

PHILIPS

Horticulture
LED Solutions

High-wire



Your recipe for
growth. **Better control.**
Higher yield.

Boost your quality and production with a year round
summer-tasting crop

We all know how important light is for the photosynthesis, growth and development of high-wire crops in a greenhouse. Natural light often falls short on delivering what high-wire vegetables need for optimal growth and fruiting, and in many regions higher light levels are a necessity if you're on the lookout for a higher winter production. Without supplemental lighting, the darker winter or a run of low light days can quickly lead to delays in production and lower yields.

When natural light is

**Did
you know...**
you didn't need to
worry about short days
and cloudy skies
affecting your crop
production?

“

It gives us this ability to produce even fruit size and consistent quality all year round. So far we have achieved really good results in winter, and we expect to see it throughout the season.”

Roly Holt, Sandylands Nurseries, R & L Holt – UK – Tomato



“

We place strict requirements on varieties, presentation, nutrition, pruning strategy and spacing **in order to optimize quality.**”

Luc Coghe, Greet Biesbrouck – Belgium – Tomato

**Did
you know...**
you could tailor
the quality of
your crop to meet
specific customer
demands?

Light is needed for plant growth. But not all light is the same. The right light, called Photosynthetic Active Radiation (PAR), is the light that powers plant growth. Unlike the PAR light of sunlight, Philips GreenPower LEDs deliver targeted blue and red PAR light for the highest photosynthetic efficiency.

Targeted light is one of the major aspects of your recipe for growth from Signify that can help you realize better control and higher yields with LED lighting. Imagine what it can do for your business.

What if?

Why LED?

Why Signify?

Make your choice

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not enough



Did you know...
you could lengthen
the lighting season by
planting your crops
earlier in the year's
lighting period?

“

Within two weeks of starting to use the LEDs we saw production increase. **Two fruits more per truss, faster ripening and higher fruit weight.”**

Alfred Pedersen, Alfred Pedersen & Søn – Denmark – Tomato

Did you know...
you could grow
more stems
per square
meter?



“
This year I planted my cucumber crop much earlier **so the crop can produce in full capacity earlier in the season.”**

Jac Dings, Gerja – The Netherlands – Cucumber



“

We wanted a more heavy-duty lighting installation that didn't raise the plant temperature.”

Matthieu Serrault, Le Jardin de Rabelais – France – Tomato

Did you know...
you could control
your growing climate
more efficiently and
effectively?



Grow your business with LED lighting

As a grower, you are always looking for the best recipe for growth – ways to optimize results, minimize risks and increase yield. You can realize this through predictable, high-quality, high production crops or plants delivered all year round. You aim to have maximum control over your investment and operational costs and want to find out how you can use LEDs to improve your business results. A successful LED based growth strategy will result in a couple of promises.



Predictable growth

LED lighting gives you better control over your climate and your crop, so you can produce high quality and high yields of crops at the right time. It also gives you more flexibility in your cultivation schedule. You can already start planting in the summer without worrying about too much heat in your greenhouse. You can lengthen your lighting season and get a stronger and healthier crop year-round. Plant crops earlier and lengthen your crop cycle. You are in charge with LEDs.



Higher quality

The right light and growth recipe can help you tailor the size, taste, nutritional value to meet specific customer demands. Grow cucumbers and tomatoes with greener leaves and healthier overall plants. Produce crops that are stronger, more consistent and more visually appealing. Fine-tune color and shelf life to help your customers' products stand out in a crowded marketplace.



Higher yield

Achieve higher yields with LED lighting compared to natural daylight, or HPS lighting. You can apply higher light levels to grow more in the same space and to achieve a better balance between leaf production and fruit production.



What if?

