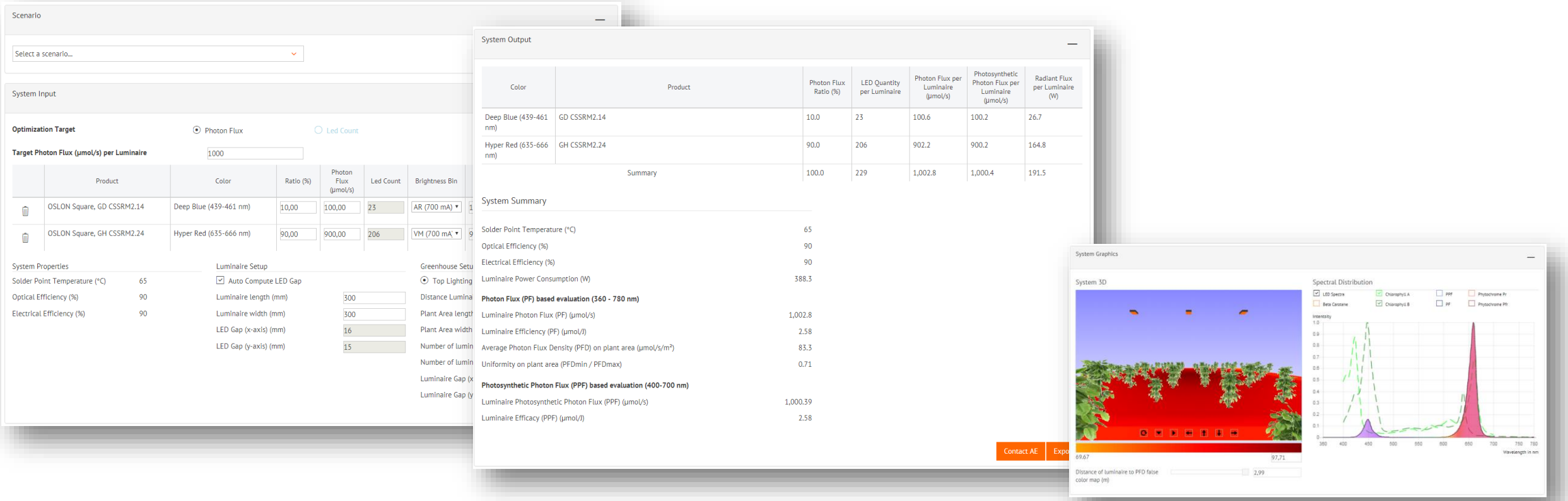

Horticulture Lighting Web Tool

OS GL S EEM | 2018 | Regensburg

Light is OSRAM

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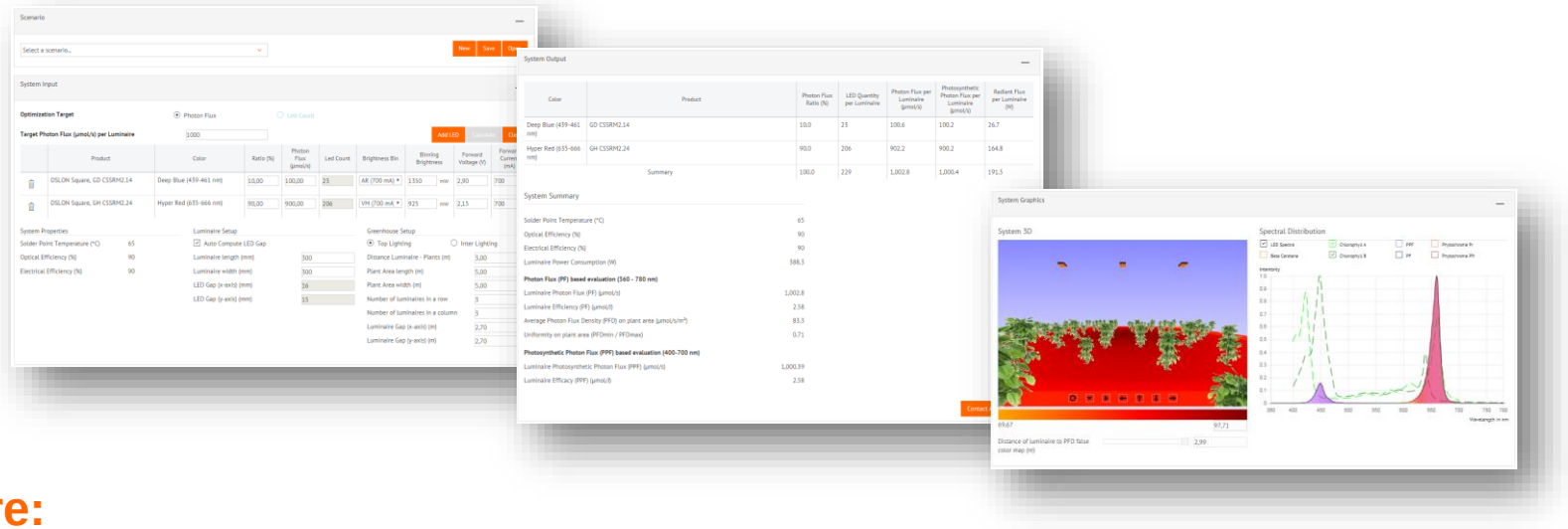
Welcome to the horticulture lighting web tool from OSRAM OS

The horticulture lighting web tool allows an easy estimation of the necessary number of LEDs to achieve a target photon flux and gives a first indication on the photon flux density by an irradiance estimation of multiple fixtures.



<u>Please be aware:</u>

The calculations in this horticulture tool are based on mathematical methods and approximations using typical characteristics and values! Variations between real systems and calculation results are possible! Please always verify the final design with a real prototype!

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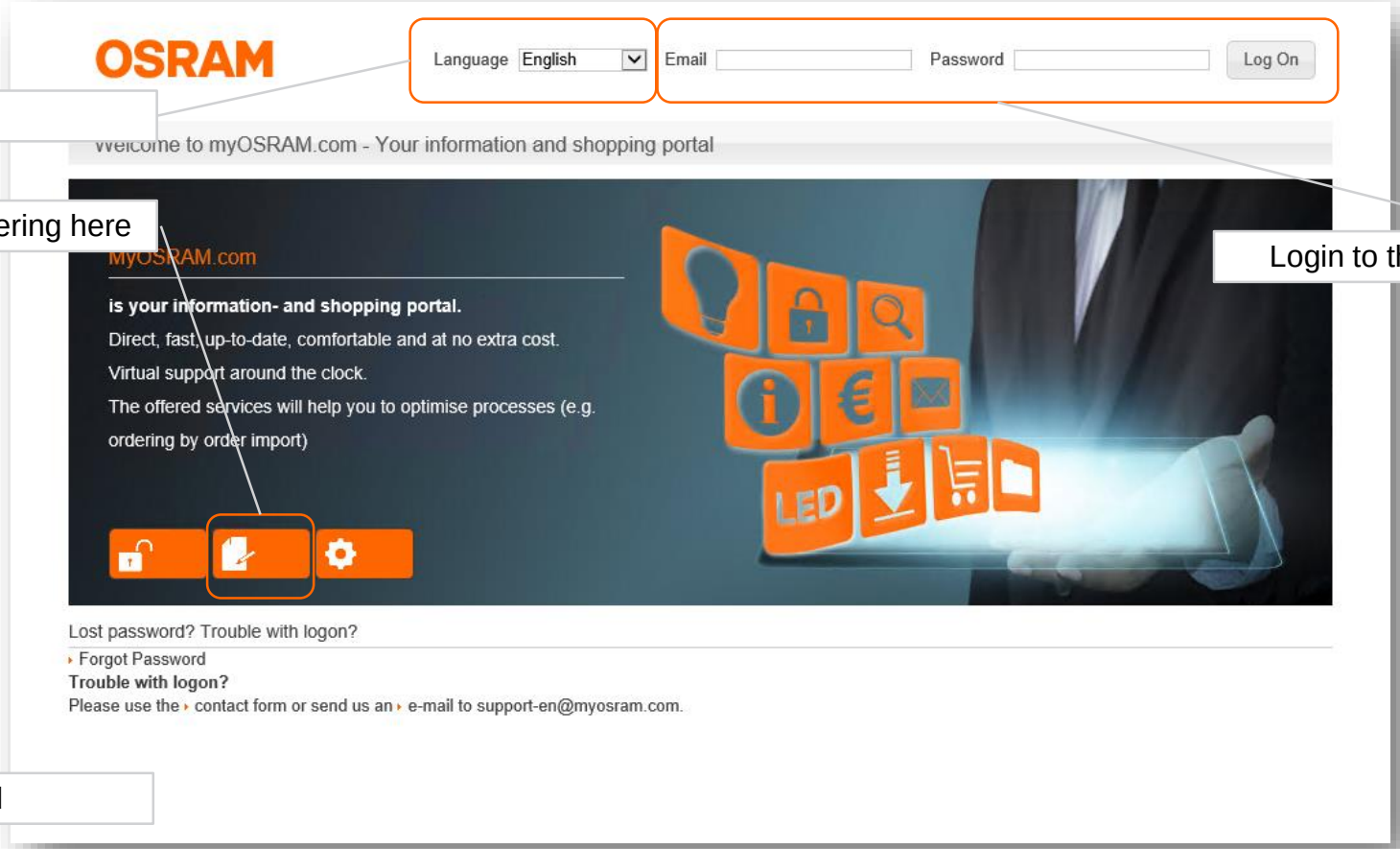
Overview

1. How to log in to the system?
2. How to load a scenario and what are the basic sections of the tool?
3. How to create your own scenario?

