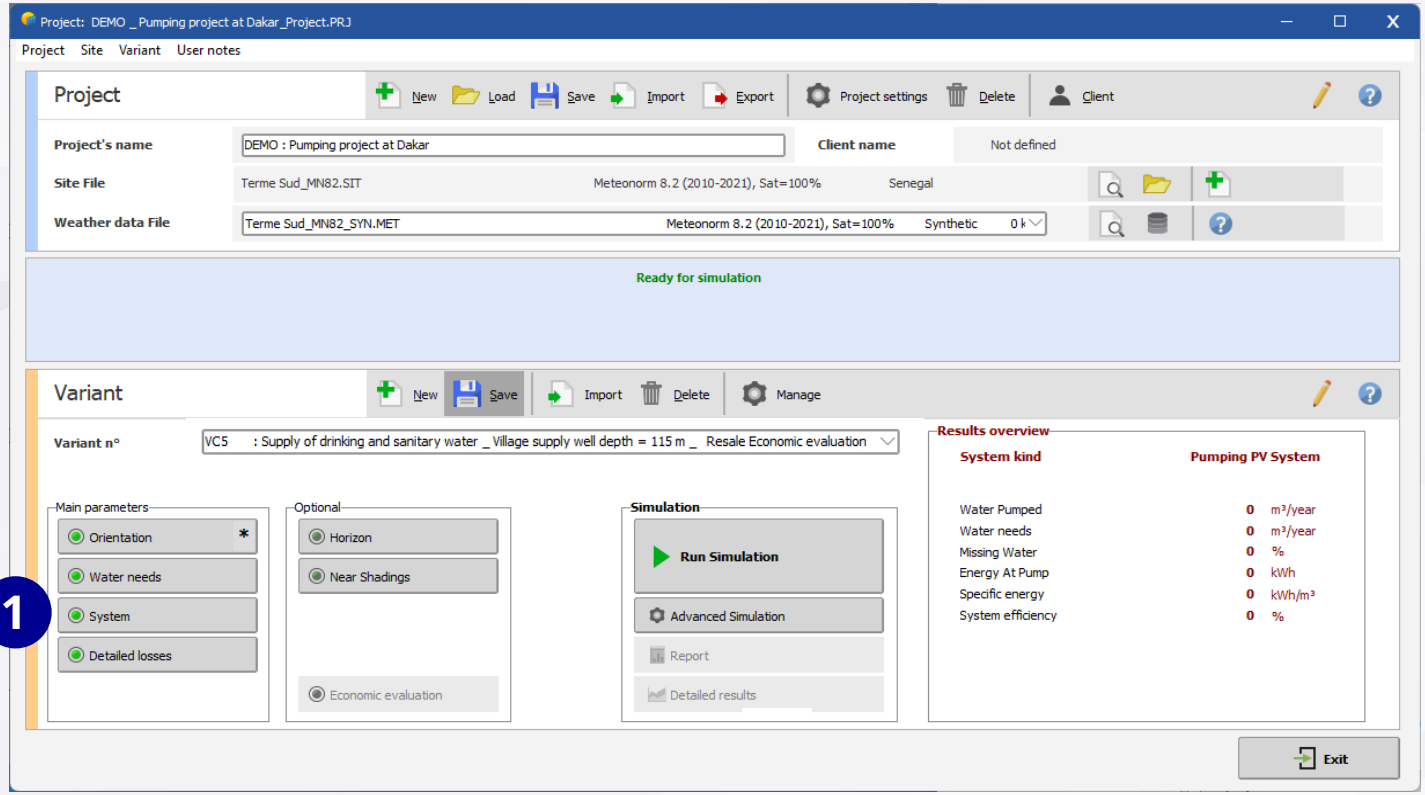
   Set 100 mWC

3. Click «OK»



Chapter 6: VC5 - System Definition

1 Define the system



Chapter 6 : VC5 - System Definition (1)

