SMART SOLUTIONS TO DRIVE THE FUTURE

Optical Disc and Solar

SINGULUS TECHNOLOGIES AG

Milestones
SINGULUS TECHNOLOGIES

- 2011 New order for Selenization Oven for CIS Thin Film Solar
- 2010 Start of expanded Solar Strategy
  Major order for new Thin Film Solar Production System
  First FAT for Front End System
  Market share > 90 % in prerecorded Blu-ray Production Systems (excl. Sony)
- 2009 First shipment of SINGULAR
- 2008 Acquisition of Blu-ray business from Oerlikon
- 2007 Acquisition of STANGL
  Start in the Solar equipment market
  First revenues in Blu-ray replication lines
- 2006 Takeover of majority share in largest competitor HamaTech
- 2004 2nd Mastering acquisition
- 2001/2002 Acquisition of injection molding and 1st Mastering company
- 1997 Introduction of DVD Inline Systems
- 1996 Introduction of CD Inline Systems
- 1995 Start of SINGULUS TECHNOLOGIES

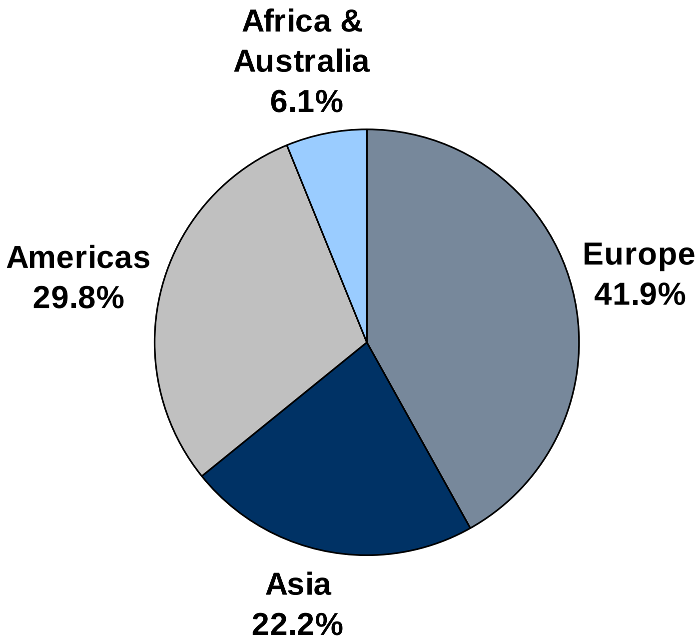
SINGULUS TECHNOLOGIES Status

Overview 2010

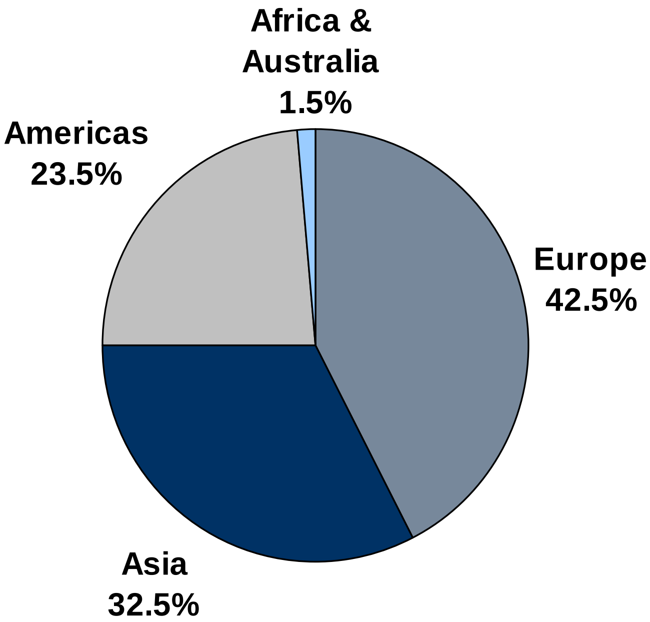
- Orders in Solar Segment delayed
- Forecast for 2010 adjusted to € 118 – 125 million
- Executive Board reevaluates balance sheet assets in October 2010 depreciation and expenses of 67.8 Mio. €
- Optical disc activities to be centralized in Kahl
- Cost base improved
- Strong growth for Blu-ray achieved
- Order intake and order backlog higher compared to 2009
- Outlook 2011 for Blu-ray favorable
- Pick-up of Solar expected for 2011

Sales Split by Region – 9 Months

Sales split by region 2010

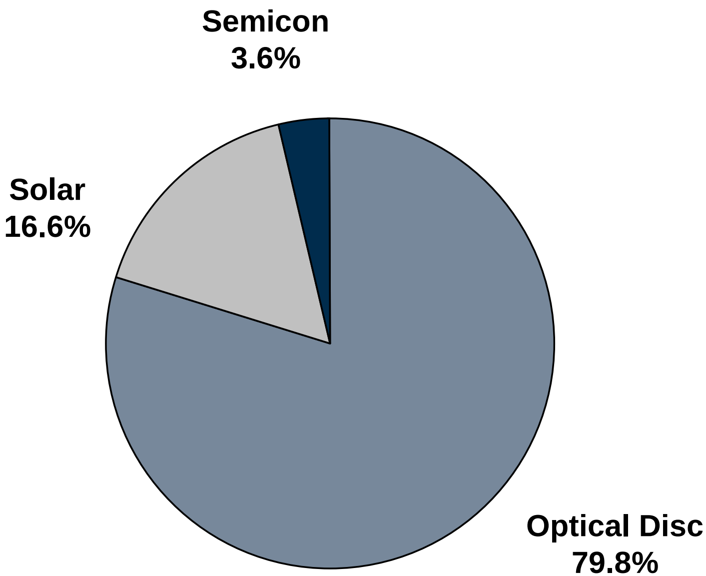


Sales split by region 2009

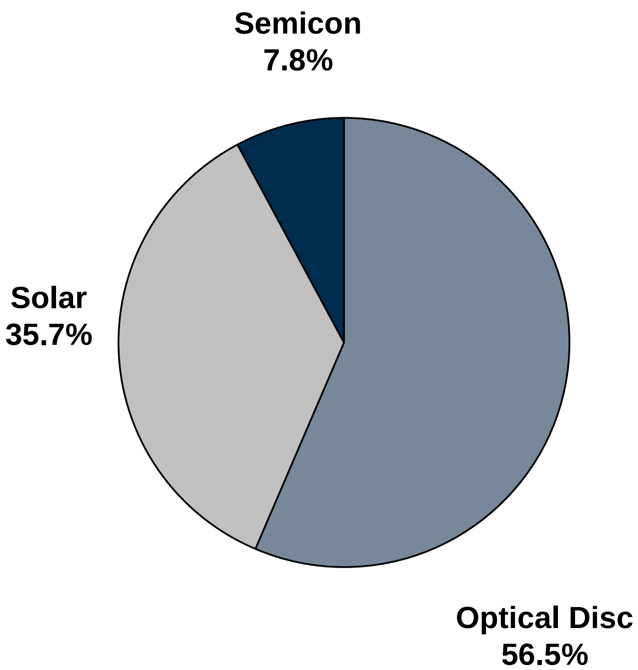


Sales Split by Products 9 Months

Sales split by products 2010



Sales split by products 2009



Employees

	Q3/2008	Q3/2009	Q3/2010
SINGULUS	500	381	324
STANGL	159	175	130
HamaTech	105	77	0
SINGULUS Group	764	633	454
Domestic	497	461	333
Abroad	267	172	121

