

< The fourth future vision development >

# Future Vision of the Optoelectronics Industry

Toward Further Growth  
by Evolutionary Technologies and Progressive Developments  
in an Advancing Borderless Society

The Optoelectronic Industry and  
Technology Development Association

# Contents

1. Background and purpose of the fourth future vision development
2. Philosophy and process of the development
3. Summary of the future vision
  - The Relation between social trends and the optoelectronics industry
  - Forecast of the global market size of the optoelectronics industry
  - Trends in the optoelectronics technology
  - Estimates of domestic production volume of the optoelectronics industry
  - The mid- and long-term growth factors and prospects  
in the optoelectronics industry
  - Proposing strategy for promoting the optoelectronics industry

# 1 Background and purpose of the fourth future vision development

- Since the foundation of the Optoelectronic Industry and Technology Development Association in 1980, three future visions of the optoelectronics industry have been developed to provide guidelines for the relevant industry.
- Since the third future vision was developed in 1995, the explosive popularization of cellular phones and the bursting of an IT bubble economy came out.
- With such circumstances in mind, the fourth future vision was intended to develop to be “positive and inspiring”.
- This time, It was intended to view economic and social trends, global market trends in optoelectronics technology, and domestic production volumes of the optoelectronics industry in the years of 2010 and 2015.

## 2 Philosophy and process of the development

- Estimated the growth rates of every product category (or application field) by viewing global social trends and technological trends. We then multiplied the growth rates and the existing global market sizes individually to forecast the future global market sizes by product category (application field) basis. We summed up these figures to get the forecast of the future total global market size.
- Divided the each forecasted market size to regional one respectively, by taking into consideration regional social and economic trends, to get the future regional market size by product category basis. Consequently, summed up these figures to get the total regional market size.
- In addition, intended to view technology trends beyond 2010 – 2015 time-frame by hearing from experts of each field.
- Estimated the future domestic production volume by taking account of the actual result of 2002 domestic production volume, global market growth rate and the forecasted shifting ratio of production to overseas.
- Finally, summarized proposing strategies for promoting the optoelectronic industry by contributions from the designated members of the Future Vision Developing Committee and other volunteer experts.
- Started the vision developing in 2002, soon after the IT economic bubble had burst, and completed it two years later in November, 2004.

## 3 Summary of the Future Vision

- 3.1 Social trend
- 3.2 Optoelectronic devices/equipment relevant to social trends
- 3.3 Forecasted global market size with breakdown by application field basis
- 3.4 Forecasted global market size with new products versus existing ones
- 3.5 Deployment order to each regional market
- 3.6 Forecasted global market size with breakdown by regional market basis
- 3.7 Market forecast summary 1
- 3.8 Market forecast summary 2
- 3.9 Topics in optoelectronics technologies prospectively in use beyond 2010's
- 3.10 Estimates of domestic production volume in fiscal years 2010 and 2015
- 3.11 Estimating trend of domestic production volume by application fields basis
- 3.12 Mid- & long-term growth factors and prospects of the optoelectronics industry
- 3.13 Proposing strategy for promoting the optoelectronic industry

