

KOSTAL Solar Plan

Planning tool for KOSTAL components



Operating manual

Legal notice

KOSTAL Solar Electric GmbH

Hanferstraße 6

79108 Freiburg i. Br.

Germany

Tel. +49 (0)761 477 44-100

Fax +49 (0)761 477 44-111

www.kostal-solar-electric.com

Exclusion of liability

All names, trademarks, product names and other designations used in this manual may be legally protected even if not indicated as such (e.g. as a trademark). KOSTAL Solar Electric GmbH assumes no liability for their free usage. The illustrations and texts have been compiled with great care. However, the possibility of errors cannot be ruled out. The compilation is made without any guarantee.

General note on gender equality

KOSTAL Solar Electric GmbH is aware of how language impacts on gender equality and always makes an effort to reflect this in documentation. Nevertheless, for the sake of readability we are unable to use non-gender-specific terms throughout and use the masculine form instead.

© 2024 KOSTAL Solar Electric GmbH

All rights reserved by KOSTAL Solar Electric GmbH, including those of reproduction by photocopy and storage in electronic media. Commercial use or distribution of the texts, models, diagrams and photographs appearing in this product is not permitted. This manual may not be reproduced, stored, transmitted or translated in any form or by means of any medium, in whole or in part, without prior written permission.

Valid from version:

05.2024

Contents

1.	About this manual	5
2.	Safety	6
2.1	Proper use	7
2.2	Obligations of the planner	8
2.3	Qualification.....	9
2.4	Disclaimer.....	10
3.	About KOSTAL Solar Plan	11
4.	Prerequisites and launching the application.....	12
4.1	System requirements.....	13
4.2	KOSTAL Solar Plan	14
4.3	Launching KOSTAL Solar Plan via the KOSTAL Solar Terminal.....	15
4.4	Registering for the KOSTAL Solar Terminal.....	16
5.	User interface	17
5.1	Homepage	18
5.2	Menu bar and menu	19
5.3	Creating a project/Performing planning.....	20
5.4	Overview of projects	21
6.	Quick sizing	23
6.1	Starting quick sizing	24
6.2	Reports	28
7.	Standard sizing.....	31
7.1	Starting standard sizing	32
7.2	Creating a project	33
7.3	Creating project master data/location	34
7.4	Consumption.....	35
7.5	PV generators	36
7.6	Inverter	39
7.7	Cabling.....	44
7.8	Additional components.....	45
7.9	Profitability.....	46
7.10	Result.....	47
7.11	Report.....	48

8. Settings..... 49

8.1 Settings – General 50

8.2 Settings - My Profile 51

8.3 Settings - PV modules 52

8.4 Settings - Inverter database..... 53

8.5 Settings - Sizing 54

8.6 Settings - Profitability..... 55

9. Service and support..... 56

1. About this manual

Read this manual carefully in its entirety. It forms part of the KOSTAL Solar Plan application of KOSTAL Solar Electric GmbH and contains important information. Most of the user guidelines are self-explanatory.

If you have any technical questions, simply contact our service hotline.

Service and contact

Validity of this manual

This manual applies to all KOSTAL components and is aimed at system planners for PV systems.

The most recent version of the operating manual for the product is available in the download area at www.kostal-solar-electric.com.

Navigation in the document

In order to enable navigation through this document, it contains clickable areas.

The table of contents takes you to the specified chapter in one click.

You can navigate to the referenced points in the document within the instruction text using the cross-references.

2. Safety

- 2.1 Proper use 7
- 2.2 Obligations of the planner 8
- 2.3 Qualification 9
- 2.4 Disclaimer 10

2.1 Proper use

The KOSTAL Solar Plan planning tool from KOSTAL Solar Electric GmbH is a free inverter configuration software.

Using the configuration software, the most appropriate string configuration for the PV systems can be identified automatically based on a specific location using a complex yield simulation. The software also enables a quick check up based on the technical limitations of an inverter with a PV module.

The resulting yield calculations are determined on the basis of historical weather data and may deviate from the actual yields.

Inappropriate planning can be hazardous and lead to injury or even death to the user or third parties.

Material damage to the device and other equipment can also occur.

2.2 Obligations of the planner

As the planner, you are responsible for the proper use of the product.

This includes the following obligations:

- ensuring that users have read and understood the manual for the product.
- ensuring that the manual is accessible to all users.
- instructing other users in the product.

2.3 Qualification

This manual is intended for PV system planners.

Specialist knowledge is required to use KOSTAL Solar Plan.

System planners should have the following knowledge/qualifications:

- Knowledge of how an inverter works and operates.
- Knowledge of the relevant laws, standards and guidelines.

2.4 Disclaimer

The KOSTAL Solar Plan may only be used for its intended purpose. Any use that differs from or goes beyond the stated intended purpose is considered inappropriate. The manufacturer accepts no liability for any damage resulting from this.

All names, trademarks, product names or other designations used in this manual may be legally protected even if this is not labelled as such (e.g. as a trademark). KOSTAL Solar Electric GmbH assumes no liability and provides no guarantee for their free usage. The illustrations and texts have been compiled with great care. However, the possibility of errors cannot be ruled out. The compilation is made without any guarantee.

Any instance of misuse of the KOSTAL Solar Plan will result in the termination of the warranty, guarantee and general liability of the manufacturer.

KOSTAL Solar Electric GmbH assumes no liability for any damage resulting from non-observance of this manual.

KOSTAL Solar Electric GmbH does not provide any quality guarantee when providing data specifications or other descriptions of the software, even if they refer to DIN standards and/or other standards.

KOSTAL Solar Electric GmbH provides no guarantee that the application will interact with third-party software programs and will not infringe on their rights.

The recommendation presented for the system configuration has been created based on the data transmitted and is non-binding. KOSTAL Solar Electric GmbH assumes no liability for damages or financial deviations of sizings that occur in connection with the operation of the planned photovoltaic system. The software planning results do not replace the user's own test of the system configuration. The Terms and Conditions of Use apply.

3. About KOSTAL Solar Plan

If a solar system is being planned, not only should the system work, it should produce as high a yield as possible. Without software support, such optimum planning is usually very time-consuming. That is why KOSTAL Solar Electric GmbH offers the free layout software KOSTAL Solar Plan for your KOSTAL inverter.

With the KOSTAL Solar Plan tool, KOSTAL Solar Electric GmbH facilitates the planner's work and supports them in finding the optimum KOSTAL inverter for each PV system.

The sizing is based on the technically feasible limits, which are determined individually for each combination of PV module type and inverter type.

Based on the user's specifications, the application determines the best combinations of several different string configurations consisting of PV modules, each with one inverter.

KOSTAL Solar Plan delivers all the relevant data and provides the most important energy and financial data, such as the self-consumption rate, the degree of self-sufficiency and various other parameters, including remuneration and savings on electricity costs.



INFO

The degree of self-sufficiency indicates the percentage of the annual power requirement that can be covered by self-generated energy.

The self-consumption rate shows the proportion of energy you use yourself in relation to the total energy generated.

The application works with global irradiation and climate databases and with a comprehensive PV module database that is regularly updated. The user's own PV modules can also be created.

4. Prerequisites and launching the application

- 4.1 System requirements 13
- 4.2 KOSTAL Solar Plan..... 14
- 4.3 Launching KOSTAL Solar Plan via the KOSTAL Solar Terminal 15
- 4.4 Registering for the KOSTAL Solar Terminal 16

4.1 System requirements

Certain conditions must be fulfilled in order to use KOSTAL Solar Plan:

- The end device (computer, tablet or smartphone) must be connected to the Internet.
- A supported web browser must be used.
- The web browser must support JavaScript.

The following web browsers are supported. Please always use the latest version of the web browser:

- Microsoft Edge
- Mozilla Firefox
- Google Chrome
- Opera
- Apple Safari

4.2 KOSTAL Solar Plan




INFO

Before you can launch the KOSTAL Solar Plan application, you require a business customer account in the KOSTAL Solar Terminal and must have been assigned the **Planning** role.

If you do not have a company user account, create one first.

