

Market Research Study Photonics 2017

Key Data – Third Edition



PHOTONICS PUBLIC PRIVATE PARTNERSHIP



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Photonics Industry – A Key Enabling Industry with solid Growth

Global Photonics Industry: Innovative – Enabling – Growing

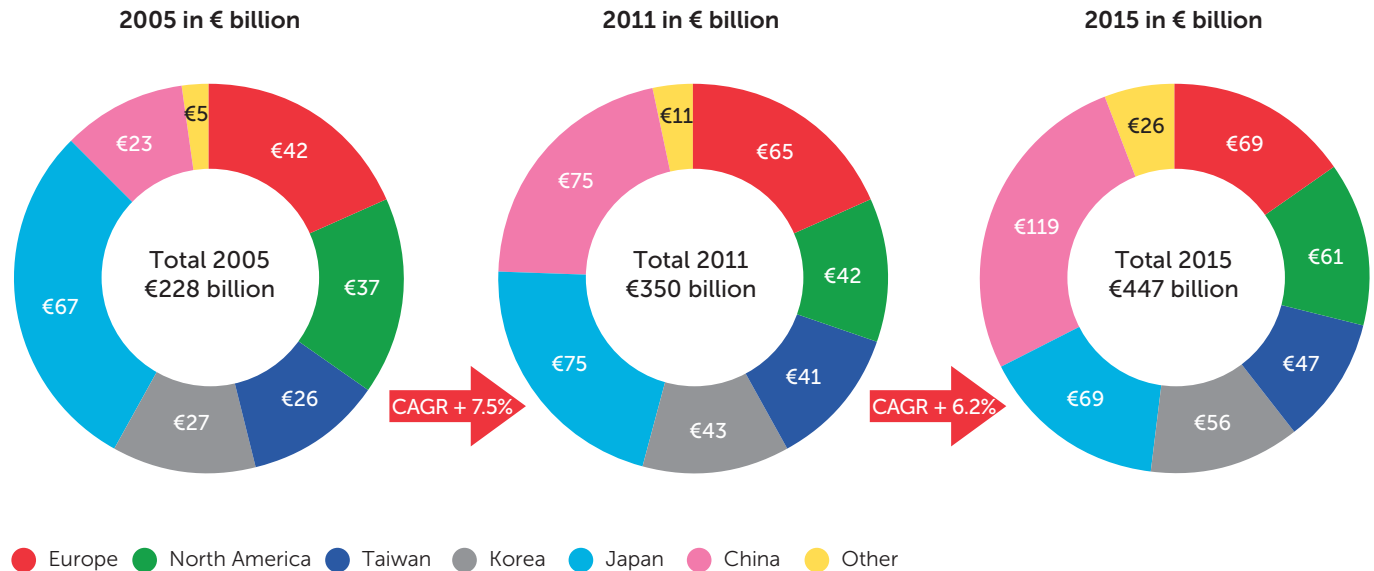
- Global Photonics Industry grew from €228 billion in 2005 to €447 billion in 2015
- Proved track record of growing more than two times of the global GDP growth
- Share shift – China became the new # 1 – Japan lost share
- Global specialisation ongoing – regional segment focus is fairly different

European Photonics Industry: Excellent positions in Core Segments

- European Photonics global Market Share slightly dropped versus 2011 – # 2 position before Japan
- Solid long-term growth in the core segments of the Photonics PPP far above European GDP growth
- Growth fluctuations driven by PV industry which is not subject of the PPP
- Europe kept an excellent position in the core segments far above the average EU market share
 - 50% in Production Technology demonstrating its leading position in the Laser and Lithography Systems
 - 35% in Measurement & Automated Vision – this segment even gained 2% of share
 - 32% in Optical Components & Systems
 - 28% In Medical Technology & Life Sciences
 - 26% in Defense & Security
 - 24% in Lighting
- Strong Innovation Power and high R&D intensity
- Solid long-term 2% job growth – 42,000 additional positions expected by 2020 versus 2011

Solid growth above global GDP: Photonics Industry grew from a €228 billion industry in 2005 to a €447 billion industry in 2015

Production Volume on Euro Basis*

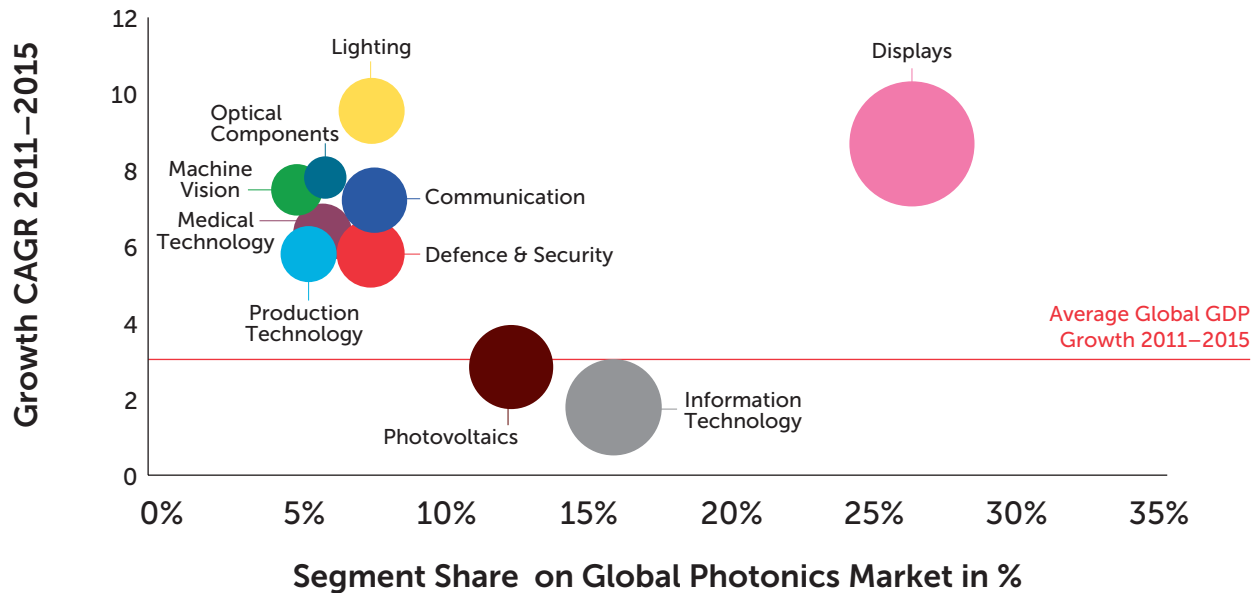


*including Photovoltaics, which is not subject of the PPP

Source: Optech Consulting, Market Research Study 24.1.2017

Global Segments Growth compared to Global GDP Growth – except for Information Technology and Photovoltaics all Segments grow faster

