ElectroniCast Report Announcement

OLED Lighting
Global Market Forecast
2017-2027

Study Release Date:
May 17, 2018

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Organic Light Emitting Diode (OLED) Lighting
Global Market Forecast
2017-2027

Publish Date: May 17, 2018
Text Pages: 437 (PDF)
Also Included: Excel worksheets and PowerPoint Slides
Fee: $3,990

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Report Description

This market forecast report, which is available immediately, is part of a consultant service from ElectroniCast Consultants to our clients. This report provides a market forecast of the worldwide consumption of Organic Light Emitting Diodes (OLEDs) used in lighting applications. The OLEDs defined in this report are often referred to as OLED devices, OLED light sources, OLED panels or sub-panels, and OLED tiles.

Historical estimated data are presented for 2017, plus the year-by-year forecast through 2027.

OLED Description  An organic light-emitting diode (OLED) is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compounds, which emit light in response to an electric current. This layer of organic semiconductor material is situated between two electrodes. Generally, at least one of these electrodes is transparent.

Lighting Applications  The definition for lighting in this study includes general lighting, which is used to provide the main illumination of an area. The lighting category also includes specialized lighting, such as directional, supplementary, and architectural lighting, as well as OLED panels/tiles used in vehicles for the main purpose of lighting.

However, OLEDs used in signage, TVs, displays, and signals are not included in the market forecast data for this study.
OLED Level Quantified in the ElectroniCast Study  
Below in particular, are three levels (or “food chain”) pertaining to the OLED marketplace. For the purposes of this ElectroniCast study, we quantify and provide a market forecast for “Level 2”

Level 1 – Organic Materials, anode and cathode

Level 2 – OLED Lighting panel or tile with initial integrated frames  
(Without electronics and driver)

Level 3 – OLED Module, one or more panels (tiles) with control circuits, other value added components

OLED devices will actually use a value-added OLED product, complete with the electronics (plugs and wires), driver integrated circuits, and possible structural packaging (cap, metallic/plastic panel frames). Also, even further, these packaged/equipped panels/tiles (also known as OLED modules) will typically be available as part of other value-added product, such as lamp-holders/fixtures. Therefore, it is important to note that this market forecast data only quantifies the OLED device (sometimes referred to as a tile, light source, panel or sub-panel) and not the complete module, lamp/fixtures or other value-added product(s).

This report provides the market data by the following regional segments:

- Global (Total)
  - America
    - United States and Canada
    - Latin America
  - EMEA
    - Northern Europe
    - Southern Europe
    - Western Europe
    - Eastern Europe
    - Middle East and Africa
  - APAC
    - China and Taiwan
    - Japan
    - Republic of Korea (ROK)
    - Rest of APAC

This report provides the forecast by the following functions:

- Consumption Value: US$, Million
- Quantity: Number of square meter (m²) in Millions
- Average Selling Prices: ASP US$, per square meter
**Value Market Forecast**  
The worldwide consumption value of selected lighting OLEDs reached $187.6 million last year; consumption value is forecast to increase at an average annual growth rate of 49.7 percent to $1.4 billion in 2022 (1). The total consumption value is forecast an increase to nearly $8.14 billion in 2027. Market forecast data in this study report refers to consumption (use) for a particular calendar year; therefore, this data is not cumulative data.

In the early years of the forecast period, a large percentage of the use of OLEDs in lighting is associated with Research and Development (R&D). R&D costs are non-capitalized labor, which is used for research, design engineering, manufacturing development, and start-up, costs of new production lines. It does not include capital equipment and associated setup costs, marketing support, or normal production support; however it does include expense incurred while prototyping and developing a new process or production line.

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**Figure 1**  
OLEDs Used in Lighting  
Global Market Forecast (Value Basis, US$ Billion)  
*Source: ElectroniCast Consultants*

All values and prices in this report are at factory as-shipped levels, and are in current dollars, which include the effect of a forecasted 5 percent annual inflation rate over the forecast period.

