

## Backgrounder

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**PROF**

### **Philips City Farming**

**Global food supplies face unprecedented challenges. Changing demographics, land-use, tastes, habits and attitudes have created a need for a new method of food production to meet the challenges of the twenty-first century.**

On the demographic front, we face a fast growing global population and a greater proportion of that population inhabiting cities. UN research shows that by 2050, the world's population will have grown by another 2.3 billion and 66% of the world's population will inhabit cities. In addition to this, 80% of the world's agriculture appropriate land is already in use and more extreme weather patterns are putting pressure on conventional farming.

Consumer habits and attitudes also bring their own unique challenges. Increasingly, we expect our favorite foods to be available all year and at an affordable price. Strawberries are no longer just a summertime treat! Yet, despite this, environmentally conscious consumers also worry about "food miles" – the distance food has travelled to reach your plate. They also worry about the resources used up by food production, as well as the use of pesticides. How can these competing priorities be resolved?

#### **Space**

So we need to grow more food to provide for the growing demands of people in urban areas, but there is less space available for agriculture. Technology provides the answer to help solve these challenges and a part of the answer is light. Philips' knowledge of plants and light can help usher in a new era of City Farming, where food is grown locally in limited spaces without natural daylight.

Philips has led research into horticultural lighting technology for decades and the new Philips GrowWise City Farming Research Centre will continue this important work. The focus of current research activity is to optimize produce already grown in indoor environments called City Farms, such as salad and lettuce, as well as developing new methods for growing staple foods such as potatoes. The new found ability to grow carbohydrate containing foods in or close to urban areas could help to tackle global food shortages.

**Philips GrowWise City Farming - Local food on a global scale**



While Philips Horticultural Lighting has been supporting traditional horticultural food producers that utilize greenhouses for decades, City Farming is a very recent innovation. City Farming is a sustainable, reliable and scalable indoor vertical farming system that produces high-quality vegetables, herbs and fruits all year round - in all environments. It bundles a unique combination of LED light solutions, dedicated growth recipes for specific crops, careful climate monitoring and regulating equipment plus all the necessary engineering, logistics and support required for constant, uninterrupted production.

Philips GrowWise CityFarming allows growers - who could be city farmers, supermarkets, food companies, or even restaurants - to produce food, on an ongoing basis, extremely close to where it will be consumed. This leads to a vast reduction in transport-related damage and perishing of delicate products like lettuce, herbs and strawberries.

Being a closed system, Philips GrowWise City Farming isn't affected by storms, temperature extremes, drought, seasons or - of vital importance - insects. Pesticides are therefore no longer necessary. In addition to LED lighting, only an absolute minimum of fertilizer and water (both to grow and wash the crops) is required. The result is increased yields, reduced operating costs and maximum nutrition and taste.

Because of the carefully-controlled nature of the growing cycle, new possibilities emerge too; for example boosting levels of nutrients and vitamins in crops, improving taste and even developing new varieties. City Farming has the potential to drive fundamental changes in the way fresh food is grown, brought to market and enjoyed by consumers.

Philips technology is already supporting City Farms: Deliscious in the Netherlands and Green Sense Farms in the USA. (see appendix)



### **Light Recipes help you get the best crops**

Philips is committed to helping growers get the maximum benefit from their LED lighting systems, by developing tailor-made lighting recipes which ensure that each product is getting the right light for its needs. A Philips lighting recipe includes: the type and number of LEDs

required; where to place them to deliver the optimal lighting conditions; the amount of coverage for the plant type and greenhouse set-up; how bright the lights should be; and when they should be switched on and off.

Philips works closely with scientists and leading academic institutions to understand lighting's impact on plant physiology. This type of research, along with working directly with growers, allows Philips to not only understand a grower's needs, but also how LED lighting can go even further.



### **The evolution of horticultural lighting**

Philips has been offering dedicated horticultural lighting solutions to professional plant growers since 1936 and continues to do so. For years artificial lighting has supplemented natural daylight in greenhouses and, therefore, extended the growing season.

Over the years, research has shown that plants' sensitivity to light is very different to humans. Light can have many colors, which are defined by the so-called wavelength of the light – from infrared light with a relatively large wavelength, to ultraviolet with a much smaller wavelength. Plants only make use of certain wavelengths, some of which are non-visible to humans, and different plants respond to different sets of wavelengths. Traditional lamps did not provide ideal conditions for growing, but LED lighting can amplify the impact of horticultural lighting. Philips is the global leader in LED lighting and the company is using its leadership to bring leading LED solutions to traditional greenhouse growers, as well as the emerging City Farm market.