How can I log in to the horticulture web tool?

In order make full use of the horticulture web tool you can register and log into the MyOSRAM.com portal. www.myosram.com



Set your language

Create your account by registering here

Login to the MyOSRAM.com Portal

Reset your password

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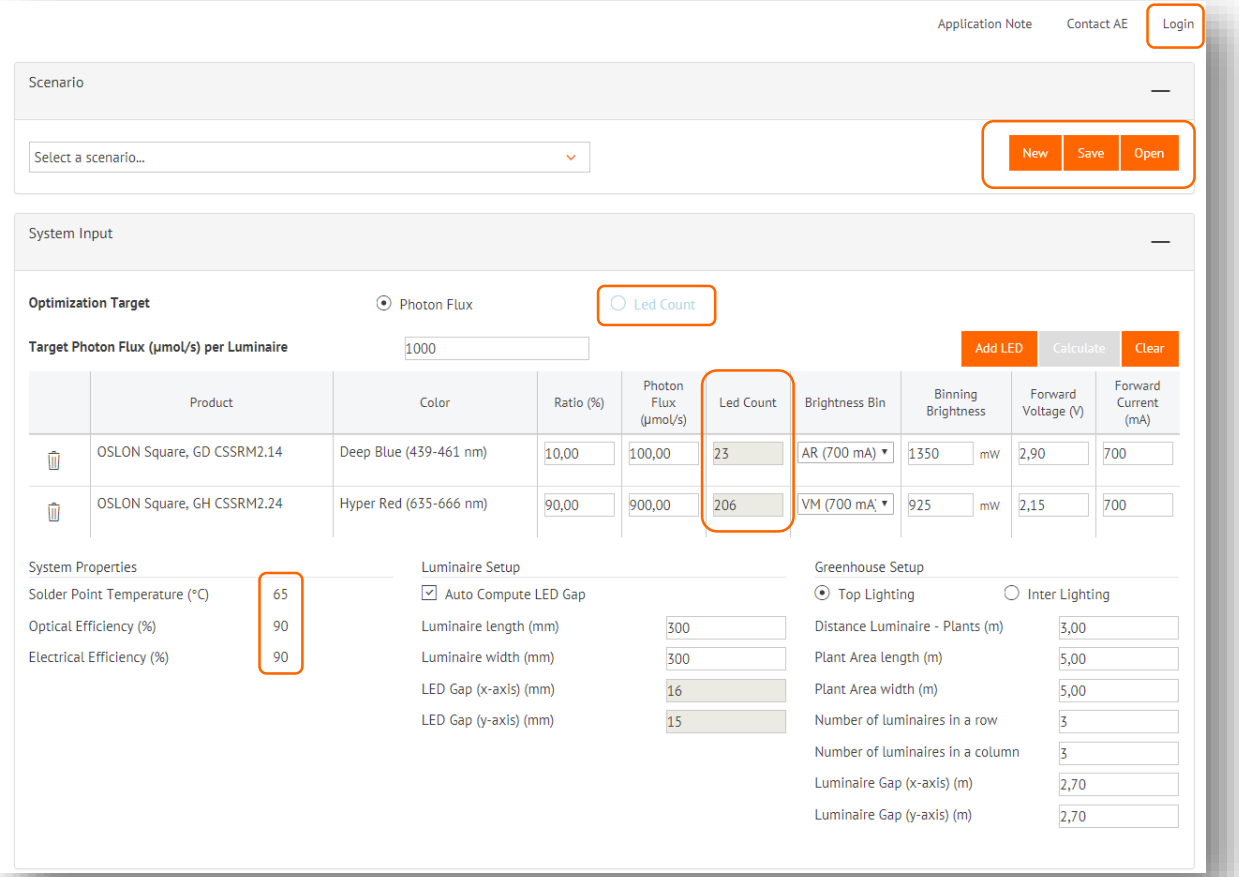
Why should I register and login to the tool?

First you should Login to the tool to use all functionalities. Basic calculations are available also without Login.



Function	Open	Login required
Basic calculation	Yes	Yes
Change solder point temperature Ts	No	Yes
Change optical efficiency	No	Yes
Change electrical efficiency	No	Yes
Set individual LED counts	No	Yes
Save and load scenarios	No	Yes

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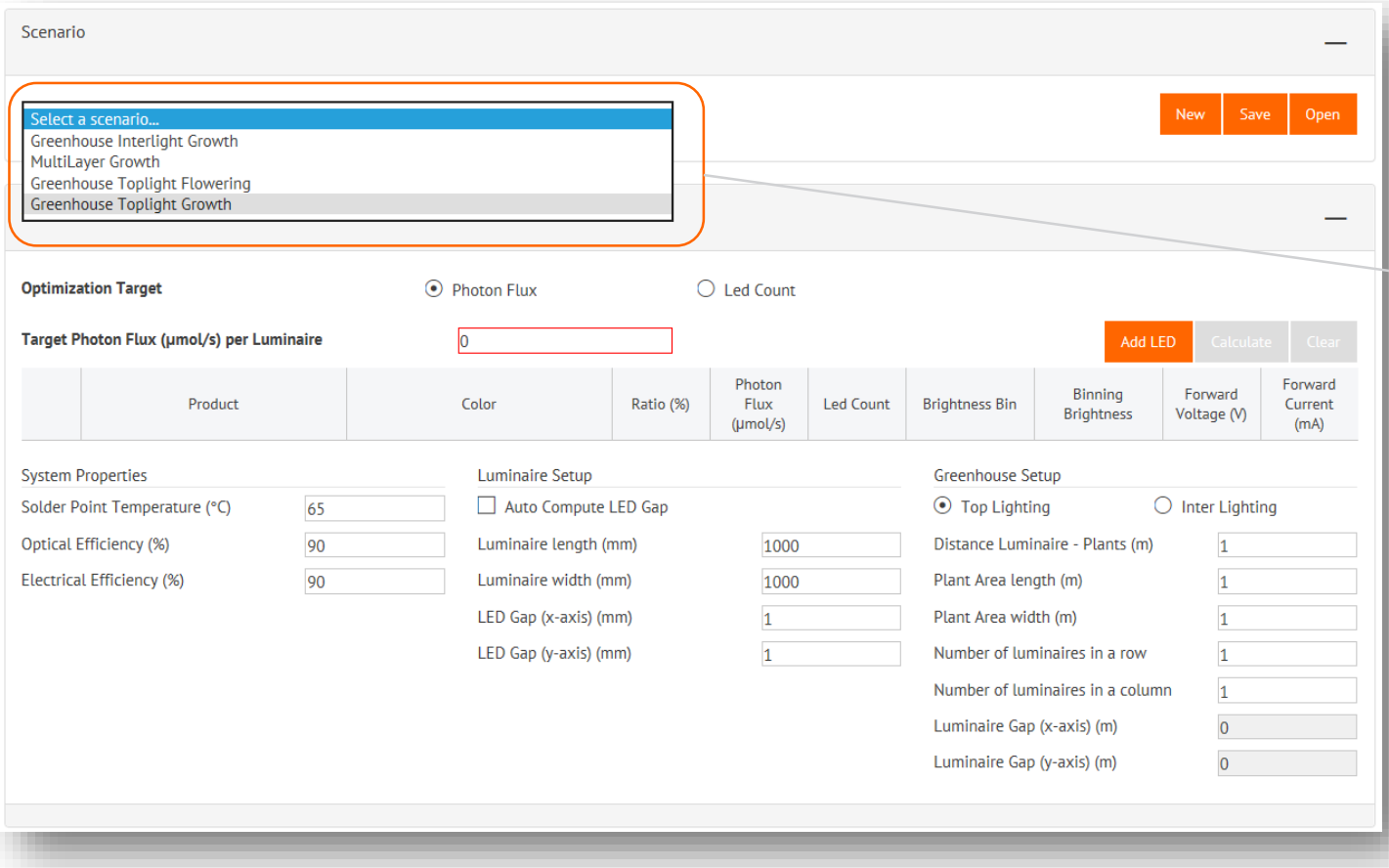
How can I load a predefined scenario?

The easiest way to start with the Horticulture Lighting Web Tool is to load a predefined scenario and change some properties to get used to the parameters and functions.



Select a predefined scenario to get familiar with the tool

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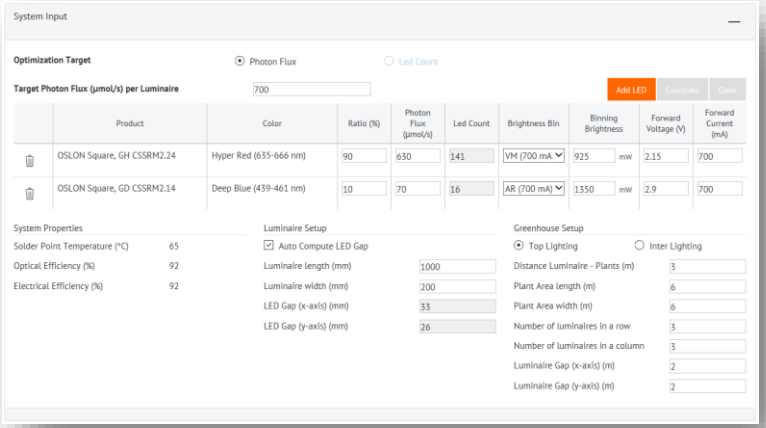
What are the different sections of the tool?