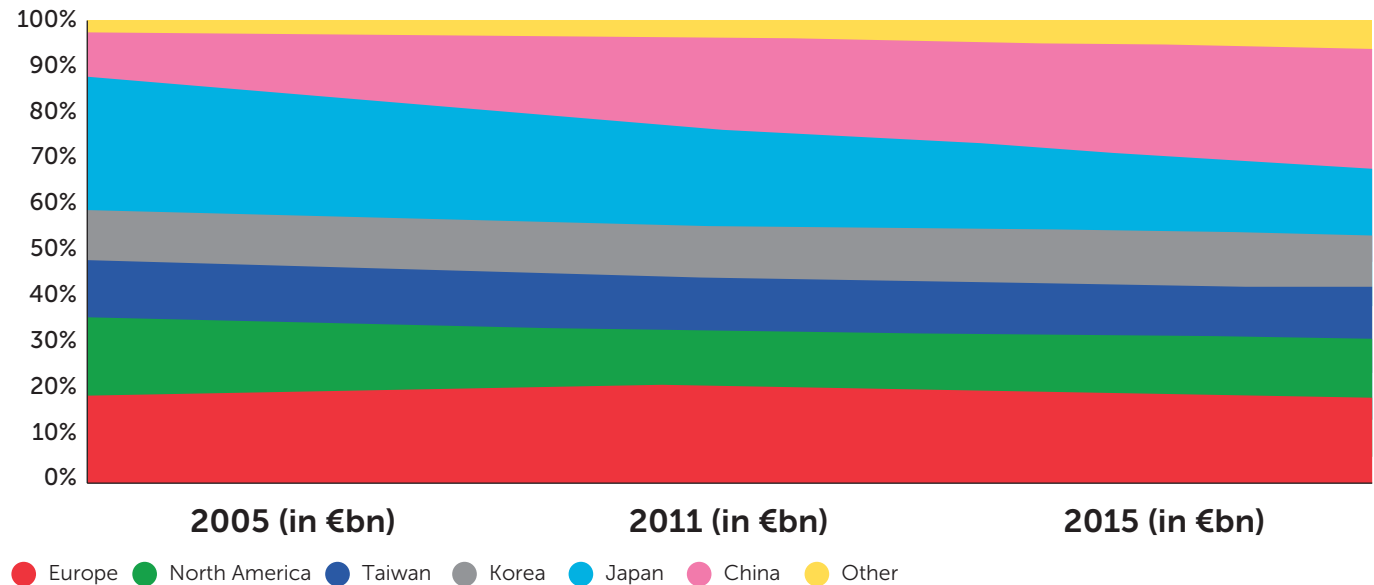
Global Photonics Segments 2015 Data on Euro basis



Data Sources: Eurostat / DB Research / Optech Consulting, Market Research Study 24.1.2017

Further Share Erosion of Japan – China became the Number 1 Producer – Europe on Second Position

Production Volume Share in Euro*

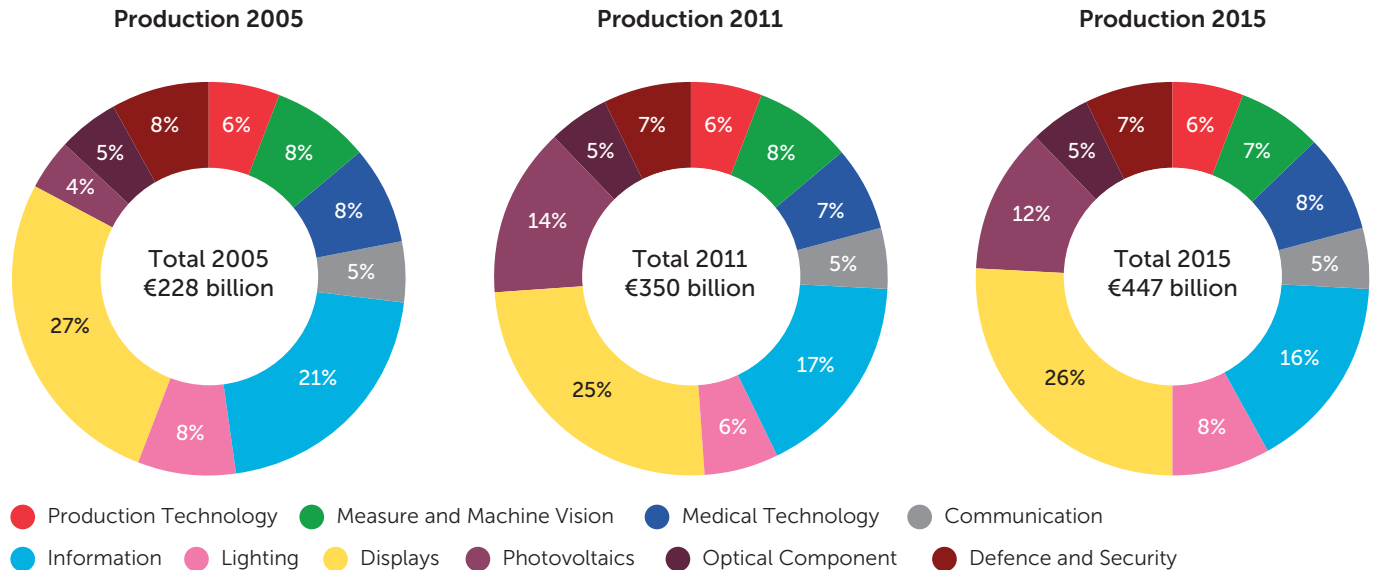


*including Photovoltaics, which is not subject of the PPP

Data Source: Optech Consulting, Market Research Study 24.1.2017 and 'Branchenreport Photonik 2013'

Development of the various Segments over Time – most Fluctuation came from Photovoltaics followed by Information Technology