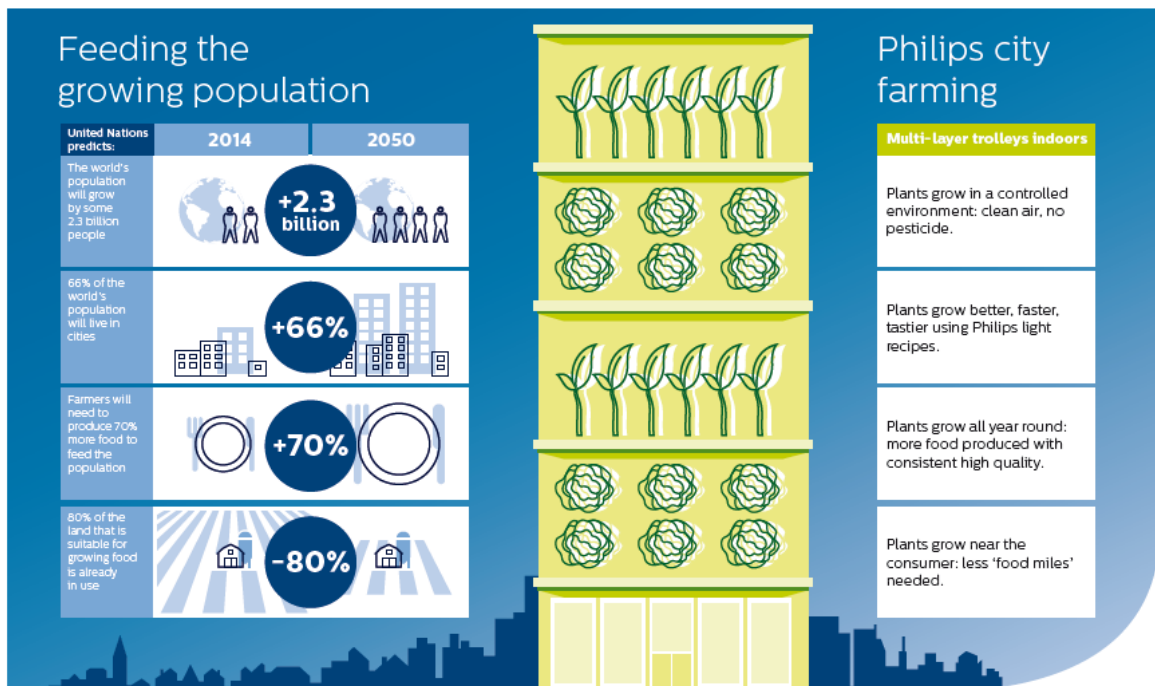
### **LED Lighting - The future of fresh food production**

With the advent of LED technology Philips is able to meet a grower's unique needs. LEDs are highly efficient, produce light in very pure colors (i.e., with a narrow spread of wavelengths) and are available in varieties across the visible and invisible spectrum from far infrared to ultraviolet.

LEDs allow us to optimize lighting solutions to bring even greater value for growers – whether that is higher yields, lower running costs or more control over when plants are ready to go to market. By choosing different types of LEDs, you can very specifically define the spectrum of

light plants receive – so there are no wasted wavelengths. Also, LEDs run cool, so they can be placed very close to the plants, ensuring complete illumination of the plant with no shadowing and no danger of scorching. They are also completely controllable – you can turn them on and off, and change the brightness as you wish.

## APPENDIX – City Farming – the context



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### About Philips Lighting

Philips Lighting, a Royal Philips (NYSE: PHG, AEX: PHIA) company, is the global leader in lighting products, systems and services. Our understanding of how lighting positively affects people coupled with our deep technological know-how enable us to deliver digital lighting innovations that unlock new business value, deliver rich user experiences and help to improve lives. Serving professional and consumer markets, we sell more energy efficient LED lighting than any other company. We lead the industry in connected lighting systems and services, leveraging the Internet of Things to take light beyond illumination and transform homes,

buildings and urban spaces. In 2015, we had sales of EUR 7.4 billion and employed 33,000 people worldwide. News from Philips Lighting is located at [www.philips.com/newscenter](http://www.philips.com/newscenter)