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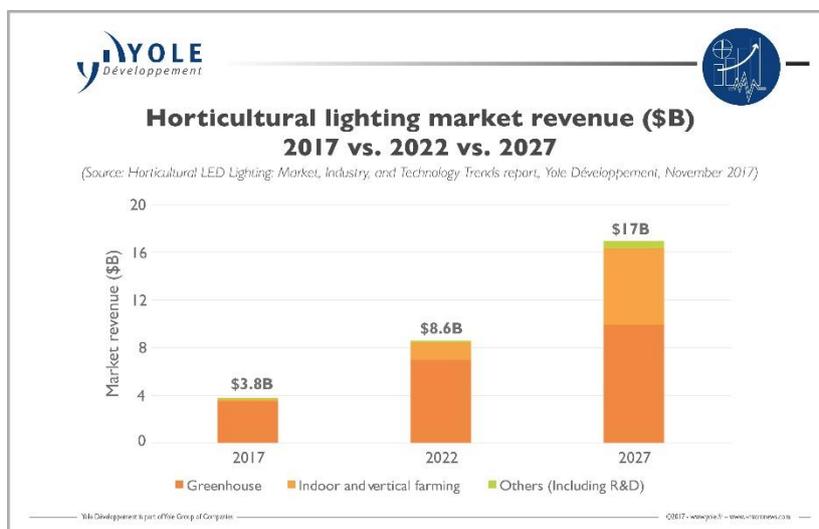
Horticultural lighting: LED technologies and emerging applications are driving the revolution

Extracted from: Horticultural LED Lighting: Market, Industry, And Technology Trends report, Yole Group of companies including PISEO and Yole Développement, November 2017

LYON, France – November 23, 2017: The 2016 horticultural lighting market (i.e. system level) represented a business of about US\$3.1 billion, which should grow to approximately US\$3.8 billion in 2017. The current business is mostly driven by greenhouse applications and incumbent technologies, representing respectively 92% and 79% (in revenue) of the total market in 2017. However a transition to LED technology and the emergence of new applications will further increase this market's size and attractiveness, both at system and LED device levels.

A new report titled [Horticultural LED Lighting: Market, Industry and Technology Trends](#), has been released today by [Yole Développement \(Yole\)](#) and [PISEO](#), both part of by Yole Group of Companies. A detailed description of this analysis is available on [i-micronews.com, Solid State Lighting reports section](#).

Under this new LED technology & market report, the market research and strategy consulting company proposes a comprehensive understanding of the overall horticultural lighting landscape. Yole's analysts review all related applications with insights into grow-light principles, functioning and associated metrics. This report is offering a detailed description per application and region. It also assesses technology and industrial trends.

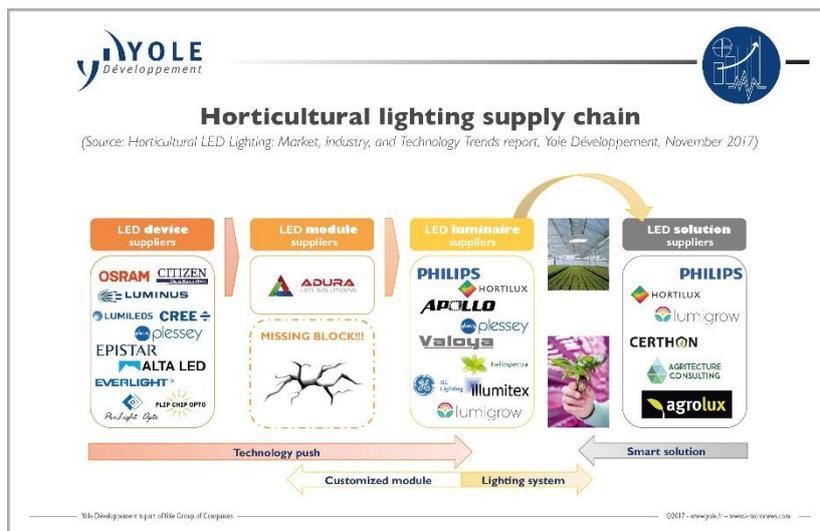


In this context, Yole Group of Companies expects the horticultural lighting market to reach nearly US\$8.6 billion in 2022 with 17.8% CAGR between 2016 and 2022. “This is only a starting point”, comments **Pierrick Boulay, Technology & Market Analyst at Yole**. “Therefore, indoor/vertical farms are poised to boom from 2022 - 2027, propelling the total market to more than US\$17 billion in 2027.”

Moreover, at the LED device level, market opportunity represents almost US\$100 million in 2017 and should grow to about US\$400 million in 2022. The horticultural LED Lighting technology & market analysis from Yole Group of Companies is showing a US\$ 700 million market in 2027.

In a global lighting market that is becoming increasingly competitive, horticultural lighting is seen by the LED lighting industry as a new opportunity for which to develop high added-value products and reap greater margin levels. However, established LED players also face competition from new entrants, mostly start-ups and SMEs, desiring their own share of this growing opportunity.

As of Q4/2017, the LED horticultural lighting industry is still small, with less than 50 players identified as offering dedicated LED-based systems. The industry is highly concentrated in North America with a 50% market share (number of companies involved), the result of medicinal cannabis's legalization.