The tool is structured in 3 sections:

System Input

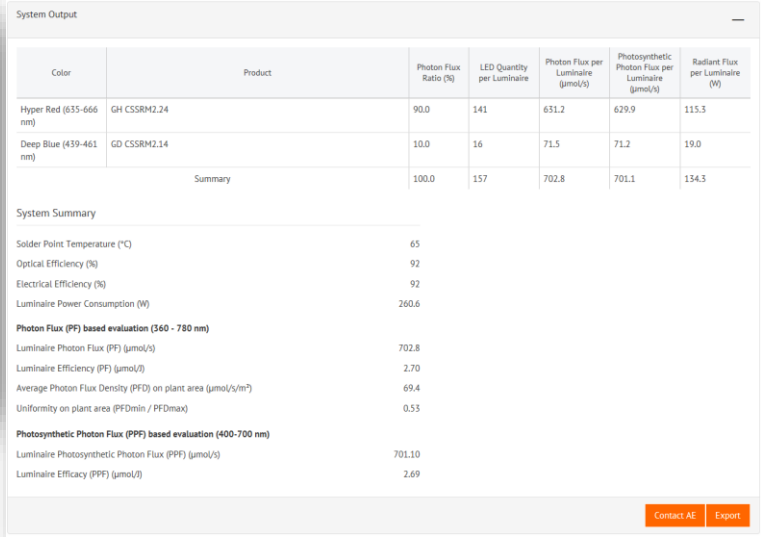


Here you can configure the complete system from the LEDs, the luminaire properties to the greenhouse setup

System Graphics

Here you can see a graphical illustration of the system setup and a false color map of the PFD distribution as well as the spectral composition of solution

System Output



Here you will find the calculation results for the fixture and the complete illumination scene

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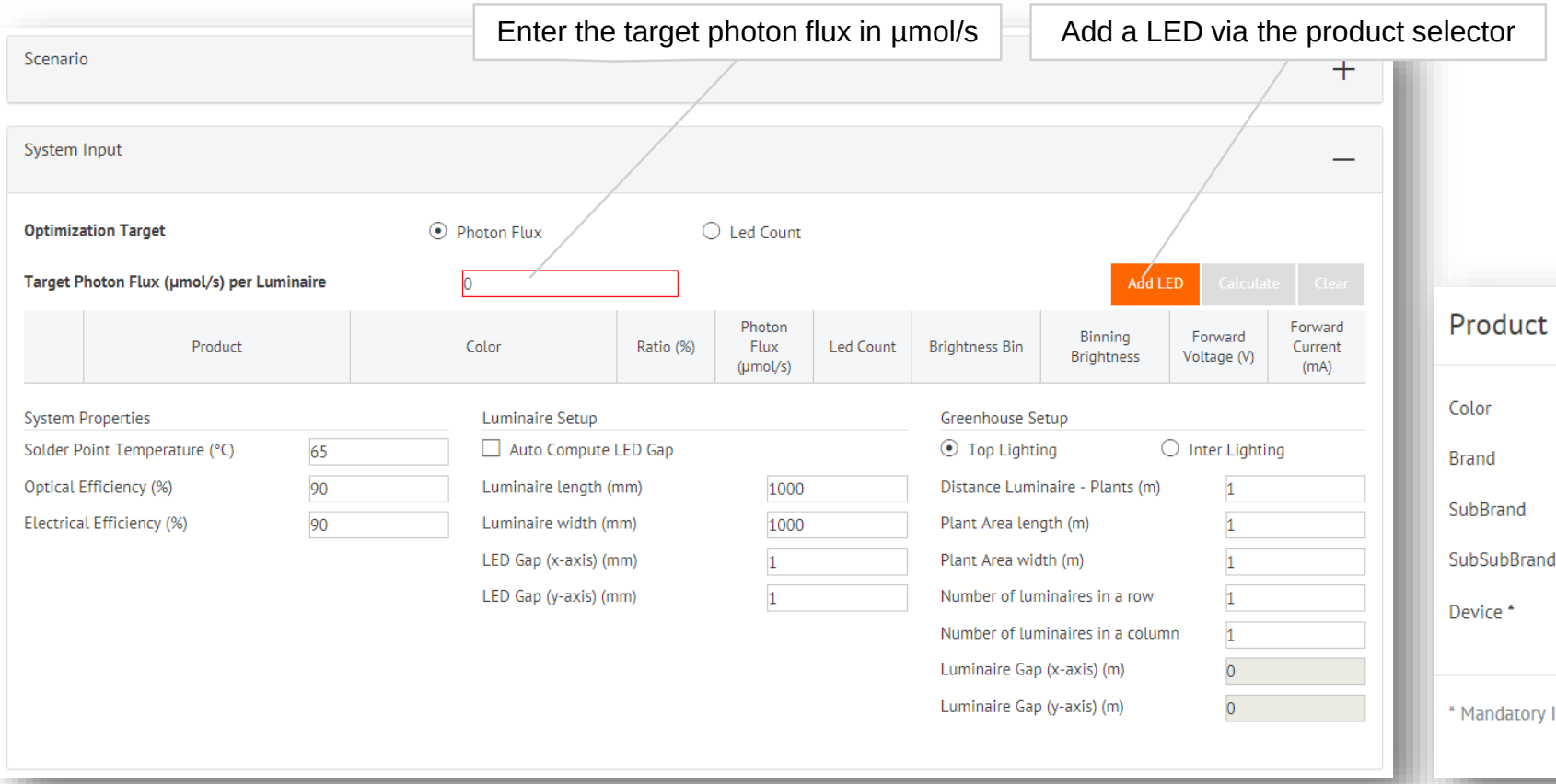
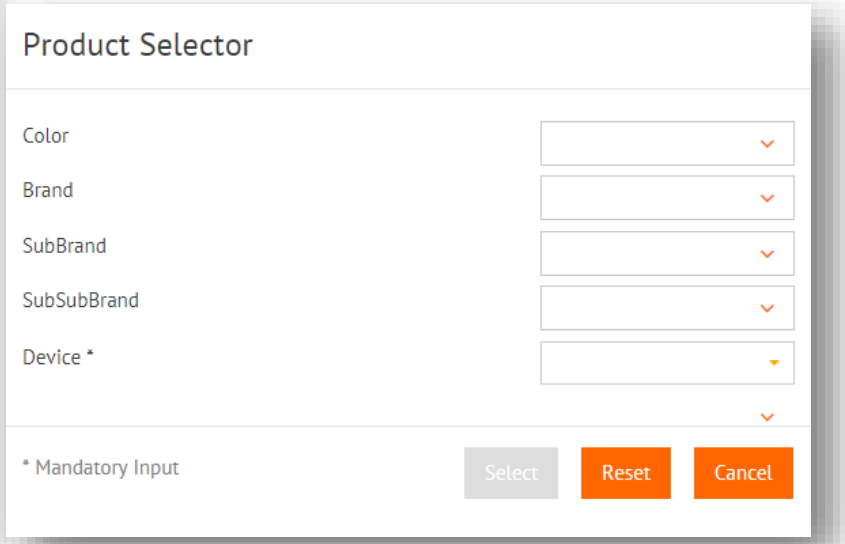
Lets get started! Login to the tool and do your first calculations …

Start your calculations either by entering your target photon flux in µmol/s from the luminaire, or selecting your first LED.





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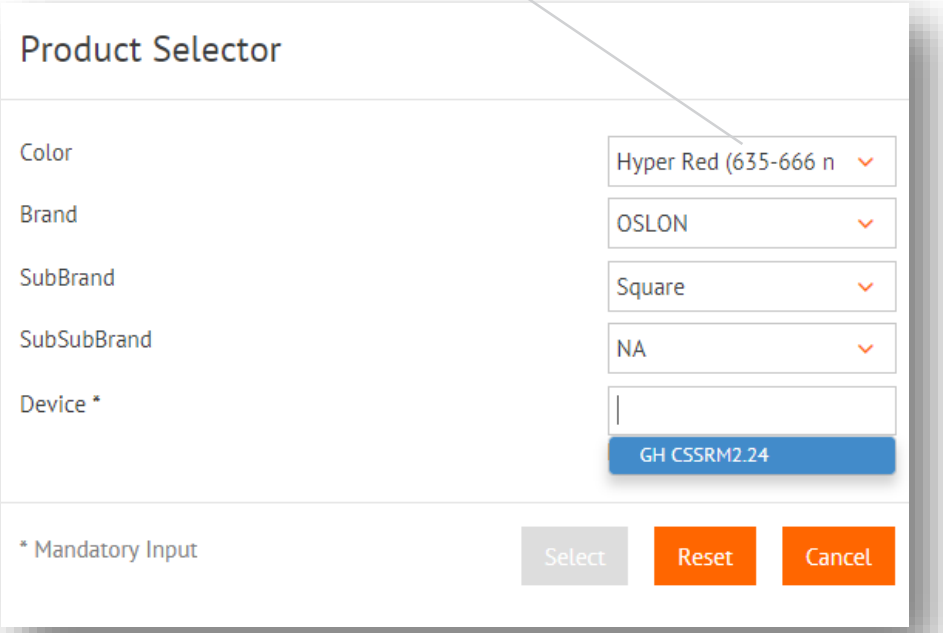
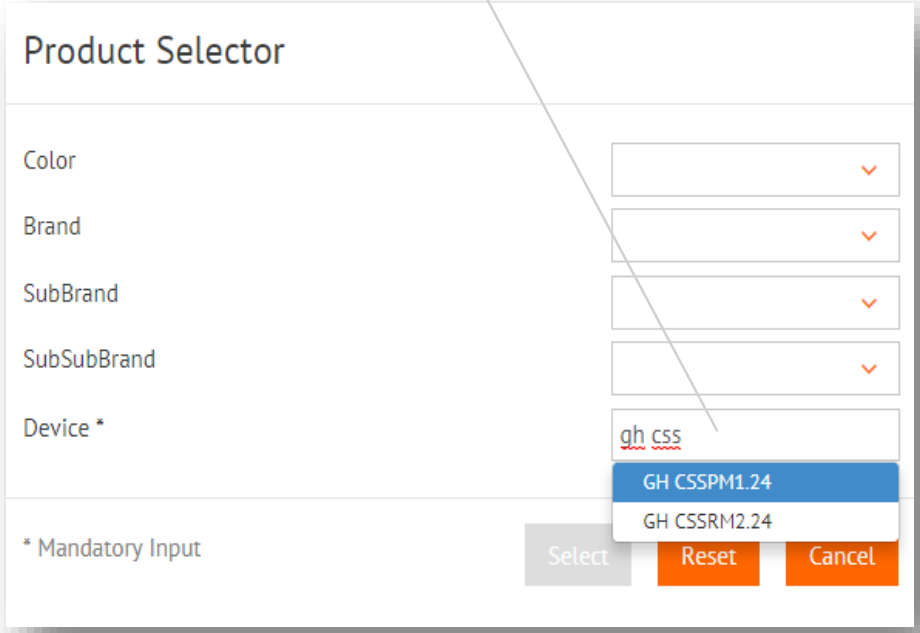
Select your LEDs …

