

# Summary table The main InfoGrow screen

Select nursery

Select start and end date for value calculations

Last received measurement  
05/01/2024 09:34:27

Start date: 28. Dec 2023

End date: 04. Jan 2024

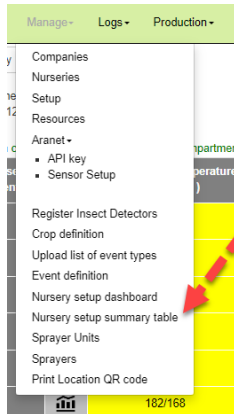
Greenhouse Compartments		Degree Sum (°C)	Indoors light sum (mole/m <sup>2</sup> leaf)	Photosynthesis sum (g CO <sub>2</sub> /m <sup>2</sup> )	Ligh use efficiency (g/kWh)	Avg. Pn Activity (g/h/m <sup>2</sup> leaf)	Heating (Wh/m <sup>2</sup> per day)	Growth light (Wh/m <sup>2</sup> per day)	Avg. Humidity (%)	Avg. Temp. (°C)	Avg. CO <sub>2</sub> (ppm)
Nus 1-3 V		91/168	50.7/112	32/160	4.5	0.2	2383	1184	75 <sup>85</sup>	15.2 <sup>20.0</sup> -98.9	944
Nus 1-3 B		133/168	71.2/112	44/160	4.3	0.2	2826	1273	80 <sup>87</sup>	16.7 <sup>22.1</sup> 8.9	1104
Nus 4		136/168	38.6/112	22/160	4.5	0.1	1206	624	68 <sup>82</sup>	17.0 <sup>21.4</sup> 10.3	995
Nus 5 - 6000		186/193.6	44.9/112	25/160	4.4	0.1	2432	730	60 <sup>70</sup>	23.3 <sup>25.2</sup> 21.7	997
Nus 6		146/168	85.9/112	53/160	7.4	0.3	1842	905	73 <sup>80</sup>	18.3 <sup>22.6</sup> 10.2	1134
Nus 6 - 600000		131/168	43.4/112	25/160	4.4	0.1	3837	715	68 <sup>76</sup>	16.3 <sup>21.1</sup> 8.9	732
Nus 7 - 9		143/168	73.4/112	45/160	4.3	0.2	2208	1319	74 <sup>81</sup>	17.9 <sup>22.8</sup> 9.4	1114
Nus 8		168/189.6	74.6/112	49/160	4.9	0.3	2339	1248	71 <sup>78</sup>	21.0 <sup>24.3</sup> 17.7	777
Nus 10		135/168	76.9/112	48/160	4.3	0.2	1832	1397	76 <sup>83</sup>	16.8 <sup>22.7</sup> 5.0	690
Nus 11		133/168	78.1/112	49/160	4.3	0.3	2174	1420	80 <sup>92</sup>	16.6 <sup>21.5</sup> 6.5	635
Nus 12		138/168	87.4/112	54/160	4.2	0.3	2284	1605	72 <sup>77</sup>	17.2 <sup>22.5</sup> 7.8	690
Nus 13		132/168	57.1/112	35/160	4.4	0.2	1983	995	82 <sup>88</sup>	16.5 <sup>21.9</sup> 7.1	633

Values describing the greenhouse production

Open graph menu for the compartment



# Select what you want to see in the table



Selected	Name	Unit
<input checked="" type="checkbox"/>	Light use efficiency	mgCO <sub>2</sub> /Wh
<input checked="" type="checkbox"/>	Photosynthesis activity	g/h/m <sup>2</sup>
<input checked="" type="checkbox"/>	Heat energy	Wh/m <sup>2</sup>
<input checked="" type="checkbox"/>	Growth Light energy	Wh/m <sup>2</sup>
<input checked="" type="checkbox"/>	Humidity	%
<input checked="" type="checkbox"/>	Temperature	Celcius
<input checked="" type="checkbox"/>	CO <sub>2</sub>	ppm
<input checked="" type="checkbox"/>	Degree day sum	Celcius
<input checked="" type="checkbox"/>	Photosynthesis sum	g/m <sup>2</sup>
<input checked="" type="checkbox"/>	Sum light at plante height	mol PAR/m
<input type="checkbox"/>	Insect alarm niveau	level
<input type="checkbox"/>	Daily light hours	hour

Select values you want to see in the table.