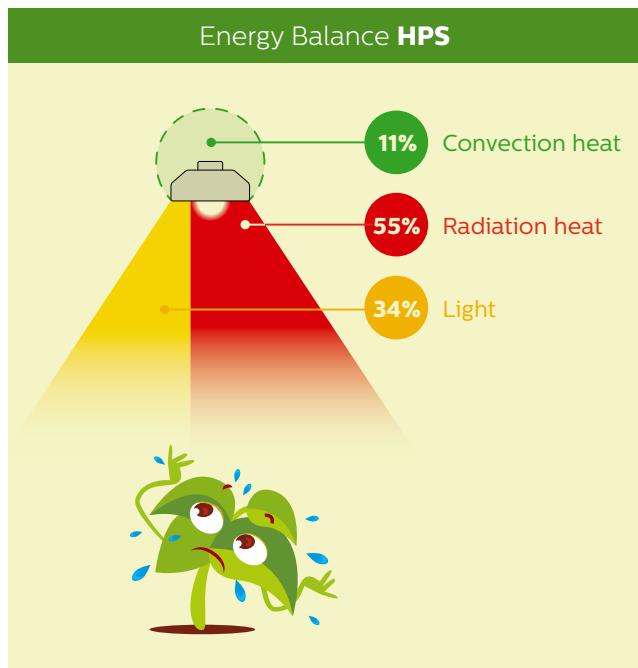
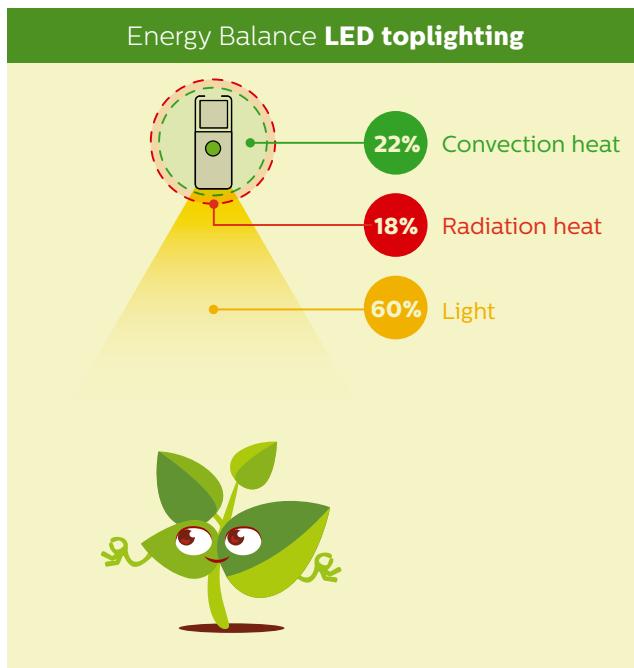
Why LED?

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What is the difference between LED and HPS grow lights?



One important aspect is understanding how to grow your crops with LED lighting. When comparing the energy balance of LED lighting versus HPS lighting, the conversion of electricity into light and heat is different. Using the same amount of energy, LED modules deliver more light and less radiant heat. This does call for new growth strategies for high-wire crops.

High levels of radiant heat can stress or even burn the plants. With LED lighting you can control heat and light separately. You can apply higher levels of light to plants with 67% less radiant heat than HPS lighting. A lower crop temperature means you will have to raise the ambient temperature in your greenhouse and manage the related change in humidity. Learn more about the influence on your climate from our experienced plant specialists.

Why partner with Signify?

You want to be sure that your investment will rapidly pay for itself and that the entire process will be carried out professionally. Signify is a global leader in the lighting sector and has built up a substantial track record in more than 500 projects in the horticultural lighting market since 1995. This includes over a decade of dedicated experience developing LED based light recipes that maximize light in a greenhouse environment. Collaborating with leading growers and research institutes around the world, we gain knowledge that is used to fine-tune our GreenPower LED solutions bringing the greatest value to growers.

Making the most of your business

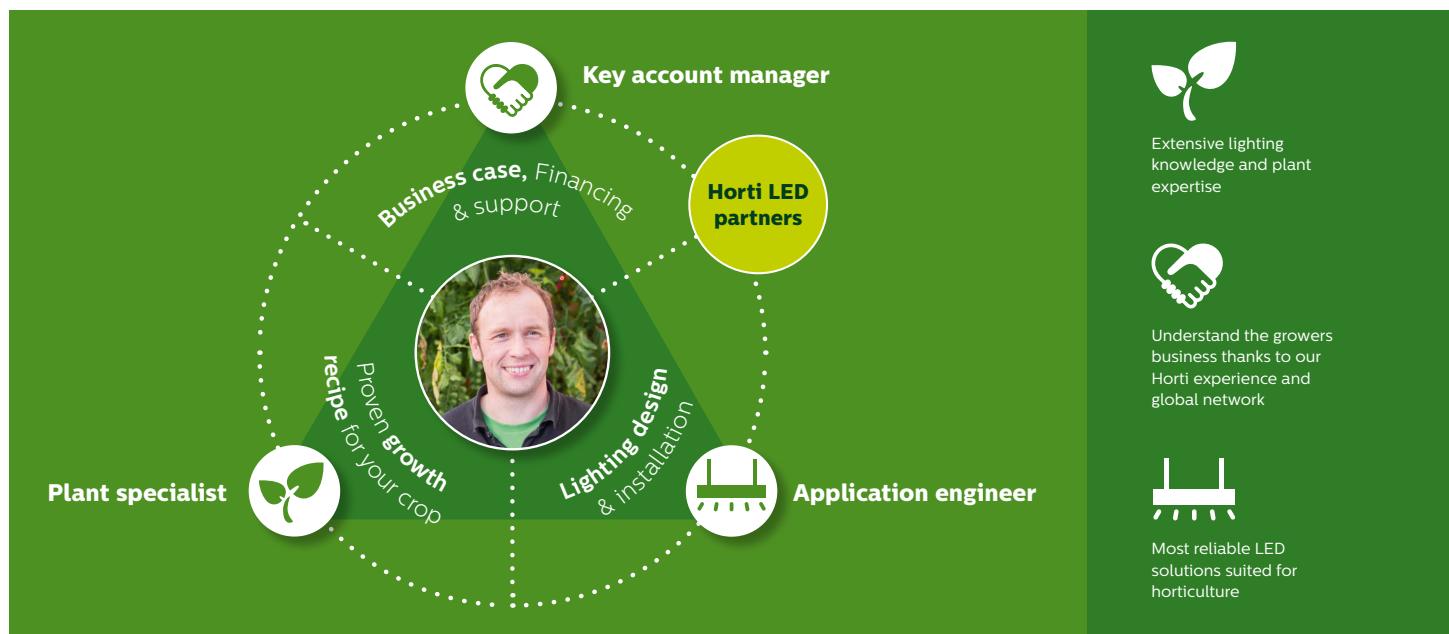
Signify brings together a variety of specialists to help you make the most of your business. From plant specialists to lighting experts and business advisors, we have all the experts in house to create a custom solution that will help you realize your business goals. Working with Signify guarantees you to have access to state of the art knowledge from LED experts.