Prerequisite:

- The user must be registered for the KOSTAL Solar Terminal.
Create a business customer account:  **Registering for the KOSTAL Solar Terminal, Page 16**

There are two ways of launching KOSTAL Solar Plan:

- Launch KOSTAL Solar Plan using the direct link
<https://plan.kostal-solar-electric.com>.
- Launch KOSTAL Solar Plan via the KOSTAL Solar Terminal.

4.3 Launching KOSTAL Solar Plan via the KOSTAL Solar Terminal

1. Open the web browser.
2. To access the KOSTAL Solar Terminal, enter the following URL:
<https://terminal.kostal-solar-electric.com>

or go to the KOSTAL Solar Electric GmbH website by entering the URL <https://www.kostal-solar-electric.com> and then select the KOSTAL Solar Terminal from the menu bar.

- The log-in window will appear.
- 3. Enter your log-in details and confirm with **Log in**.
If you have forgotten your password, you can request a new one by clicking on **Forgotten password?**.
- The KOSTAL Solar Terminal is displayed with various applications.
- 4. Launch the KOSTAL Solar Plan planning tool.
- ✓ KOSTAL Solar Plan is displayed.

4.4 Registering for the KOSTAL Solar Terminal

The KOSTAL Solar Terminal is a central hub for various applications. To use them, you have to register once. You will then be given a user account for all the applications offered in the KOSTAL Solar Terminal.

If you have already registered in the KOSTAL Solar Terminal, you can log in using your user details.

Creating a business customer account for the KOSTAL Solar Terminal

1. Open the web browser.
2. To access the KOSTAL Solar Terminal, enter the following URL:
<https://terminal.kostal-solar-electric.com>

or go to the KOSTAL Solar Electric GmbH website by entering the URL
<https://www.kostal-solar-electric.com> and then select the KOSTAL Solar Terminal from the menu bar.

→ The log-in window will appear.

3. To create a business customer account, select **No account yet? Register here.**



INFO

You require a business customer account to use KOSTAL Solar Plan. This option is not available to installation operators (private or commercial).

4. Enter your details in full and confirm these by clicking **Register**.
- You will then receive an e-mail containing an activation link.
5. Open the e-mail and confirm the registration.
 6. Your organisation's administrator must then assign you the **Planning** role.
- ✓ A user account for the KOSTAL Solar Terminal has been set up for you.

5. User interface

- 5.1 Homepage..... 18
- 5.2 Menu bar and menu..... 19
- 5.3 Creating a project/Performing planning 20
- 5.4 Overview of projects 21

5.1 Homepage

The homepage is divided into three areas.

■ Menu bar:

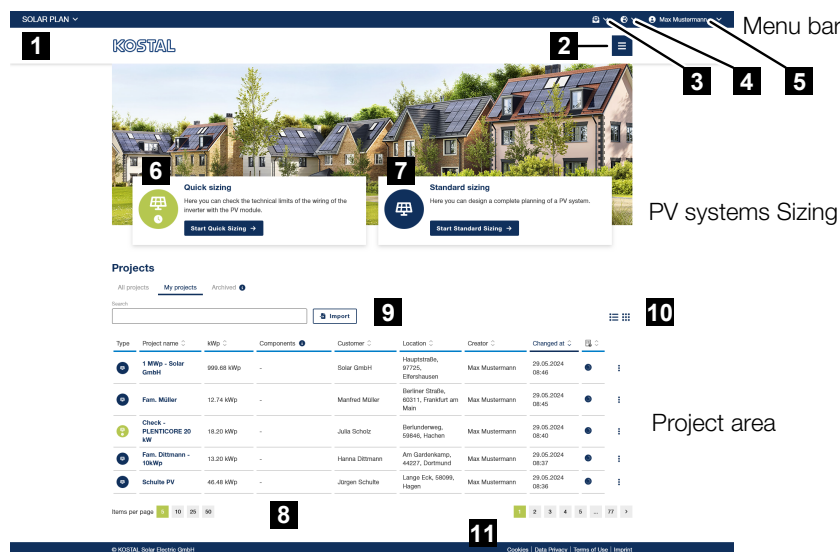
Offers you the option to launch other applications via the KOSTAL Solar Terminal, display messages, select the interface language and manage the user account. More information can be found at [Menu bar and menu, Page 19](#)

■ Create plan:

This area offers two sizing methods: quick sizing and standard sizing. More information can be found at [Creating a project/Performing planning, Page 20](#)

■ The project area:

Displays all projects that have been created. More information can be found at [Overview of projects, Page 21](#)



- 1 Launch other KOSTAL Solar Terminal applications
- 2 Menus (Homepage, Settings, Service & Support)
- 3 Message display
- 4 Language selection
- 5 Profile settings and log-out button
- 6 Quick sizing can be used to plan a PV system by entering just a few details.
- 7 Standard sizing can be used for complete PV system planning.
- 8 Project area
- 9 Import project
- 10 Change project view
- 11 Information on cookies, data privacy, terms of use and legal notice

5.2 Menu bar and menu



- 1 Menu bar
- 2 Menus

The menu bar

The menu bar contains the following functions:

- **Other KOSTAL applications**

This menu item can be used to launch other applications offered in the KOSTAL Solar Terminal.

- **Messages**

New messages are displayed here.

- **Select interface language**

Select which language is used for the interface.

- **User account settings**

The settings configured here are used as standard when creating a new sizing.

- **My profile**



View your personal contact details. These are also used for the PV system planning reports, which you can hand over to your customers. If the information is incorrect or details are missing, these can be changed via the KOSTAL Solar Terminal.

- **Logout**

Log out from KOSTAL Solar Plan

The menu

The menu can be used to quickly access the following items from any page:

- Opening the **Homepage**
- Opening the Settings  **Settings, Page 49**
- Opening  **Service and support, Page 56**

5.3 Creating a project/Performing planning

New projects can be created on the homepage using two different available sizing methods:

■ Quick sizing



Quick sizing enables you to create a plan quickly in just a few steps and to check the technical limitations for connecting the inverter with the PV module being used.

There is an option to select a consumption forecast (home consumption with or without battery) so that you can see an estimation of the yield.

More information can be found at [📄 Quick sizing, Page 23](#)

■ Standard sizing



The standard sizing is a complete planning of a PV system. It guides you step by step through planning the PV system, from selecting the location up to the yield and profitability simulation.

More information can be found at [📄 Standard sizing, Page 31](#)

5.4 Overview of projects

All of the planned projects are displayed in the Projects section.

■ Project management

Here you can choose to view all of a company's planned projects (**All projects**), only the projects that you have planned (**My projects**) or archived projects (**Archived**).

■ Search function

Projects can be browsed based on specific criteria: project type, project name, project size, project component, customer, location (country, area, street), editor, changed on, project status.

■ Import

Project files saved on the local device with the file extension (.kspw) can be imported.

■ Change view

It is possible to switch between table and tile view.

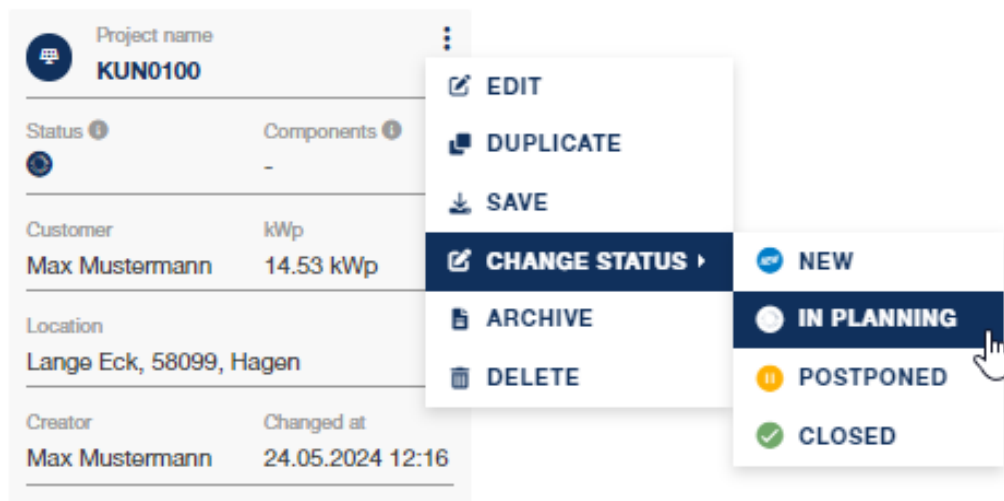
■ Project information and filtering

The projects are displayed with the following information: type, project name, project size, project components, customer, location, creator, changed on and project status.

