



Characteristics of the liquid crystals market

Information Day 2013 – A Deep Dive into the LC&OLED Business

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Agenda

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Basics of liquid crystals and the display industry

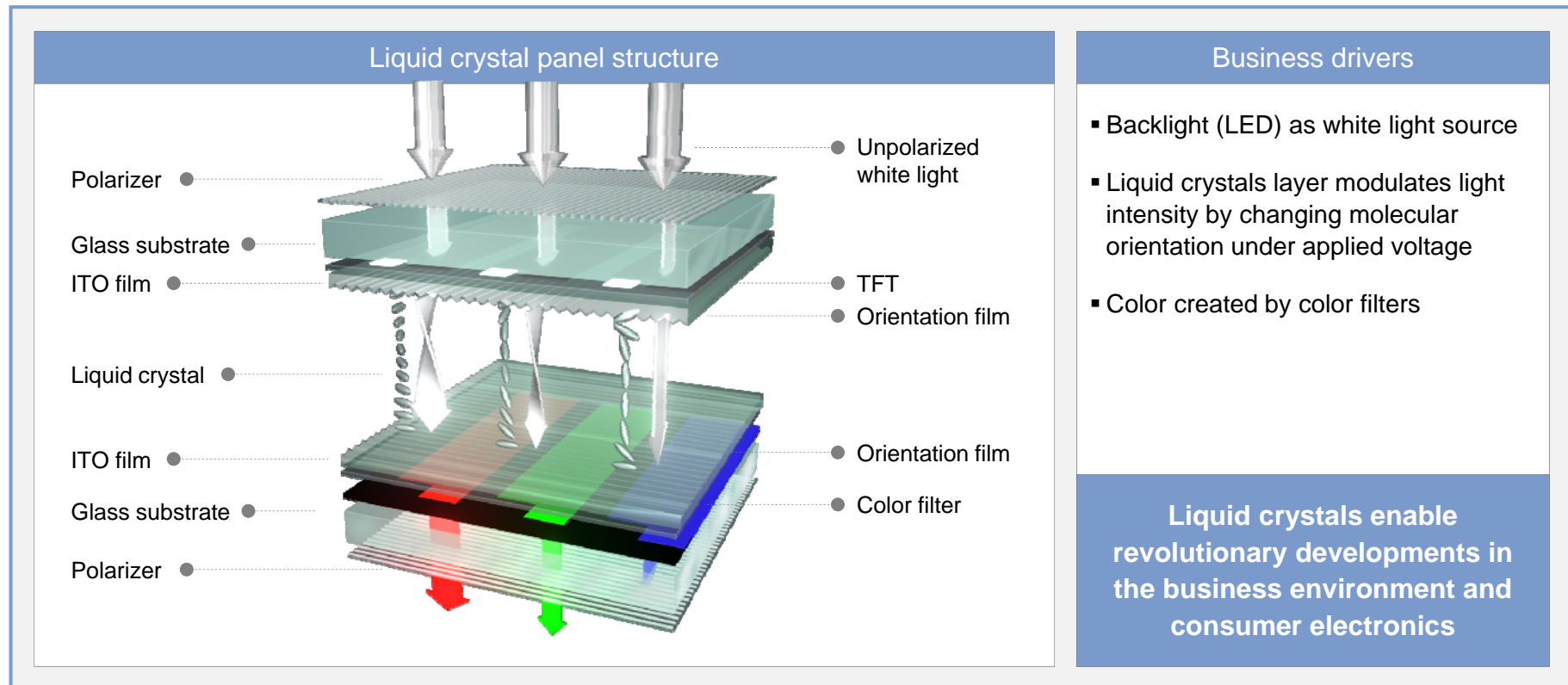
Market, customers and competitors

Key products

Supply chain

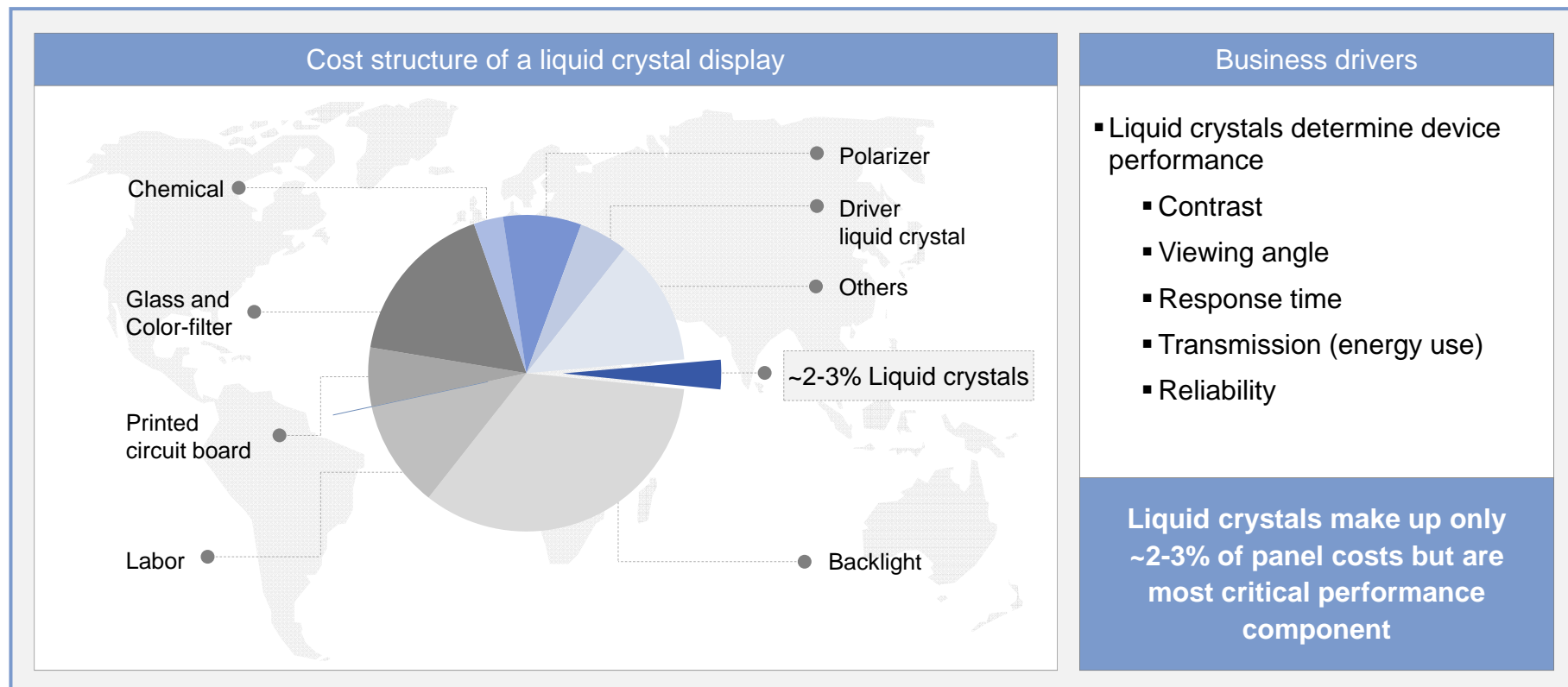
Conclusion

Basic setup of a liquid crystal display



Acronyms: TFT = Thin-Film Transistor; ITO = Indium Tin Oxide; LED = Light-Emitting Diode

Liquid crystals: The decisive element of a display but with low share of module cost



Source: DS Cost Report Q4 2012 (40" FHD 120Hz TV Module)