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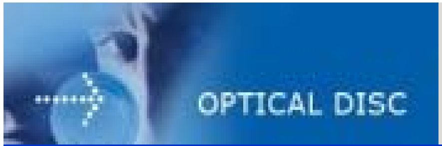
Segment Optical Disc

- Mastering
- Molding
- Replication

Segment Solar

- Wet Processing
- Coating
- Systems Business



SINGULUS Covers the Complete Value Chain

For all disc formats CD – DVD – Blu-ray

Mastering → **Molding** → **Metallizing** → **Bonding Laquering** → **Finishing**

The Total Solution

OPTICAL DISC

3D Ready: Production Systems for all Blu-ray Formats

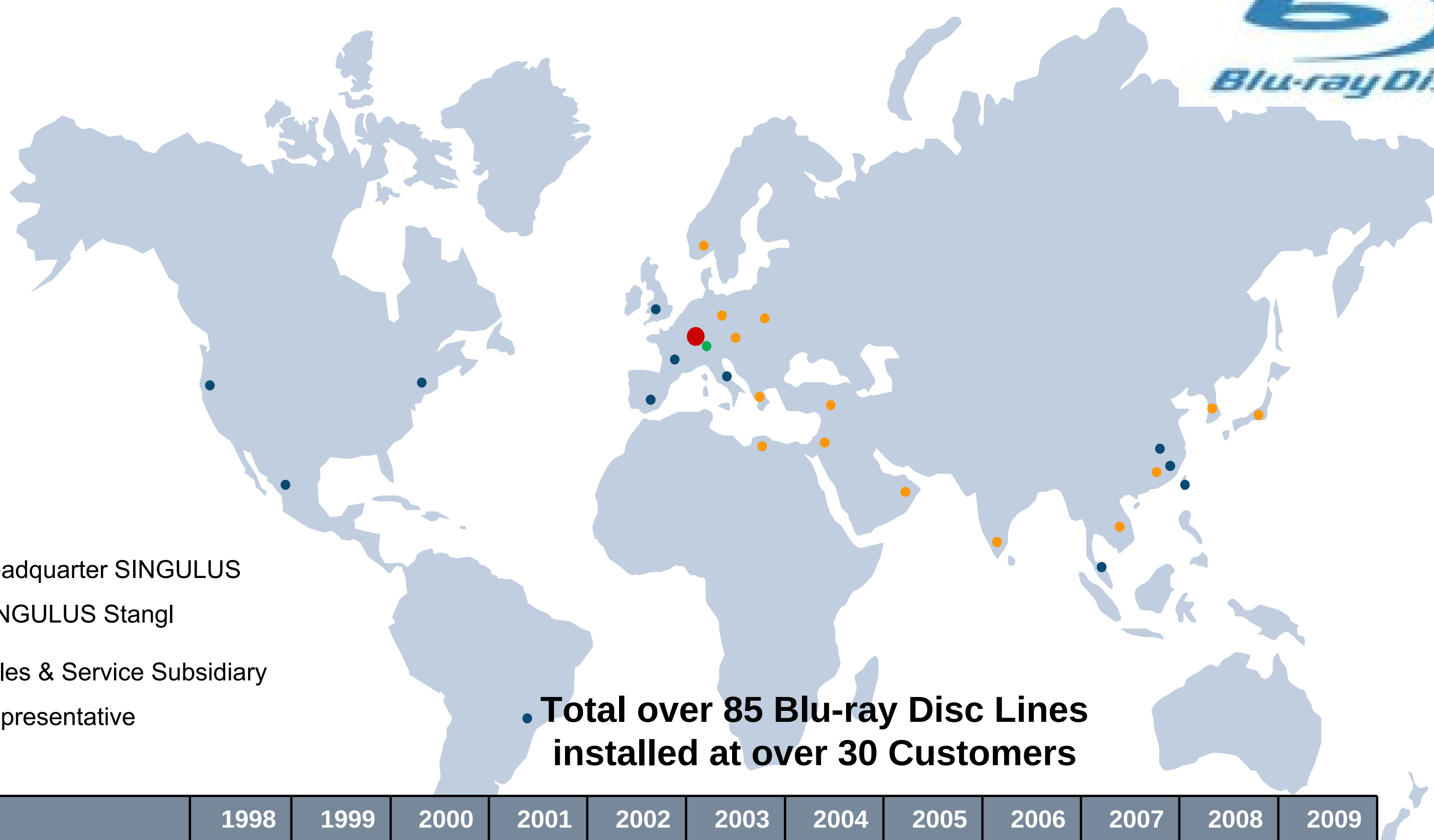
High Margin Product BLULINE II

- Best of class
- Market share 90 % (excl. Sony)
- Excellent equipment performance
- > 85 Blu-ray systems installed base
- Platform for BD 75 & BD 100

CRYSTALLINE

- Ready for Dual Layer Blu-ray
- Well-established in the market

SINGULUS Blu-ray Disc Lines Installed Base Worldwide



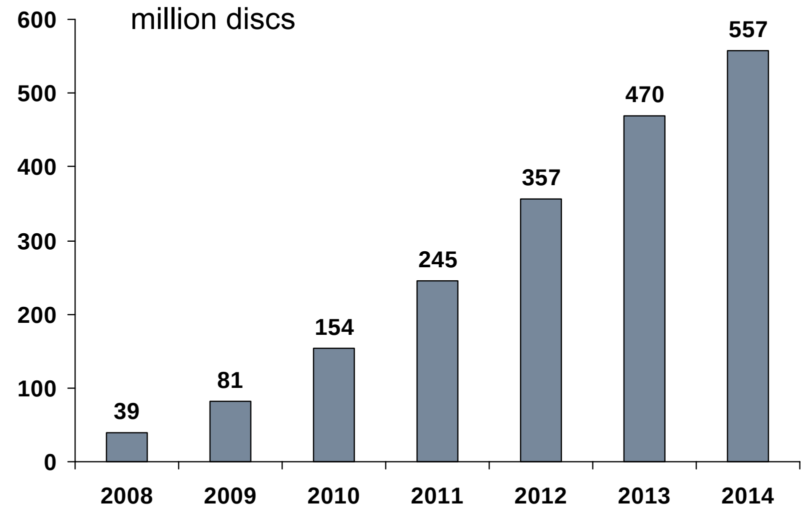
- Headquarter SINGULUS
- SINGULUS Stangl
- Sales & Service Subsidiary
- Representative

Total over 85 Blu-ray Disc Lines installed at over 30 Customers

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CD	122	234	405	221	134	310	202	82	113	80	19	12
DVD	17	26	99	79	182	183	255	149	123	113	72	17

A New Market: BD-R/BD-RE

Projected Global BD-R/RE Disc Production



Top 5 Global Blu-ray Replicators (Video & Games)