The projects can be sorted using the headings or using the sort function in the tile view.

Editing projects

Projects created in the project view can be changed later.



The following changes can be made:

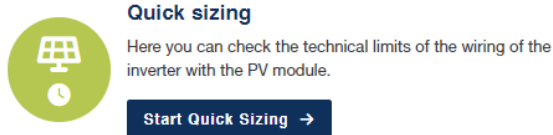
- Edit project again
- Duplicate project
- Save project on the local computer
- Change project status (new, planned, in progress, completed)
- Archive project
- Delete project

6. Quick sizing

- 6.1 Starting quick sizing 24
- 6.2 Reports..... 28
 - 6.2.1 Quick report 29
 - 6.2.2 Partial reports..... 29

6.1 Starting quick sizing

To start quick sizing, select the item **Start quick sizing** on the homepage.



The quick sizing menu item performs system planning for an inverter.

This includes selecting an inverter, the photovoltaic modules that are to be used, and the relevant string configuration. As a result, all the required information is displayed, showing to what extent the configuration created is within the technical limitations.

There is also an option to select consumption and a battery to obtain an estimate of the self-consumption and degree of self-sufficiency.

The (+) symbol can be used to create another plan. Both plans can be compared using the **Comparison** item.

The **Report** page can be used to save, export or print the plan once it is complete.



- 1 Project name
- 2 Project settings
- 3 Current plan
- 4 Other plans/Compare plans
- 5 Launch report

Sizing 1 6

Number of PV modules 7

Database
All

Manufacturer
LG Electronics Deutschland GmbH

Description
LG385N1C (5/2021)

Module temperature Min. [°C]
-10

Module temperature Max. [°C]
70

Module temperature Uoc [°C]
4

Performance increase (bifacial solar cells) [%]
0

Inverter 8

Please choose a Country
Germany

Number of phases
3-phase

Inverter series
PLENTICORE G3

Inverter
PLENTICORE L G3 15

Power ratio Min. %
80

Power ratio Max. %
120

Cos φ
Underexcited

0.95

Yearly consumption (optional) 9

Load profile
H2 (Midday/evening consumption)

Estimated annual consumption kWh/a
6,000

Battery storage
Battery-Box Premium HVS 10.2

Own consumption

28%

15% Direct consumption
13% Battery charge
72% Grid feed

Self-sufficiency

81%

45% Direct consumption
36% Battery discharge
19% Grid reference

- 6 Name of the current sizing/create another sizing/delete sizing
- 7 PV module selection
- 8 Inverters selection
- 9 Consumption forecast selection

Wiring 10

Info	MPPT A	MPPT B	Info
Number of Strings	1	1	
Number of PV modules	20	20	
Number of PV modules total	20	20	40 (15.40 kWp)
Max. power MPP Tracker [kW]	18.00	18.00	
Power PV generator [kW]	7.70	7.70	OK
Power ratio [%]	102.67		OK
Min. MPP voltage inverter [V]	75.00	75.00	
Min. MPP voltage PV generator (70°C) [V]	611.72	611.72	OK
Max. MPP voltage inverter [V]	800.00	800.00	
Max. MPP voltage PV generator (-10°C) [V]	786.44	786.44	OK
Max. system voltage inverter [V]	1,000.00	1,000.00	
Max. working voltage inverter [V]	900.00	900.00	
Max. system voltage PV module [V]	1,000.00	1,000.00	
Max. open circuit voltage PV generator (4°C) [V]	885.86	885.86	OK
Max. input current inverter [A]	30.00	30.00	

- 10 Plan and view string adjustment

Selecting a photovoltaic module

Select a photovoltaic module from a comprehensive database. First of all, select the manufacturer and the desired type.

Then you can search for suitable modules from the comprehensive module database in the pop-up window using filter criteria. If the module you are looking for is not in the database, you can create a module yourself.

Modules can be marked as favourites so that they can be reused in the next project by going to Favorite.

You can also enter sizing details, such as the minimum and maximum module temperature to be used and the module temperature for idling voltage.

If bifacial photovoltaic modules (photovoltaic modules that are active on both sides) are used, you can also enter the power gain.

Selecting an inverter

Next select the country in which the inverter will be used. Then the inverters can be filtered using the **Number of phases** filter, allowing either all inverters or just one- or three-phase inverters to be displayed. An inverter must be selected from these.

The minimum and maximum power ratio and the $\cos \phi$ value must also be defined.

The String adjustment area displays columns related to the number of MPP trackers for the selected inverter. In these columns, the number of strings and modules per string are set.

These are used for a calculation shown in the String adjustment area, clearly showing whether the chosen inverter model is a valid combination with the PV modules. Invalid configurations are clearly marked and the tool also generates a warning or error if the configuration is no longer recommended.

Selecting the consumption forecast (optional)

To start the optional consumption forecast for the string adjustment, a load profile (commercial or private load profile) can be selected. This starts an annual consumption forecast with a yield simulation, which calculates the degree of self-sufficiency and the self-consumption for a default location within the selected country.

The degree of self-sufficiency indicates how much of the annual consumption will be covered by the PV system (including a battery storage system). Self-consumption indicates how much of the generated solar energy has been used by the system operator.

Compatible battery storage can also be selected for the planned inverter so that this can also be taken into consideration in the self-consumption and self-sufficiency calculation.



INFO

It is only possible to select one battery storage unit for each inverter that can be combined with battery storage.

String adjustment

Enter the number of strings and PV modules per MPP tracker (string). Then check the values of the sizing and correct if there are warnings or errors by changing the number of modules or the inverter.

Further sizing

It is possible to create another sizing result, which can be compared with the first sizing result. A maximum of two sizing results can be compared.

Compare sizing results

If another sizing result has been added, system plans can be compared using the **Comparison** menu item or a print-out can be generated for the report.

6.2 Reports

Creating a project

If no project data has been provided yet, you will be automatically asked to give the project a name when you open the Reports page.

Project data can also be entered via Settings (cogwheel).

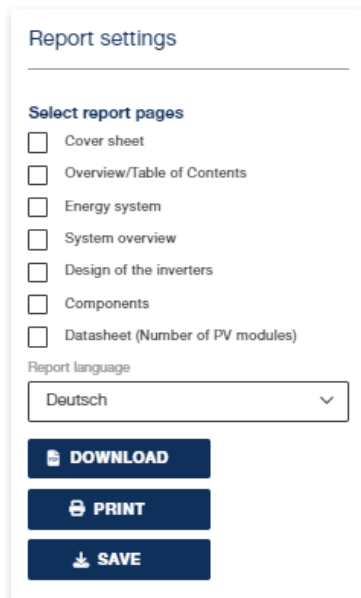
1. Enter a project name.
 2. There is also an option to provide a project status and planned date of commissioning and to assign the project to a customer.
 3. Enter the customer details.
- ✓ Project data has been entered and is being used for the report.

Printing the report

The sizing can be printed in two variants:

- **Quick report:** Project overview with sizing result and project data on one page.
- **Partial reports:** Selection of individual partial reports, such as: project overview with sizing results and project data, sizing of PV modules and inverters, a consumption forecast, comparison of several plans and PV module data.

The report can also be downloaded directly as a PDF or printed out and the project can be saved locally.