The table can hold a maximum of 10 values.

More values might come later.

Coming soon

# Define colors and values

The summary table can be adapted to your needs.

Degree Sum (°C)	Indoors light sum (mole/m <sup>2</sup> leaf)	Photosynthesis sum (g CO <sub>2</sub> /m <sup>2</sup> )
91/168	50.7/112	32/160
133/168	71.2/112	44/160

Click in the cell you want to change

Important values to define:

- Degree sum
  - Base temperature is defined in the crop setup
  - Target temperature sum (°C)
- Indoor light sum
  - Daily target sum for indoors light (mol)
- Photosynthesis sum
  - Daily target sum for photosynthesis (g CO<sub>2</sub>/m<sup>2</sup>)
- Avg Pn Activity (Photosynthesis activity)
  - Crop type (select crops defined in “Manage, Crop definition”)

This is the menu shown when clicking the Degree sum:

## Setup for radial gauge about Degree day sum

[Back to summary table](#)

Basis temperature  °C (Crop definition specified)  
 Daily Target Sum Temperature  °C

Setup layout

Range values

Max. value   
 High value   
 Low value   
 Min. value

Range colors

High color range   
 Medium color range   
 Low color range

Optimal range

Max. value for the optimal range   
 Min. value for the optimal range

Setup definitions

The colors are both used for the radial gauges as well as in the summary table.

Click save to save your changes before leaving the menu

Valid for compartments

<input type="checkbox"/>	Name
<input type="checkbox"/>	Hus 5 - Øko
<input type="checkbox"/>	Hus 9
<input checked="" type="checkbox"/>	Hus 1-3 V
<input type="checkbox"/>	Hus 1-3 Ø
<input type="checkbox"/>	Hus 4
<input type="checkbox"/>	Hus 7 - 8
<input type="checkbox"/>	Hus 6
<input type="checkbox"/>	Hus 6 Formering
<input type="checkbox"/>	Hus 10
<input type="checkbox"/>	Hus 11
<input type="checkbox"/>	Hus 12
<input type="checkbox"/>	Hus 13


Define min, low, high, and max values and the colors that is used depending on the actual values (as shown in setup definitions). Optimal range is not used.

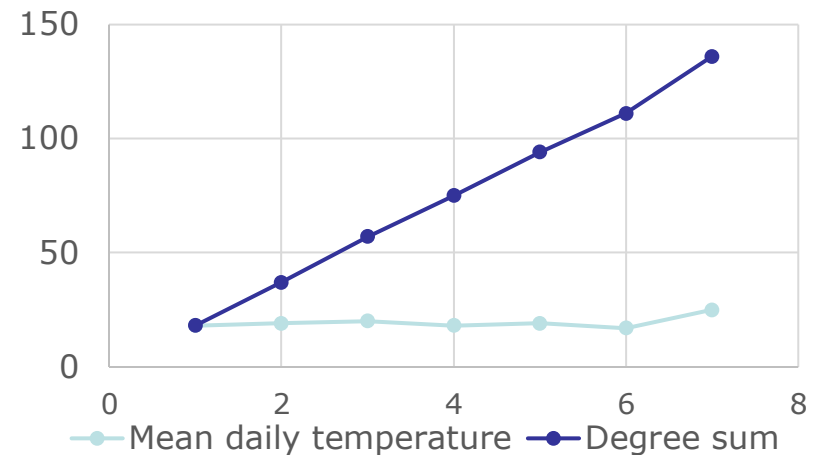
Select the compartments that the values is used for (before saving).