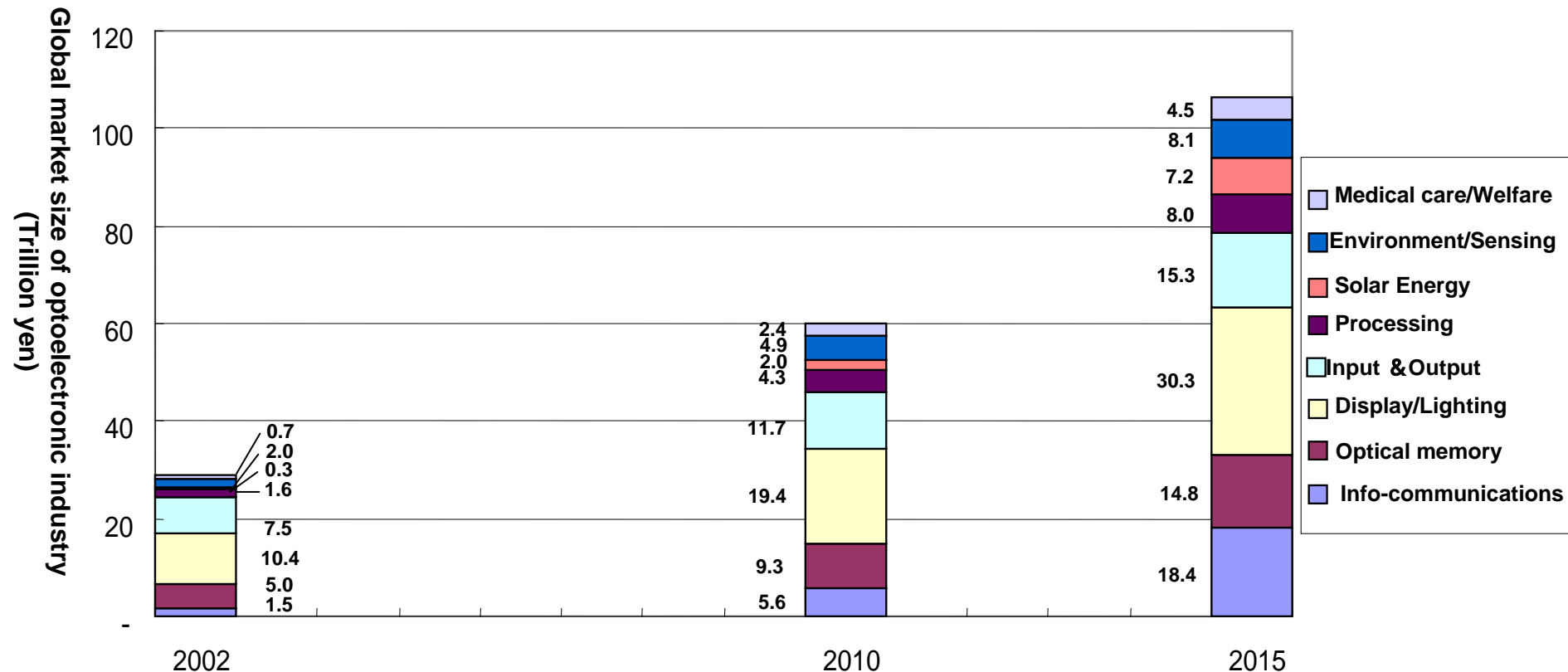
## 3.1 Social trend

- ▶ **[Population]**
  - Aging population ratio will increase.
- ▶ **[GDP]**
  - In 2010, the world GDP will increase by 20% from 2000.
  - In 2015, it is estimated to increase by 37% from 2000.
- ▶ **[Economic activities]**
  - Economies will further globalize.
  - Many free trade zones will be established and international trade will increase in activity.
- ▶ **[Products/service]**
  - Service will be more emphasized.
  - Every person will benefit from service provision without difficulty, regardless of age or gender.
- ▶ **[Development of industries]**
  - Each country will grow with the most global competitive industry by focusing on it.
  - A country does not need to have a heavy industry in homeland to establish an electronic/electric device/equipment industry or information technology industry.

## 3.2 Optoelectronic devices/equipment relevant to social trends

- ➔ **Demographic aging society (Aging society with fewer children )**
  - Advanced input and output device, medical devices, mobile devices, etc.
- ➔ **Environment-friendly society**
  - Energy saving devices, environment monitoring devices, etc.
- ➔ **Advancing borderless society**
  - Individual authentication devices, remote-control surveillance devices, etc.