Report settings

Select report pages

- ☐ Cover sheet
- ☐ Overview/Table of Contents
- ☐ Energy system
- ☐ System overview
- ☐ Design of the inverters
- ☐ Components
- ☐ Datasheet (Number of PV modules)

Report language

Deutsch

DOWNLOAD

PRINT

SAVE

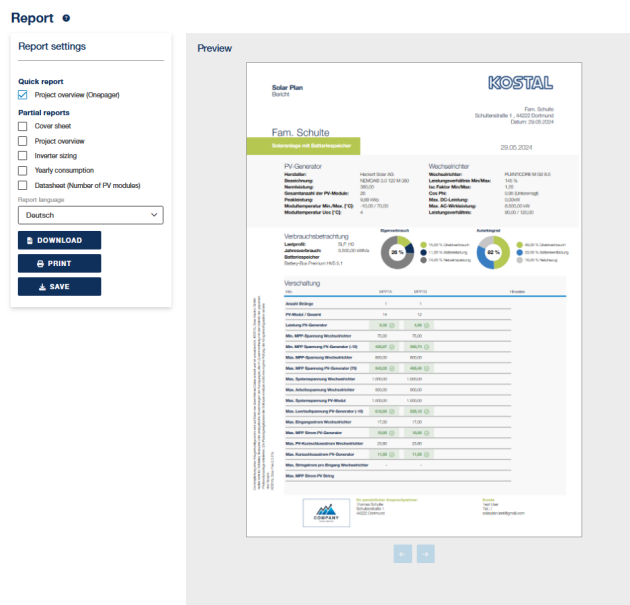
6.2.1 Quick report

The quick report consists of only one page and contains the most important information about the PV system planning.

The following information is included in the report:

- Project name with address details
- PV modules used
- Inverters used
- Consumption forecast
- String adjustment with additional information

The report can also be created in different languages, can be downloaded directly as a PDF, and can be printed or saved locally.



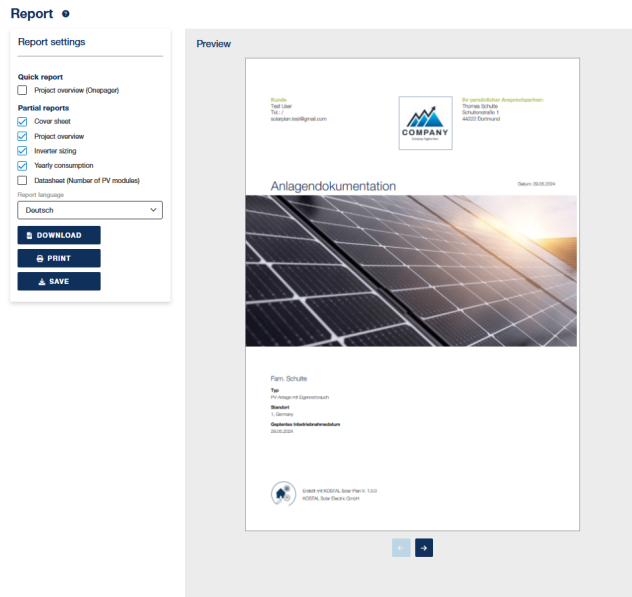
6.2.2 Partial reports

For the detailed report, you can choose for yourself what it should contain. If all the options are selected, the report contains the following items:

- Project overview
- Inverter sizing
- Consumption forecast
- Comparison of several plans
- Datasheet (PV module)

6. Quick sizing

The report can also be created in different languages, can be downloaded directly as a PDF, and can be printed or saved locally.



7. Standard sizing

- 7.1 Starting standard sizing..... 32
- 7.2 Creating a project 33
- 7.3 Creating project master data/location 34
- 7.4 Consumption 35
- 7.5 PV generators 36
 - 7.5.1 Manual planning..... 36
- 7.6 Inverter..... 39
 - 7.6.1 Automatic inverter planning 39
 - 7.6.2 Manual inverter planning 42
- 7.7 Cabling 44
- 7.8 Additional components 45
- 7.9 Profitability 46
- 7.10 Result 47
- 7.11 Report 48

7.1 Starting standard sizing

Select the item **Start standard sizing** on the homepage to start the standard sizing.



This item allows you to create a project entirely tailored to the customer's requirements. The results can be saved and a report printed, which you can then send to the customer.

The following items are included in standard sizing:

- Creating a project
- Selecting the location
- Selecting a load profile for the customer
- Planning PV generators and PV modules
- Sizing inverters automatically or manually
- Checking the plan
- Planning the PV system cabling
- Incorporating additional system components, such as energy meters and a battery
- Calculating the profitability of the PV system
- Planning results
- Creating, saving and printing a report

7.2 Creating a project

When the standard sizing is started, you can enter the project details. These can be changed subsequently by going to **Settings** (cogwheel on the menu bar).

The following project settings can be entered:

1. Under **Project data**, you enter the project details (project name) and, as an optional detail, a contact person.
2. There is also the option to enter the details of the plant operator, which is also used in the report.
3. You then select a **Presetting**. Depending on what is selected, various additional items are displayed or not displayed during the planning process.

- **PV plant as full Feed-In.**

Here, the total generated power is fed into the public grid. Self-consumption is not scheduled, so the power cannot be stored in a battery or used for consumers.

- **PV plant with Self-consumption**

You can select additional options for PV systems with self-consumption. These options guarantee a more accurate evaluation of the consumption data. Various parameters are queried for this during the planning phase.

Project Settings

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

The screenshot shows the 'Project Settings' interface with three main panels:

- Project data:**
 - Project name*: PLENTICORE plus 8.5 - Wuppertal
 - Project status: In planning (dropdown)
 - Choose a date: 12/5/2023 (calendar icon)
 - Contact person first name*: Dirk
 - Contact person last name*: Heimmuster
 - Notes: (text area, 0/500)
- Plant operator (optional):**
 - Salutation: Mr. (dropdown)
 - First name: Mustermann
 - Last name: Max
 - Company name: KOSTAL
 - Street: Langeeck
 - House number: 11
 - Place: Hagen
 - Post code: 58099
 - Country: Germany (dropdown)
 - Phone number: +4923318040822
 - E-mail: (empty field)
- Project Settings:**
 - Options:
 - PV plant as full Feed-In (selected)
 - PV plant with Self-consumption
 - Battery

A 'Save' button is located at the bottom right of the form.

4. Confirm the entry via **Start**.

✓ The project has been created

The project name can be changed again at any time by going to Edit (pencil symbol) and via Settings (cogwheel). The Info area (i symbol) provides you with all the information about the project that has been created.

7.3 Creating project master data/location

1. First of all, enter your project data for the location. You can use the search bar to specify the address or coordinates (latitude, longitude) for the planned PV system. The data is then automatically transferred into the **Location** fields and the customer address is updated.
Tip: When entering the location, start with the house number to find the correct address more quickly.
 2. You can adopt the standard value for solar irradiation at the location and the grid parameters or you can adapt them to your location and grid provider.
- ✓ Click on the right arrow to go to the next page.

i INFO

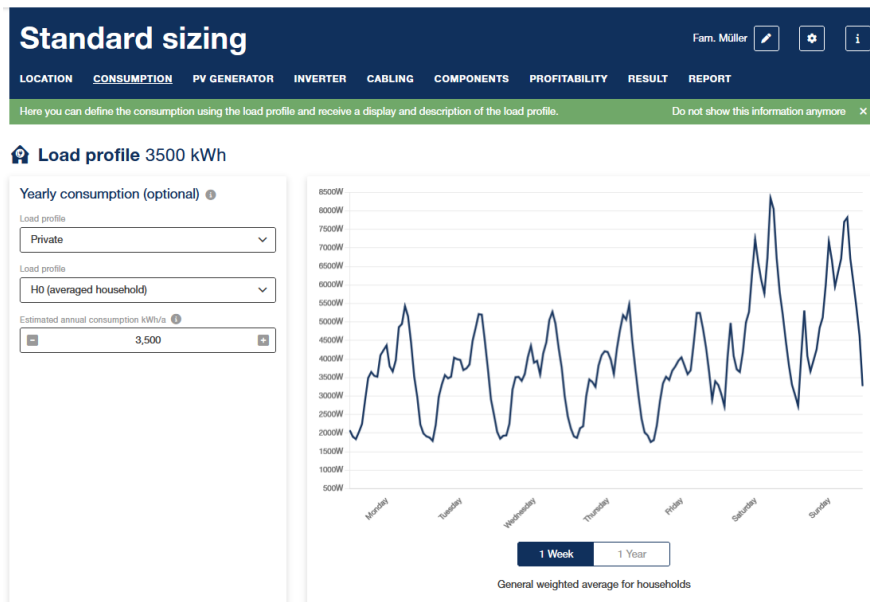
If the checkbox **Use address as customer address** has been checked, the PV system's location is automatically used as the customer address.