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According to ElectroniCast, there was enough overall OLED interest and activity in 2017 by substantial leading lighting competitors with existing capable manufacturing capabilities, working with evolving technology, to push for “mass-production”. Also, industry players have been very active in establishing the required strategic supplier and intellectual property (IP) agreements, as well as progress in sales/distribution channel (planning) strategy.

Therefore, the stage is set for a “Build-it and They Will Come” marketing strategy. The question is, how many customers will come and when. At the same time, other (competing) lighting solutions already work, have substantial customer base and established sales/distribution channels, occupying store footprint; therefore, OLED will need to find unique style/designs to provide a common-sense approach to providing lighting solutions that the other technologies do not currently provide.

Beyond the “light-bulb” Mentality The ElectroniCast market opportunity analysis (MOA) shows the OLED panel market should not be limited to (only) lamps and typical (conventional) lamp fixtures for general lighting (table lamps, wall/ceiling fixtures). ElectroniCast assumes that the OLED panel general-lighting market will grow beyond the “light-bulb” mentality to a broad base of applications, which currently may not even be in the idea-stage. Applications that have been mentioned by industry participants include (but not limited to) OLED incorporated into the following applications:

- Windows/Skylights
- Wall panels
- Ceiling panels
- Mirrors with light function
- Flooring/Steps-stairs
- Embedded into furniture
- Structural lighting
- Other (almost endless possibilities)

ElectroniCast Methodology

Market analysis and technology forecasting are complex tasks. Any predictions of the shape and trends of technology and economic movement start from the notion that the germ of what will be important tomorrow is present, although smaller or larger or in a different form, in our environment today. However, taking as a basis for a prediction the assumptions of current, conventional belief creates a set of preconceived notions that can lead to serious mistakes. ElectroniCast, instead, looks to the basic driving forces.

The future market for an OLED consumed in selected applications depends on a number of factors, including: User equipment demand, for example – specific applications, energy efficiency requirements and government regulations/laws/mandates/low carbon footprint, future-proofing (design and in technology), economy and investment community: new housing/building and/or renovation cycles, product life cycles, competing technologies/solutions, cost/benefit ratios, requirements
driven by intelligent/digital building lighting controls, and others.

This study is based on analysis of information obtained continually over the past several years, but updated through the middle of May 2018. During this period, ElectroniCast analysts performed interviews with authoritative and representative individuals in the OLED and LED manufacturing (materials, chips, packaging, devices, associated parts/pieces, fittings/fixtures) and building/facility management, local/state and federal government policy and management, LED driver IC and micro-controllers, product distributors, retail store management, import/export, and other. The interviews were conducted principally with:

- Engineers, marketing personnel and management at manufacturers of OLEDs (materials, packaged OLEDs, lamps, fixtures, controls, systems) as well as other technologies.
- Design group leaders, engineers, marketing personnel and market planners at major users and potential users of OLEDs.
- Other industry experts, including those focused on standards activities, trade associations, and investments.

The interviews covered issues of technology, R&D support, pricing, contract size, reliability, documentation, installation/maintenance crafts, standards, supplier competition and other topics. Customers and distributors also were interviewed, to obtain their estimates of quantities received and average prices paid. Customer estimates of historical and expected near term future growth of their application are obtained. Their views of use of new technology products were obtained.

The analyst then considered customer expectations of near term growth in their application, plus forecasted economic payback of investment, technology trends and changes in government regulations in the United States, to derive estimated growth rates of quantity and price of each product subset in each application. These forecasted growth rates are combined with the estimated baseline data to obtain the long-range forecasts at the lowest detailed level of each product and application.

A full review of published information was also performed to supplement information obtained through interviews. The following sources were reviewed:

- Professional technical journals and papers
- Trade press articles
- Technical conference proceedings
- Product literature
- Company profile and financial information
- Additional information based on previous ElectroniCast market studies
- Personal knowledge of the research team.

In analyzing and forecasting the complexities of the American and other world region markets for light emitting diode products, it is essential that the market research team
have a good and a deep understanding of the technology and of the industry. ElectroniCast members who participated in this report were qualified.