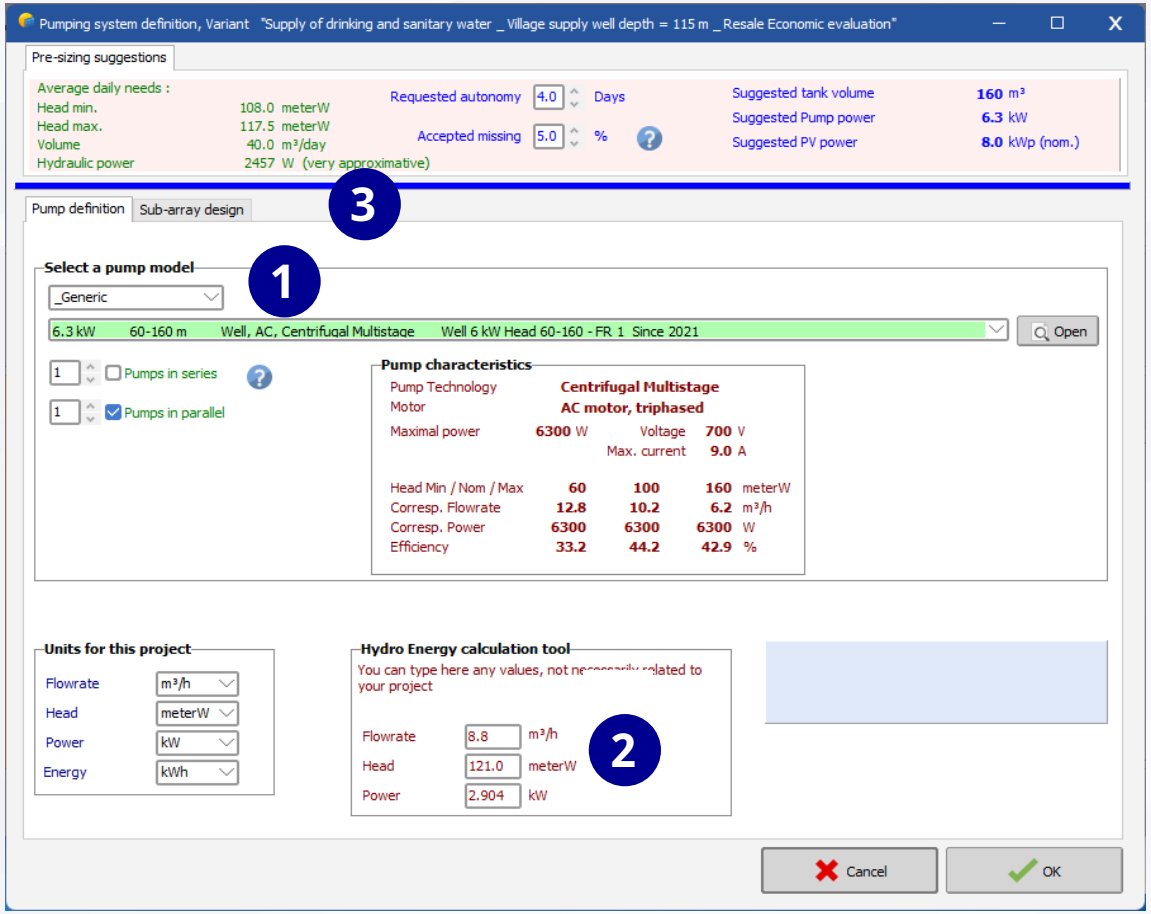
1 Pump model selection:

Select : «_Generic»
Select model : «6.3kW / 60-160m...»

2 Set the following values:

Flow rate : 8.8 m³/h
Pressure : 121.0 mWC
Power : 2.904 kW

3 Click on «Sub-array design»



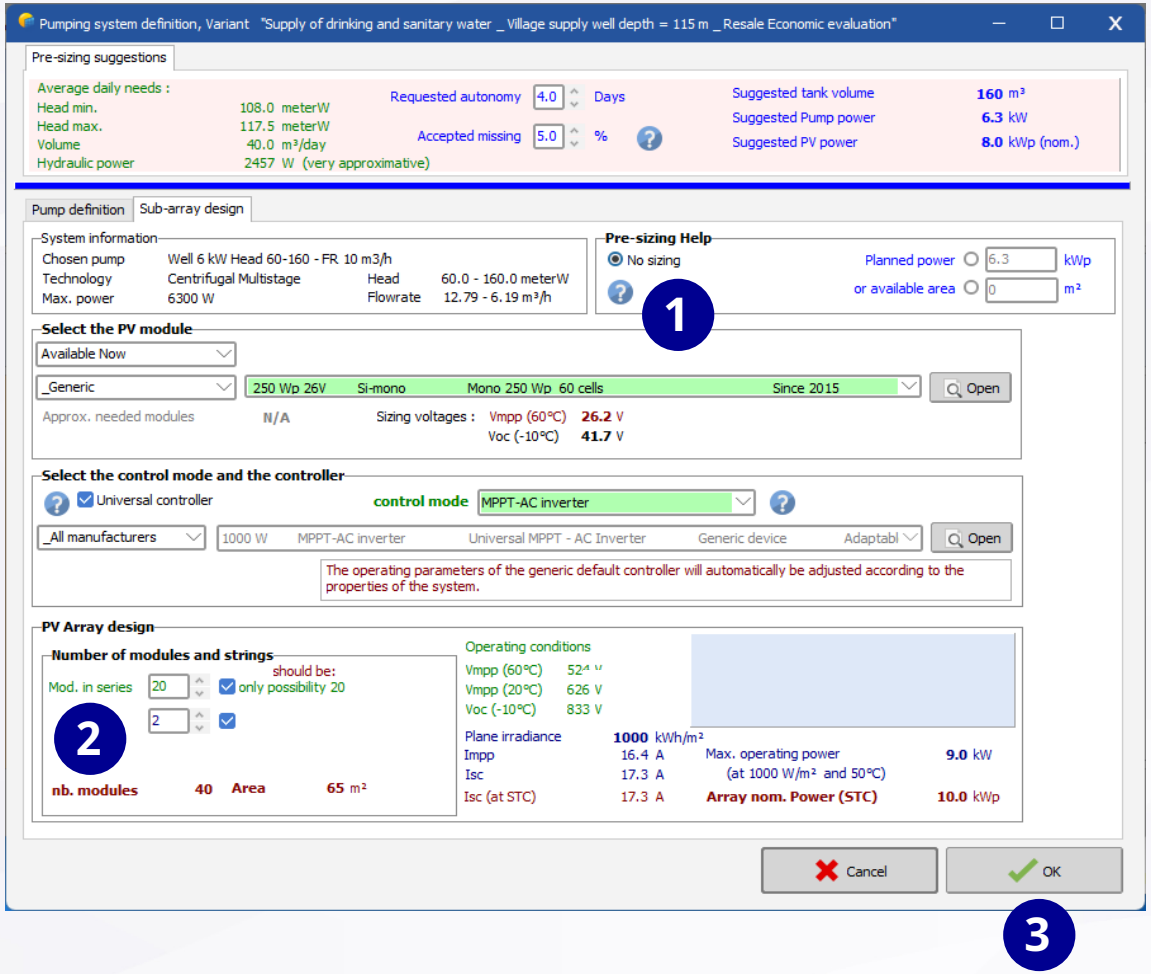
Chapter 6 : VC5 - System Definition (2)