Select your LEDs in the Product Selector dialog “Add LED”:

You can select a LED type by starting from the color and select the brand, sub brand and finally the device



If you know the LED type you can select the LED directly by typing into the device field



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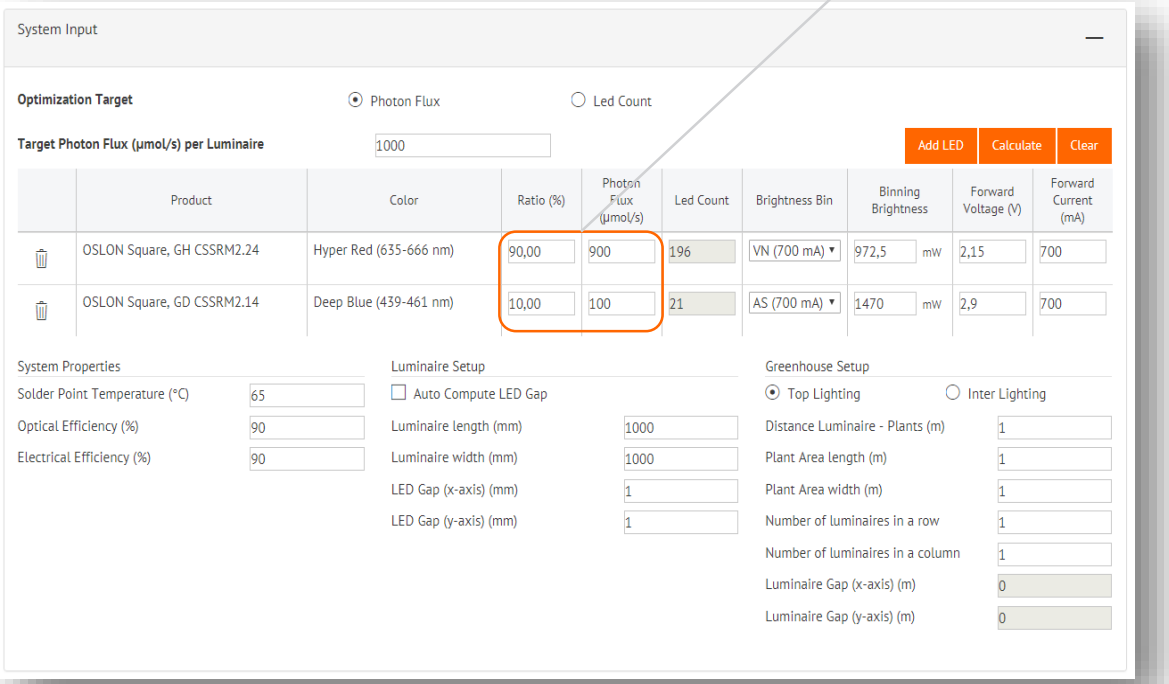
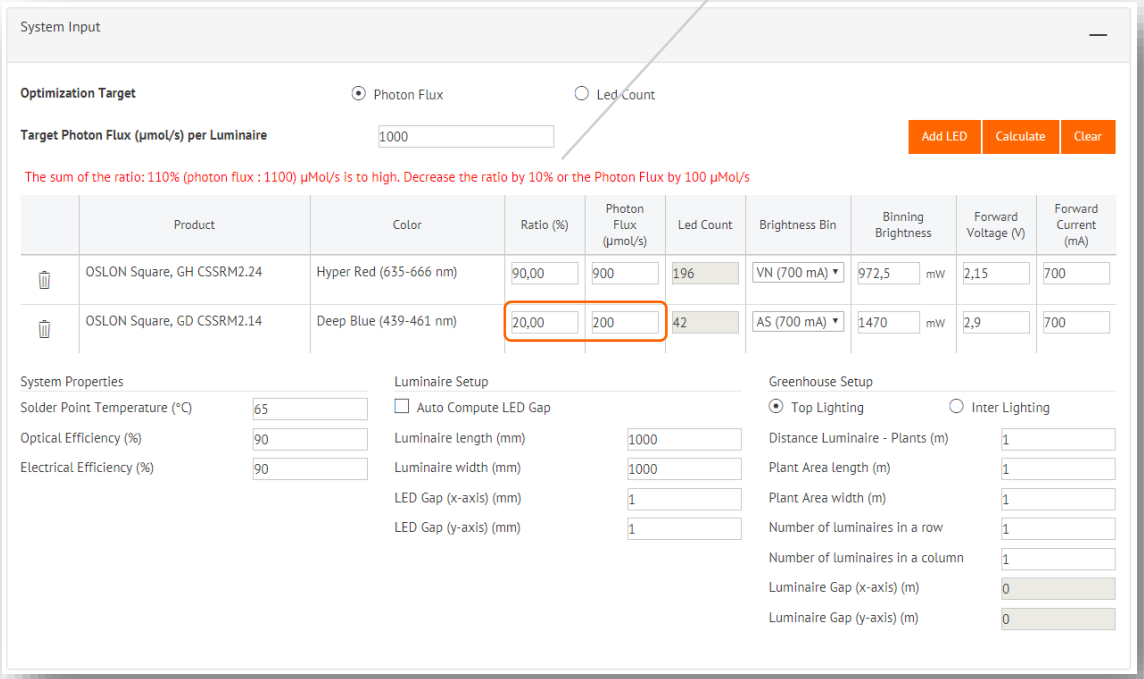
Set the your photon flux ratio for the different LEDs …

Usually the spectrum of horticulture fixtures are requiring certain ratios for different wavelength ranges. Set the target ratio in % for the wavelength range generated by the LED.

In this example we want 90% of the µmol/s coming from the Hyper Red 660nm LED and 10% of the µmol/s from the Deep Blue 450nm LED. You can also enter the photon flux per color directly.

If the sum is larger than 100% for all LEDs the tool will show a red error massage and ask to reduce either the ratio or the photon flux. A mouse over will show you the maximum available ratio left.





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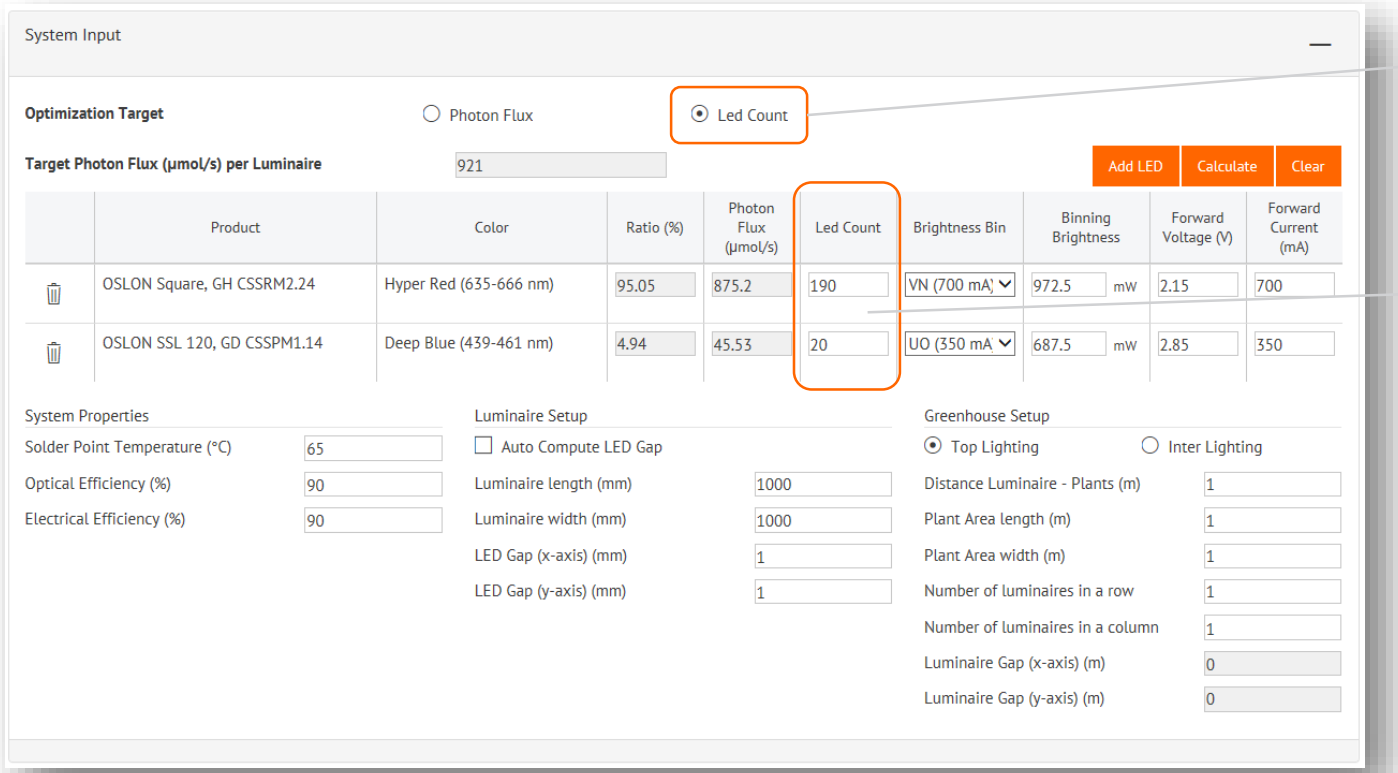
Instead of an automatic calculation of the LED count you can set a specific amount of LEDs per type

Usually the LED count is calculated automatically to meet the requested µmol/s ratio for the different wavelength and LED types. This can be uses as a first indication. Afterwards you can also set the number of LED to meet your electrical and geometrical requirements on the PCB.