The background market research focuses on the amount of each type of product used in each application in the historical base year (2017), and the prices paid at the first transaction from the manufacturer. This forms the base year data. ElectroniCast analysts then forecast the growth rates in component quantity use in each application, along with price trends, based on competitive, economic and technology forecast trends, and apply these to derive long term forecasts at the lowest application levels. The usage growth rate forecasts depend heavily on analysis of overall end user trends toward equipment usage and economic payback.

The calculation and analysis data spreadsheet technique is based upon input/output analysis, leveraging the quantitative consumption quantity, price and value of each item in each application at all levels to achieve reasonable quantitative conclusions; this interactive analysis concept, first applied on a major scale by Leonteff, of the US Department of Commerce, in the mid 1950s, was then adopted successfully by analyst/forecasting firms Quantum Science, Gnostic Concepts and (in 1981) by ElectroniCast; the methodology is further illustrated by Figure 2

![Figure 2](image-url)

**Figure 2**
Market Research & Forecasting Methodology
About ElectroniCast

ElectroniCast, founded in 1981, specializes in forecasting technology and global market trends in fiber optics communication components and devices, as well providing market data on light emitting diodes used in lighting.

As an independent consultancy we offer multi-client and custom market research studies to the world's leading companies based on comprehensive, in-depth analysis of quantitative and qualitative factors. This includes technology forecasting, markets and applications forecasting, strategic planning, competitive analysis, customer-satisfaction surveys and marketing/sales consultation. ElectroniCast, founded as a technology-based independent consulting firm, meets the information needs of the investment community, industry planners and related suppliers.

Proprietary Statement

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One-Fee Policy

This market forecast report, which is available immediately, is part of a consultant service from ElectroniCast Consultants to our clients. All employees of the client company/organization may use this report, worldwide at the consultant service subscription fee shown in the front pages of this announcement.

Analyst Inquiry Service

Up to 2-hours of consultant inquiry is included in this service; carried-out by e-mail and/or telephone conference(s) to address questions pertaining to the information provided in the report.
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   Chi Mei Group
   Corning Incorporated
   CYNORA
   DELO
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   Dow Electronic Materials (Dow Chemical Company)
   Duksan Hi-Metal
   DuPont / DuPont Teijin Films
   e-Ray Optoelectronics Technology Company
   Electronics and Telecommunications Research Institute (ETRI)
   E2M Technology
   First O-Lite, Inc.
   Fluxim AG
   Fraunhofer Institute for Photonic Microsystems (IPMS) – COMEDD (Dresden)
   General Electric Company
   Heraeus Precious Metals
   Hodogaya Chemical Group
   Idemitsu Kosan Company, Limited
   Industrial Technology Research Institute (ITRI)
   Intrinsiq Materials, Inc. (IM)
   JOLED Inc.
   Jusung Engineering Company, Limited
   Kaneka Corporation
   Kateeva
   Kintec Company
   Kolon Industries, Inc
   Konica Minolta Pioneer OLED, Inc. / Radiant Vision Systems
   Kyulux Inc.
   LG Electronics / LE Chem
   LOMOX Limited
   Lumiotec Incorporated
   Merck KgaA - EMD Chemicals Group
   Mitsubishi Chemical
   Mitsui Chemicals
   Miwon Commercial Co., Ltd.
   Momentive Performance Materials Inc.
NEC Lighting, Limited
Nippon Electric Glass Company, Limited (NEG)
Nippon Steel and Sumikin Chemical Company Ltd.
Nissan Chemical Industries, Ltd.
Novaled GmbH
nTact
OLEDWorks LLC
OSRAM Opto Semiconductors GmbH (Siemens AG)
OTI Lumionics Inc. / aerelight
Philips (Koninklijke Philips Electronics N.V.)
PixelLight
PolyIC GmbH & Co. KG (Leonhard Kurz Stiftung & Co. KG)
Polyphotonix
PPG Industries Inc.
RITEK Corporation
ROHM Company Limited
SAES Getters (SAES Group)
Samsung Group / Cheil Industries / Novaled
Sanyo Chemical Industries
Schott AG
Seiko Epson Corporation
Showa Denko K.K.
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3M™ - Display Materials & System Division
Tianma Micro-electronics Company
Tokyo Electron Limited (TEL)
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Toppan Printing
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