1. Check «No pre-dimensioning»

2. Set the number of modules and strings:

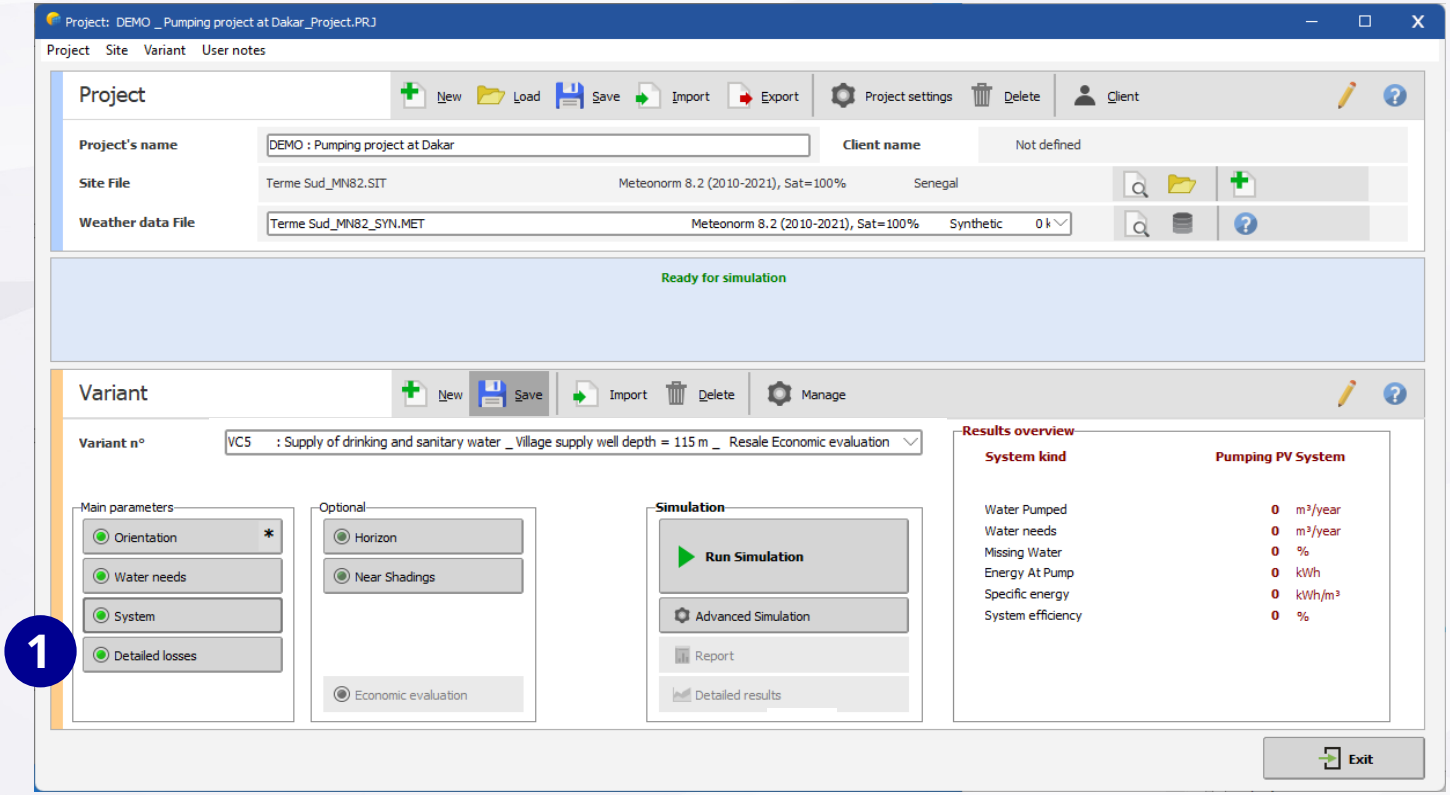
   Modules in series : 20
   Strings : 2