If the checkbox **Consider country release of the inverters** is checked, a check is carried out to ascertain which inverters are approved based on the location. The **Inverter** tab then only displays inverters that are approved.

Irradiation and climate databases

Different institutions provide KOSTAL Solar Electric GmbH with this data. Therefore, we cannot guarantee the completeness and/or accuracy of the data that we are given and that is shared with you.

7.4 Consumption



Under Consumption, you can select the load profile that is suitable for you from different standardised load profiles for private households or commercial premises.

1. First select the load profile type, such as **Private**.
2. Then select the load profile. Each load profile is explained below the diagram.
3. Then enter the annual consumption in kWh. You can get this value from the annual bill from the energy provider, for example.

On the right-hand side, you can display the load profile by week or by year. Under the graphic, you will find a description of the selected load profile.

7.5 PV generators

7.5.1 Manual planning

Standard sizing PLENTICORE plus 8.5 - Wuppertal

LOCATION CONSUMPTION **PV-GENERATOR** INVERTER CABLING COMPONENTS PROFITABILITY RESULT REPORT

In this section you can do this and that, and for example also further things like this. Do not show this information anymore

PV generator

PV Generator 1 **PV Generator 2**

Select database:

Manufacturer:

Description:

Bifacial power gain [%]:

Number of PV modules: Rated power [kWp]:

Inclination [°]: Orientation [°]:

Type of installation:

PV Module data

PV Module data		Cell type	mono	Efficiency	20.92 %
Rated DC power	460 Wp	Open circuit voltage STC	50.2 V	Height / Width / Depth	2110 / 1042 / 40 / mm
MPP voltage STC	42.4 V	Short-circuit current STC	11.45 A	PV generator area	21.99 m²
MPP current STC	10.86 A				

Overview PV Generators

Generator	Manufacturer & Model	Number of PV modules	Rated power	Area	Bifacial gain	Orientation	Inclination	Installation
PV Generator 1	LG Electronics Inc. LG460N2W-E6 (1/2022)	12	5.52 kWp	26.38 m²	0%	⊙ 45°	Δ 42°	
PV Generator 2	LG Electronics Inc. LG460N2W-E6 (1/2022)	10	4.60 kWp	21.99 m²	0%	⊙ -135°	Δ 42°	

[+ Add new generator](#)









You can create up to four PV generators yourself by going to the **PV generators** menu item. The PV modules are selected from a database.

1. Select the database from which you want to select the PV generators.
 2. Then select the PV module under manufacturer and type.
 3. If the PV module is a bifacial module, you can enter a percentage for the assumed bi-facial power gain.
 4. Then select the number of modules, the roof incline and the orientation.
The rated output is calculated automatically, but it can be changed.
 5. Select the type of module installation.
- At the bottom you find an overview of the PV-Generators.
6. To create more PV generators, repeat the steps by clicking on the (+) symbol at the top or the **Add new generator** button.
You can change the name of the PV generator by going to Edit (pencil symbol next to the name).
- ✓ Click on the right arrow to go to the next page.

Created PV generators

Once created, PV generators can be copied, deleted (bin) or renamed (pencil) using the symbols on the bar or at the top.

Overview PV Generators

Generator	Manufacturer & Model	Number of PV modules	Rated power	Area	Bifacial gain	Orientation	Inclination	Installation	
PV Generator 1 	LG Electronics Inc. LG460N2W-E6 (1/2022)	12	5.52 kWp	26.38 m ²	0%	⌚ 45°	△ 42°		 
PV Generator 2 	LG Electronics Inc. LG460N2W-E6 (1/2022)	10	4.60 kWp	21.99 m ²	0%	⌚ -135°	△ 42°		 

[+ Add new generator](#)

Dynamic performance ratio

Depending on the settings configured in the program options for **KOSTAL Solar Plan**, the dynamic performance ratio calculation is provided here.

When determining the performance ratio, the user can choose between a static and dynamic performance ratio calculation.

The dynamic performance ratio takes into account both the system location and the orientation and inclination of the PV modules, meaning that the performance ratio can be estimated with greater accuracy. This involves checking the maximum power that occurs simultaneously with surfaces with different orientations.

To perform the dynamic calculation, answer the question with **Yes**.

Dynamic power ratio

×

Do you want to consider the dynamic power ratio in the calculation? This takes the conditions specific to the system location into account.

Note: Considering the dynamic power ratio extends the sizing calculation!

☐ Do not show this message again (Future designs will consider the parameters set in the settings)

No

Yes

Please note that it may take several minutes for the layout to be calculated because of the simulation running in the background. If it is taking too long, you can exit the calculation using the Cancel button.



INFO

The performance ratio is the ratio of a PV generator's output power to the power drawn by the associated inverter. This ratio depends on the efficiency at which the inverter is working, i.e. how much of the DC power present is being converted into usable AC power.

The static performance ratio is faster to calculate and uses the PV rated output that can be found in the inverter's technical data.

The dynamic performance ratio takes longer to calculate and is based on the power that can be achieved at the system location.

7.6 Inverter

There are two ways to plan inverters.

■ Manual planning

With manual planning, you select the inverter yourself and can connect this with the PV modules that have already been planned.

■ Automatic planning

For automatic planning, the web tool suggests the optimal KOSTAL recommendation for the connection of the inverters.

Select the type of planning.

7.6.1 Automatic inverter planning

With automatic planning, the web tool suggests the optimal KOSTAL recommendation for the connection of the inverters.

Inverter sizing

Inverter selection

Inverter series

Inverter filter

☒ PLENTICORE G3

☒ PLENTICORE plus G2

☒ Consider country release

☒ Aktuelle Wechselrichter ☒ Nur dreiphasig

List of inverters

<input type="checkbox"/>	Type	Max. power [kW]	MPPTs	Functions [!]
<input type="checkbox"/>	PLENTICORE L G3 (17.5)	20.00	3	
<input type="checkbox"/>	PLENTICORE L G3 (20)	20.00	3	
<input type="checkbox"/>	PLENTICORE plus 4.2 G2	4.20	3	
<input type="checkbox"/>	PLENTICORE plus 5.5 G2	5.50	3	
<input type="checkbox"/>	PLENTICORE plus 7.0 G2	7.00	3	
<input checked="" type="checkbox"/>	PLENTICORE plus 8.5 G2	8.50	3	
<input type="checkbox"/>	PLENTICORE plus 10 G2	10.00	3	

Currently 2 Inverters in your selection

With automatic planning, you can make a preselection of inverters using filters and presettings. The optimum string adjustment is recommended based on the preselection.

Selecting an inverter

1. Select an inverter series under **Choose inverter**. You can also narrow down the selection further by using filters.
2. On the right-hand side, the inverters to be used for a calculation are selected. A maximum of 10 inverters can be selected. The symbols or the PDF document also provide you with additional information about the inverters.



INFO

If a PLENTICORE BI inverter is combined with an inverter from a third-party provider, the actual name of the third-party provider's inverter is not displayed in the inverter list. This is always listed as a 3rd party inverter.

If you cannot find the 3rd party inverter in the database, you can upload the datasheet using the button. After a check is performed, this is then added to the inverter database.

- ✓ Click on the right arrow to go to the next page.

Sizing settings for inverters/PV generators

You can set several parameters for inverters and PV generators by going to the sizing settings. This more accurately restricts the sizing. Alternatively, you can use the standard settings.