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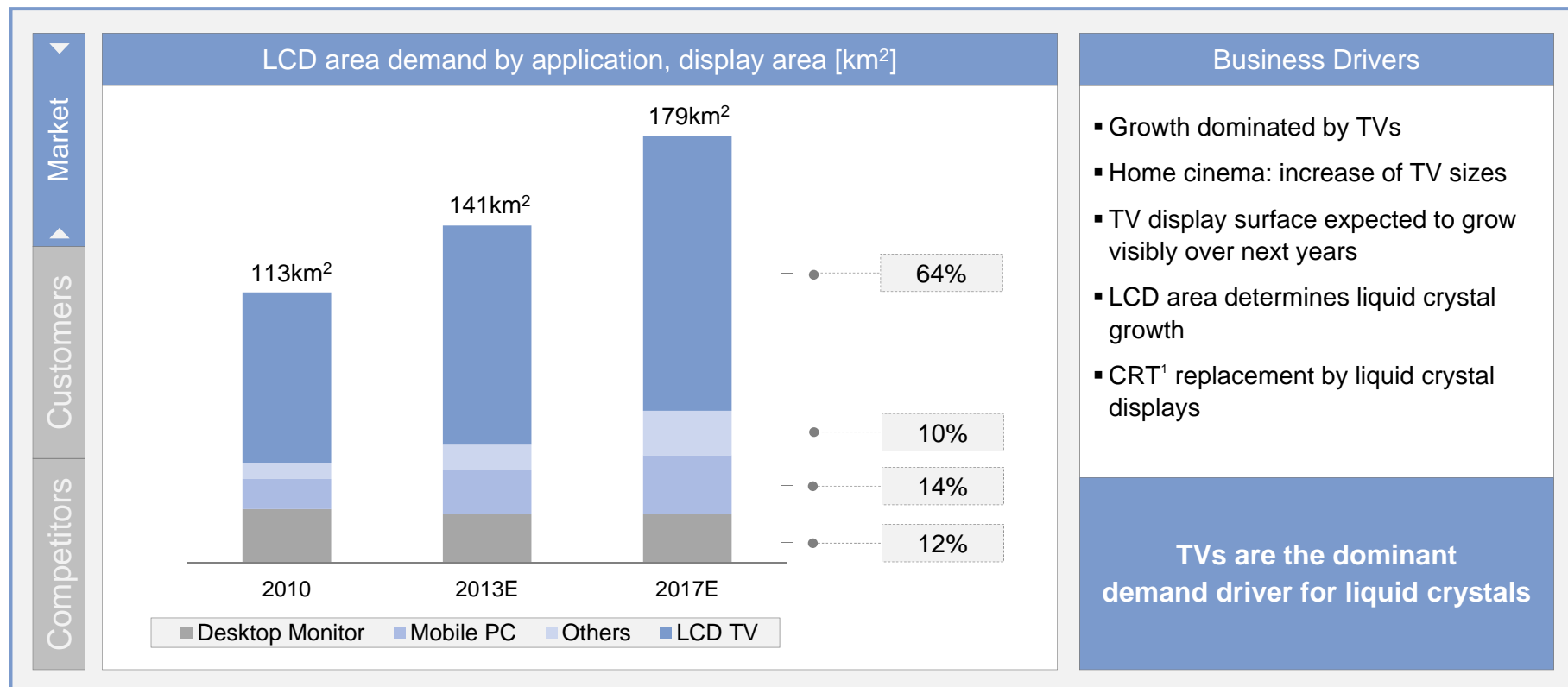
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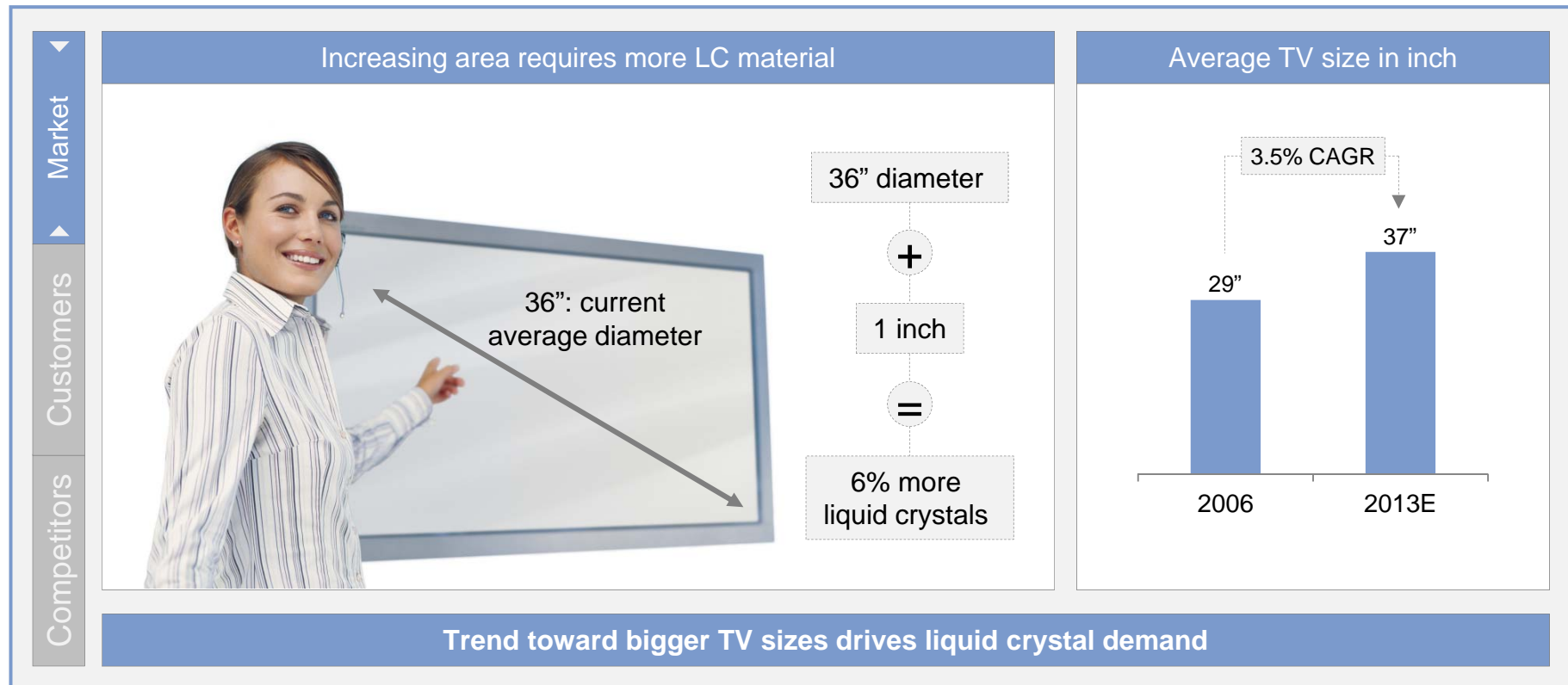
TV displays dominate the liquid crystals market and are its most prominent growth driver



Source: DisplaySearch Q1'13; ¹ Cathode ray tube; Others include: mobile phones, public displays, car navigation and others