Select the LED Count option to enable the LED count fields in the input area

Set the number of LEDs for the different LED types. The photon flux ratio and value will be recalculated based on your inputs.

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Adjust the brightness bin, the brightness at binning conditions, the forward voltage and the forward current if necessary …

Reasonable values for brightness, Vf and If are chosen by default. Please review the values so they match to your requirements and system.

System Input

Optimization Target ◉ Photon Flux ○ Led Count

Target Photon Flux (µmol/s) per Luminaire 1000

Add LED | Calculate | Clear

	Product	Color	Ratio (%)	Photon Flux (µmol/s)	Led Count	Brightness Bin	Binning Brightness	Forward Voltage (V)	Forward Current (mA)
🗑	OSLON Square, GH CSSRM2.24	Hyper Red (635-666 nm)	90,00	900,00	196	VN (700 mA)	972,5 mW	2,15	700
🗑	OSLON Square, GD CSSRM2.14	Deep Blue (439-461 nm)	10,00	100,00	21	AS (700 mA)	1470 mW	2,9	700

System Properties

Solder Point Temperature (°C)	65
Optical Efficiency (%)	90
Electrical Efficiency (%)	90

Luminaire Setup

☐ Auto Compute LED Gap

Luminaire length (mm)	1000
Luminaire width (mm)	1000
LED Gap (x-axis) (mm)	1
LED Gap (y-axis) (mm)	1

Greenhouse Setup

◉ Top Lighting ○ Inter Lighting

Distance Luminaire - Plants (m)	1
Plant Area length (m)	1
Plant Area width (m)	1
Number of luminaires in a row	1
Number of luminaires in a column	1
Luminaire Gap (x-axis) (m)	0
Luminaire Gap (y-axis) (m)	0

Set the brightness and forward voltage under binning conditions.

Adjust the forward current to the application conditions. A reduced forward current can increase the efficiency of the system significantly

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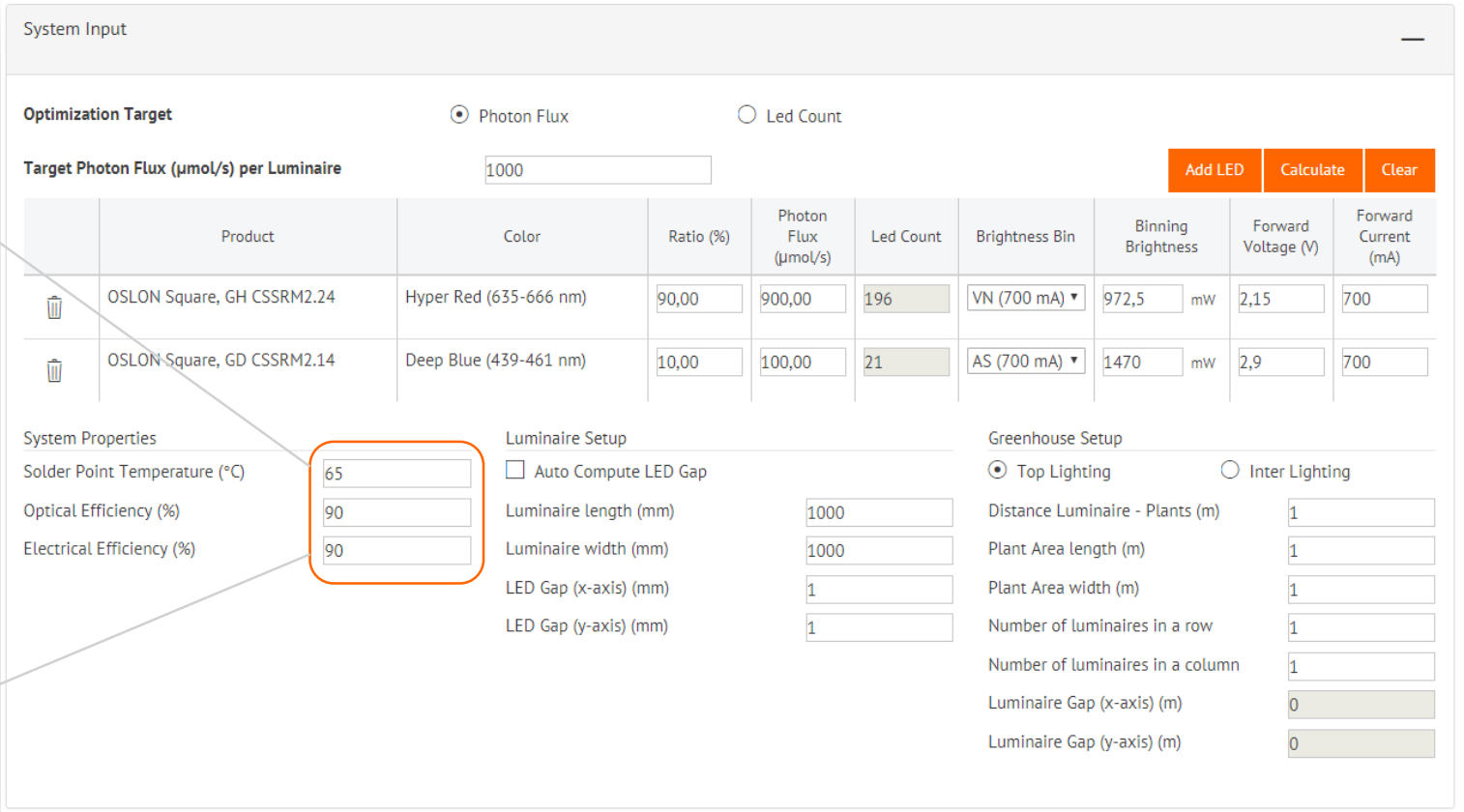
Adjust the fixture properties to your system setup

The solder point temperature and the optical and electrical efficiencies have significant influence to fixture performance.

The solder point temperature can be measured on the PCB and next to the LED. It strongly depends on the thermal management, the power consumption and the ambient temperature. A thermal simulation or calculation can help to get a reasonable starting point. It should always be checked with a first prototype.

Adjust the optical and electrical efficiency of the complete system to consider the losses in the optical system e.g. lenses or cover glass and the losses in the LED driver.



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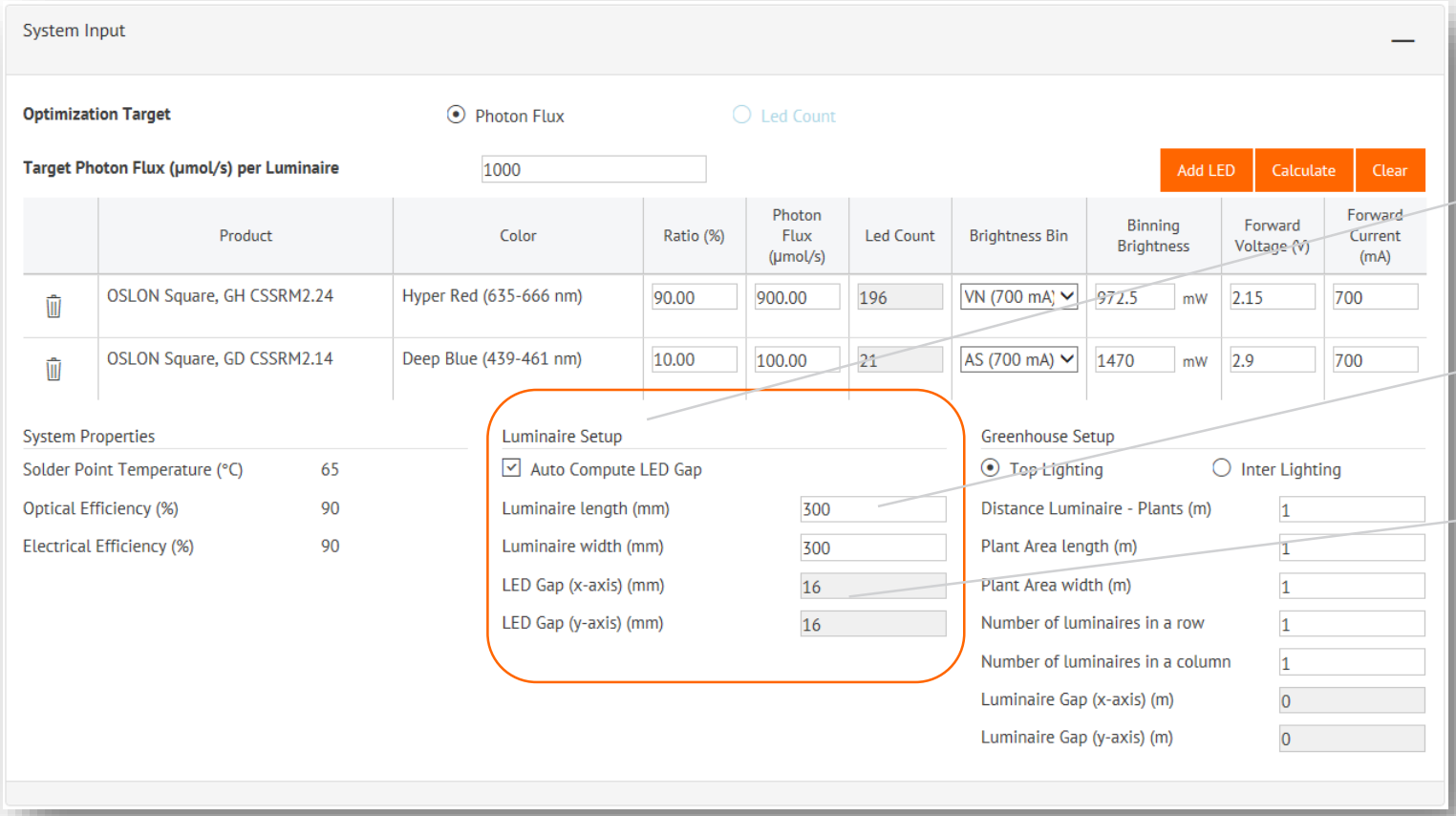
Specify the size of the luminaire or fixture and get a feeling of the gap between the LEDs