# Degree Sum

Last received measurement  
25/10/2023 09:31:39

Start date 17. Oct 21

Greenhouse Compartments		Degree Sum (°C)	Indoors light sum (mole/m <sup>2</sup> leaf)
Hus 1 A/B		168/160	56.5/80



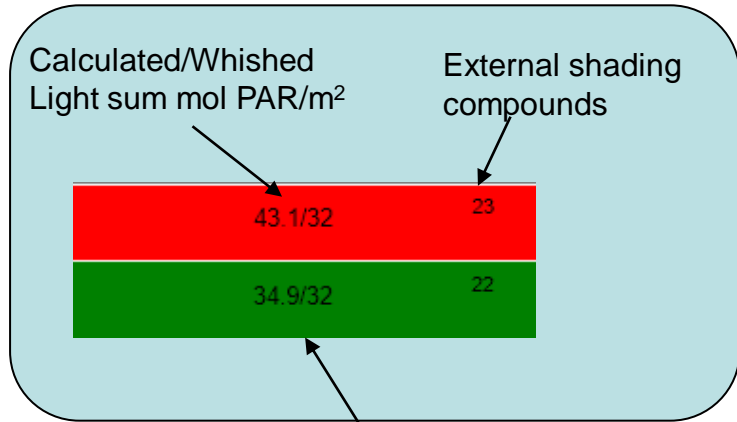
- Degree Sum is calculated as mean temperature minus the base temperature (the point where plant growth is zero) over a given period (here 3 days). For most productions the base temperature is 0°C.
- The graph show mean daily temperature for 7 days. The degree sum is accumulated values of the daily mean values.
- Plant development is mainly controlled by the Degree Sum – not number of growing days and only little by light level.
- Plant growth (size) is controlled very much by both light, temperature and CO<sub>2</sub>

Click and define your daily target temperature (for pot plants 0°C for vegetables it might have other values.)