Production Volume on Euro Basis*

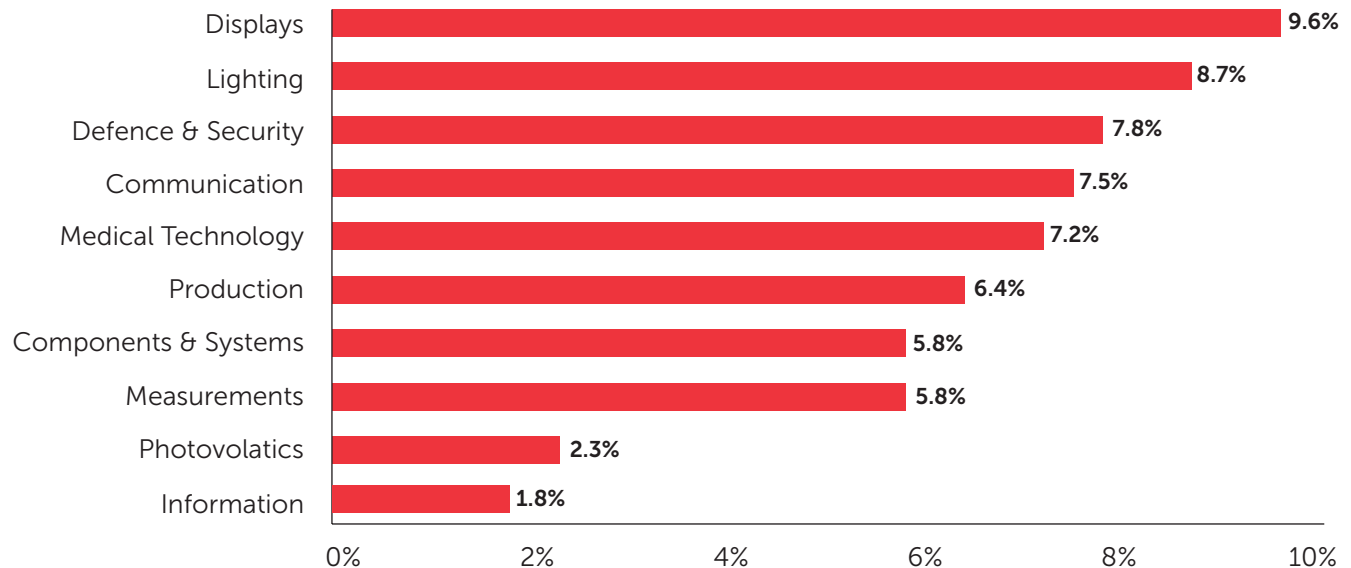


*including Photovoltaics

Source: Optech Consulting, Market Research Study 24.1.2017

Displays and Lighting were the fastest growing Photonics Segment 2011-2015 – Information and Photovoltaics the lowest

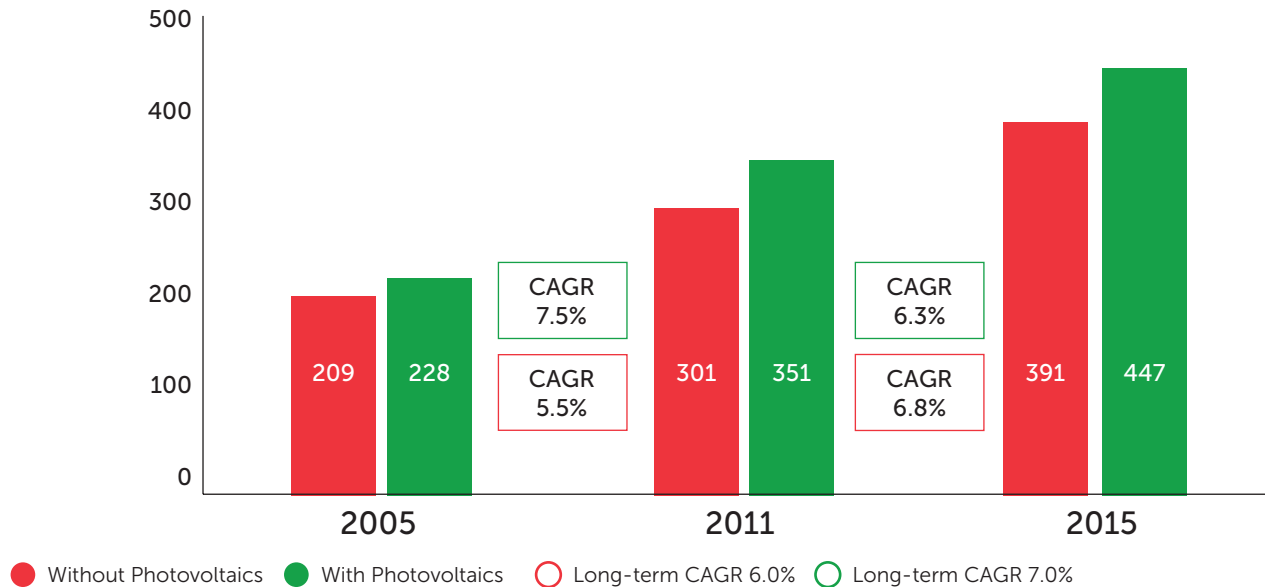
Growth rate on Euro Basis – CAGR 2011-2015 in %



Source: Optech Consulting Market Research Study 24.1.2017

Photovoltaics caused some fluctuations in growth rates and regional shares – however more moderate on a global basis