Disc Production: 2009 & 2010

2009

Sony DADC
- 266.1 million discs
- USA, Australia, Austria, China, Japan

technicolor
- 42.7 million discs
- Mexico, Poland, Australia

Cinram
- 30.6 million discs
- USA, Germany

arvato digital services
- 7.6 million discs
- USA, Germany

Panasonic
- 4.5 million discs
- USA, Japan

2010

Sony DADC
- 379.3 million discs
- USA, Australia, Austria, China, Japan

technicolor
- 73.6 million discs
- Mexico, Poland, Australia

Cinram
- 44.0 million discs
- USA, Germany

arvato digital services
- 17.6 million discs
- USA, Germany

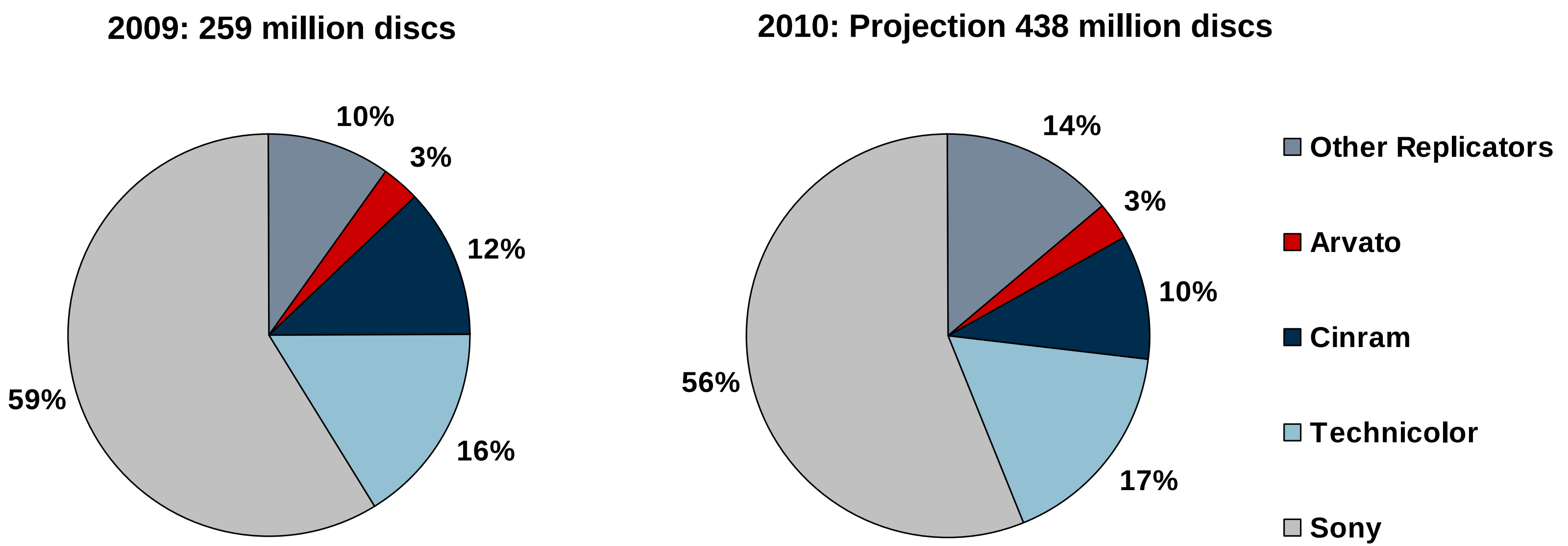
QOL
- 7.5 million discs
- France

Source: 2010 Futuresource Consulting Ltd

OPTICAL DISC

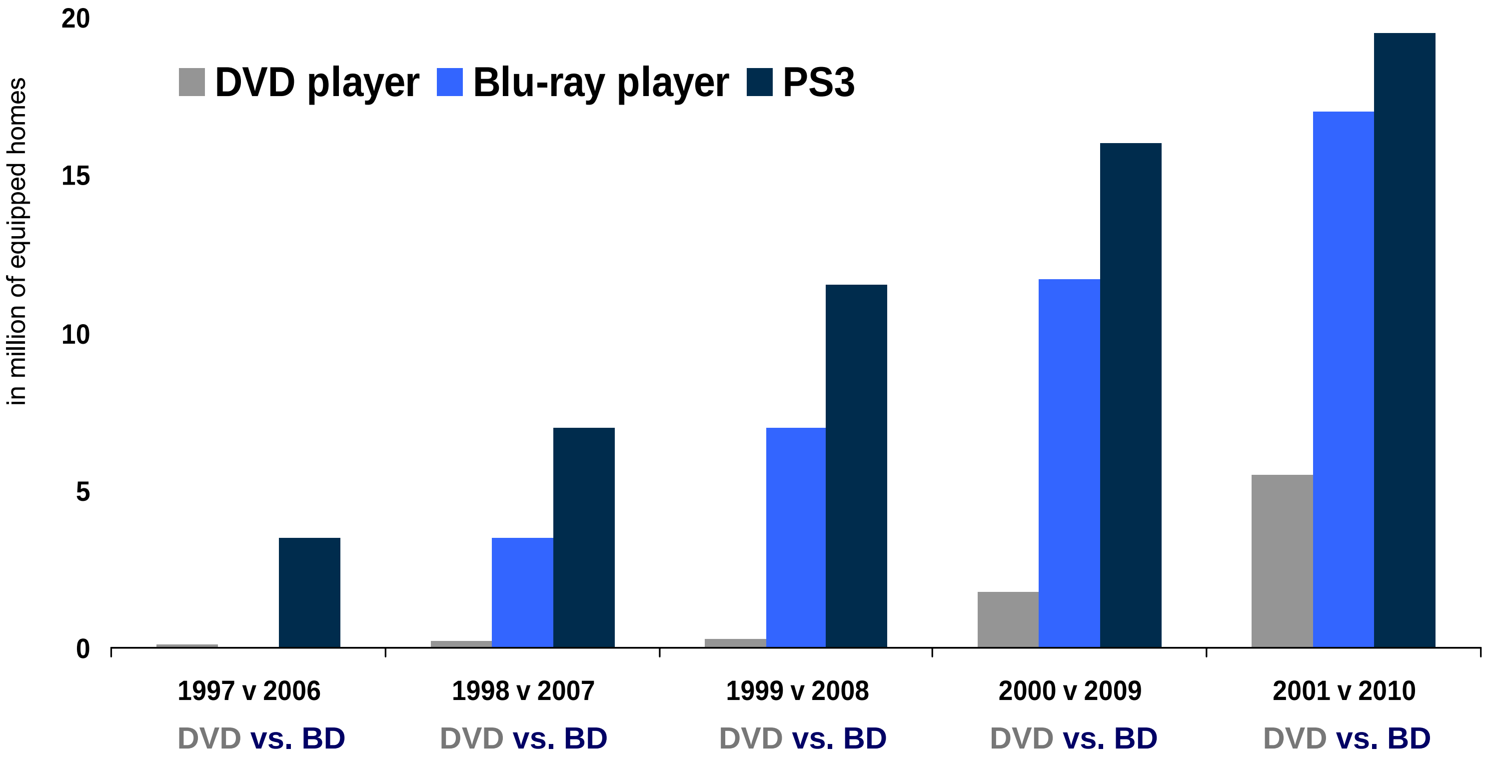
Tier 1 Replicator Blu-ray Video Market Share Evolution