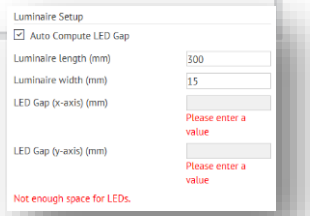
The size of the luminaire has an impact on the illumination simulation and allows also an indication on the gap between the LEDs on the PCB.



Ensure that the “Auto Compute LED Gap” box is checked

Enter the size of the luminaire in mm

The system will calculate the gap between the LEDs based on the number of LEDs used in the fixture.
If the fixture is too small for the amount of LEDs a error message will be displayed.



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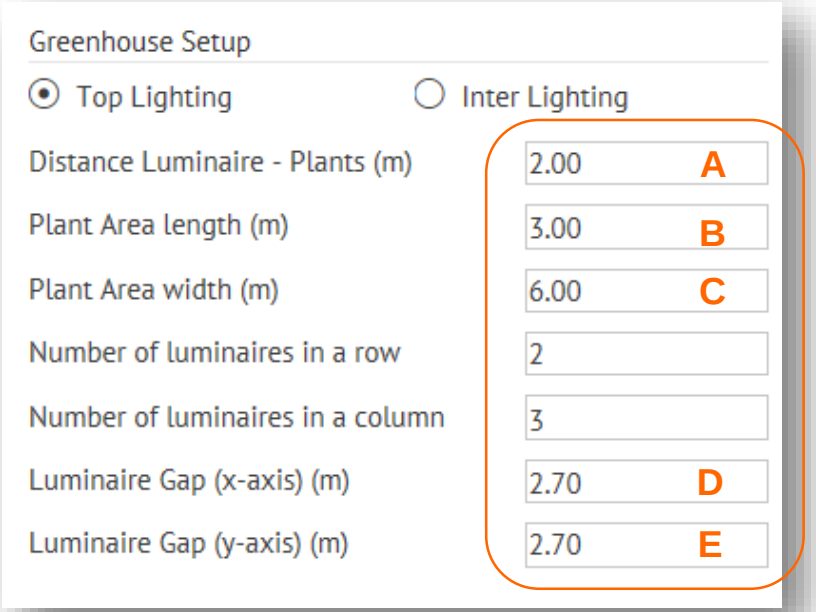
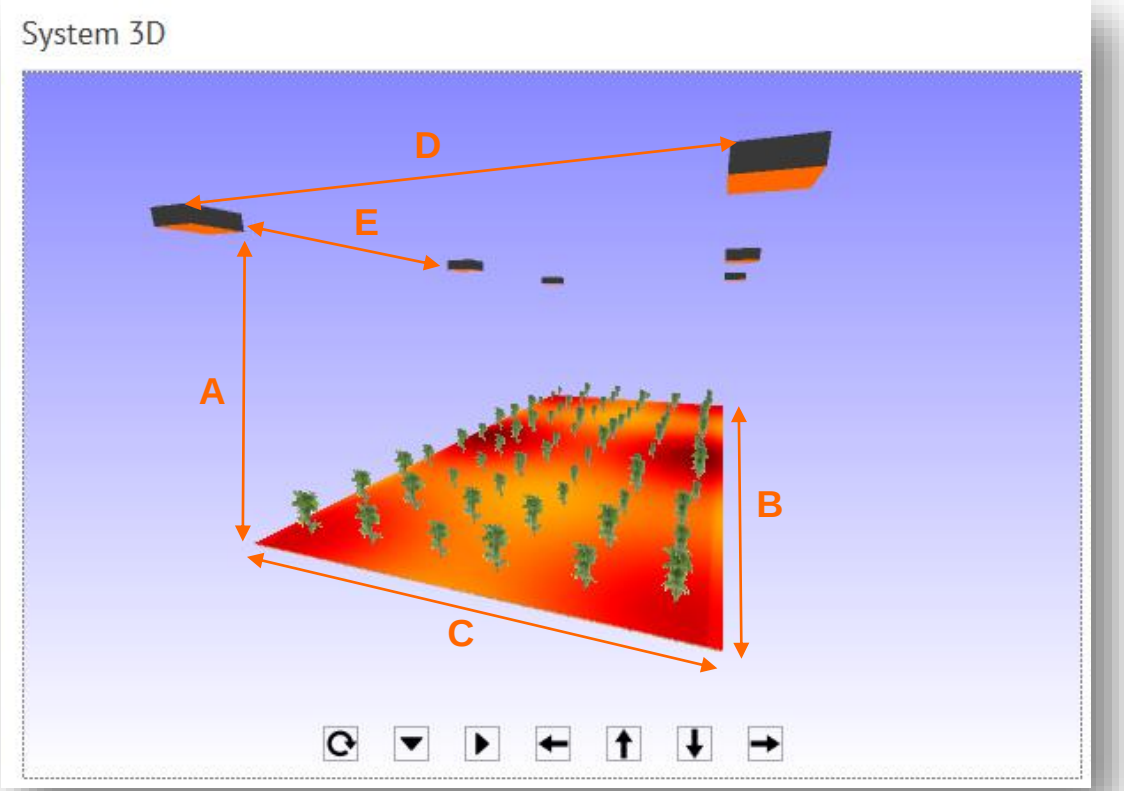
Specify the size of the Greenhouse and Plant Area Setup

In the Greenhouse Setup area you can define the illumination setup with the size of the plant area, the distance of the fixtures to the plants, the number of luminaires and the positioning.





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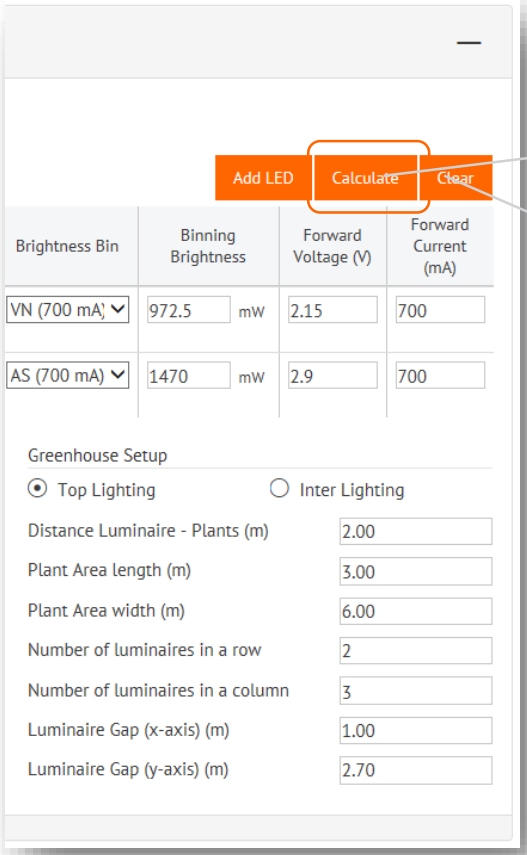
Start the calculation!

Whenever you change some values in the System Input area you are changing the setup and a new calculation of the setup is necessary.