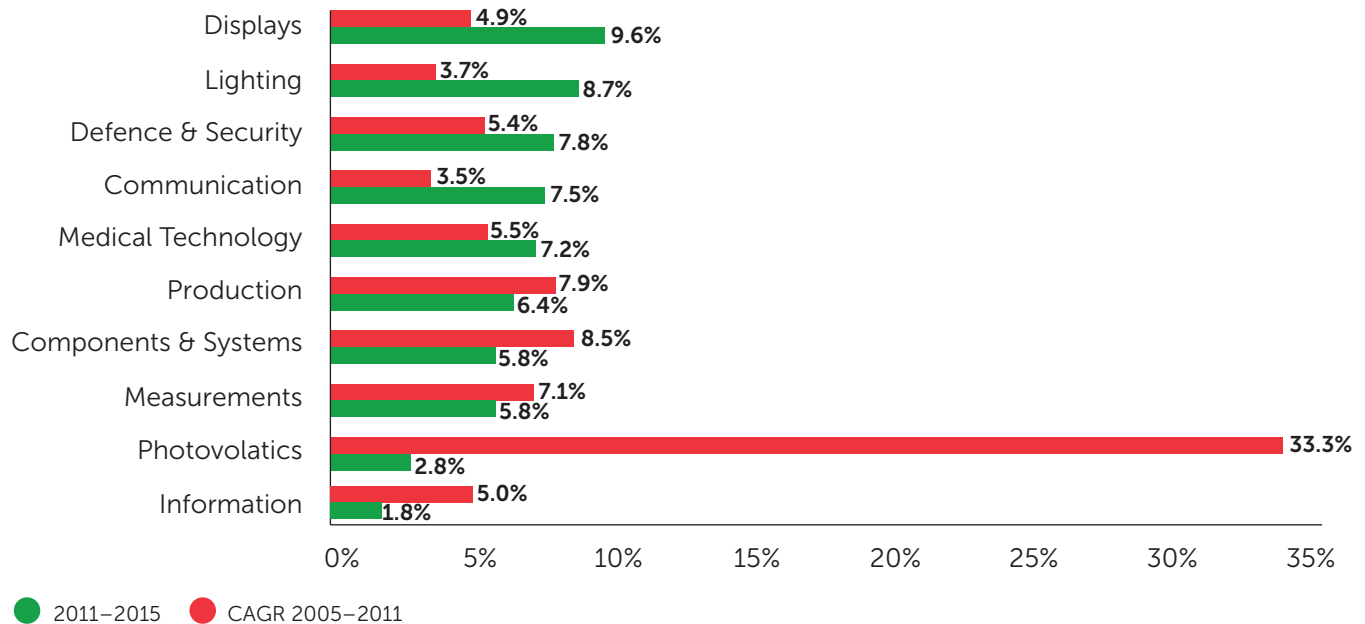
Production Volume in Euro*



Source: Optech Consulting, Market Research Study 24.1.2017

Global segment growth rates comparison demonstrates a changing picture over the two periods

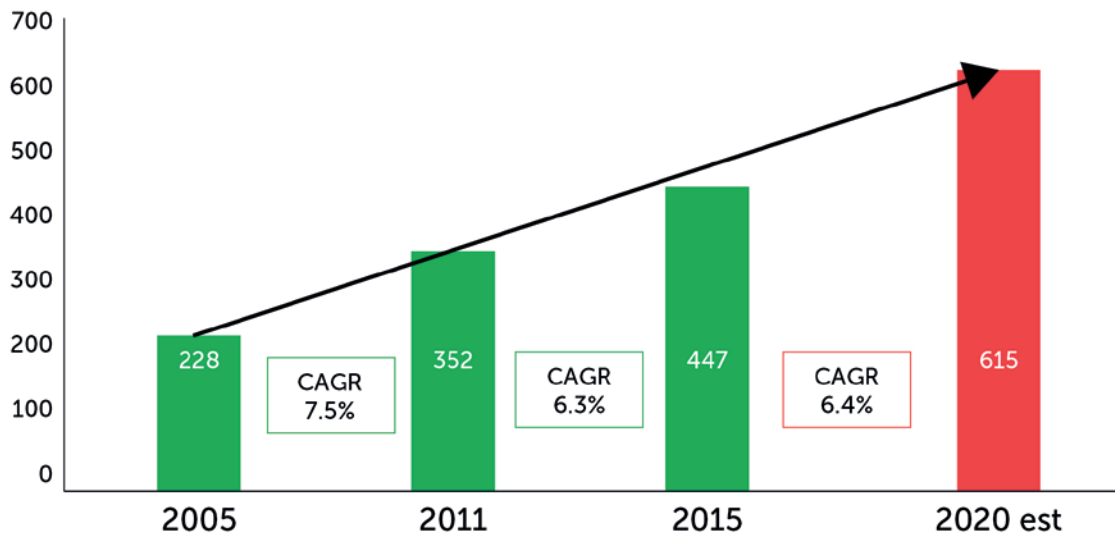
Growth rate comparison (Euro Basis)



Source: Optech Consulting Market Research Study 24.1.2017

Long-term Global Photonics Industry Development 2005–2020 foresees a solid average Growth Rate of 6.8%

Production Volume in Euro*



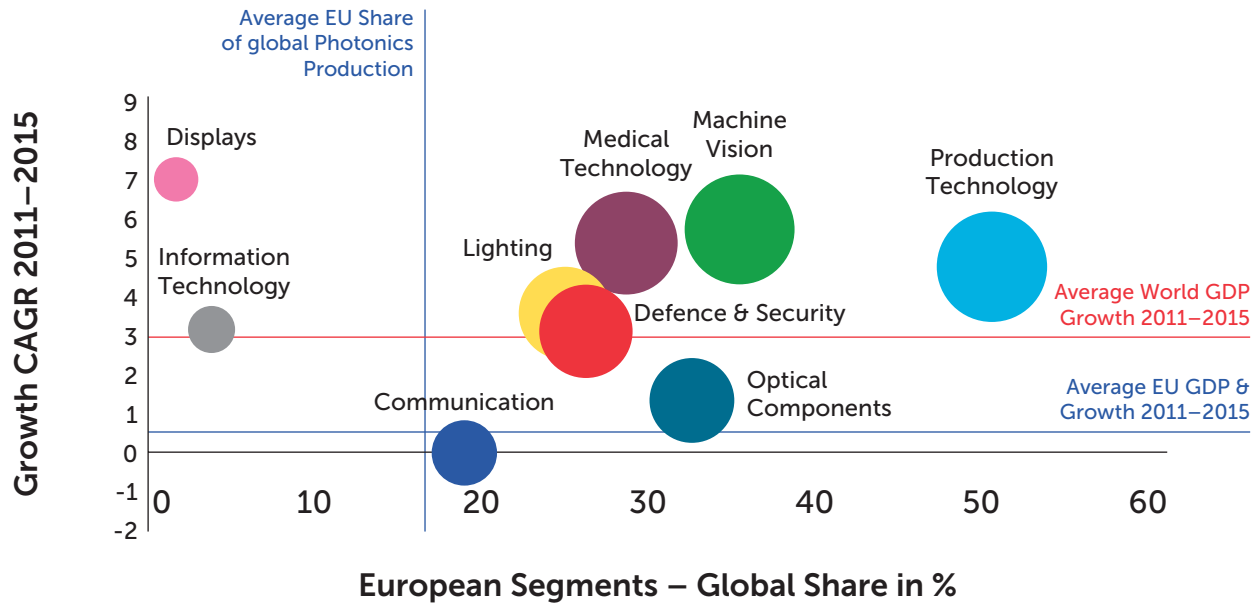
○ Long-term CAGR 6.8%

*includes Photovoltaics which is not subject of the PPP

Data Source: Optech Consulting, Market Research Study 24.1.2017 and 'Branchenreport Photonik 2013'

The Segments View: Most European Segments were able to outgrow Global and European GDP Levels