Basis temperature  °C

Daily Target Sum Temperature  °C

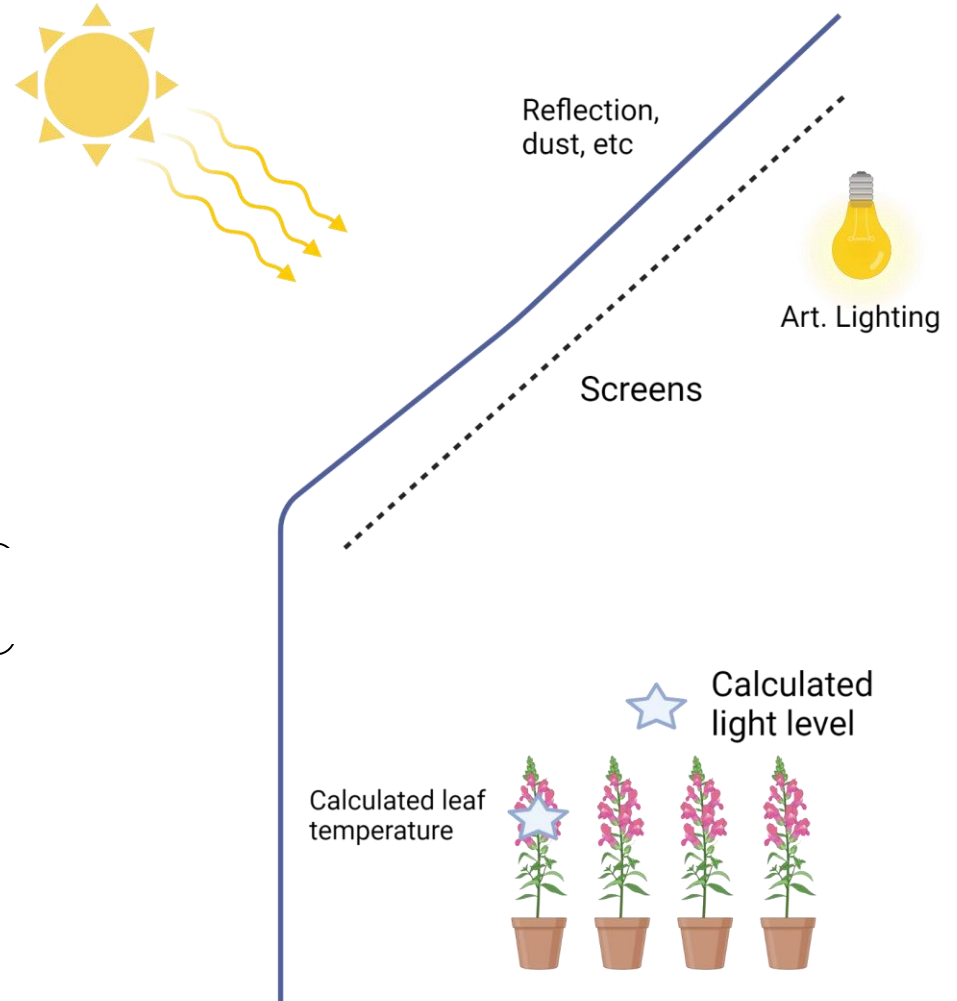
# Indoors light sum 1



Click to change sum or external shading

Daily Target Sum IndoorsLight	<input type="text" value="4"/>	mol PAR/m²
Shading agent	<input type="text" value="23.00"/>	%

- Indoors light sum is the sum of light over a given period (here 3 days).
- The value depends on the natural and artificial light measured as moles of photons per m<sup>2</sup> leaf.
- Plant growth depends on carbon accumulation induced by light together with temperature as the main factors.
- The light levels can fluctuate without affecting plant growth as long as the determined sum is reached within 3-7 days (depending on the plant species).



Light at plant height = Sun + Lighting - Reflection etc. - Shading  
 Leaf temperature = Calculated from energy balance in three layers

# Indoor light sum 2

The greenhouse construction is described in several menu items.

Select Manage, Nurseries.

Open the list of greenhouses

Click the greenhouse and you edit the data!

Select the material used for the greenhouse covering. Roof 1 is the side facing south.

InfoGrow calculate light transmission from new and clean covering material.

Internal shading describes how much light is missed due to dust, age, construction etc. This is an important parameter to estimate!

Select the correct screens installed. **You can change the screen type but contact HortiAdvice if you need to change the number of screens.**

Select the correct lamps installed. **You can change number and age but contact HortiAdvice if you need to add or delete a lamp system to the greenhouse.**

The screenshot displays the 'Construction' tab of the InfoGrow software. It is divided into three main sections:

- General Construction Settings:** A list of components with dropdown menus and input fields.
 

Floor	Soil
Frontwall	Build together
Backwall	PC 3 wall 16 mm
Roof 1	Single glass 4mm
Roof 2	Single glass 4mm
Sidewall 1	Build together
Sidewall 2	PC 3 wall 16 mm
Internal shading (0-1)	0.50
Cultured area (%)	95.00
Infiltration (m³/h)	1.00
Direction (°)	0
Width (m)	20.00
Length (m)	75.00
Height (m)	3.00
Inclination (°)	40.00
No. of spans	1
Span width (m)	20.00
- Screen Configuration:** A table showing screen products and their locations.
 

Screen product	Location	Layer
PhormiTex 66 B1	Roof 1	Inner layer
PH 98 FP plus PH 1 FP	Whole roof	Outer layer
PhormiTex 66 B1	Roof 2	Inner layer
- Lamp Configuration:** A form for editing a specific lamp system.
 

Name	Lamp type	Intensity (W)	Burning time (h)
Lamp37	Senmatic FL600	400	0

Below the table, there are input fields for:
 
  - Lamp type: Senmatic FL600
  - Number of lamps: 300
  - Burning time (h): 0
  - Ballast Correction: 1.09
  - AgeCorrection: 1

# Define crop grown in your greenhouse

1

Administration - Manage - Logs - Production

- Companies
- Nurseries
- Setup
- Resources
- Aranel -
  - API key
  - Sensor Setup
- Register Insect Definitions
- Crop definition
- Upload list of event types
- Event definition
- Nursery setup dashboard
- Nursery setup summary table
- Sprayer Units
- Sprayers
- Print Location QR code

2

### Crop type Campanula

Crop type  
Campanula

Production time in days: 40 Days

Basis temperature: 0 °C

Target sum temperature: 1600 °C

Target sum indoorslight: 0 mol PAR/m<sup>2</sup>

Target sum photosynthesis: 0 g CO<sub>2</sub>/m<sup>2</sup>

Select Culture Model: PotChrysanthemum

Select which sum is referenced to calculate the expected end of production

Temperature  
 Indoors light  
 Photosynthesis

3

### Type of cultures

Create crop type Export Crops & Varieties

Crop type	Production time in days	Basis temperature	Target sum temperature	Target sum indoorslight	Target sum photosynthesis	Used model
Campanula	40	0	1600	0	0	PotChrysanthemum

Variety

DARK GET MEE Edit Delete

WHITE GET MEE Edit Delete

Create variety

For the summary table you only need to select the most appropriate photosynthesis culture model. For the use of the batch-system, the other data is also necessary.