3. Click «OK»



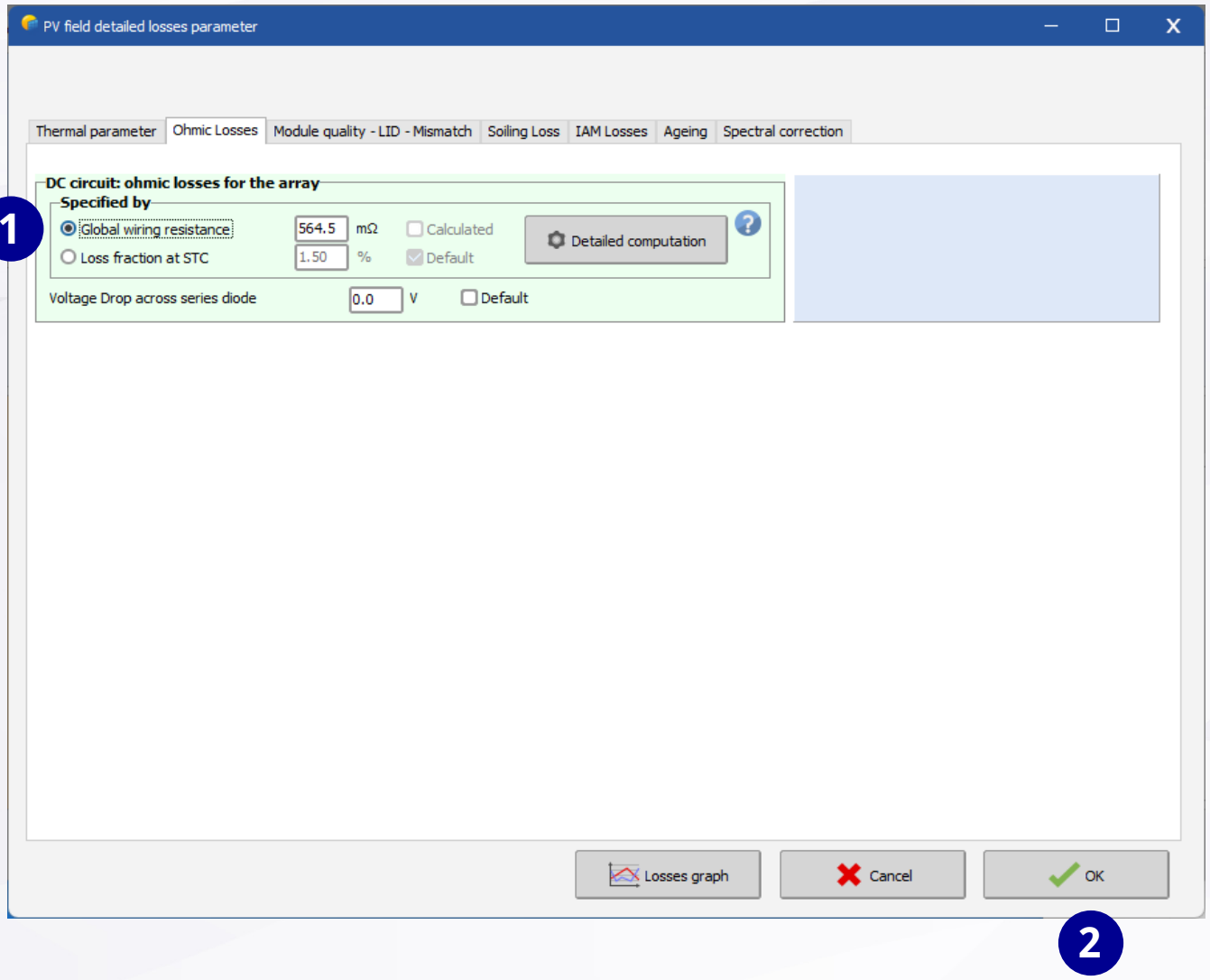
Chapter 6: VC5 - Definition of Detailed Losses