Worldwide Blu-ray Video Production



Speed of 5 years for DVD vs. BD Players in Europe

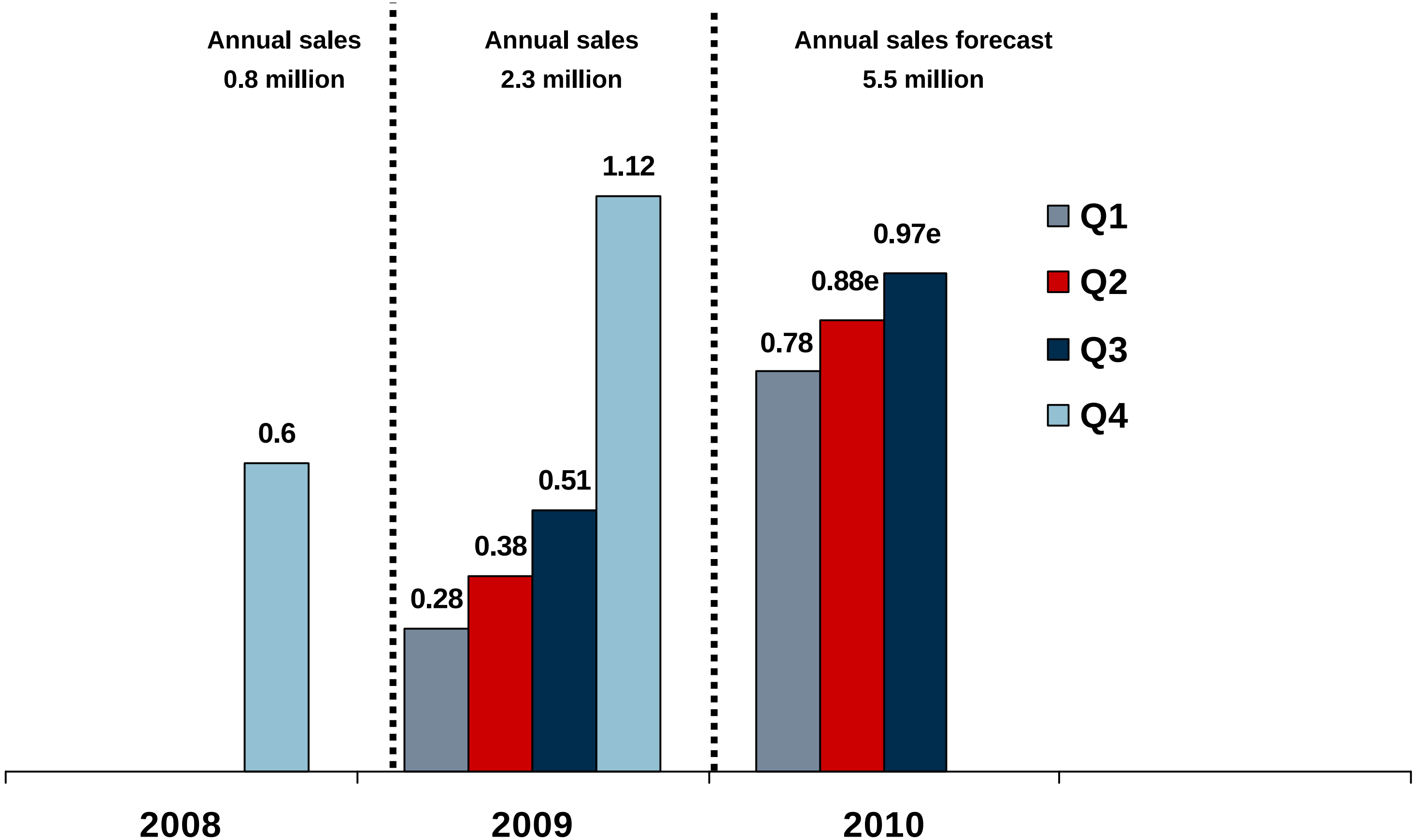
Market penetration of Blu-ray playing devices much higher compared to DVD



Source: Replix Magazine, March/April 2010, Screen Digest

European Blu-ray Player Sales Building Up

Annual sales* (million)

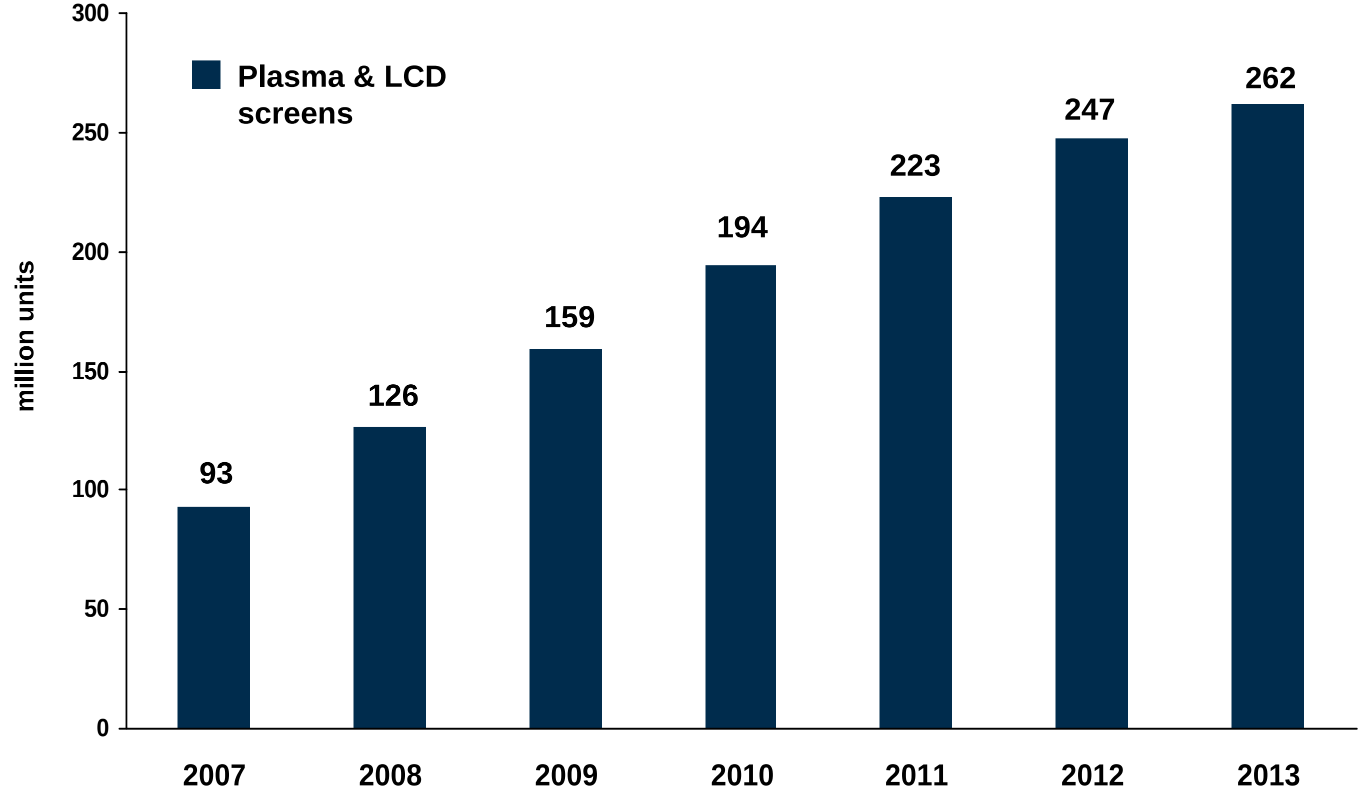


* Data relates to top 16 European markets.