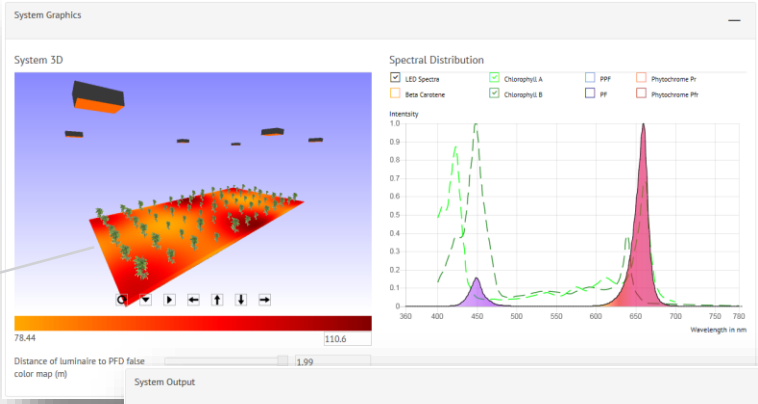


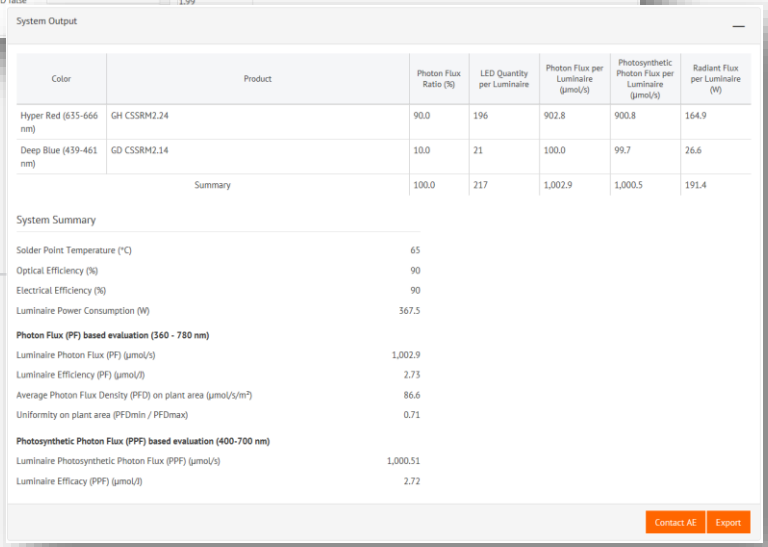
Press the Calculate Button to start the processing

If you want to start a new System press the Clear Button

After the processing you will get:

- 3D System representation of the setup including a false color map of the photon flux density (PFD) distribution
- A visualization of the spectral composition relative to typical plant characteristics
- A detailed breakdown of the complete system performance and parameters for the fixture and the system setup





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Reviewing the calculation results of the system setup in the “System Graphics” area – the 3D representation

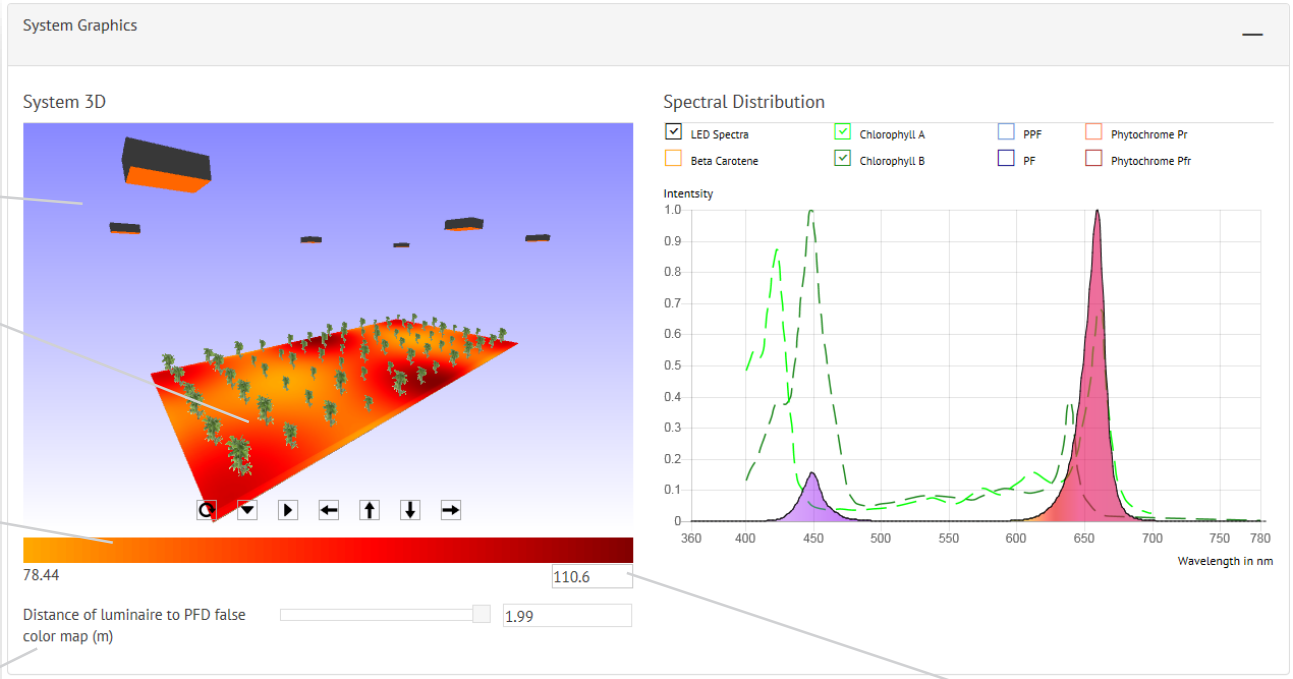
The System 3D window gives you a visual overview of the system setup.

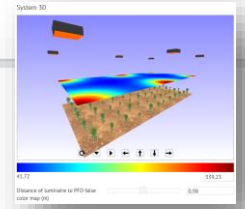
The System 3D window shows a visualization of the Greenhouse setup

The false color map gives you a rough indication on the Photon Flux Density (PFD) in µmol/s/m². This is a rough estimation base on the radiation characteristic of the LED only and should be confirmed by a more detailed system simulation based on the final design of the fixture! (e.g. DIALUX, RELUX, …)

The false color map will also show the minimum and maximum value of the PFD within the plant area

You can change the distance of the evaluation from the plant area (default) closer to the fixtures to evaluate the uniformity at different distances





You can change the scaling of the false color map by adjusting the maximum value in order to evaluate the uniformity

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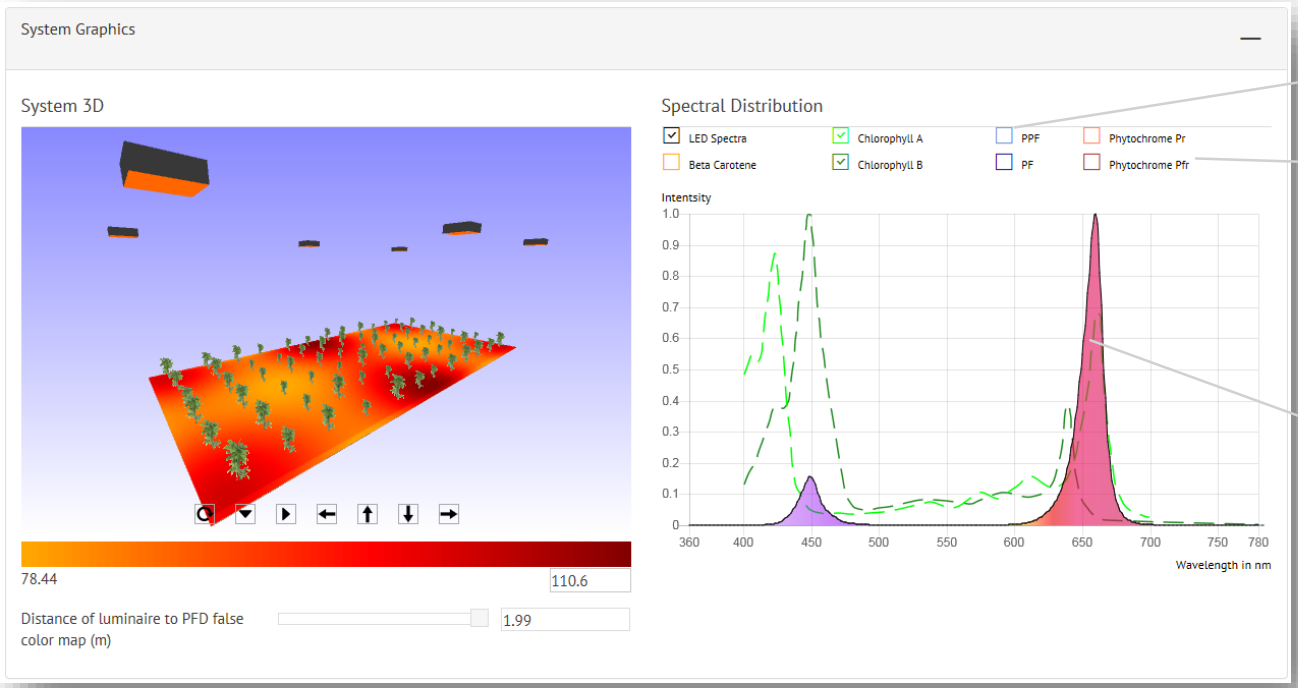
Reviewing the calculation results of the system setup in the “System Graphics” area – the spectral data

The Spectral Distribution window shows the resulting mixed spectral composition of the light in respect to typical plant characteristics.



You can view the PPF range (400-700nm) or the complete PF range from 360-780nm in this tool.

You can select and deselect different typical plant characteristics to evaluate the match of the spectrum to the targeted sensitivity curves.

The resulting mixed spectrum from the fixture is displayed

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Reviewing the calculation results of the system setup: The System Output

The System Output area gives you the typical parameters for one fixture.