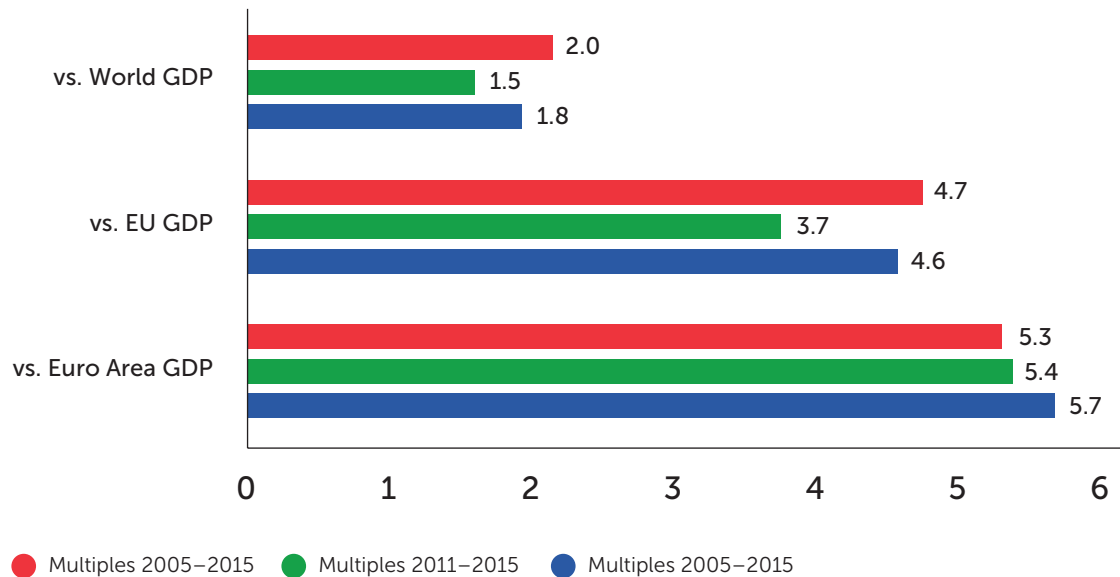
European Photonics Segments



Source: Optech Consulting, Market Research Study 24.1.2017

Eliminating the effects from Photovoltaics which is not subject of the PPP European Photonics Industry was able to outgrow GDP levels

Multiples: Growth of European Photonics Industry* vs. GDP

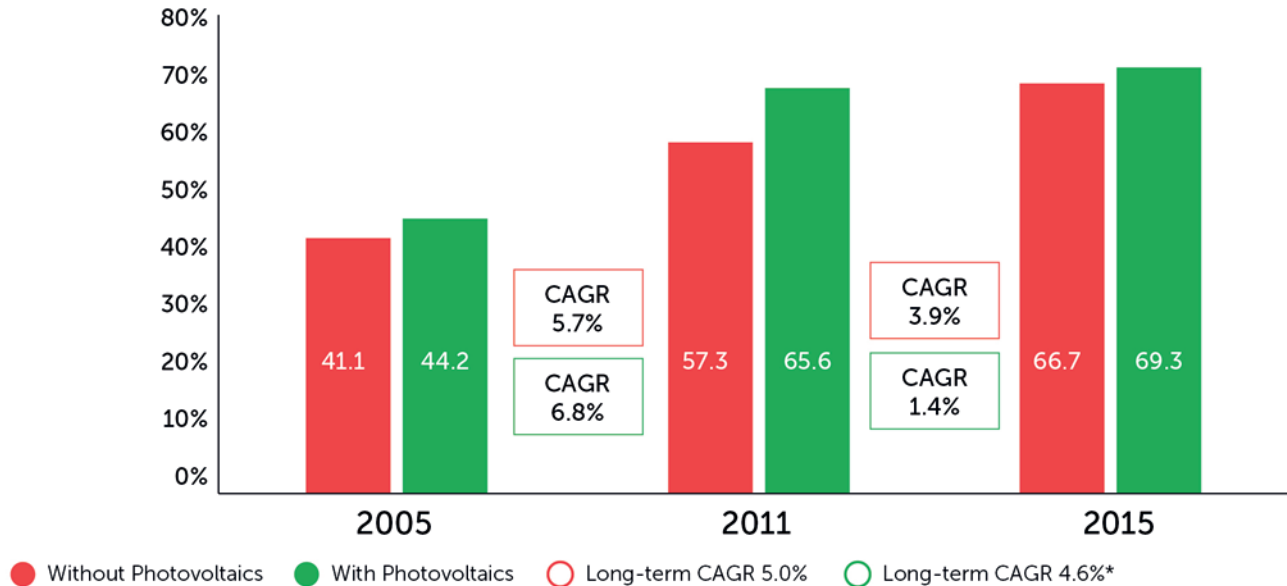


*without Photovoltaics, which is not subject of the PPP

Data Sources: Eurostat / Deutsche Bank Research / Optech Consulting, Market Research Study 24.1.2017

European Photonics Industry showed a solid long-term Growth of 5% in 2005–2015 / Fluctuation came from Photovoltaics

Production Volume in Euro

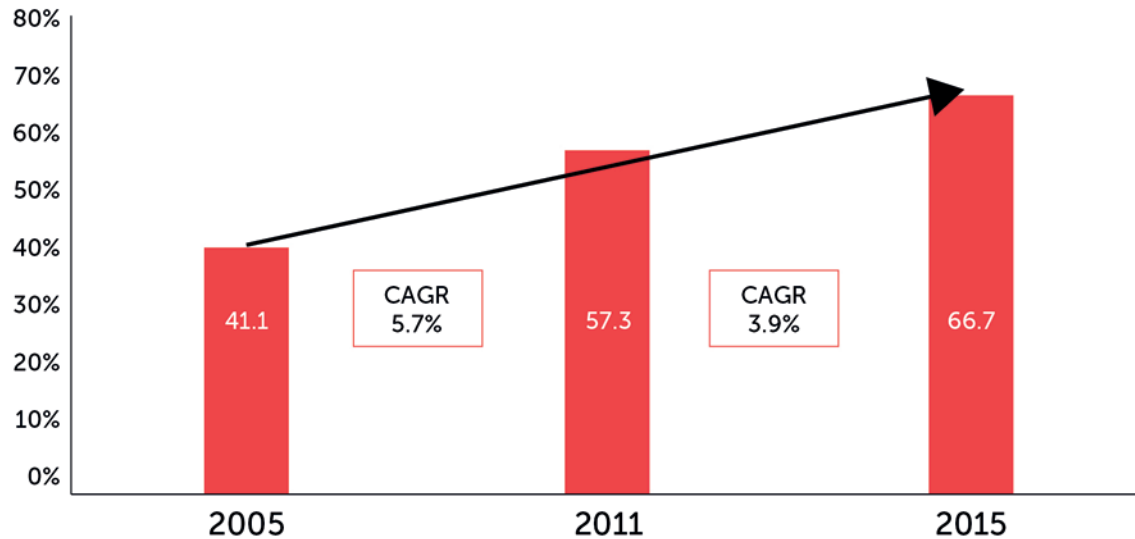


*Please note: Photovoltaics is not subject of the PPP

Data Source: Optech Consulting, Market Research Study 24.1.2017

Growth: European Photonics Industry demonstrated a solid long-term Growth Rate of 5% from 2005–2015