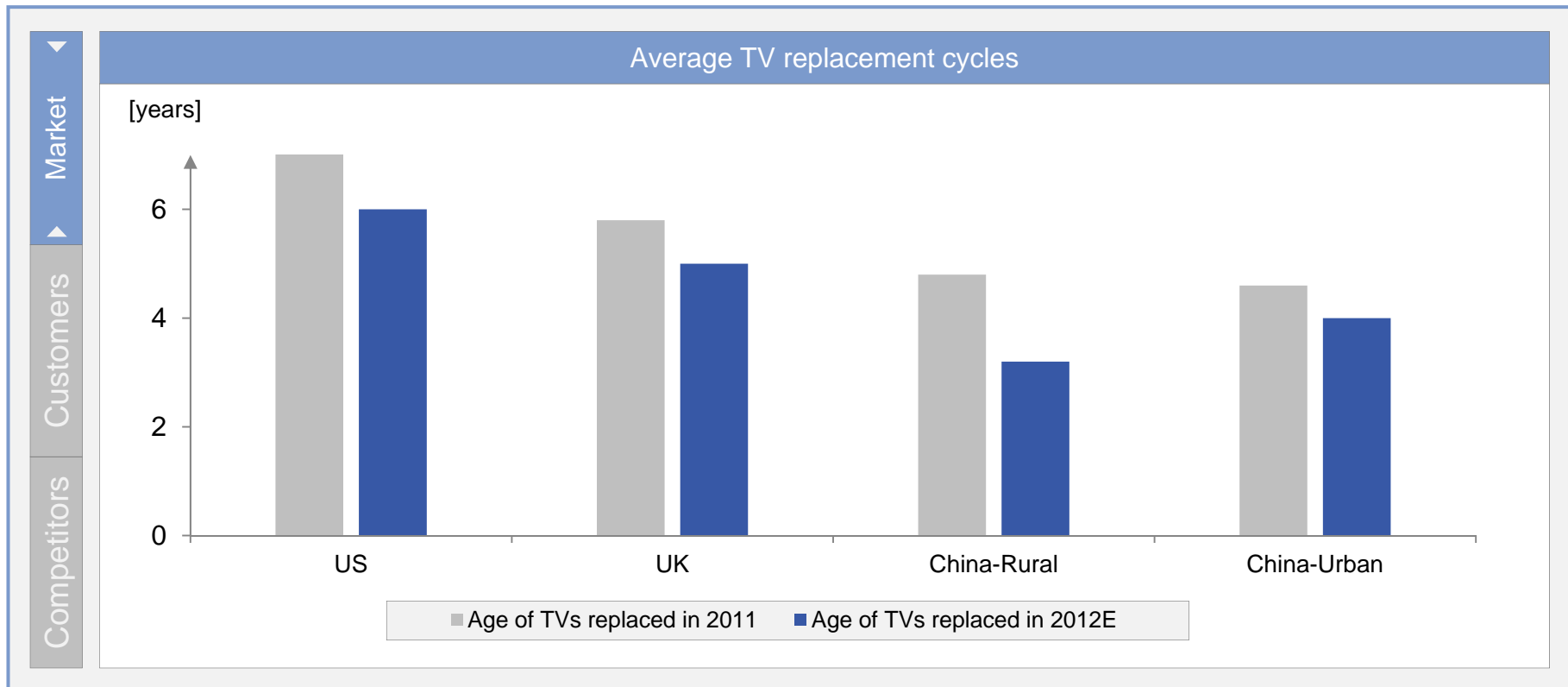
TV size increase leads to overproportionate demand increase for liquid crystals

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TV replacement cycles are getting shorter, driving liquid crystals demand

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Source: DisplaySearch 2012

The liquid crystal market is attractive despite its potential volatility



Our customers: All have strong capabilities in liquid crystal displays

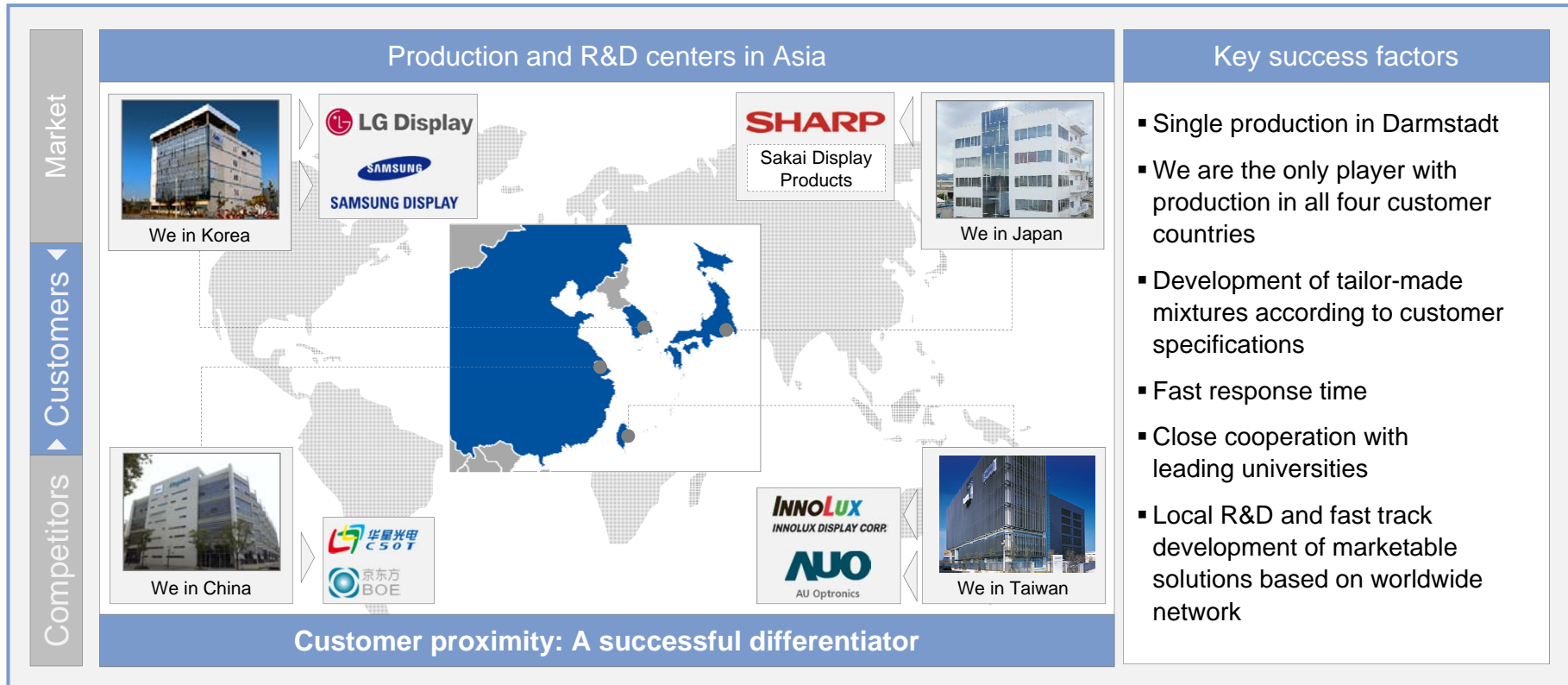
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	“Panel makers”	Small- / medium-size panels	Large size panels	Focus		LCD panel market entry
				Local	Global	
Market Customers Competitors	 INNOLUX INNOLUX DISPLAY CORP.	✓	✓		✓	✓ 1999
	 AUO AU Optronics	✓	✓		✓	✓ 1995
	 SAMSUNG SAMSUNG DISPLAY	✓	✓		✓	✓ 1995
	 LG Display	✓	✓		✓	✓ 1996
	 京东方 BOE	✓	✓	✓		✓ 2005
	 华星光电 C50T		✓	✓		✓ 2011
	 SHARP	✓	✓		✓	✓ 1995
	 Sakai Display Products		✓		✓	✓ 2009
All customers are based in Asia						