4

Photosynthesis activity (g/h/m<sup>2</sup>)

8.9

### Setup for radial gauge about Photosynthesis activity

[Back to summary table](#)

Crop type: Select culture type


No crop types defined. Go to admin. crop types

Click on the Photosynthesis activity number to select the crop used for estimation of photosynthesis.

# Photosynthesis activity and sum

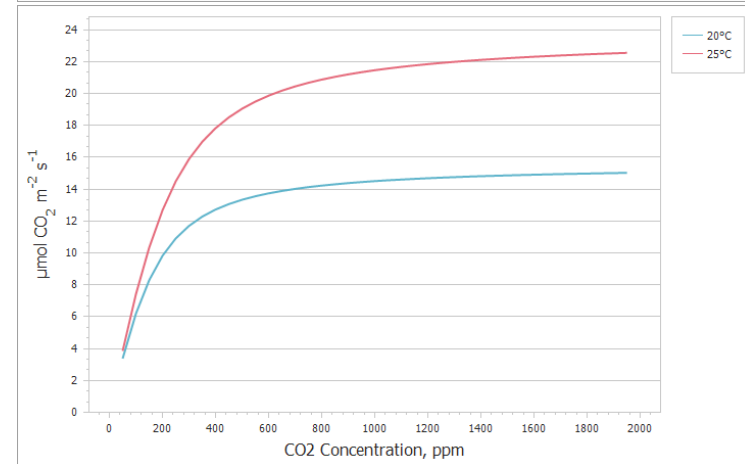
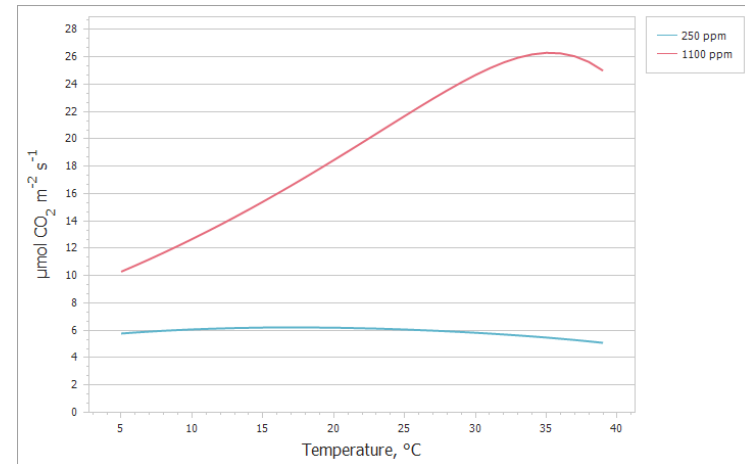
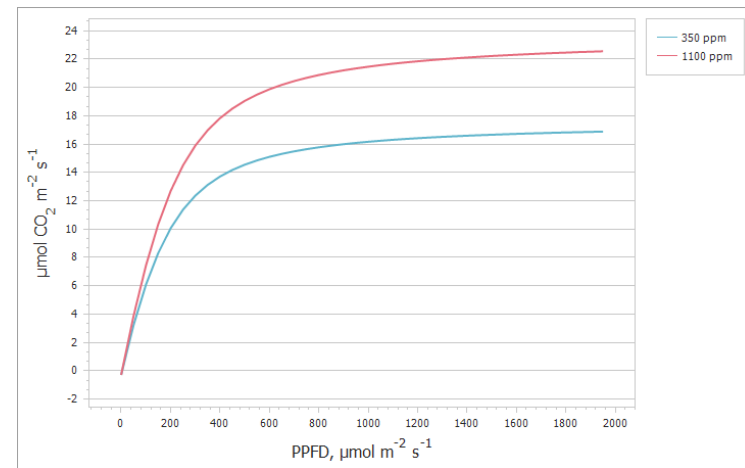
Last received measurement  
25/10/2023 09:31:39