Production Volume in Euro*



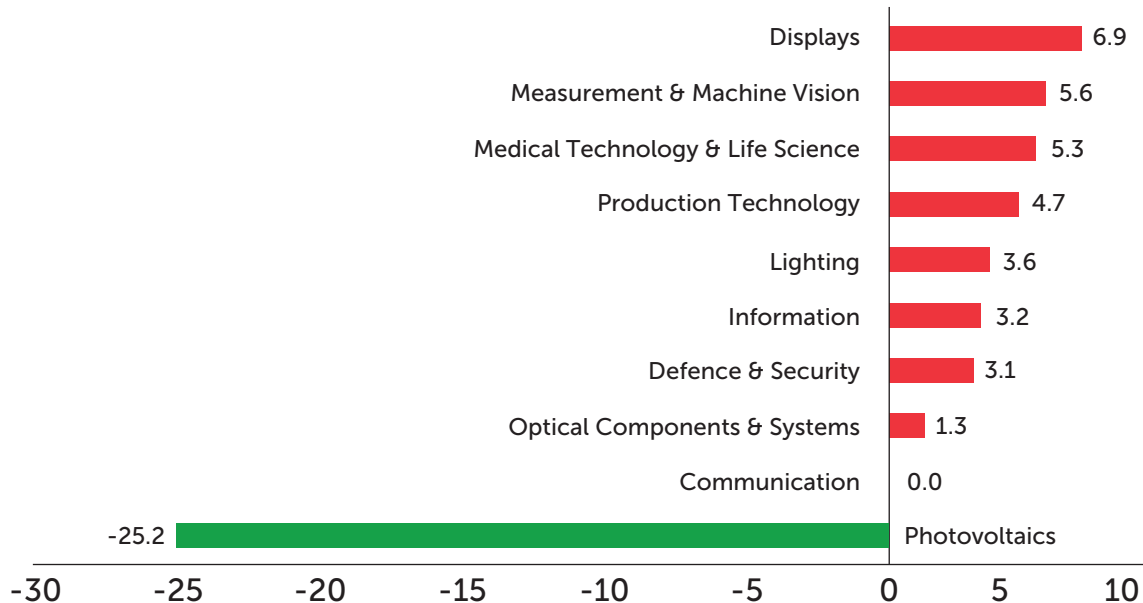
○ Long-term CAGR 5.0%

*without Photovoltaics, which is not subject of the PPP

Data Source: Optech Consulting, Market Research Study 24.1.2017

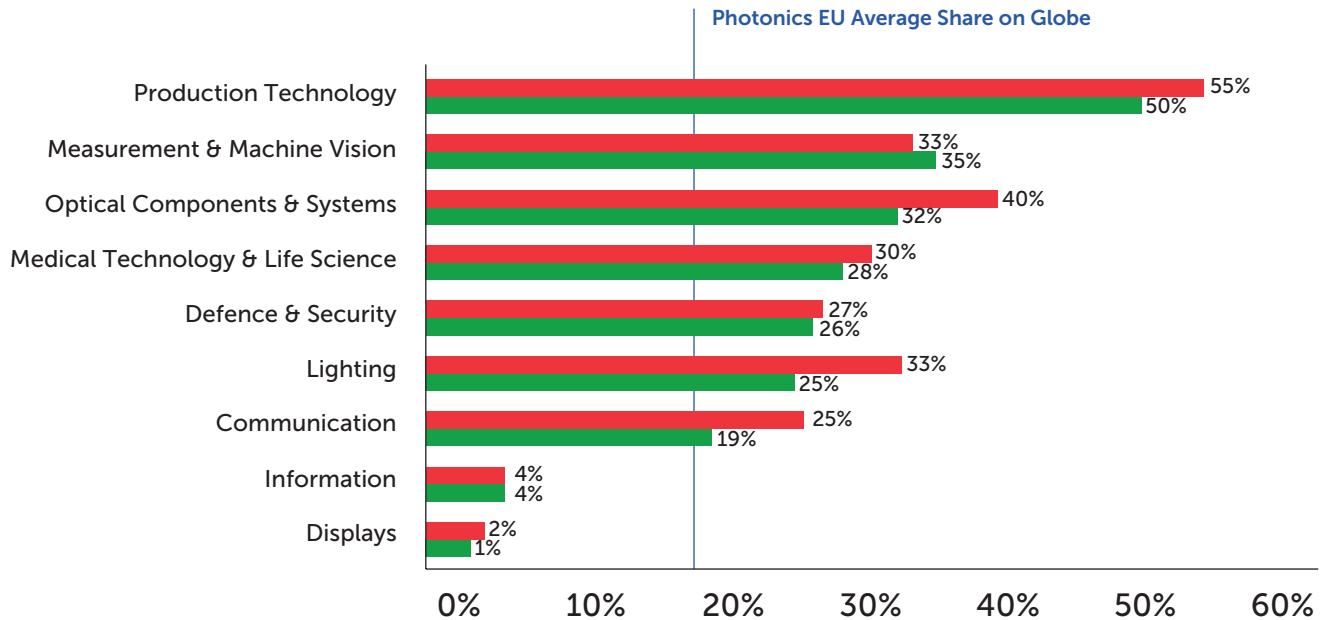
Segment Growth 2011–2015: Figures show solid Growth in the Industrial and Medical European Core Segments

Segment Growth – sorted CAGR 2011–2015 (on Euro basis)



Data Source: Optech Consulting, Market Research Study 24.1.2017

Leadership Position: Europeans Core Competence Segments remained strong and defended a Leading Global Position