Latest plant expertise

Each variety has different lighting requirements and you need this knowledge to make the best choices. To support you in this process, our dedicated plant specialists can provide you

with knowledge about the specific needs of your crop and the range of possibilities with supplemental lighting. Each plant specialist has a background in agricultural science and is continuously involved in research trials with universities, agricultural research institutes and individual growers to gain new knowledge about LED lighting.

They use dedicated tools to help you make decisions about the right growth strategy for your individual crop and situation. And know how to help you set the right yield prognosis, control heat and light separately and manage the related change in humidity.



“

The Signify plant specialist had so much promising data **that I could relate to with my own business. I had to try out LEDs”**

Ulf Harf, Handelsträdgård K. Harf – Finland – Cucumber

What if?

Why LED?

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Realistic business case

A typical payback period for LED investment is 3 to 5 years and depends heavily on your growth strategy, marketing, financial situation etc. Other factors that affect the payback include the price you get for your crop, the energy costs in your region, your geographic location and your local climate. To help you make a realistic decision about how you can get the most out of your LED investment, our key account manager provides you with a business calculation based on your business goals, crop and growing situation. It shows how long it will take you to repay the investment, as well as your savings and additional potential earnings over time. This realistic business case can be used to support your financial planning and to convince your financers. Signify can also help you in the process of financing your LED investment.

Local support every step of the way

We work with a global network of certified LED horticultural partners and one of our local partners is always involved in your project. Based on the detailed lighting design prepared together with our application engineer, the local partner is responsible for installing your Philips LED solution. He is right around the corner to provide local assistance and after-sales support if needed or desired.

“

Because of the use of LED, the plants are more vital, and **stay more vital and that quality translates into more kg/m²**”

Wim Peters, Kwekerij Wim Peters – The Netherlands – Tomato



What if?

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At Signify we understand that your business is unique and that there are many factors involved when considering complementary LED lighting for your high-wire crop. We offer a unique approach that brings together different competencies dedicated to helping you make the best decision to grow your business.

What is your best choice?

High-wire crops face an added challenge because their abundant crop canopy limits overhead light from reaching the part of the crop that needs the light most. In fact, overhead lighting provided by LED toplighting modules usually penetrate to only about 75 cm below the crop canopy. That's why Signify has developed LED interlighting modules as a single or double line solution. Placing lighting within the canopy of your high-wire plants directs and focuses growth stimulating light on the most vital part of the crop. By applying

a special sideways light distribution pattern, the leaves can more efficiently transform the light into growing more yield.

What is your most effective lighting installation?

It all depends on your situation. Important factors to consider are the layout and height of your greenhouse, the existing supplemental lighting you are already using and limitations in your electrical capacity.

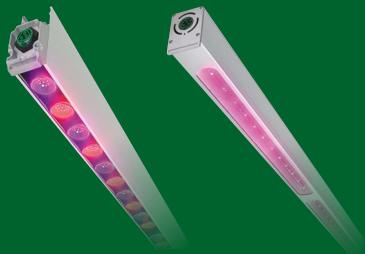
| Value of natural and supplemental light sources | LED toplighting LED interlighting | HPS toplighting LED interlighting | HPS toplighting | Daylight |
|---|--------------------------------------|--------------------------------------|-----------------|----------|
| Flexibility in planting scheme | | | | |
| Number of lighting hours possible | | | | n.a. |
| Healthy crop | | | | |
| Yield potential | | | | |
| Climate control | | | | |
| Yield/kWh | | | | n.a. |

Reliable GreenPower not just a paper pro

Due to its large global network, Signify has the resources to mass produce its products and provide high quality and cost-efficient solutions for both small and large projects worldwide. Every grower has different needs, so we offer a variety of GreenPower LED products that support you in making the most of your crop and growing situation.