System Output

Color	Product	Photon Flux Ratio (%)	LED Quantity per Luminaire	Photon Flux per Luminaire (µmol/s)	Photosynthetic Photon Flux per Luminaire (µmol/s)	Radiant Flux per Luminaire (W)
Hyper Red (635-666 nm)	GH CSSRM2.24	90.0	196	902.8	900.8	164.9
Deep Blue (439-461 nm)	GD CSSRM2.14	10.0	21	100.0	99.7	26.6
Summary		100.0	217	1,002.9	1,000.5	191.4

System Summary

Solder Point Temperature (°C)	65
Optical Efficiency (%)	90
Electrical Efficiency (%)	90
Luminaire Power Consumption (W)	367.5
Photon Flux (PF) based evaluation (360 - 780 nm)	
Luminaire Photon Flux (PF) (µmol/s)	1,002.9
Luminaire Efficiency (PF) (µmol/J)	2.73
Average Photon Flux Density (PFD) on plant area (µmol/s/m²)	86.6
Uniformity on plant area (PFDmin / PFDmax)	0.71
Photosynthetic Photon Flux (PPF) based evaluation (400-700 nm)	
Luminaire Photosynthetic Photon Flux (PPF) (µmol/s)	1,000.51
Luminaire Efficacy (PPF) (µmol/J)	2.72

Contact AE | Export

Overview of the LED types used in the fixture, the amount of LEDs, the generated PF, PPF and optical power of each individual LED type.

In the System Summary you get information on the selected solderpoint temperature, optical and electrical efficiency and total power consumption of the fixture.

The calculation is always targeting Photon Flux (PF) in the complete range from 360-780nm. The results in this range for Photon Flux, Photon Flux Efficacy, average Photon Flux Density and uniformity at the plant area.

If the results for the Photosynthetic Photon Flux (PPF) is required the section below is giving the results for PPF and PPF Efficacy.

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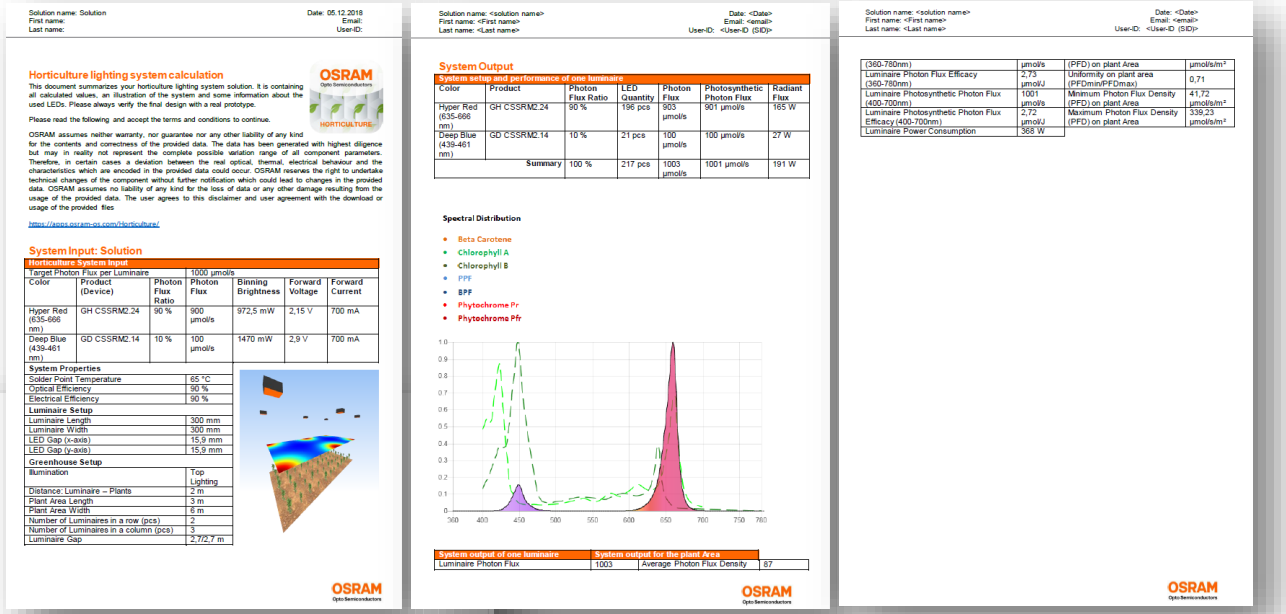
Creating a Summary Report of the simulation as PDF

In order to send the simulation results also to other persons you can save the configuration and results in a PDF report.

If you encounter problems, don't hesitate to tell us! Just drop us an email by pressing the Contact AE button.



Photon Flux (PF) based evaluation (360 - 780 nm)

Luminaire Photon Flux (PF) (µmol/s)	1,002.9
Luminaire Efficiency (PF) (µmol/J)	2.73
Average Photon Flux Density (PFD) on plant area (µmol/s/m²)	86.6
Uniformity on plant area (PFDmin / PFDmax)	0.71

Photosynthetic Photon Flux (PPF) based evaluation (400-700 nm)

Luminaire Photosynthetic Photon Flux (PPF) (µmol/s)	1,000.51
Luminaire Efficacy (PPF) (µmol/J)	2.72

Contact AE | Export

You can create a PDF report with all the system settings by pressing the Export Button

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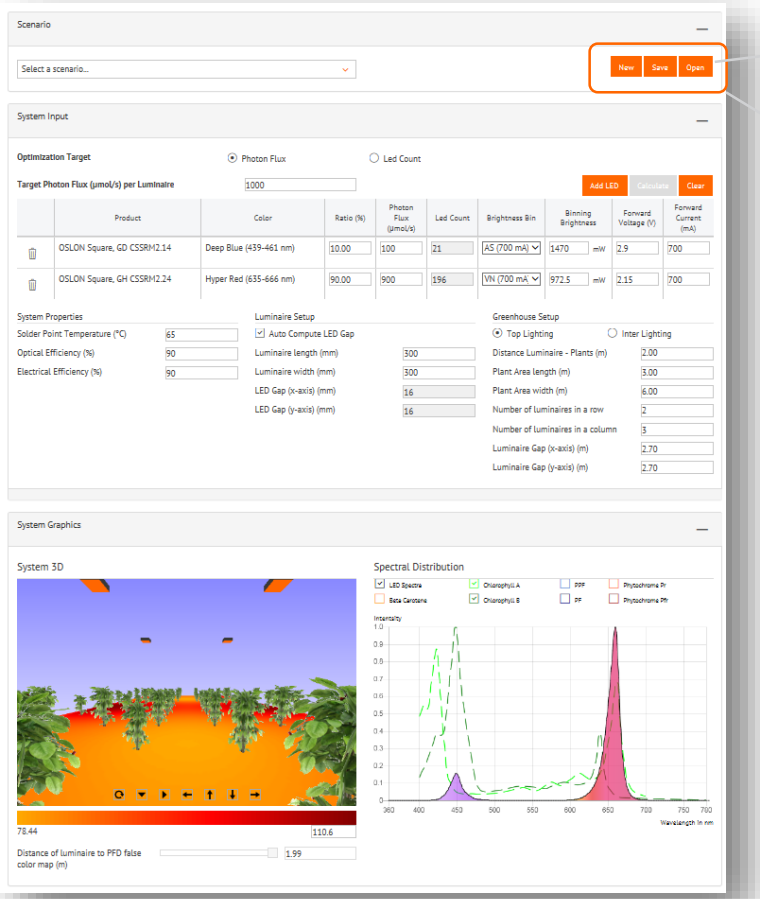
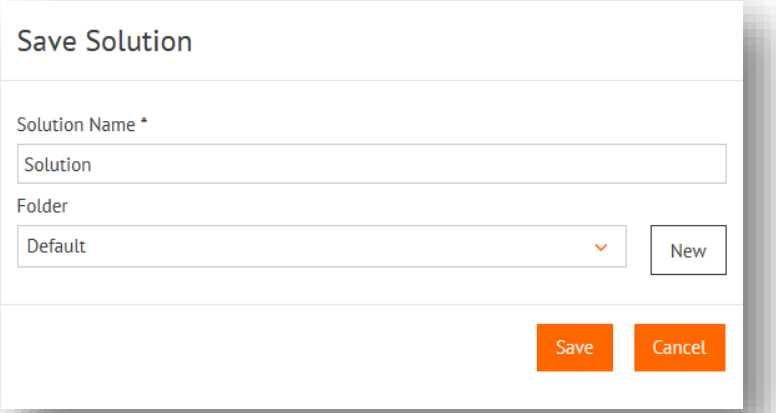
Save your work for later review or modification

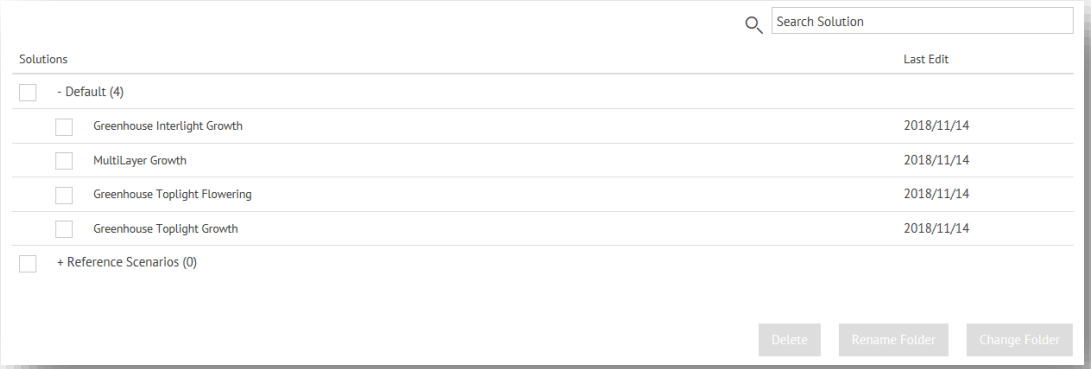
You can save your solution for later use and load if for modifications.



Save your Solution by pressing the Save button if you are logged on to the tool.



Open a saved Solution by pressing the Open button if you are logged on to the tool.



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Thank you.