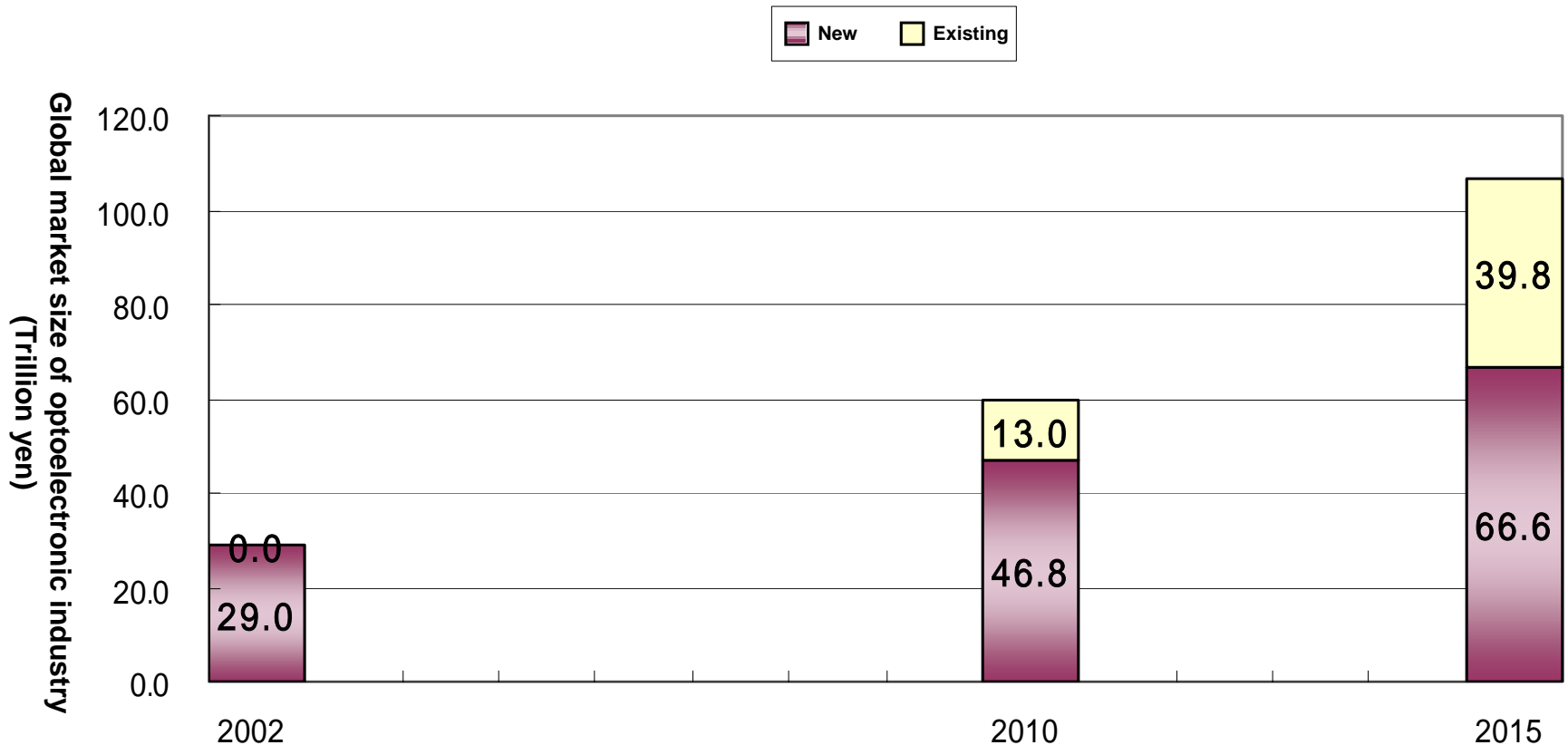
### 3.3 Forecasted global market size with breakdown by application field basis



➤ **The total market size will expand to about 106 trillion yen in 2015.**

- ▶ With regard to individual (by product category) market size, display/lighting, info-communications, input & output, and optical memory are dominant. The sum of them accounts for over three fourths of the total market size.
- ▶ With regard to average annual growth rate by product category (or application field) basis, solar energy and medical care/welfare will have higher growth rate than others.