“Looking ahead, industry evolution will strongly depend on market dynamics,” explains Joel Thomé, PISEO’s CEO. “Indeed, industrial players’ marketing and communications are currently focused on two main applications including medicinal plants (mostly cannabis) production, which is today the main market driver and vegetable production, which is developing with a “low-end / high-volume products” focus.”

Part of the established lighting system industry may never proceed with the medicinal plants application, in order to preserve brand reputation. Such a situation is likely to benefit new entrants that will generate revenue swiftly and rapidly increase their horticultural lighting market expertise.

At the device level, most LED manufacturers embrace a “technology push strategy”, taking advantage of their traditional LED portfolio (i.e. UV, visible, and NIR LEDs) to quickly offer some horticultural lighting solutions and related marketing tools, such as dedicated datasheets. In the future, with a better understanding of LED light’s effect on plant growth, these players might start offering more dedicated solutions (i.e. fine-tuned wavelength package, multiple wavelength package, etc.).

The missing block in the supply chain is mostly at the module level, with no real supplier in 2017 – reason being that the market is still emerging and the industry is still young, with no standards and regulations. In this context, each lighting system manufacturer design its own module with a specific wavelength mix/recipe.

Some companies are finally starting to position themselves as solution providers, offering not only lighting systems but global solutions integrating sensors (humidity, oxygen, etc.) and data management software. The objective of these smart lighting systems is to further increase the productivity of greenhouses and urban farms.

Yole Group of Companies pursues its investigation towards the LED industry. Analysts are daily following the evolution of the industry to identify emerging applications and disruptive technologies. Yole Group of Companies is daily debating with leading companies to understand technical breakthroughs and market issues.

The group will present its vision of the industry during international trade shows and conferences. Next dates are:

- [1st International UV Workshop](#) (Olching, Germany – Nov. 27&28): Yole's presentation names "The global market for light sources" on November 28. Yole's speaker is Pierrick Boulay, Market & Technology Analyst, LED, OLED & Lighting Systems at Yole.
- [ForumLED Europe](#) (Lyon, France – Dec. 13&14). Pars Mukish, LED, OLED and Sapphire Business Unit Manager from Yole Développement is Chairman during the conference. Yole's team also proposes several presentations:
 - "The market for LED lighting: State of the art and market trends" on December 13 at 11:00 AM
 - "MicroLED Displays: Hopes and Challenges" on December 13 at 5:15 PM
 - "Overview of Automotive Lighting Trends" on December 14 at 4:00 PM

Stay tuned with Yole Group of Companies!

ABOUT THE REPORT:**HORTICULTURAL LED LIGHTING: MARKET, INDUSTRY, AND TECHNOLOGY TRENDS**

Urban farming and LED technology adoption will drive unprecedented growth in the horticultural lighting market. -

Produced by Yole Group of Companies including PISEO and Yole Développement.

**Companies cited in the report:**

Adura LED Solutions, Aerofarms, Agritecture Consulting, Agrolux, AltaLED, American Society for Agricultural and Biological Engineers, ApacheTech, Apollo Horticulture, Asia Grow, Association for Vertical Farming, AT&S, Beijing Ieda Protected Horticulture Co Ltd, Biolites Co., BrightLED, California Lightworks, Certhon, Citizen, Creative Commons, Cree, Edison Opto, Epistar, Everlight, Flip Chip Opto, FloraLED... [Full list](#)

Authors:

- **Pierrick Boulay** works as Market and Technology Analyst in the fields of LED, OLED and Lighting Systems to carry out technical, economic and marketing analysis at Yole Développement, the “More than Moore” market research and strategy consulting company. He has experience in both LED lighting and OLED lighting. In the past, he has mostly worked in R&D department for LED lighting applications. Pierrick holds a master degree in Electronics (ESEO - France).
- **Joël Thomé** holds a Master Degree in mechanical engineering and has more than 25 year experience in the lighting industry. He spent many years working for Philips Lighting where he held various global Marketing and R&D senior management position with a strong focus on Lighting Controls and LED based luminaires. Before heading PISEO he was Associate Director at INGELUX Lighting Consultants.
- **Dr. Olivier Andrieu** is in charge of R&D related projects and technical consultancy at PISEO. He holds an engineering degree, a Master and PhD. His career allowed him to exercise different responsibilities in R&D in the automotive industry before joining Philips Lighting where he was from 2011 to 2014 in charge of LED lighting platforms R&D projects at global level. In this capacity he designed many LED lighting systems involving mechanical, electronic, optical and thermal issues.



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ABOUT PISEO – WWW.PISEO.FR

PISEO is a unique technical center of its kind. Specializing in design and characterization of innovative optical systems, the team creates value for customers of various business sectors by carrying out missions in the fields of innovation, expertise, testing and training. Contact: Joël Thomé,

ABOUT YOLE DEVELOPPEMENT – WWW.YOLE.FR

Founded in 1998, Yole Développement has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide covering MEMS and image sensors, Compound Semiconductors, RF Electronics, Solid-state

lighting, Displays, software, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management.

The “More than Moore” market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business. . For more information, visit www.yole.fr and follow Yole on [LinkedIn](#) and [Twitter](#).

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