1 Define the detailed losses



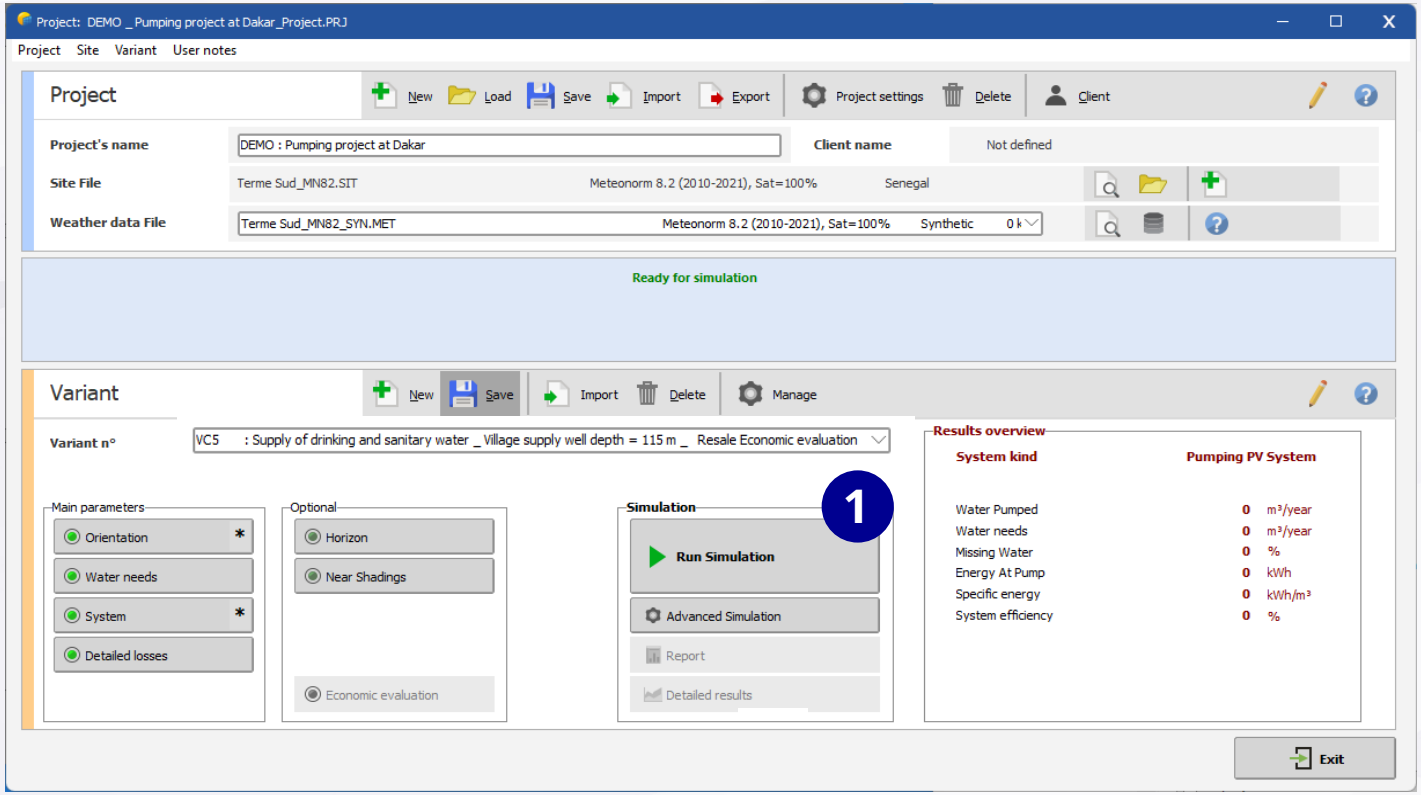
Chapter 6: VC5 - Detailed Losses

1. In the «Ohmic losses» window, Select «Global wiring resistance»
2. Click «OK»



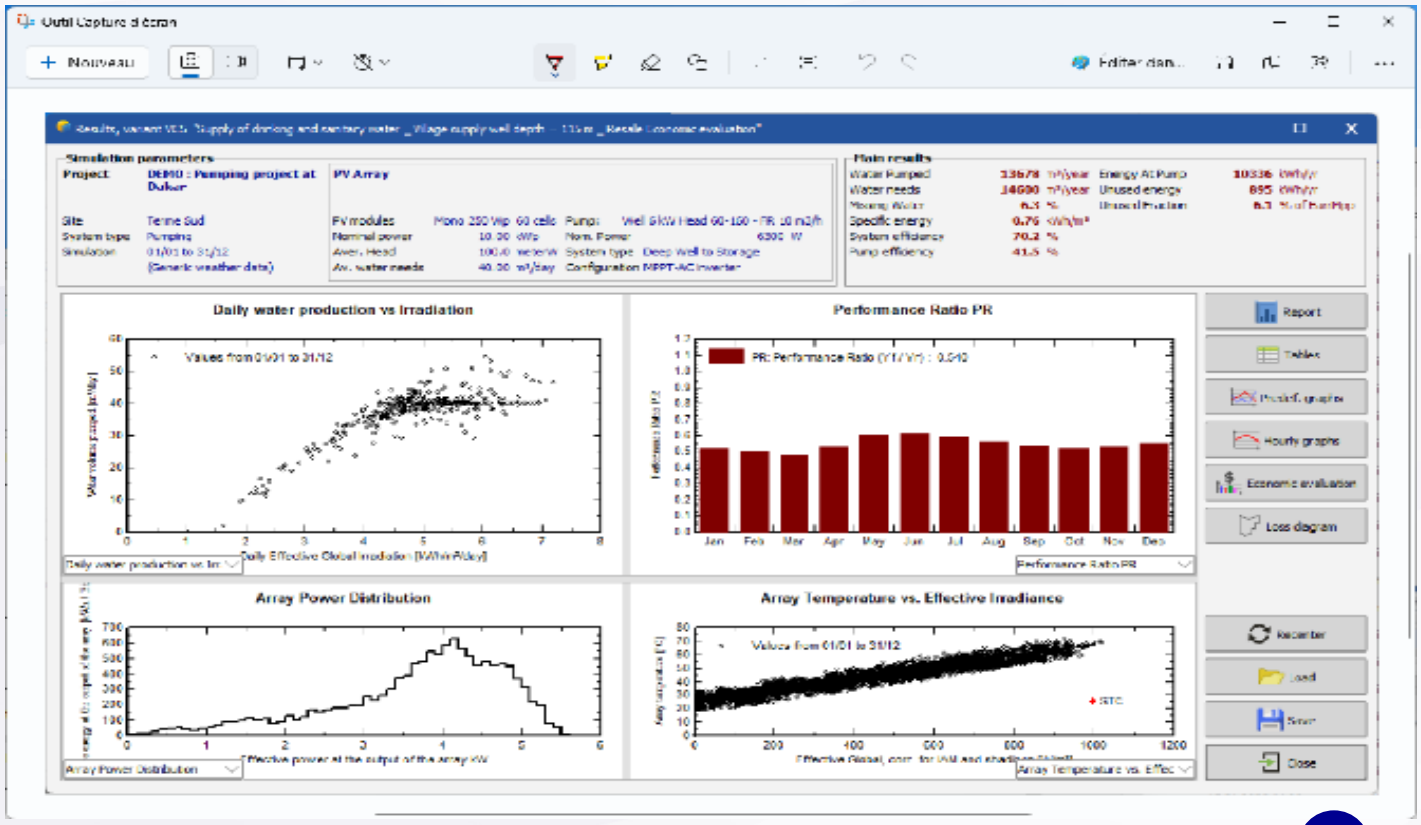
Chapter 6 : VC5 - Run the Simulation