Source: Merck KGaA, Darmstadt, Germany research

We are the only player with complete geographic customer coverage

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We are THE innovation leader with broadest competitive platform

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The Group and competitors													
	Technologies					Market		R&D center				Conglomerate advantage	
	TN	IPS	VA	PS-VA	New techs	Position	Share	China	Korea	Taiwan	Japan		
Market													
Customers	<div>Merck KGaA Darmstadt · Germany</div>						No.1	~ 60%					
Competitors	<div>JNC</div>						No.2	~ 30%					
	<div>DIC</div>	some activity	some activity			No.3	~ 10%						
We are leading in all aspects of liquid crystals													

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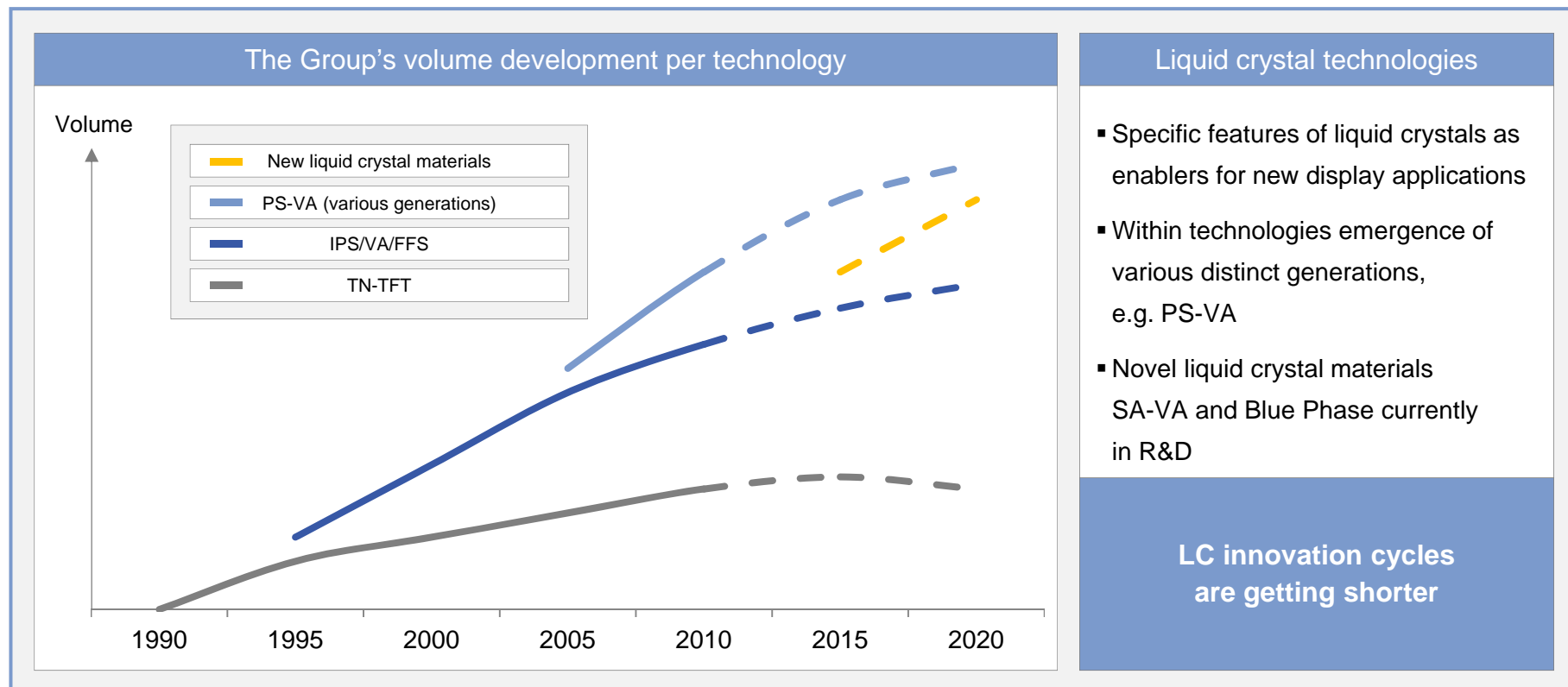
Market, customers and competitors