Source: 2010 Futuresource Consulting Ltd

OPTICAL DISC

Flat Panel TV Market Development: Annual Shipments Global



Source: Futuresource Consulting, Dec. 2009

SINGULUS

About 1600 Blu-ray Releases in 2010, more than 3000 in total

Source: http://www.bluray-disc.de/

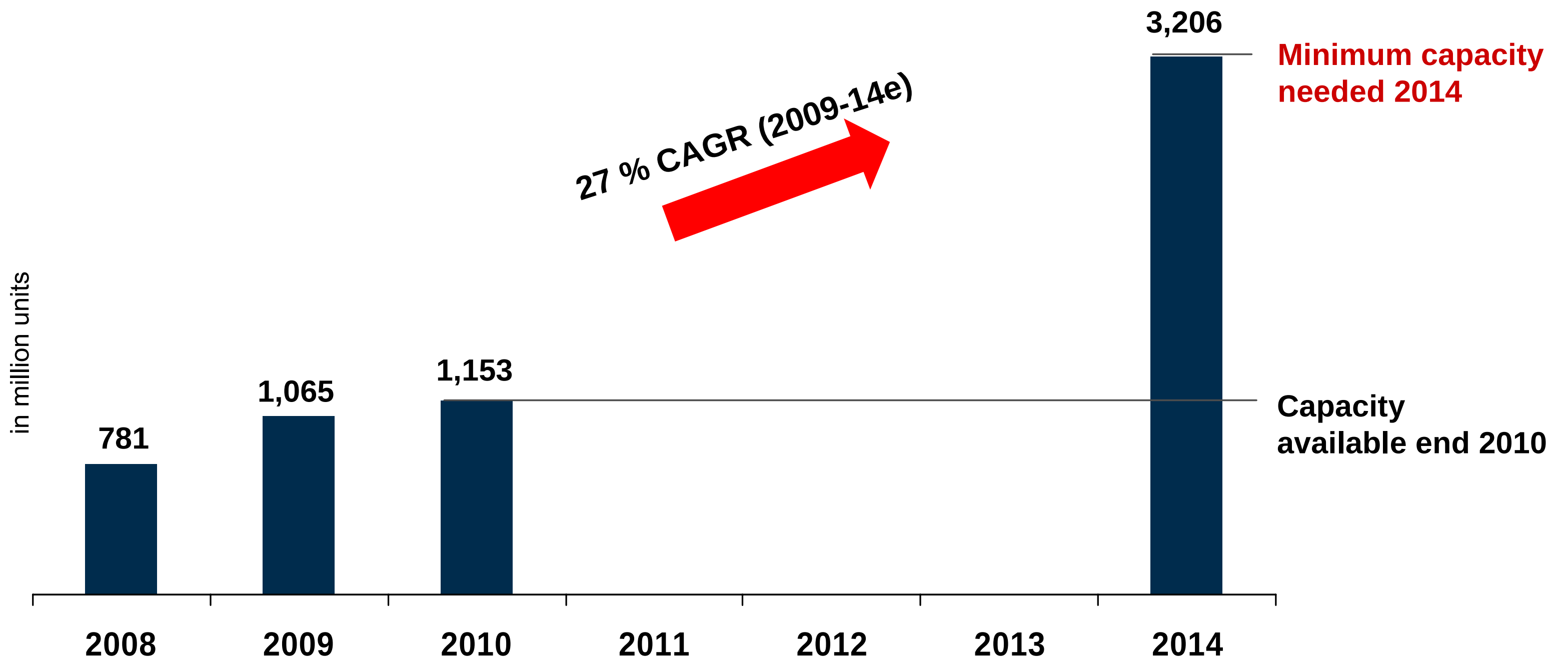
High Resolution 3D Movies

3D Movies are the killer application for Blu-ray

http://www.bluray-3d.de

Minimum Future Prerecorded Blu-ray Pressing Capacity Worldwide

Significant Growth potential is forecasted for the foreseeable future



Source: Futuresource Consulting, April 2010

Blu-ray will be the Future Format in Home Entertainment

Unstoppable Momentum

- + 80 % in Blu-ray disc sales in USA
  9 months 2010, (DEG)
- + 104 % BD players sales in USA
  9 months 2010, (DEG)
- 62 million 3D TVs expected in 2011
  ABI Research, USA
- + 67 % in Blu-ray disc sales in Europe
  3. Quarter GFK International
- Packaged Media remain the major revenue generator for Studios
  Futuresource Consulting 2010

Innovation via Blu-ray

- 3D Movies will boost the Blu-ray market
- Packaged media DVD & Blu-ray generate revenues for Hollywood studios of more than 50 % of total revenues

Source: Blu-Ray Association / SINGULUS/ FutureSource

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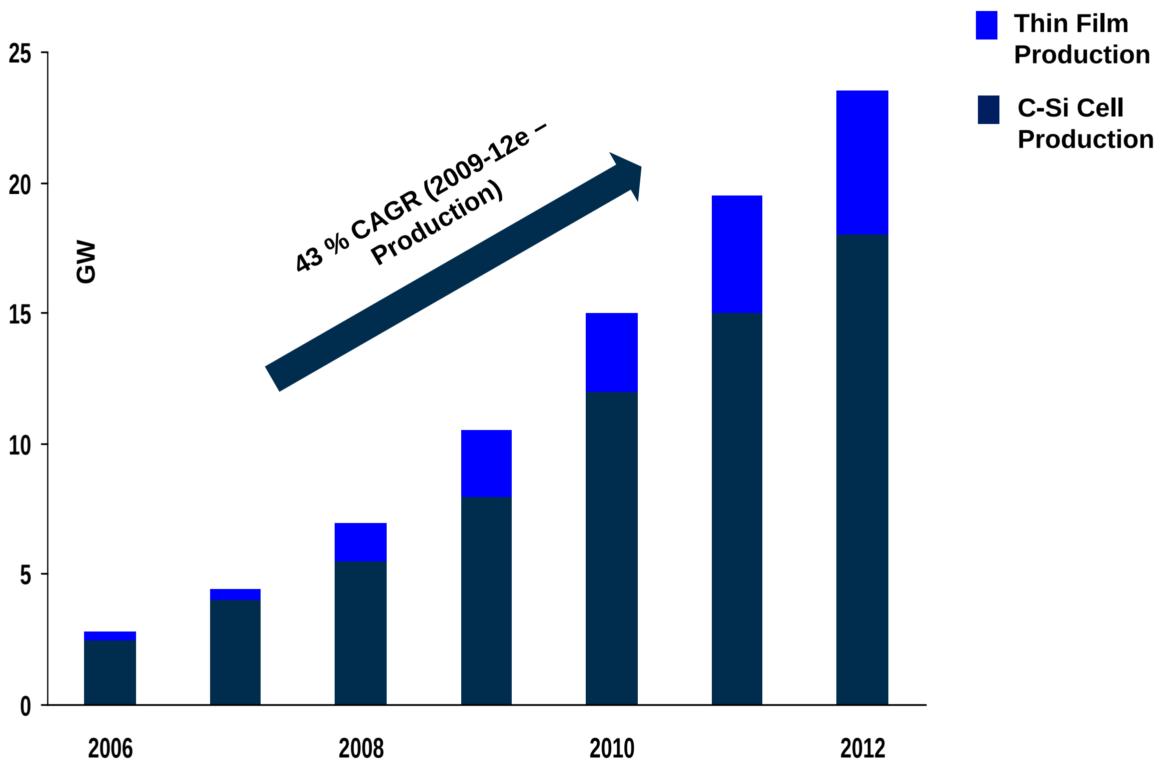
Segment Optical Disc