1 Click on «Run simulation»



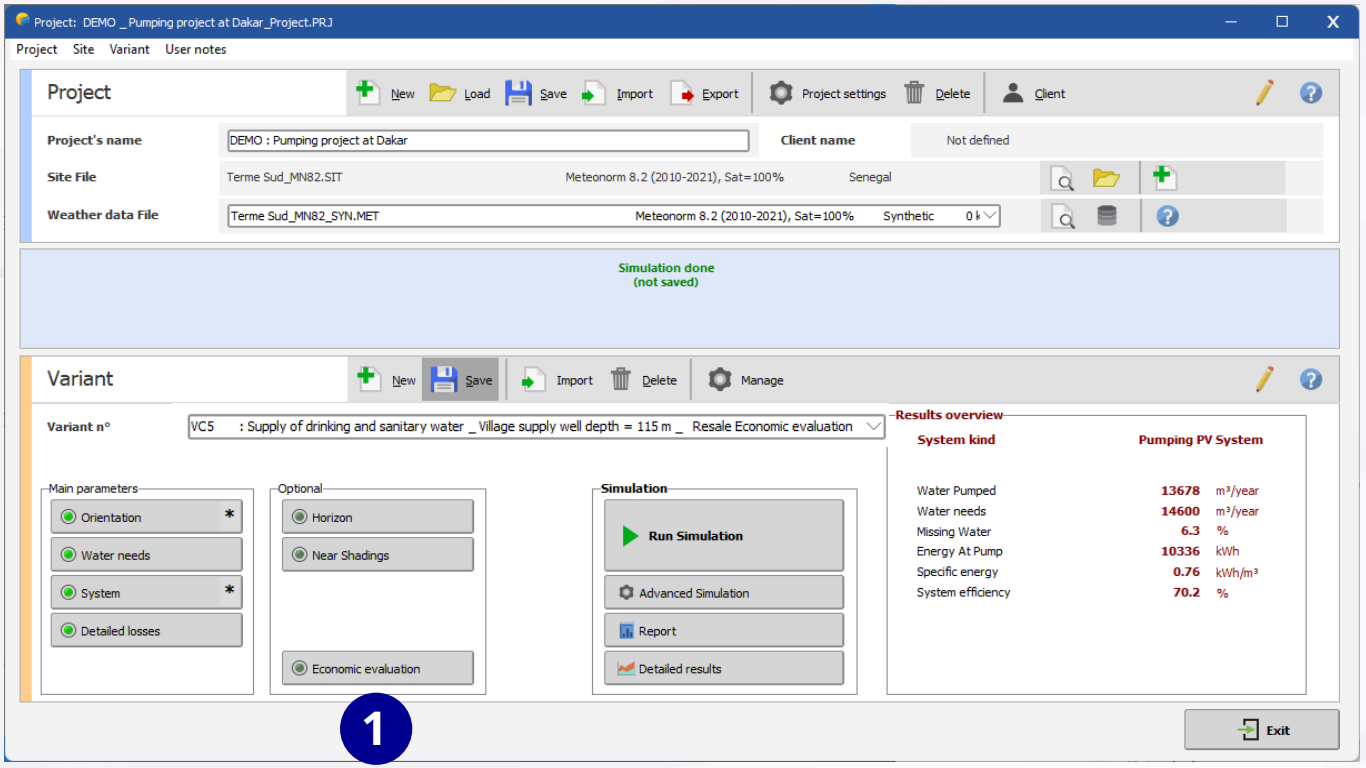
Chapter 6 : VC5 - Run the Simulation

1 Click «Close»



Chapter 6 : VC5 - Economic Evaluation

1 Click on «Economic evaluation»



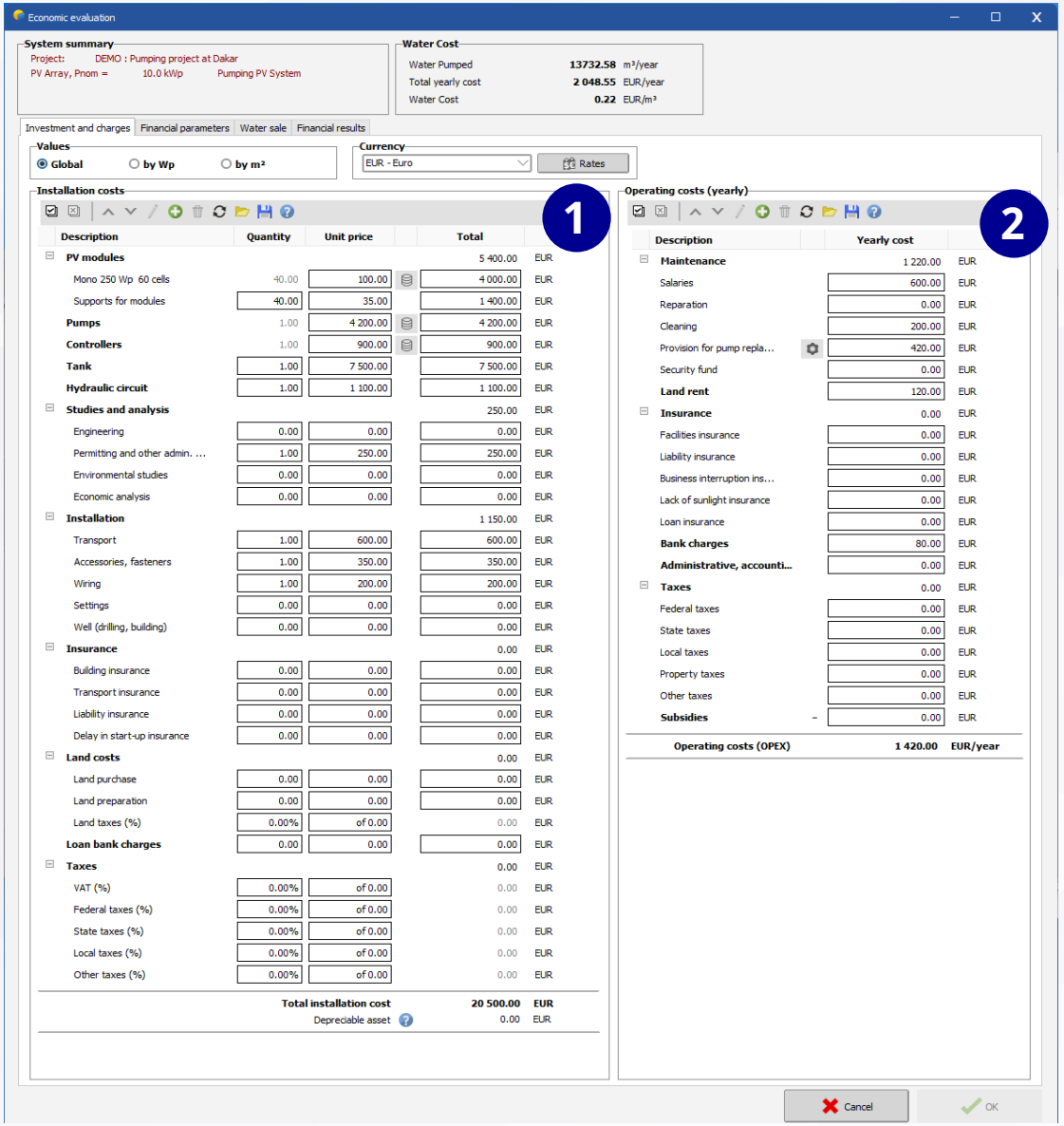
Chapter 6 : VC5 - Economic Evaluation (1)