## 3.4 Forecasted global market size with new products versus existing ones



➤ **Market size of both existing and new products will expand.**

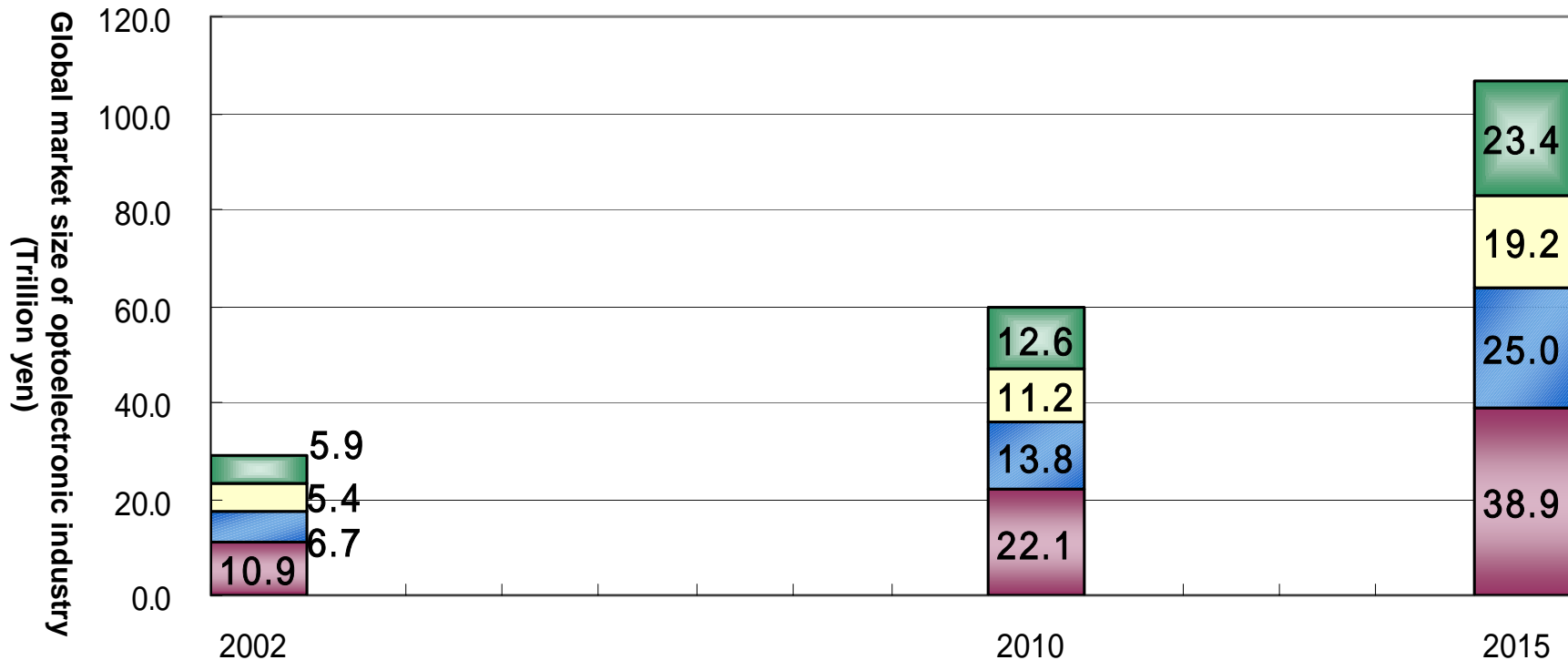
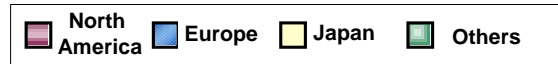
- ▶ Info-communications, optical memory and display/lighting will create more new products than others.
- ▶ In display/lighting, input & output, info-communications and optical memory, existing products are dominant in volume.

## 3.5 Deployment order to each regional market

Field	The order of popularization				Main reason
	1st	2nd	3rd	4th	
Info-communications	NA	Japan	Europe	Others	NA is ahead with communication using optical technology.
Optical memory	Japan	NA	Europe	Others	Japan is ahead in terms of popularization of optical discs for Audio Visual application and so on.
Display/lighting	Japan	NA	Europe	Others	Japan is ahead with new displays, such as FPD.
Input/output	NA	Japan	Europe	Others	NA leads Digital still camera and office device/appliance market.
Processing	NA	Europe	Japan	Others	Advanced countries, the majority of which are in NA and Europe, have taken a lead in processing using optoelectronic technology.
Solar energy	Japan	NA	Europe	Others	Japan is technologically advanced in this field. Governmental support has facilitated the popularization of solar energy. This trend is considered to continue furthermore.
Environment/Sensing	Europe	Japan	NA	Others	Europe is highly conscious of environment-friendly measures. Japan and Europe lead the sensing market. NA leads the human interface-related market.
Medical care/Welfare	NA	Europe	Japan	Others	Europe and NA lead the new medical care fields, such as remote-controlled health care, etc.