Start date 17. Oct 2023

Greenhouse Compartments		Degree Sum (°C)	Indoors light sum (mole/m <sup>2</sup> leaf)	Photosynthesis sum (g CO <sub>2</sub> /m <sup>2</sup> )
Hus 1 A/B		168/160	56.5/80	44/64

- Photosynthesis activity is the average of the photosynthesis (CO<sub>2</sub> in g per m<sup>2</sup> leaf)
- Photosynthesis sum is the sum of accumulated CO<sub>2</sub> in g per m<sup>2</sup> leaf over a given period (here 3 days).
- Plant growth depends on the CO<sub>2</sub> concentration in the plant together with temperature and light as the main factors. See figures.
- The photosynthesis sum is calculated not measured.
- The desirable photosynthesis sum depends on the plant species.

Please note that the photosynthesis is calculated as a sum per m<sup>2</sup> leaf





# Light use efficiency

Light use efficiency is a measure that tells us how much photosynthesis we have per Wh electricity used for lighting.

An optimized climate produces more plant material per Wh than a poorly optimized climate.

On the right is data from a winter and summer situation. In summer, large production is due to natural light.

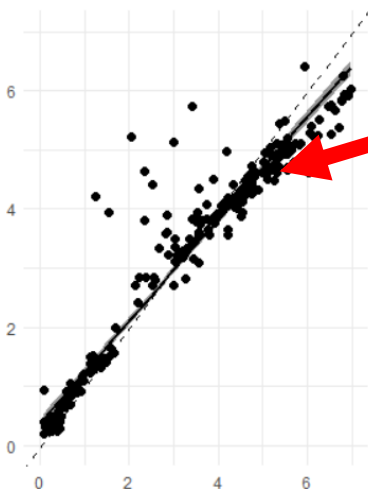
Compare departments to see if the climate can be improved.

Winter	Summer
Light use efficiency mg CO <sub>2</sub> /Wh	Light use efficiency mg CO <sub>2</sub> /Wh
267.2	1050.2
236	944.4
9.5	-
237.2	268.9
270.8	1225.2
276	1231.3
270.1	1204.7
355.1	1845.8
42.3	-
187.3	804.6
186	803.4
193.8	811.9
191.5	800.9