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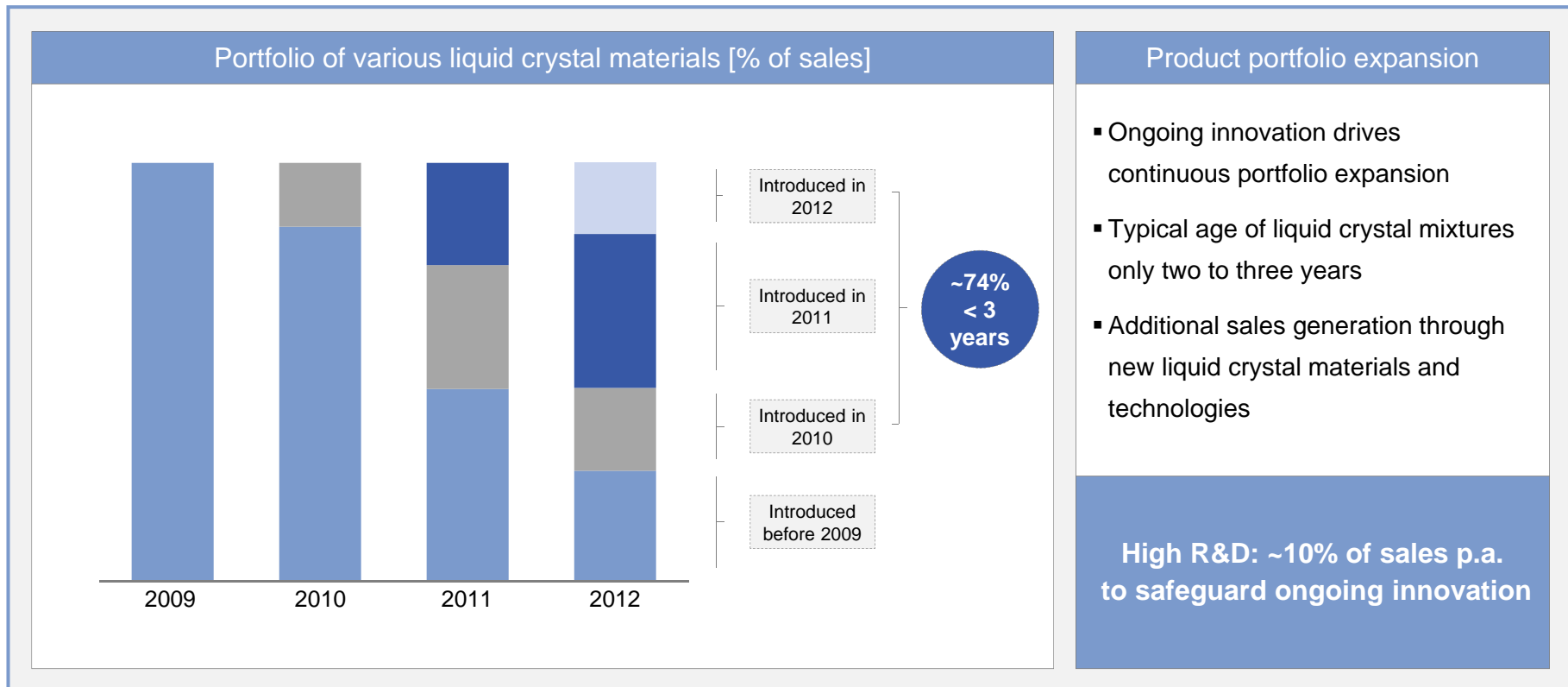
Continued delivery of new innovations generating additional sales



Illustration

Strong R&D investment fosters innovation stream and product portfolio

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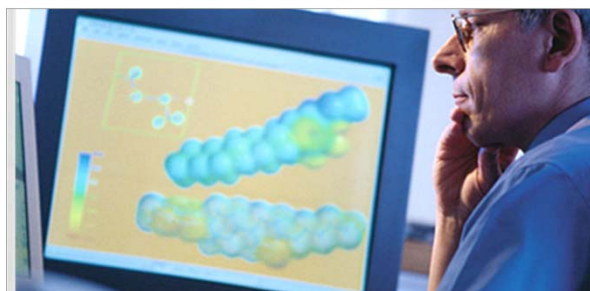


Our deep know-how creates high entry barriers for potential competitors

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New classes of liquid crystals enable revolutionary display and performance

Our liquid crystal single material



- Tons of raw materials used in multistep chemical syntheses to produce > 300 singles
- Ultra pure organic chemistry
- High quality standard of single substance

Translate
chemistry into
physics

Customized liquid crystal mixtures



- Leveraging our expertise in mixture recipes
- Approximately 10,000 mixtures per year
- We design the exact liquid crystal that our customers need