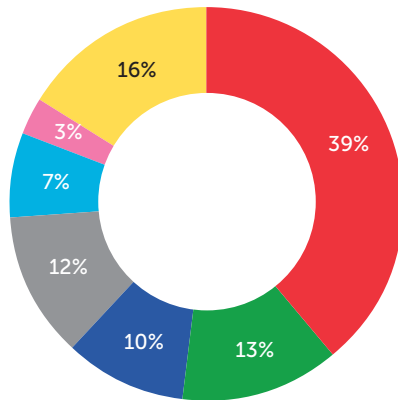


● 2011–2015 ● 2005–2011

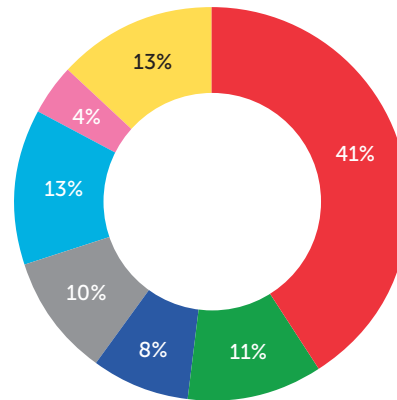
Data Source: Optech Consulting, Market Research Study 24.1.2017

Country View on Employment and Production: Germany remained the largest Producer followed by Netherlands and France

2015 Share of Employees in %



2015 Production Volume in %

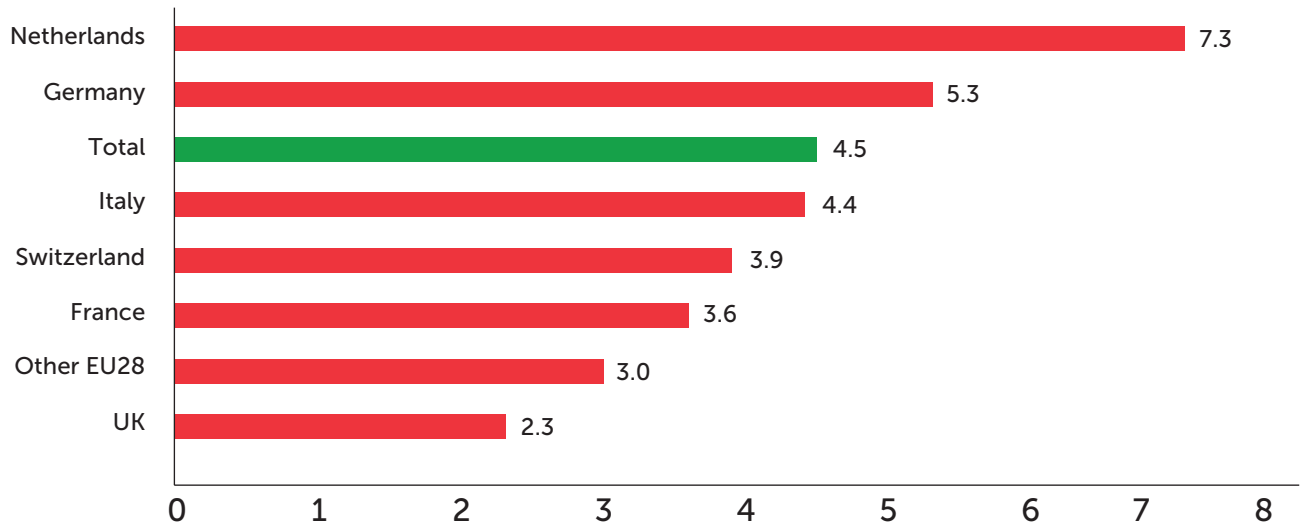


● Germany ● France ● Italy ● UK ● Netherlands ● Non EU ● Other EU

Data Source: Optech Consulting, Market Research Study 24.1.2017

Growth by Country: In an long-term View from 2005–2015 all Countries showed Growth in Photonics despite Economic Challenges

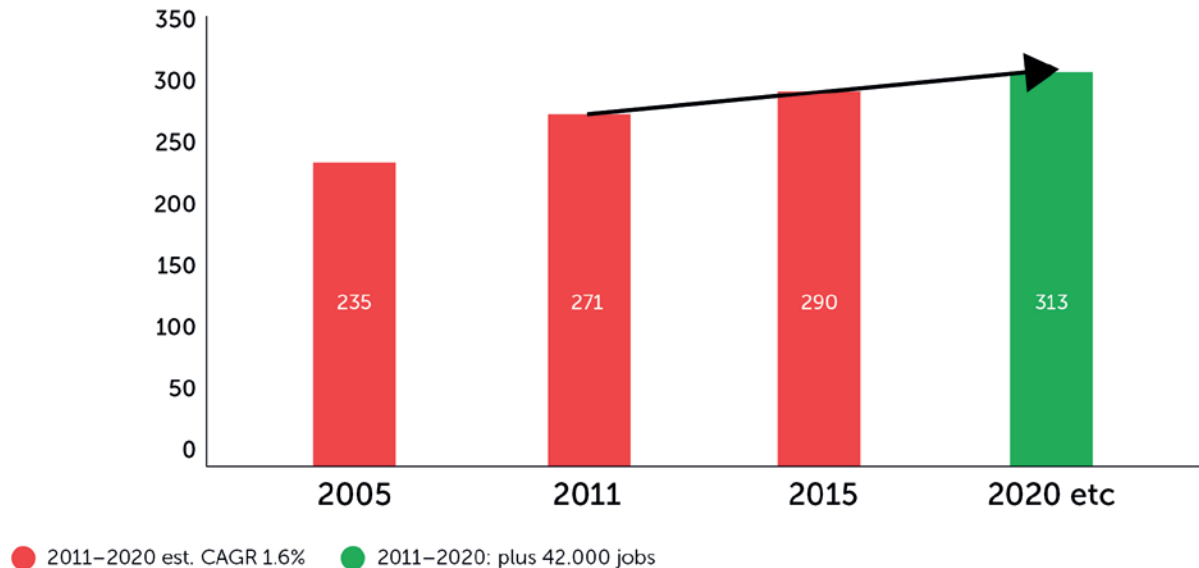
CAGR Photonics Production (in %) 2005–2015



Data Source: Optech Consulting, Market Research Study 24.1.2017

Employment: 42,000 more Jobs by end of Horizon 2020 expected – long-term Growth rate of 1.6% in 2011–2020