NA: North America

## 3.6 Forecasted global market size with breakdown by regional market basis



### ➤ Market sizes will expand in respective regions.

- ▶ Market size remains in the following order: North America, Europe, Others, Japan.
- ▶ The “Others” region has the highest annual average growth rate.

## 3.7 Market forecast summary 1

### ➤ **Future market size and growth rate of the optoelectronics industry**

- ▶ The global market size of the optoelectronic industry was 29 trillion yen in 2002. It is expected to be 59.8 trillion yen in 2010 and 106.5 trillion yen in 2015.
- ▶ The annual average growth rate from 2002 to 2015 will be 10.5%.
- ▶ The growth rate from 2010 to 2015 (12.5%) will be higher than the growth rate from 2002 to 2010 (9.5%).

### ➤ **Distinctions observed from existing and new markets**

- ▶ New markets (markets created by products using new technologies) are expected to be about 22% proportion in 2010, and about 37% proportion in 2015.
- ▶ The annual average growth rate from 2010 to 2015 will be about 26%, leading the whole market.

## 3.8 Market forecast summary 2

### ➤ Distinctions among regional markets

- ▶ Market size of the four regions (North America, Europe, Japan, Others) is in the order of North America>Europe>Others>Japan. This trend will continue for some time in the future.
- ▶ The “Others” region will grow up drastically, but it will not reach the market size of Europe by 2015.

### ➤ Distinctions among application fields

- ▶ Four application fields, display/lighting, communication, input & output, and optical memory, will account for the largest market proportion, which is over three fourths of annual total market size.
- ▶ The fields of Medical care/welfare, optical energy and communication will have higher annual average growth rates.

## 3.9 Topics in optoelectronics technologies prospectively in use beyond 2010's

### ➤ **Info-communications field**

- Optical packet switch, Optical flip flop, Quantum cryptographic communications, etc.

### ➤ **Display/Lighting/Optical memory fields**

- 3-D display, Sheet display, White LED, Molecular memory, etc.