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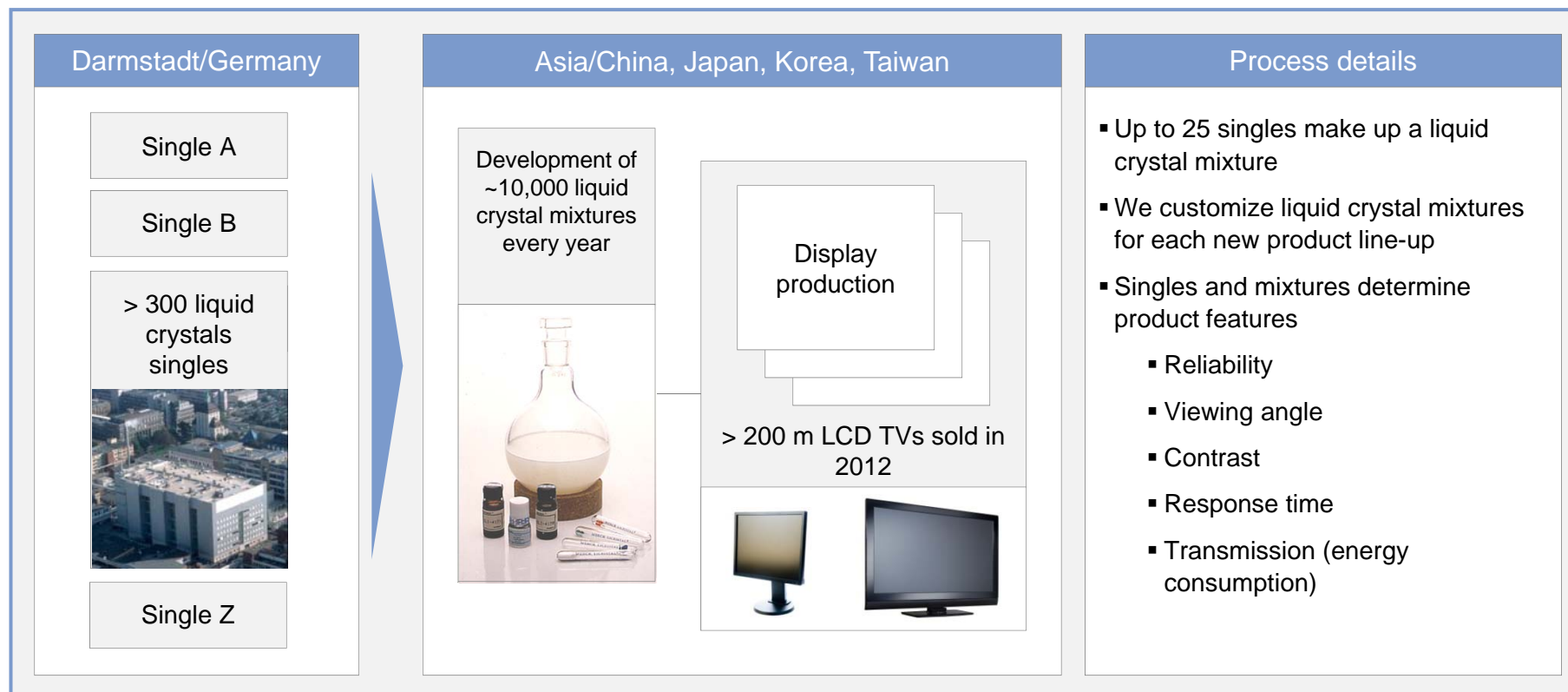
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Special expertise in single and mixture development crucial for market success

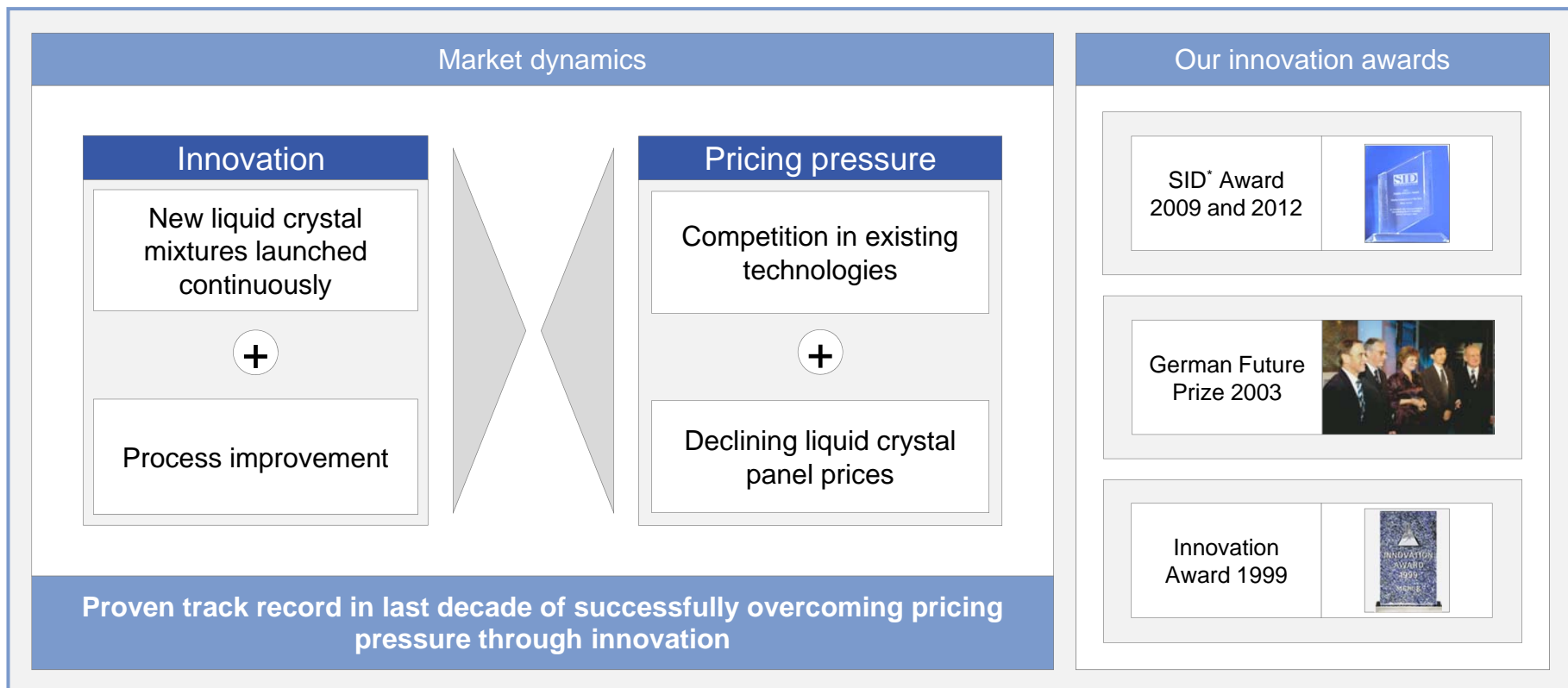
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State-of-the-art multi-purpose production facilities with world's largest factory for liquid crystals