- Mastering
- Molding
- Replication

Segment Solar

- Wet Processing
- Coating
- Systems Business

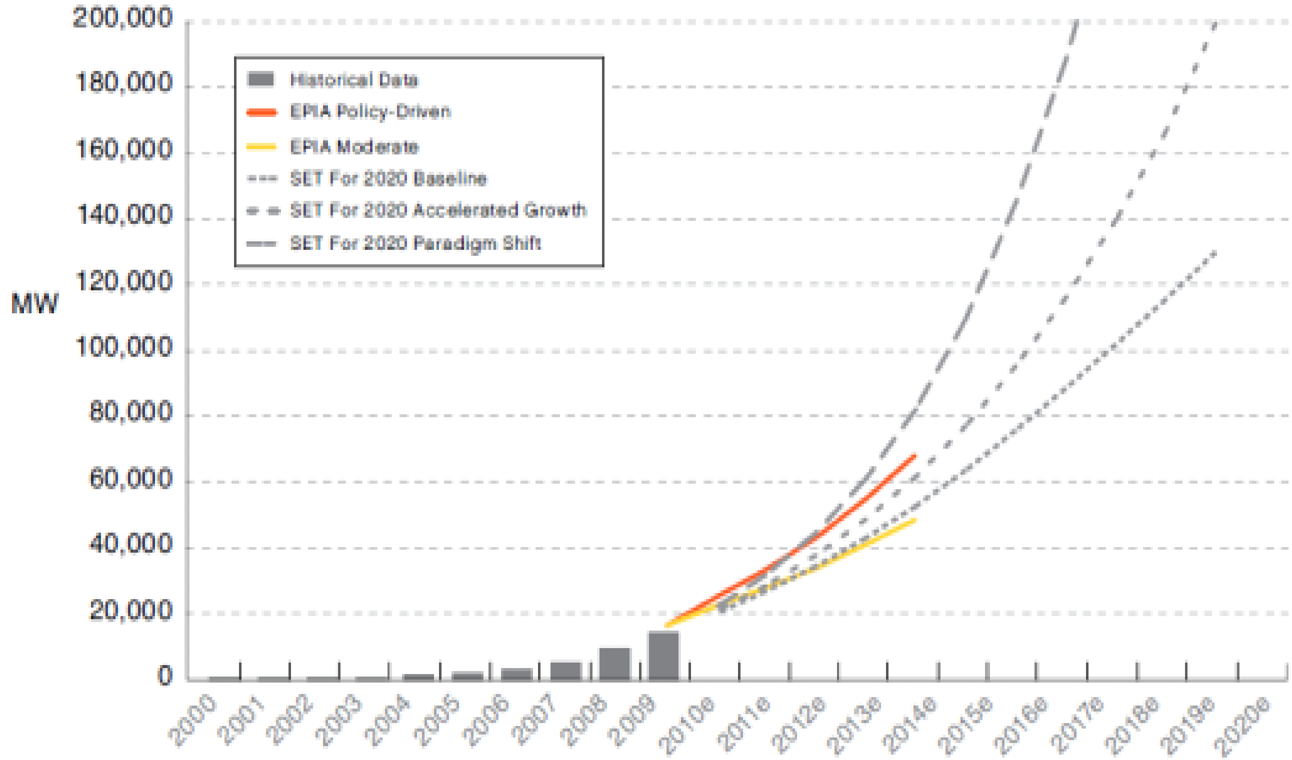
Cell Production Capacity



Source: Bank Sarasin, December 2009

2012-2014 Forecasts and the „SET For 2020“ Targets in EU

Paradigm Shift: Targets up to 12% of the EU electricity consumption from PV by 2020



Source: EPIA, Global Market Outlook for Photovoltaics until 2014, May 2010

Solar – Successful Market Entry & Development

2011
- Orders for SINGULAR machines
- Integrated PV production systems
- More orders for inline diffusion furnace
- Stronger thin film market
- Active R & D for new cell design
- Stronger development of the asian sales network

2010
- 1st Order for inline diffusion furnaces
- FAT for 1st front end system
- Complete solutions with partners

- Cooperation with HZB for ILGAR
- Large Order for flexible CIGS solar cells
- Shipment of 1st SINGULAR

2007
- Takeover of Stangl
- Start of SINGULAR development
- Inline Wet Processing for SI cells

2007 — 2010 — 2011

Roadmap for c-Si Equipment

SOLAR

Today

- Machine in production
- Standard processes developed
- High-efficiency processes in development
- Co operations with several interested institutes and lead customers for new cell concepts in progress
- New orders acquired and further expected
- Sales activities in Asia enhanced

- Systems in production in front-end line integrated

- Integrated c-Si production systems and corresponding standard processes defined
- Marketing of systems has started

Tomorrow

- Application of high efficiency cell processes on existing equipment
- Introduction of new equipment for advanced cell concepts
- Integration of high efficiency processes into system business

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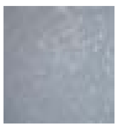
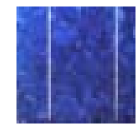
Integrated System Business for Crystalline Solar

Silicon production → Ingots/ wafers → **Cells/ modules** → System integration → Distribution/ installation



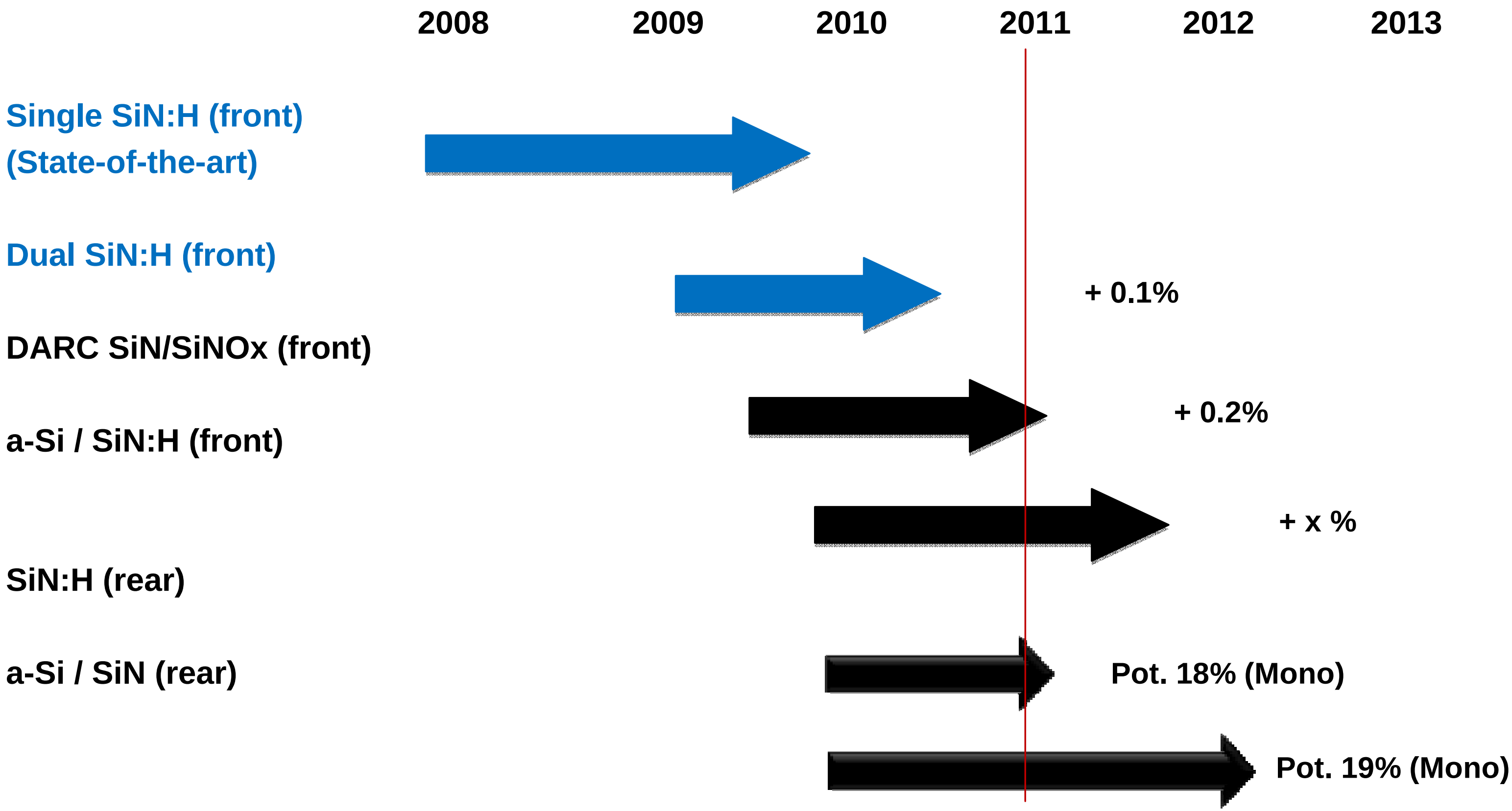
Etching → **Texturing** → **Doping** → **PSG Removal + Edge Isolation** → **AR Coating + Passivation** → **Metallizing** → Edge Isolation → Firing → Test + Sort