### ➤ **Environment/Energy/Biotechnology fields**

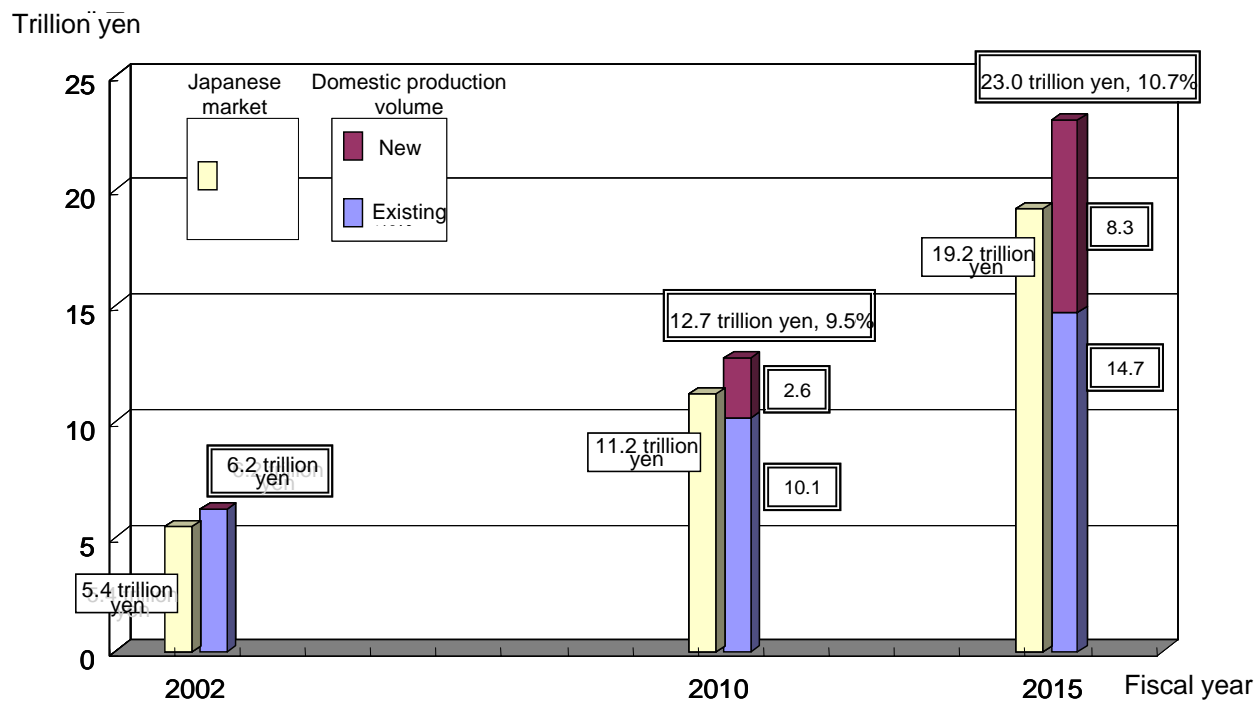
- Fiber nerve net, Photocatalysis, Solar power generation, Laser nuclear fusion, Optical cancer treatment, Optical CT, Optical agriculture, etc.

### ➤ **Nano-photonics/Fundamental technology fields**

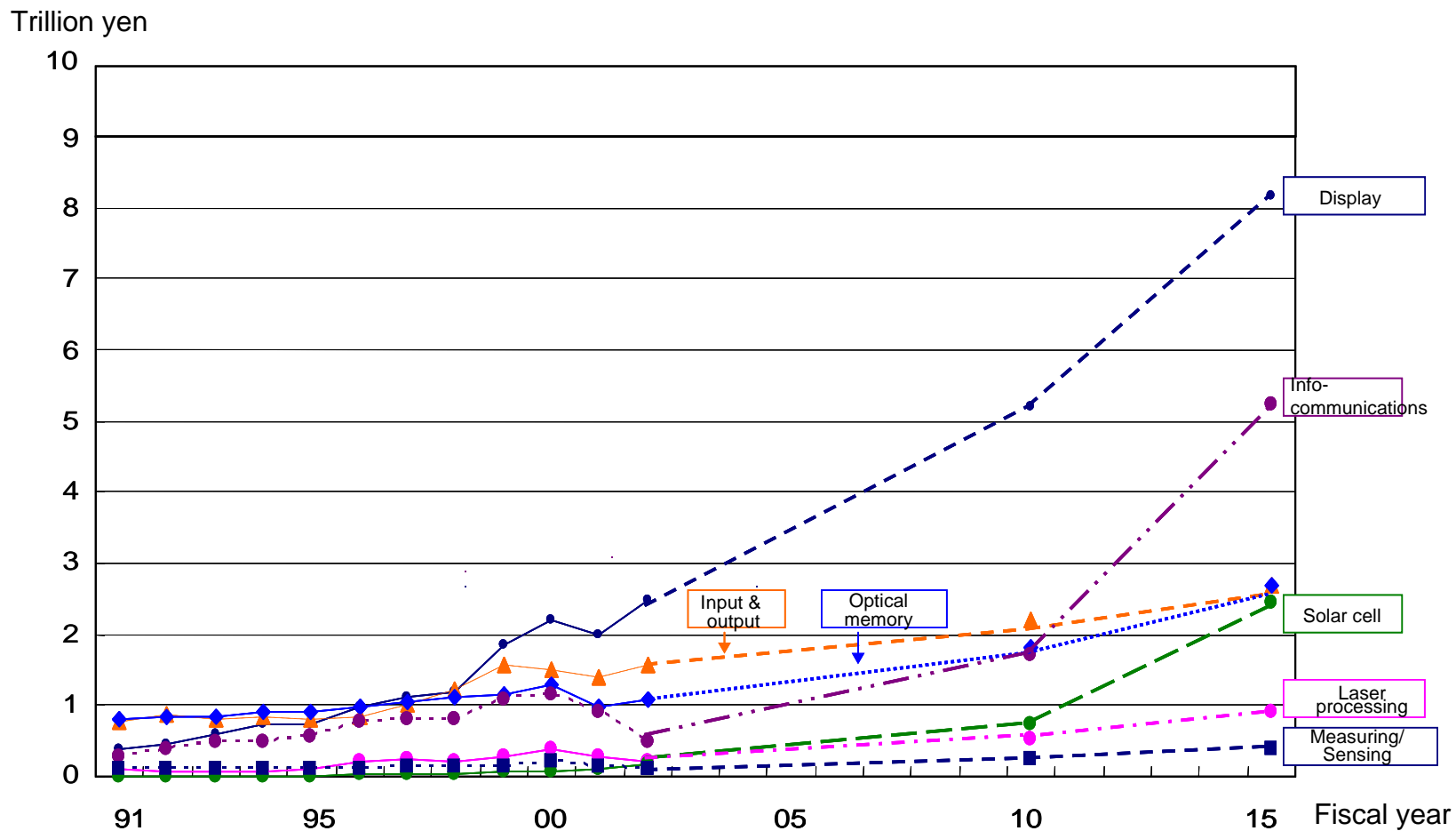
- Quantum dot, Photonic crystal, Nano optical processing/femtosecond laser processing, etc.