1 Enter the following values:

Mono 250 Wp 60 cells	: 4,000.00
Module supports	: 1,400.00
Pumps	: 4,200.00
Tank	: 900.00
Hydraulic circuit	: 7,500.00
Controllers	: 1,100.00
Permits and other fees	: 250.00
Installation cost;	
per module	: 600.00
per inverter	: 350.00
Transport	: 200.00

2 Enter the following values:

Salaries	: 600.00
Cleaning	: 200.00
Replacement provision	: 420.00
Land rental	: 120.00
Bank fees	: 80.00



Chapter 6: VC5 - Economic Evaluation (2)

1 Enter the following values:

Project duration	: 20 years
Starting year	: 2021
Inflation	: 1.00 %/year
Discount rate	: 0.50 %/year

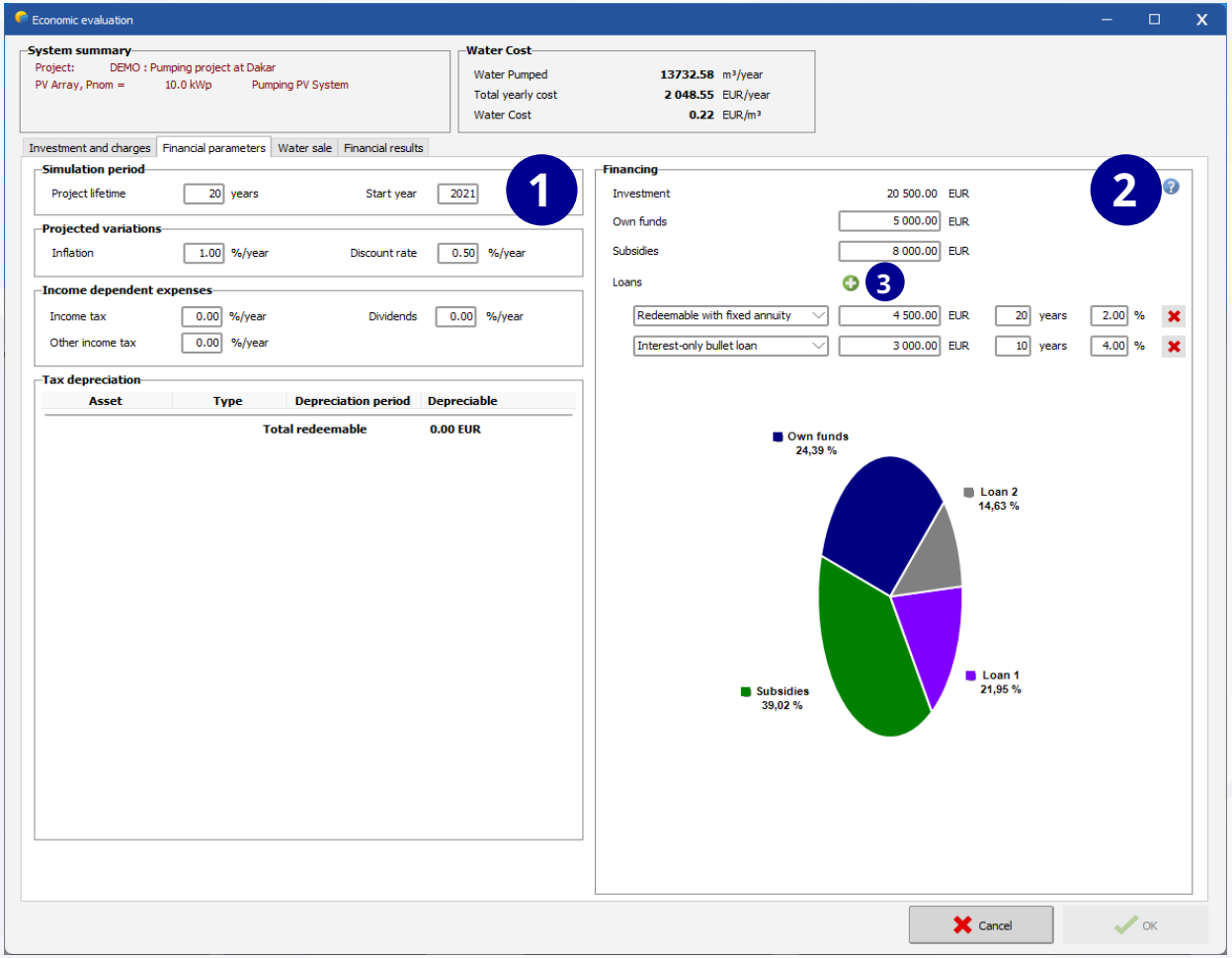
2 Enter the following values:

Equity capital	: 5,000.00
Subsidies	: 8,000.00

3 Click on the «Add» icon,

then add:

Constant annuity	: 4,500.00 / 20 years / 2.00 %
In fine	: 3,000.00 / 10 years / 4.00 %

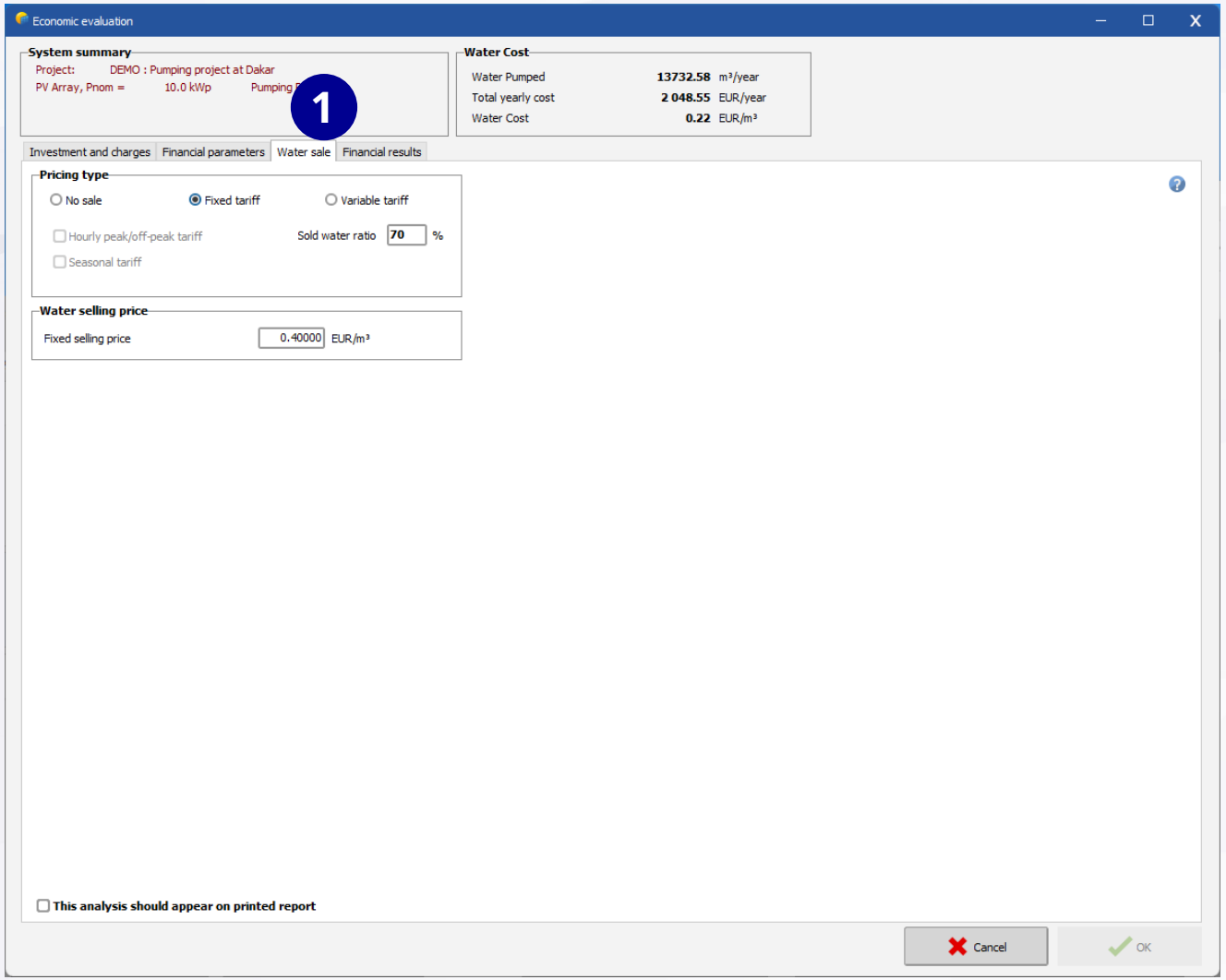


Chapter 6 : VC5 - Water Sale

1 Pricing mode : Fixed rate

Share of water sold : 70%

Fixed selling price : 0.40000 EUR/m³



Chapter 6: VC5 - Economic Evaluation

1 The financial results are available in the window:

«Financial results»