SOLARE System for Inline Production of Si Solar Cells with LINEA
and two SINGULAR & a back-end with double capacity offering approx. 60 MW

2 x LINEA / 1 SINGULAR / 5 x Handling – c-Si Front-End System

Development of Passivation Layers (SINGULAR)



All processes in SINGULAR realized
no additional process step

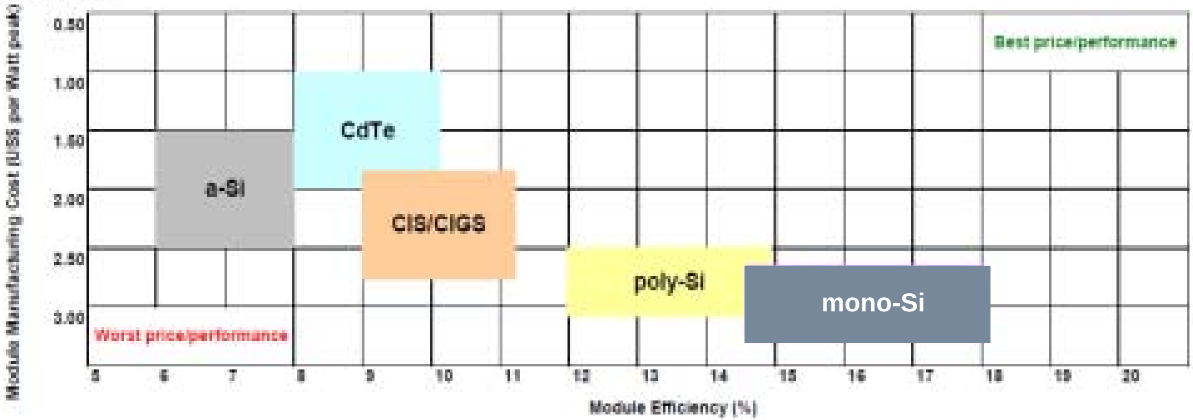
Further Strategy
Crystalline Solar

Intensified marketing & further product development

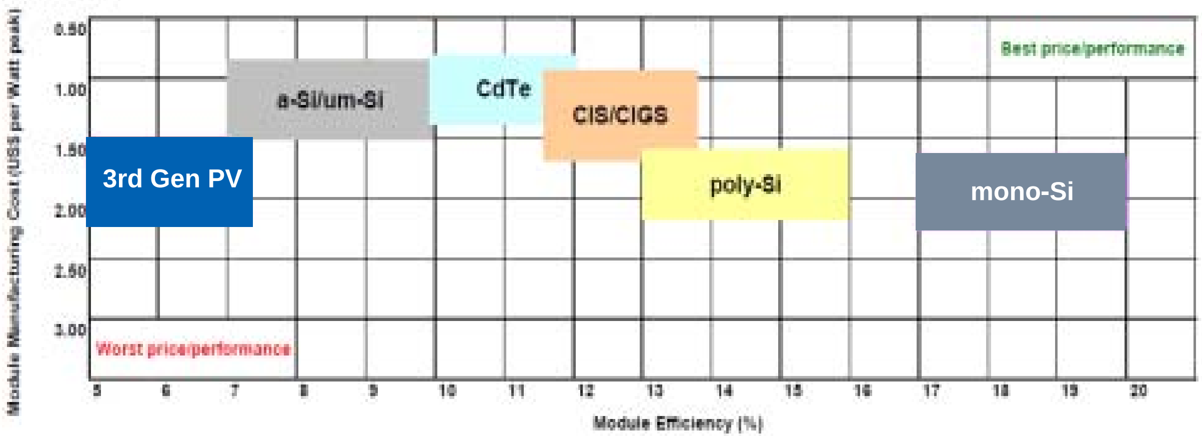
- Transfer of „Optical Disc“ inline concept to PV production
- Get more orders for front end and complete production systems
- Stepped up marketing and sales activities for the SINGULAR
- Set up of manufacturing site in China for wet processing systems
- Active participation in new cell design
- Integrator of PV production technology