Specify the following values here and save them:

Device	Parameters	
Inverter	Power ratio min./max.	Usually, inverters are sized smaller than the total generator power. Adopt the standard value or enter your own value here (20–200, standard values min. 80/max. 120).
	Cos phi (type) / (value)	Specify the type and value for cos phi.
	Limitation of the active power to [%]	Specify the active power that the inverter should be limited to when feeding into the public grid, e.g. 70%. The value is usually prescribed by the energy provider.
	Maximum unbalanced phase load [kVA]	Specify the maximum unbalanced phase load. In Germany, this is 4.6 kW, for example. (0–6, standard value 4.6)

Device	Parameters	
PV generator	Min./max. module temperature [°C]	Enter here the minimum and maximum module temperature (-50 – 200, standard value -10 / 70)
	Module temperature Uoc [°C]	Enter here the module temperature at idling voltage (-50 – 200, standard value 25)
	Isc factor	<p>If the Isc factor should be taken into consideration, select this in the settings and enter a current safety factor.</p> <p>Using the value, you can take a current safety factor into consideration in the sizing.</p>

Sizing result

★ Recommendation	Quantity of inverters	Inverter	Power ratio	Dyn. Power ratio	AC power
<input type="checkbox"/> 1	2	1x PLENTICORE M G3 12.5 1x PLENTICORE S G3 7.0	123.08 %	19.50 kVA	
<div> <div>1x PLENTICORE M G3 12.5</div> <div> MPPT A: 1 x 20 Heckert Solar AG NEMOA® 3.0 120 M 380 (1/2022), 7.60 kWp, PV Generator 1 MPPT B: 1 x 20 Heckert Solar AG NEMOA® 3.0 120 M 380 (1/2022), 7.60 kWp, PV Generator 1 Power ratio 128.00 % </div> </div>					
<div> <div>1x PLENTICORE S G3 7.0</div> <div> MPPT A: 1 x 20 Heckert Solar AG NEMOA® 3.0 120 M 380 (1/2022), 7.60 kWp, PV Generator 1 MPPT B: - MPPT C: - Power ratio 114.29 % </div> </div>					
<div> <div>Quantity of modules</div>60 <div>Nominal power</div>22.80 kWp <div>Quantity of inverters</div>2 items <div>Power ratio</div>123.08 % <div>Power factor (cos φ) 1 to</div>0.95 <div>AC phase load imbalance</div>0 kVA </div>					
Alternatives	Quantity of inverters	Inverter	Power ratio	Dyn. Power ratio	AC power
<input type="checkbox"/> 2	2	1x PLENTICORE M G3 12.5 1x PLENTICORE S G3 7.0	123.08 %	19.50 kVA	
<input type="checkbox"/> 3	2	1x PLENTICORE M G3 12.5 1x PLENTICORE S G3 7.0	123.08 %	19.50 kVA	
<input type="checkbox"/> 4	2	1x PLENTICORE S G3 7.0 1x PLENTICORE L G3 15	109.09 %	22.00 kVA	
<input type="checkbox"/> 5	2	1x PLENTICORE S G3 7.0 1x PLENTICORE M G3 12.5	123.08 %	19.50 kVA	

You can select between the different sizing results.

- A recommendation is provided (at the top) alongside four alternatives.
- For easier comparison, you can mark up to three variants using the left-hand checkbox and compare them by clicking **Compare Results**.
- You can manually reconfigure the results by clicking on the tool symbol.
 1. To conclude, select the variant you prefer.
- ✓ Click on the right arrow to go to the next page.

7.6.2 Manual inverter planning

With manual planning, you select the inverter yourself and can connect it with the PV modules that have already been planned.

You can select the inverter from a database to use in the connection.

1. Firstly, go to **Select inverter** to select an inverter. You can also narrow down the selection further by using filters.
2. Connect the inverter with the PV modules that have already been planned. If a connection is outside of the inverter specifications, a notice, warning or error will be displayed.
3. Connect the battery to a hybrid inverter or alternatively select a battery inverter. Note: The battery can be connected to either the hybrid inverter or the battery inverter.

Polystring

When connecting the inverter, you can factor in a polystring connection. Using the polystring connection, different PV generators with the same PV module type can be connected to the same MPP tracker. The number of modules for the PV module type in the strings must be identical.

If you want to delete the polystrings again, untick the checkbox.

Sizing settings for inverters/PV generators

You can set several parameters for inverters and PV generators by going to the sizing settings. This more accurately restricts the sizing. Alternatively, you can use the standard settings.

Specify the following values here and save them:

Device	Parameters	
Inverter	Power ratio min./max.	Usually, inverters are sized smaller than the total generator power. Adopt the standard value or enter your own value here (20–200, standard values min. 80/max. 120).
	Cos phi (type) / (value)	Specify the type and value for cos phi.
	Limitation of the active power to [%]	Specify the active power that the inverter should be limited to when feeding into the public grid, e.g. 70%. The value is usually prescribed by the energy provider.
	Maximum unbalanced phase load [kVA]	Specify the maximum unbalanced phase load. In Germany, this is 4.6 kW, for example. (0–6, standard value 4.6)
PV generator	Min./max. module temperature [°C]	Enter here the minimum and maximum module temperature (-50 – 200, standard value -10 / 70)
	Module temperature Uoc [°C]	Enter here the module temperature at idling voltage (-50 – 200, standard value 25)
	Isc factor	If the Isc factor should be taken into consideration, select this in the settings and enter a current safety factor. Using the value, you can take a current safety factor into consideration in the sizing.

7.7 Cabling

Cabling

Inverters

1 x PLENTICORE M G3 8.5

PV Generator 1: 11 x AIKO-455-MAH54Db (1/2024):
5.01 kWp
PV Generator 2: 11 x AIKO-455-MAH54Db (1/2024):
5.01 kWp

Total losses

18.76 kWh

Power loss

68.48 W

Loss of yield

18.76 kWh/a

DC (2x)

AC (3x)

Cable line	Length [m]	Cross section	Material	Voltage drop [%]	Power loss [W]	Loss of yield [kWh/a]
DC	10	4	Copper	0.16	8	5.17
AC	10	6	Copper	0.47	40.32	9.06

Under Cabling you must specify the lengths, cable cross-sections and material used between the PV generator and the inverter, as well as between the inverter and the AC connection.

- 1. Please enter the values for the cabling.
Ensure that the power loss is under 1%.
- ✓ Click on the right arrow to go to the next page.

7.8 Additional components

Standard sizing

Max Mustermann

LOCATION CONSUMPTION PV GENERATOR INVERTER CABLING COMPONENTS PROFITABILITY RESULT REPORT

Battery

Battery


Manufacturer

BYD

Description

Battery-Box Premium HVS 10.2

Battery-Box Premium HVS 10.2

	Number of units	4	Total energy content	10.24 kWh
	Depth of discharge (DOD)	98.01 %	Number of cycles	-
	Nominal Voltage	409 V	Max. output power	10.24 kW
			IP protection class	IP 55

Autarky: 0.07% Self consumption: -%

Energy Meter

Energy Meter

Type

KOSTAL Smart Energy Meter - G2

KOSTAL Smart Energy Meter - G2

The KOSTAL Smart Energy Meter is an energy meter and energy manager in one device for optimal measurement and monitoring of self-consumption. An overview of the different Energy Meters can be found in the table by clicking on the info icon.

Select additional components that are being installed in the PV system.

Components will not be displayed if they have not been selected in the project (e.g. battery). However, you can add components by going to the project settings.