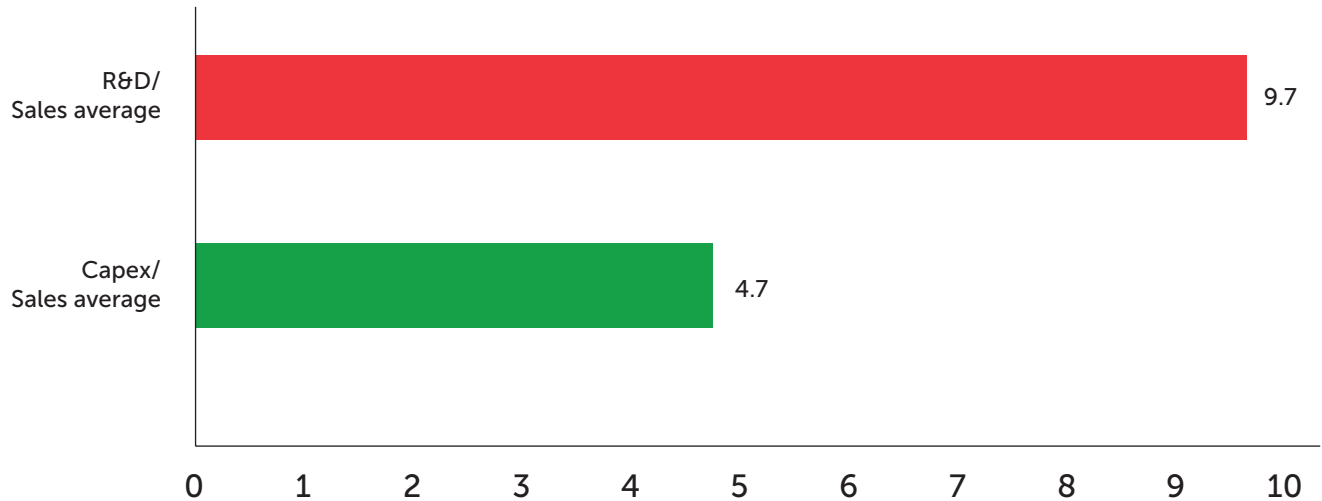
Employment – number of people (Tsd)*



*without effects from Photovoltaics which is not subject of the PPP
Data Source: Optech Consulting, Market Research Study 24.1.2017

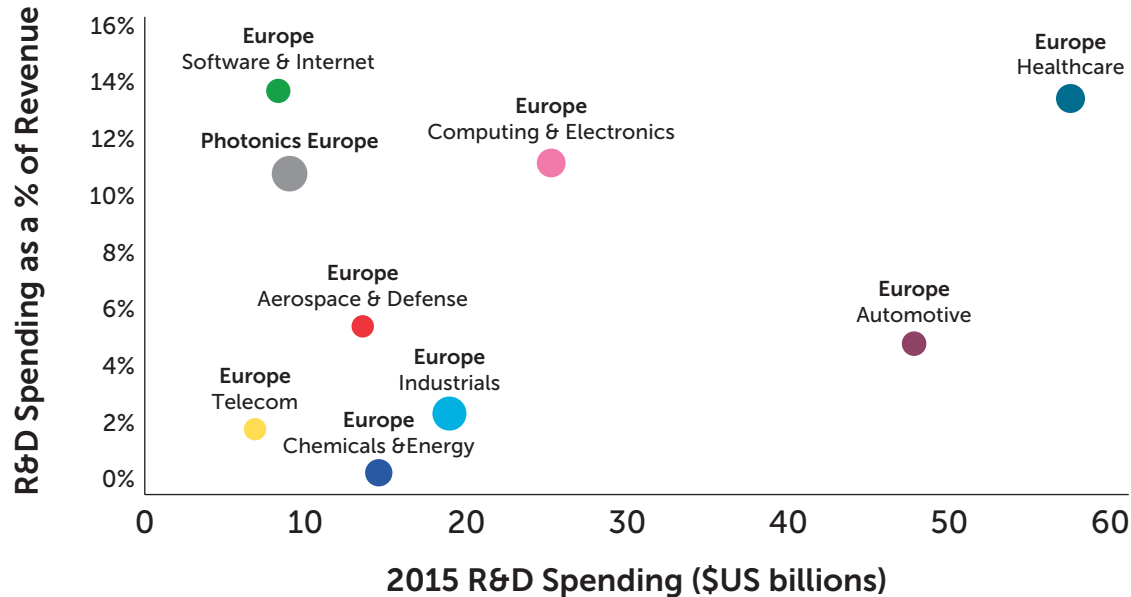
Innovation Power of Photonics Industry – well positioned in Terms of R&D Spending and Capex as Percentage of Revenue

Innovation Quota (versus revenues in %)



Data Source: Optech Consulting, Market Research Study 24.1.2017

Photonics Industry well positioned in terms of R&D spending as percentage of revenue above Industrials, Chemicals & Telecom



○ Bubble size corresponds to number of companies

Data Sources: PwC – R&D Spending Comparison – www.strategyand.pwc.com/innovation1000#VisualTabs3
Optech Consulting, Market Research Study 24.1.2017

Disclaimer

The study presented here was prepared with the greatest of care. The data contained in it is based on calculations and estimates by Optech Consulting, unless indicated otherwise.

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European Photonics Industry at a Glance

Investment

Nearly **€10Bn** – In 2015 European Photonics Industry pledged €9.6Bn to Innovation (R&D spending and Capex)

R&D intensity in the Photonics industry amounts to nearly **10%**

Photonics industry is leveraging public investment in the PPP projects by a factor of **4.3**

Industry participation in Horizon 2020 PPP projects increased to **45%** compared to 35% in FP7

7 Prototyping and Pilot Manufacturing services to help end user industry to speed up product development

€49M invested by the EC in the PPP Pilot manufacturing services (Pilot lines)

67 Projects started so far under the frame of Horizon 2020 with a public investment of a total of **€278M** EC funding over the first 3 years of Horizon 2020: 2014–2016

Market

The European Photonics market amounts to **€69Bn** per annum

European Photonics Production has increased by over **62%** over the last 10 years

The European Photonics Production has grown with an average CAGR of **5%** since 2005

European Photonics Production Growth rate is more than **3.5** higher than EU GDP Growth rate

50% global market share for European Photonics for Production Technology

35% global market share for European Photonics for Optical Measurement & Image Processing

32% global market share for European Photonics for Optical Components and Systems

People

19,000 new jobs created in the European Photonics Industry

Forecast: **42,000** new jobs could be created by 2020

9 PPP Projects explicitly devoted to promoting Research, Education & Training in Photonics

More than **1700** Photonics companies and research organisations back the Photonics PPP.

More than **3000** registered personal members in the platform Photonics21

About **1000** attendees in Photonics PPP strategy development workshops and meetings