Philips GreenPower LED products combined with our dedicated light recipes, open new opportunities for growers in the high-wire sector to increase their quality and yields and move to predictable year-round production.

Philips GreenPower LED toplighting



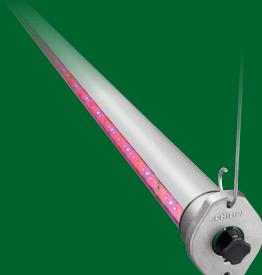
Where to use?

- Replace HPS toplighting
- In addition to HPS toplighting
- As a supplement to LED interlighting

Key benefits

- Boost production by applying overhead light at the canopy of the crop with a system efficacy of up to $3.2 \mu\text{mol}/\text{J}$
- Minimize your energy costs or maximize the amount of light by choosing the most efficient toplighting module for your situation

Philips GreenPower LED interlighting



Where to use?

- New installations
- As a supplement to LED toplighting
- As a supplement to HPS toplighting

Key benefits

- Boost production by applying light at the lower and more vital parts of the crop with a system efficacy of up to $3.0 \mu\text{mol}/\text{J}$
- Minimize your energy costs by choosing the most efficient Interlighting module for your situation
- Easy to install and maintain thanks to daisy-chaining and plug and play design

LED products, mise

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The design of an LED module has a significant impact on its overall performance and lifetime. At Signify, we take all the necessary steps to make sure your LED products are reliable and provide long lasting performance. We put each component through a battery of stringent technical and mechanical tests. Each Philips LED module is backed by our guarantee of quality to meet your requirements.

EU only

Regular Output

| | |
|--------------------|------------------|
| Voltage | 400 V |
| Power | 160 - 190 W |
| Light output | 410 - 520 µmol/s |
| Efficiency | 2.6 - 3.1 µmol/J |
| Ingress Protection | IP66 |
| Lifetime | 35,000 hrs |

High Output

| | |
|--------------------|------------------|
| Voltage | 400 V |
| Power | 195 - 210 W |
| Light output | 620 µmol/s |
| Efficiency | 3.0 - 3.2 µmol/J |
| Ingress Protection | IP66 |
| Lifetime | 35,000 hrs |

Global

Regular Output

| | |
|--------------------|------------------|
| Voltage | 200 - 400 V |
| Power | 175 - 215 W |
| Light output | 410 - 550 µmol/s |
| Efficiency | 2.3 - 2.6 µmol/J |
| Ingress Protection | IP66 |
| Lifetime | 35,000 hrs |

High Output

| | |
|--------------------|-----------------|
| Voltage | 277 - 400 V |
| Power | 265 - 285 W |
| Light output | 800 µmol/s |
| Efficiency | 2.8 -3.0 µmol/J |
| Ingress Protection | IP66 |
| Lifetime | 35,000 hrs |

Note: All data is subject to change

Regular Output

| Length | 2 m | 2,5 m |
|--------------------|------------|------------|
| Voltage | 200-400V | 200-400V |
| Power | 64 W | 79 W |
| Light output | 175 µmol/s | 220 µmol/s |
| Efficiency | 2.7 µmol/J | 2.8 µmol/J |
| Ingress Protection | IP66 | IP66 |
| Lifetime hrs | 25.000 | 25.000 |

High Output

| Length | 2 m | 2,5 m |
|--------------------|------------|------------|
| Voltage | 200-400V | 200-400V |
| Power | 64 W | 100 W |
| Light output | 240 µmol/s | 300 µmol/s |
| Efficiency | 3.0 µmol/J | 3.0 µmol/J |
| Ingress Protection | IP66 | IP66 |
| Lifetime hrs | 25.000 | 25.000 |

Note: All data is subject to change

Raise your standards with Philips LED technologies

Get on the fast-track to better control your yield for high-wire vegetables and fruit. Philips LED technologies supply the recipe for growth that helps you succeed. Get predictable, high-quality, high production crops and plants year round. Gain maximum control over your investment and operational costs.



More questions?

Visit our website
www.philips.com/horti
www.philips.com/hortiblog

Write us an e-mail:
horti.info@signify.com

Or tweet us:
[@PhilipsHorti](https://twitter.com/PhilipsHorti)



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Document order number: 4422 944 04729 E
03/2019
Data subject to change