1. Select the components or search for them in the database.

INFO

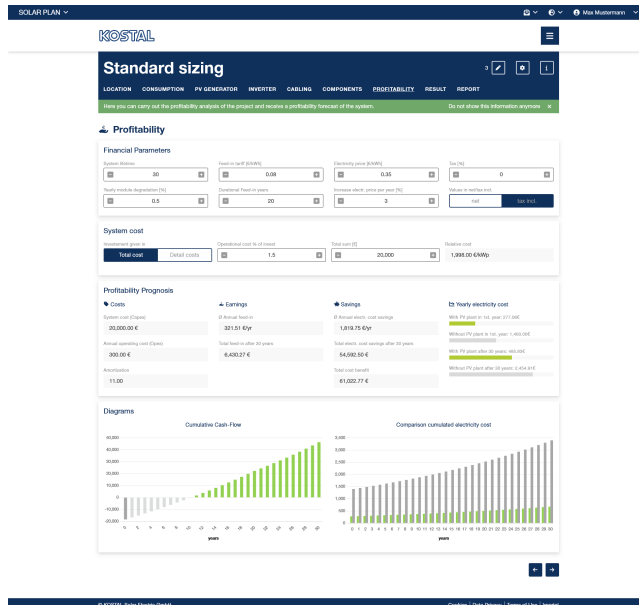
If a battery is selected, a compatible energy meter is immediately displayed as well. The selection can be cancelled. However, a smart energy meter is always required if using a battery.

- Information about the components is displayed.
- ✓ Click on the right arrow to go to the next page.

© 2024 KOSTAL Solar Electric GmbH

45

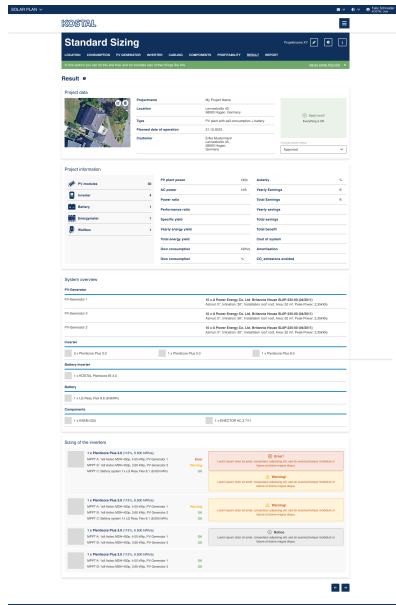
7.9 Profitability



By entering the financial parameters, the profitability of the PV system can be calculated here.

1. Enter the financial parameters. Here, you can also store standard values in the settings.
 2. Specify the system costs.
For the costs, you can choose between a simple cost input (total cost) and a detailed cost input (list of all costs).
- ✓ The profitability forecast is displayed.
 - ✓ Click on the right arrow to go to the next page.

7.10 Result



An overview of the PV system planning results is displayed. Check the settings and the results.

■ Project data

Here you will see the project data that you entered at the beginning. You can also change the project status here.

■ Project information

Overview of the installed components in the PV system and the most important figures for the PV system.

■ System overview

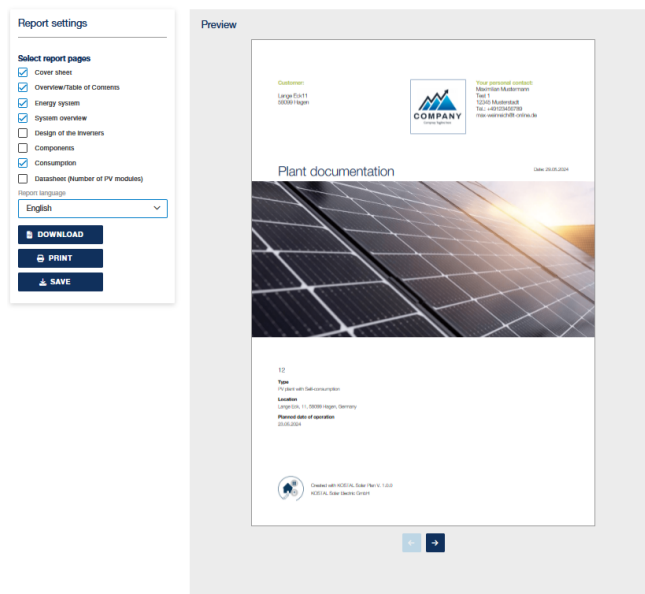
List of components that are taken into consideration in the project.

■ Inverter sizing

List of connection of the individual MPPTs and any warnings or errors. If there are still warnings and errors regarding the sizing, these must be checked and rectified.

Once you have checked the results, you can generate the report for the planned system on the next page.

7.11 Report



1. Select the pages that you want to appear in the report.
2. Select the language for the report.
3. You can download the report as a PDF, print it out or save the project.

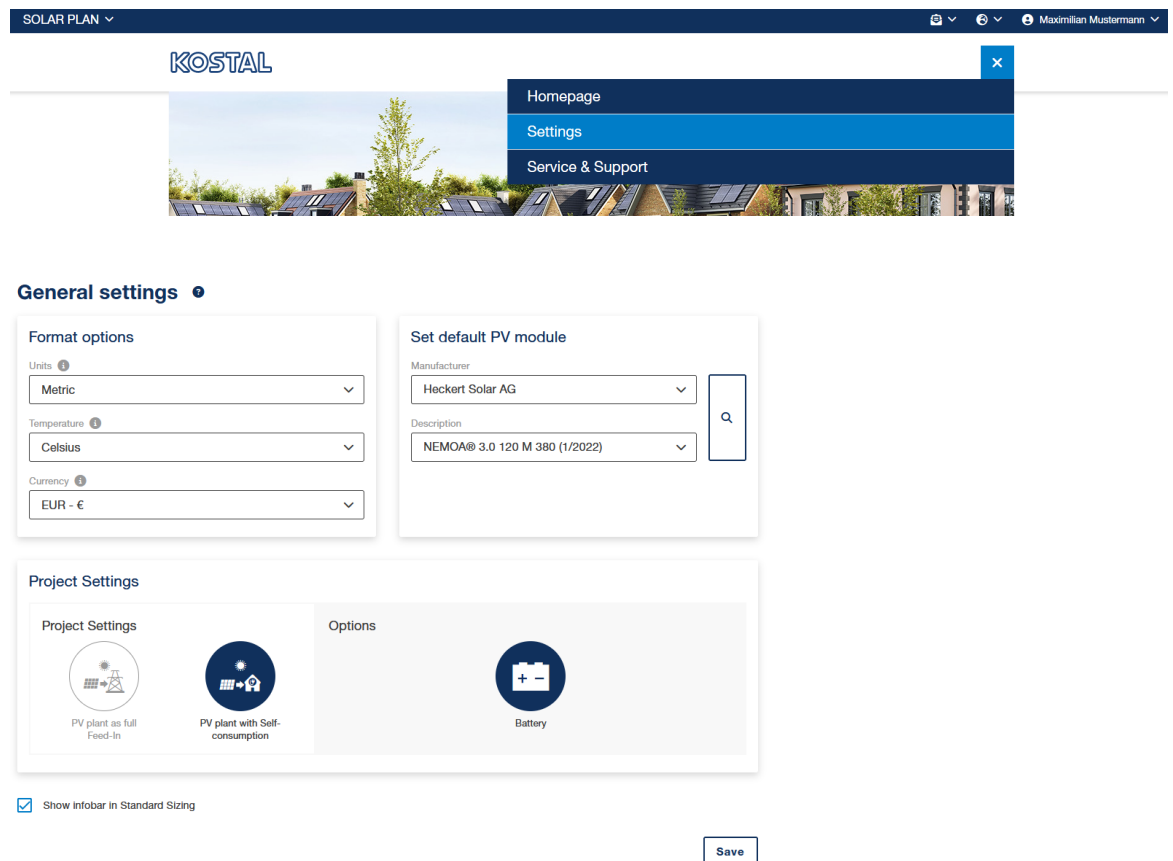
8. Settings

- 8.1 Settings – General..... 50
- 8.2 Settings - My Profile..... 51
- 8.3 Settings - PV modules 52
- 8.4 Settings - Inverter database 53
- 8.5 Settings - Sizing..... 54
- 8.6 Settings - Profitability 55

8.1 Settings – General

Under **Settings**, you can specify presets for all projects and manage the databases.

You can access the **Settings** from the homepage via the Settings menu item.



