Photonics is an important global Key Enabling Technology leveraging growth and prosperity along the value chain for other industries and service sectors. To demonstrate this great potential and lever future cross sector opportunities the German Industry Associations SPECTARIS, VDMA, ZVEI supported by the German Ministry for Education and Research jointly publish the ‘Photonics Industry Report 2013’.

01. Management Report
BCC Business Communications Consulting GmbH, Rembrandtstraße 13, 60596 Frankfurt am Main, Germany

02. Study Results Photonics 2013
Optech Consulting Dr. Arnold Mayer, Bahnhofstraße 20A, CH-8274 Tägerwilen, Switzerland

Cover Photo: Fotolia
Berlin, Düsseldorf, Frankfurt am Main, Hamburg; May 2013
PHOTONICS INDUSTRY REPORT 2013

KEY DATA OF THE GLOBAL PHOTONICS MARKET

Key Data Photonics World 2005, 2011 and Expectations 2020

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Value (billion Euros)</th>
<th>Production Technology</th>
<th>Safety- and Defence Technologies</th>
<th>Information Technology</th>
<th>Medical Technology &amp; Life Science</th>
<th>Communication Technology</th>
<th>Displays</th>
<th>Light Sources</th>
<th>Photovoltaic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>228</td>
<td>27%</td>
<td>8%</td>
<td>6%</td>
<td>5%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>2011</td>
<td>350</td>
<td>25%</td>
<td>6%</td>
<td>5%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>2020</td>
<td>615</td>
<td>23%</td>
<td>7%</td>
<td>7%</td>
<td>6%</td>
<td>5%</td>
<td>4%</td>
<td>7%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Source: BMBF, SPECTARIS, VDMA, ZVEI (pub.), 'Branchenreport Photonik 2013', Optech Consulting, Study 'Photonik 2013'/Own calculations

PHOTONICS INDUSTRY REPORT 2013

PHOTONICS – A STRONG INDUSTRY WITH EXCELLENT PROSPECTS

Photonics World
- From 2005–2011 Photonics was able to outgrow global GDP
- Expected market volume in 2020 – 650 billion Euro
- Global market share shift towards Asia
- China was able to catch up with global market leader Japan
- Europe was able to stabilize it's market share at 18 %
- Market share loss of North America and Japan

Photonics Germany
- Domestic Photonics production grew faster than global average
- Solid growth prospects in future
- Strong export contributor and job engine
- Four strong core segments with increasing global shares
- High R&D investment rate of 9 % above industry average
- Trend towards intelligent system solutions opens up opportunities
GLOBAL PHOTONICS MARKET 2011
A 350 BILLION EURO MARKET WITH SOLID GROWTH

Photons World Market 2011 – Total 350 billion Euro


GLOBAL PHOTONICS MARKET 2011
STRONG SEGMENTS WITH GROWTH WELL BEYOND GDP

Growth of Global Photonics Segments in 2005–2011 compared to GDP Growth (without PV)

Source: BMBF, SPECTARIS, VDMA, ZVEI (pub.), ‘Branchenreport Photonik 2013’, Optech Consulting, Study Photonik 2013/Own calculations
PHOTONICS IN GERMANY 2011
A 27 BILLION EURO MARKET WITH STRONG EXPORT CONTRIBUTION

Domestic Production Germany 2011 – Total 27 billion Euro

- Production Technology: 12%
- Measurement & Automated Vision: 19%
- Medical Technology & Life Science: 16%
- Light Sources: 9%
- Photovoltaic: 18%
- Optical Components & Systems, Safety- and Defence Technologies: 16%
- Information Technology & Communication Technology, Displays: 10%
- Medical Technology & Life Science: 16%


PHOTONICS IN GERMANY 2011
FOUR STRONG CORE SEGMENTS DRIVING GROWTH AND INNOVATION

Growth of German Photonics Segments in 2005–2011 compared to GDP Growth (without PV)

- Average GDP Growth

Source: BMBF, SPECTARIS, VDMA, ZVEI (pub.), ‘Branchenreport Photonik 2013’, Optech Consulting, Study ‘Photonik 2013’/Own calculations

Bubble size indicates worldwide production volume in 2011
PHOTONICS IN GERMANY

EXCELLENT GLOBAL POSITION IN CORE SEGMENTS

Expected Change World Market Shares of German Photonics Segments 2020 versus 2011


PHOTONICS IN GERMANY

JOB ENGINE –
ABOUT 30,000 NEW JOBS SINCE 2005

Number of Employees in Photonics Segments in 2005, 2011 and Expectations 2020

Source: BMBF, SPECTARIS, VDMA, ZVEI (pub.), ‘Branchenreport Photonik 2013’, Optech Consulting, Study ‘Photonik 2013'/Own calculations
PHOTONICS IN THE REGIONS

ASIA COUNTS FOR 70 PERCENT OF GLOBAL PRODUCTION

PHOTONICS IN THE REGIONS

WORLD MARKET SHARES – TRENDS TOWARDS SPECIALISATION

Production oriented Photonics, Production by Countries, 2011 vs. 2005

Information Technology oriented Photonics, Production by Countries, 2011 vs. 2005

Source: BMBF, SPECTARIS, VDMA, ZVEI (pub.), 'Branchenreport Photonik 2013', Part 2: Study Results, Optech Consulting, Studie Photonik 2013
PHOTONICS IN EUROPE 2011

GLOBAL SHARE OF 18 PERCENT – STRONG GERMAN CONTRIBUTION

Domestic Production Europe, 2011

- Photovoltaic: 14%
- Production Technology: 17%
- Measurement & Automated Vision: 15%
- Optical Components & Systems: 12%
- Information & Communication Technology, Displays: 10%
- Medical Technology & Life Science: 12%
- Safety- and Defence Technologies: 11%
- Light Sources: 9%


PHOTONICS WORLD MARKET 2020

SOLID GROWTH PROSPECTS – CONTINUED GROWTH BEYOND GDP

Photonics World Market 2020 – Total 615 billion Euro

- Photovoltaic: 16%
- Production Technology: 7%
- Measurement & Automated Vision: 9%
- Displays: 23%
- Medical Technology & Life Science: 7%
- Safety- and Defence Technologies: 7%
- Light Sources: 6%
- Optical Components & Systems: 6%
- Information Technology: 15%
- Communication Technology: 4%

PHOTONICS WORLD MARKET 2020

MOST SEGMENTS WILL CONTINUE TO OUTGROW GLOBAL GDP

PHOTONICS IN GERMANY 2020

EXPECTED TO GROW TOWARDS A 44 BILLION EURO MARKET VOLUME

Expected Growth of Global Photonics Segments 2011–2020 compared to GDP Growth

Shares of Photonics Segments in Germany

Bubble size indicates worldwide production volume in 2020

Source: BMBF, SPECTARIS, VDMA, ZVEI (pub.), ‘Branchenreport Photonik 2013’, Optech Consulting, Study ‘Photonik 2013’/Own calculations

Source: BMBF, SPECTARIS, VDMA, ZVEI (pub.), ‘Branchenreport Photonik 2013’, Optech Consulting, Study ‘Photonik 2013’/Own calculations
PHOTONICS IN GERMANY 2020

FOUR STRONG CORE SEGMENTS
FOSTER FUTURE GROWTH

Expected Growth of German Photonics Segments 2011–2020 compared to GDP Growth

DISCLAIMER

This market forecast cannot offer any guarantees of a specific future path as many uncertainties underlie the industry’s development.

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