SINGULUS Thin Film
- Focus on CIS/CIGS

PV Products in 2008

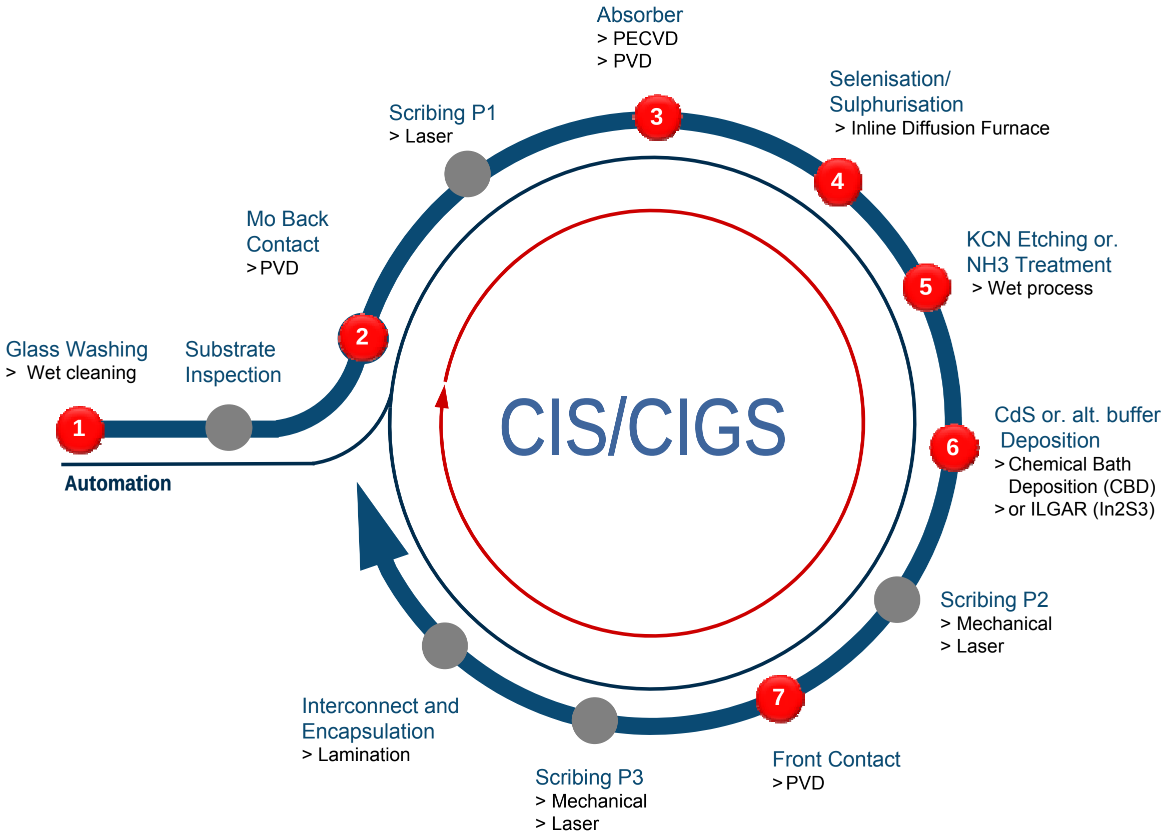


PV Products in 2013

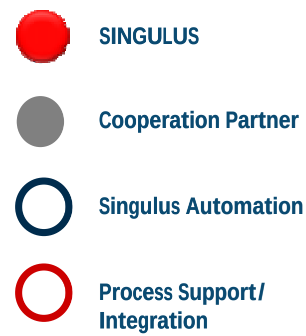


Source: Envision – Solar energy solutions report 2008

Thin Film - CIS/CIGS Manufacturing Process



Singulus Product Portfolio	
1	VITRUM Clean
2	PVD Back Contact
3	PVD Absorber
4	INSE
5	VITRUM KCN
6	TENUIS altn. ILGAR or IMPEDIO
7	PVD TCO



SINGULUS Product Portfolio
Thin Film Applications

Wet Process Applications / Cleaning / Washing / Etching Coating

<u>CIS/CIGS/CIGSSe</u>

TENUIS

Single Side

CdS/ZnS Buffer Layer

Glass Substrates

up to 1600x1200 mm

Inline

<u>CIS/CIGS/CIGSSe</u>

IMPEDIO

Single Side

CdS/ZnS Buffer Layer

Flexible Substrates

up to 1000 mm width

Inline

<u>CIS/CIGS/CdTe/a-Si</u>

VITRUM

Cleaning/Etching

(e.g. TCO/KCN/NH3)

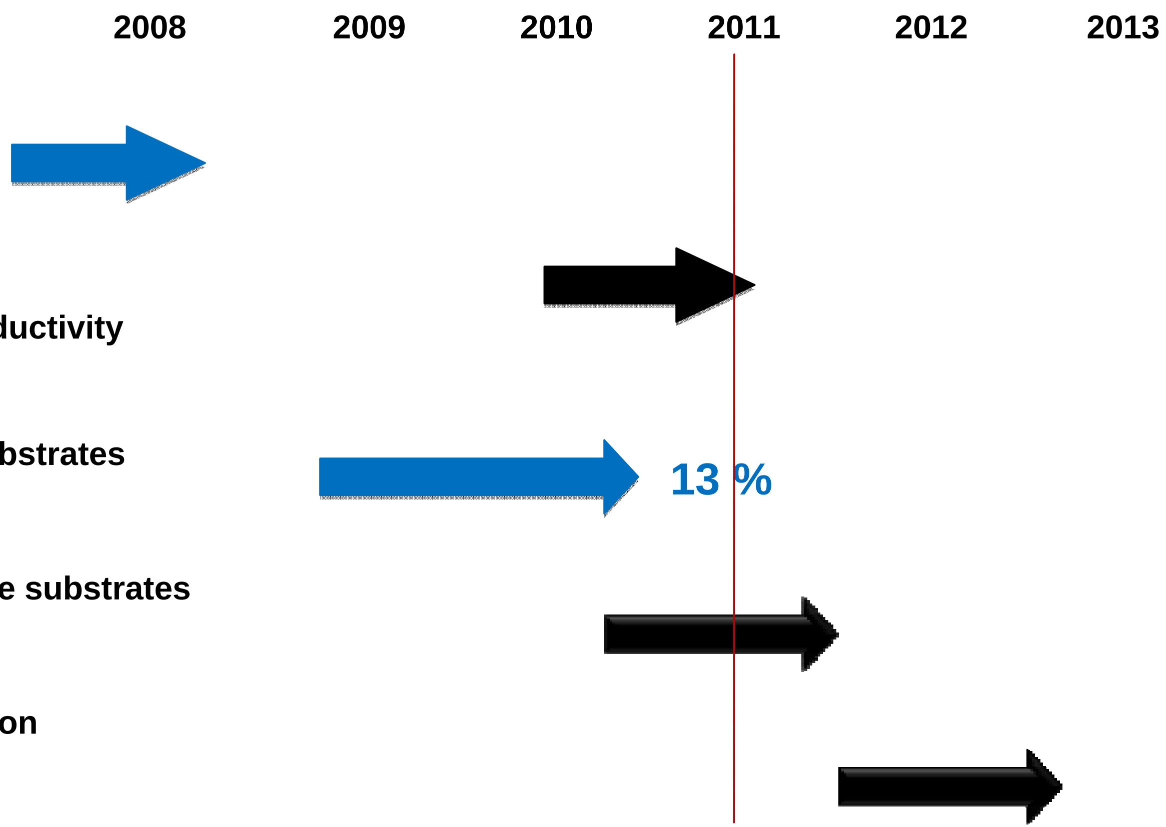
Glass Substrates

up to 2600x2200 mm

Inline

2nd Generation for Inline Diffusion Furnace Optimized Cycle Time

Development of Buffer Layer Deposition



TENUIS
- CBD - CdS

TENUIS
- CBD Cd-free
- increased productivity

ILGAR
- 30 x 30 cm² substrates

ILGAR
- production size substrates

ILGAR
- mass production

Further Strategy Thin Film Solar

Innovative products

- Become standard equipment supplier for thin film solar module production
- Business expansion with inline diffusion furnaces
- Focus on highest cell efficiency in CIS/CIGS production
- Cadmium and zinc sulfid buffer layer with TENUIS
- Introduction alternative Cd-free buffer layer – ILGAR

Back to Profitable Business in 2011

Optical Disc

- Only global one-stop supplier and No. 1 for Blu-ray equipment
- Strong growth for Blu-ray in the next years
- Profitable products with good margins
- Strong growth for Blu-ray machines in 2010 achieved
- Production know how for the coming market of rewritable/recordable Blu-ray (BD-RE/BD-R)

Solar

- Projects for complete systems in negotiations
- Well positioned in attractive, sharply growing solar market
- SINGULUS AR coating technology establishing itself
- Setup of improved sales network in Asia
- Solar segment expected to break-even in 2011

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