## 3.10 Estimates of domestic production volume in fiscal years 2010 and 2015

Fiscal year	Domestic production volume	Average growth rate per year	Remarks	
			Overseas production ratio	Japanese market
2002	6.2 trillion yen		17%	5.4 trillion yen
2010	12.7 trillion yen (Existing:10.1, New:2.6)	9.5%	25%	11.2 trillion yen
2015	23.0 trillion yen (Existing:14.7, New:8.3)	10.7%	30%	19.2 trillion yen



### 3.11 Estimating trend of domestic production volume by application fields basis



## 3.12 Mid- & long-term growth factors and prospects of the optoelectronics industry

“Optoelectronics Industry and Technology” will:

- Lead the next 50 years as an upswing economic cycle called Kondratieff Wave.
- Facilitate the revitalization of domestic production.
- Lead “the gross national cool.”
- Lower the interaction cost and change industry structure, etc.

Seventeen subjects in total were presented. They were all concerning future prospects and expectations for the optoelectronics industry such as shown above .

## 3.13 Proposing strategy for promoting the optoelectronics industry

### ◆ **Coping with an advancing borderless society**

Promoting innovation; Integrating technologies one another; International collaboration, such as facilitating acceptance of business entities and researchers/engineers from foreign countries, etc.

### ◆ **Creating market/stimulating demands**

Developing products “realizing only by optoelectronic technology”; Creating market by policy initiative; Promoting software/contents industry; Utilizing events; Procuring preferentially by central or local governments, etc.

### ◆ **Facilitating research and development**

Promoting long term national projects and supporting basic research by public; promoting to integrate optoelectronics technology and information technology; facilitating mutual partnership among industry, government and academia with a viewpoint to merge/integrate technologies; developing technology roadmap and providing information, etc.

### ◆ **Strengthening intellectual property/standardization strategy**

Strengthening intellectual property policy and promoting international collaboration to manage the policies; Founding an intermediate agency among industry, government and academia; Promoting organization standards, etc.

### ◆ **Reinforcing education and cultivating experts**

Founding internship system for graduated students majoring in science and engineering; Reinforcing the training of working people; Developing global-minded people, etc.

### ◆ **Developing and supporting start-up or small businesses**

Enhancing preferential tax treatment of research and development; Facilitating early implementation of LLC/LLP, etc.

### ◆ **Utilizing regulation policy and promoting deregulation**

Utilizing environmental regulation and security regulation, etc. as a following wind ; Promoting deregulation related to expanding borderless society, etc.