# Energy for heating and artificial light

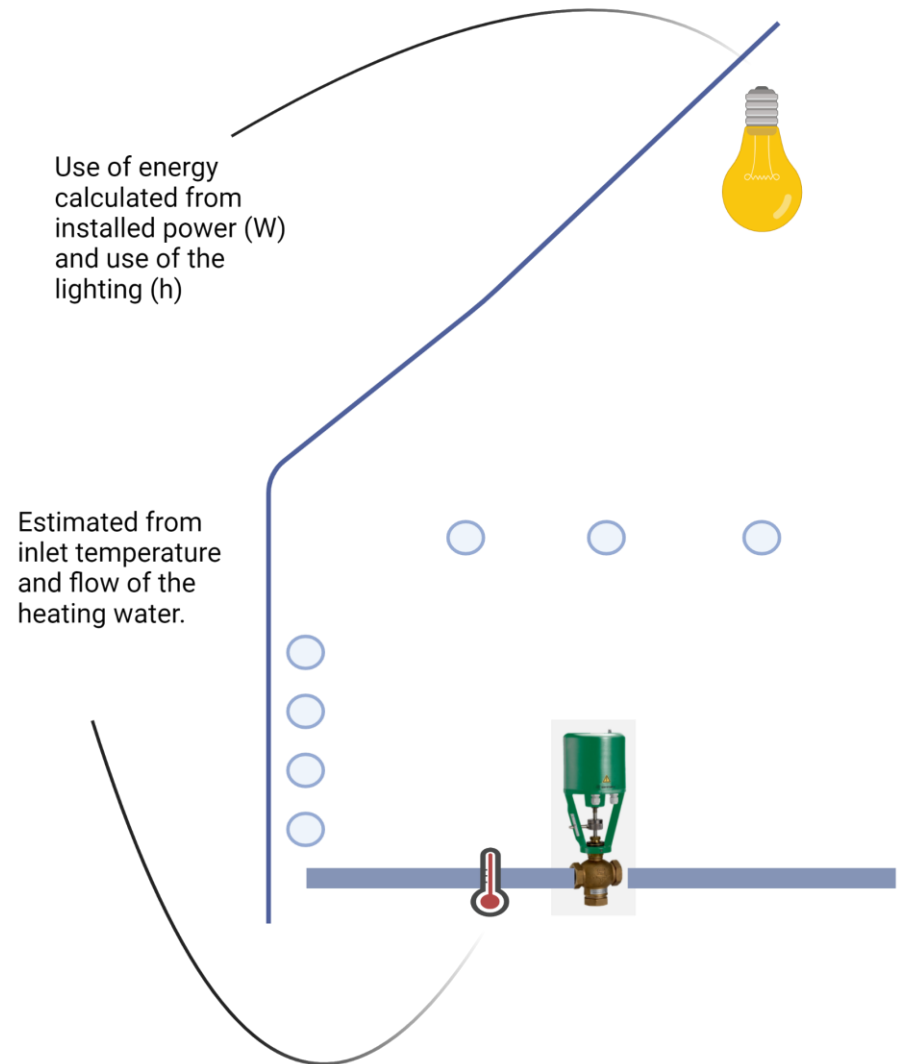
Heating (Wh/m <sup>2</sup> per day)	Growth light (Wh/m <sup>2</sup> per day)
2383	1184
2826	1273

- Heat energy is estimated from knowledge of heat pipe lengths, material, flow etc.
- Light energy is estimated from number and type of lamps installed and the status code from the climate computer.



Our model fit well, but it require calibration to each department.

If you consider data as relative data, you don't need to calibrate.



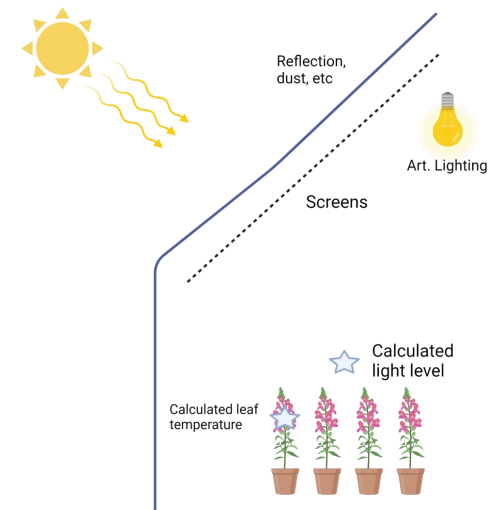
# Daylength

Daylength is calculated from light at plant height. This includes light from the sun, from artificial light and use of one or more screens.

InfoGrow keep track of the light level during the day. From these data the daylength is calculated.

Data is the average daylength for the period selected.

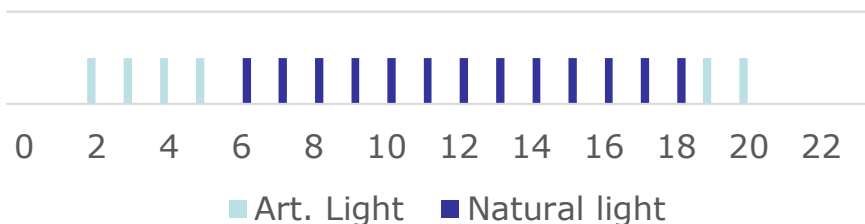
Daily light hours (hour)
16
15
15
15
15
15
15
15



Light at plant height = Sun + Lighting - Reflection etc. - Shading  
 Leaf temperatur = Calculated from energy balance in three layes

Use the data to secure your daylength in the greenhouse production.

Daylength: 19 h



# Humidity, Temperature, and CO<sub>2</sub>