The screenshot shows the KOSTAL web application interface. At the top, there is a dark blue header with 'SOLAR PLAN' on the left and user information 'Maximilian Mustermann' on the right. Below the header, the 'KOSTAL' logo is visible. A dropdown menu is open, showing 'Homepage', 'Settings' (highlighted in blue), and 'Service & Support'. Below the menu, there is a banner image of a house with solar panels. The main content area is titled 'General settings' and contains three sections: 'Format options', 'Set default PV module', and 'Project Settings'. The 'Format options' section has three dropdown menus: 'Units' (Metric), 'Temperature' (Celsius), and 'Currency' (EUR - €). The 'Set default PV module' section has two dropdown menus: 'Manufacturer' (Heckert Solar AG) and 'Description' (NEMO® 3.0 120 M 380 (1/2022)). The 'Project Settings' section has three icons: 'PV plant as full Feed-In', 'PV plant with Self-consumption', and 'Battery'. A 'Save' button is located at the bottom right. A checkbox 'Show infobar in Standard Sizing' is checked.

■ Format options

Selection of format options for the unit, temperatures and currency.

■ Standard PV module

Select a standard PV module that is preselected in the project.

■ Project presets

Select what will be displayed as standard in the project settings.

8.2 Settings - My Profile


My Profile •

My profile

First name	Last name
Planer	Planer
Phone number	E-mail
+49076147744116	KOSTAL.Terminal.Testing+Planer@gmail.com

Edit

My company

Logo	Company
	KSE
Street	House number
>Hanferstraße	6
Post code	City
79108	Freiburg
Phone number	Website
+49076147744116	

Edit

This displays your personal details and your company's details.

It is only possible to change these details via the KOSTAL Solar Terminal.



INFO

If the personal details have been changed, you may need to log in again.

The details are then automatically used in each new project.

8.3 Settings - PV modules

PV module

Enter your desired PV module

Database:

Manufacturer: Year: to

Cell type: Rated power (Wp): to

Manufacturer	Description	Rated power	Date	Cell type	Favorites
<input type="radio"/>	LG Electronics Inc. LG225P1C	225 Wp	10/2019	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="radio"/>	LG Electronics Inc. LG225P1C	225 Wp	5/2019	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	LG Electronics Inc. LG230M1C	230 Wp	5/2019	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	LG Electronics Inc. LG230M1C	235 Wp	5/2019	<input type="checkbox"/>	<input type="checkbox"/>
<input type="radio"/>	LG Electronics Inc. LG240M1C	240 Wp	5/2019	<input type="checkbox"/>	<input type="checkbox"/>

Items per page:

Module information

Module		Electrical properties		Temperature coefficients	
Manufacturer	LG ELECTRONICS INC.	Max. system voltage	1,000.00 V	TK open circuit voltage	-0.35 %/°C
Description	LG225P1C	MPP power STC	225.00 W	TK short circuit current	-0.45 %/°C
Cell type	poly	MPP voltage STC	15.00 V	TK rated power	8.38 %/°C
Width	993 mm	MPP current	25.10 A		
Length	1669 mm	Open circuit voltage STC	36.40 V		
Height	42 mm	Short-circuit current STC	8.39 A		
Efficiency	14.05				

Manage your PV modules and create favourites or your own PV modules.


- Search for PV modules and mark them as a favourite.
- Add PV modules that are not available in the database.
A new PV module can only be added by completing all input fields.
- Overview of the selected PV modules.
- Module information for the selected PV module.



INFO

















The technical data used for the PV modules originate from publicly accessible information from the relevant module manufacturer. The content of the database is continually checked and updated. However, deviations cannot be ruled out, as the data is often changed. Therefore, we provide no guarantee that the PV module data is up to date, complete and/or correct (the values are not assured properties).

8.4 Settings - Inverter database


Inverter database 


Please select the desired inverter type:

Inverter series: Filter: Consider country: Consider country release: ☐ Actual inverters: ☐

Type	Max. power [kW]	Number of phases	Functionalities 
<input type="radio"/> Piko IQ 3.0	3.00	3-phase	 
<input type="radio"/> Piko MP plus 3.0-2	3.00	1-phase	 
<input type="radio"/> PLENTICORE plus 3.0 G2	3.00	3-phase	  
<input checked="" type="radio"/> PLENTICORE S G2 (4.0)	7.00	3-phase	   
<input type="radio"/> PLENTICORE S G2 (5.5)	7.00	3-phase	   

Items per page:

Inverter information 



Description	PLENTICORE S G2 (4.0)	Battery inverter (opt.)
Max. efficiency	98.00 %	97.00 %
Max. MPPT voltage	51.00 V	
DC start input voltage	63.75 V	
Max. open circuit voltage	1,000.00 V	
Number of MPPTs	3	
		Max. total DC current
		63.75 A
		DC nominal voltage
		600.00 V
		Degree of protection
		60
		Max. apparent AC power
		4,000.00 VA

Here you will find further information on the inverters.

- List of inverters
- Filter functions
- Overview of the selected inverters
- Information about the selected inverter



INFO

The technical data used for the KOSTAL inverters in this database is continually checked and updated as necessary. Nevertheless, deviations and errors cannot be ruled out. Therefore, we provide no guarantee that the inverter data is up to date, complete and/or correct (the values are not assured properties).

8.5 Settings - Sizing

Sizing

Sizing temperature

Min. module temperature [°C] Max. module temperature [°C]

Module temperature UOC [°C]

☐ Consider Isc Factor

Inverter parameters

Cos

Limitation active power [%] Max. phase imbalance [kVA]

☒ Consider country release of the inverters

Inverter selection

Inverter series

Inverter filter

☒ PIKO CI ☒ PLENTICORE G3

☒ Actual inverters ☒ Only three phase

Power Ratio

Power ratio min. [%] Power ratio max. [%]

Min. dyn. power ratio Max. dyn. power ratio

☒ Consider dynamic power ratio

☒ Show question on the consideration of the dynamic power ratio

Set parameters for PV generators, inverters and the inverter preselection here. These will then be adopted as a preselection during the sizing process, but they can be changed at the relevant step of the process.

The settings for calculating the dynamic performance ratio are specified here and appear in the planning process depending on the setting.

Under dynamic performance ratio, the user can use a simulation to dynamically determine the performance ratio. The power that can be achieved at the system location is used for this calculation. This means that higher inverter utilisation is possible without overloading it. This involves checking the maximum power that occurs simultaneously with surfaces with different orientations.

8.6 Settings - Profitability

Financial Parameters

System lifetime

-

30

+

Feed-in tariff [€/kWh]

-

0.08

+

Electricity price [€/kWh]

-

0.35

+

Tax [%]

-

0

+

Yearly module degradation [%]

-

0.5

+

Durational Feed-in years

-

20

+

Increase electr. price per year [%]

-

3

+

Values in net/tax incl.

net

tax incl.

Specify values that you want to use as a presetting for profitability.

Parameter	Explanation
System run time	Specify the planned run time for the PV system. The profitability is calculated for this run time.
Feed-in tariff [€/kWh]	Specify here the compensation that you receive from the energy supplier per kWh fed in.
Electricity costs [€/kWh]	Specify the electricity costs per kWh here.
Tax rate	Specify the tax rate here (e.g. 19%)
Yearly module degradation	PV modules lose power over the years. Specify the value of the PV module's annual degradation.
Feed-in duration in years	Specify here the estimated feed-in time in years.
Electricity price increase per year	Specify the annual increase in electricity price as a percentage.
Net values/Gross values incl. tax	Select here whether the value has been specified as a net figure or gross including tax.

9. Service and support

The Service and support area contains further information that may assist you with planning and layout.

- **Instruction manuals**

Here you will find the online instruction manual for KOSTAL Solar Plan.

- **Missing PV modules**

If you have not found the PV module you want, you can upload the datasheet of the PV module using the relevant button. After a check is performed, the PV module will be added to the PV module database.

- **KOSTAL Solar Electric – YouTube** channel

Find useful information about our products on our channel.

- **FAQs**

Do you have any questions? Start by looking at our FAQs. You may find the answer you are looking for.

- **Service and contact**

Go to [Service and support](#) to find the right contact for you and your problem.

- **Change log**

Here you will find a change log, providing information about changes to the relevant version and details on the current version of KOSTAL Solar Plan.