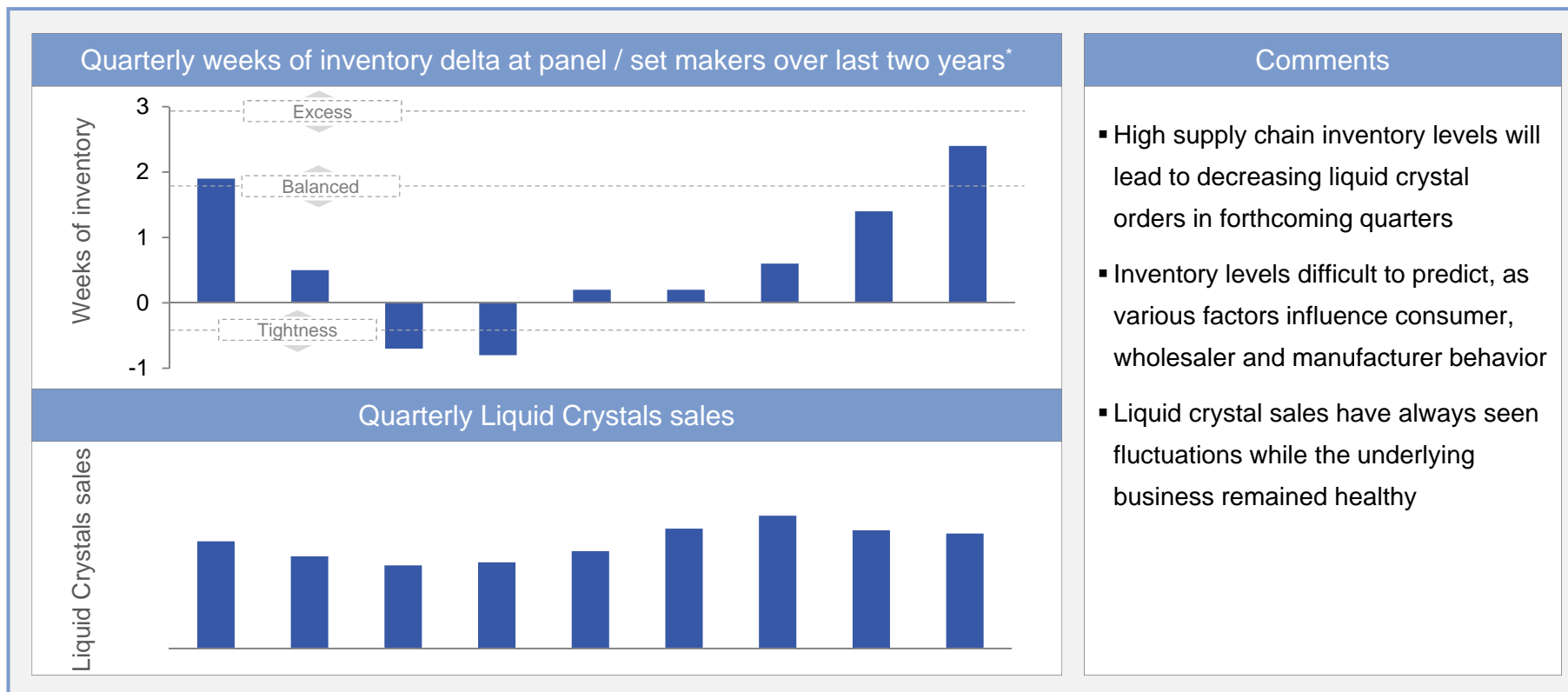


Innovation as key driver for profitability



*SID: Society for Information Display

Long-term panel demand increases while hard to predict inventories cause sales fluctuations



*Source: GfK; April 2013

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We have the most competitive platform in a dynamic liquid crystals market

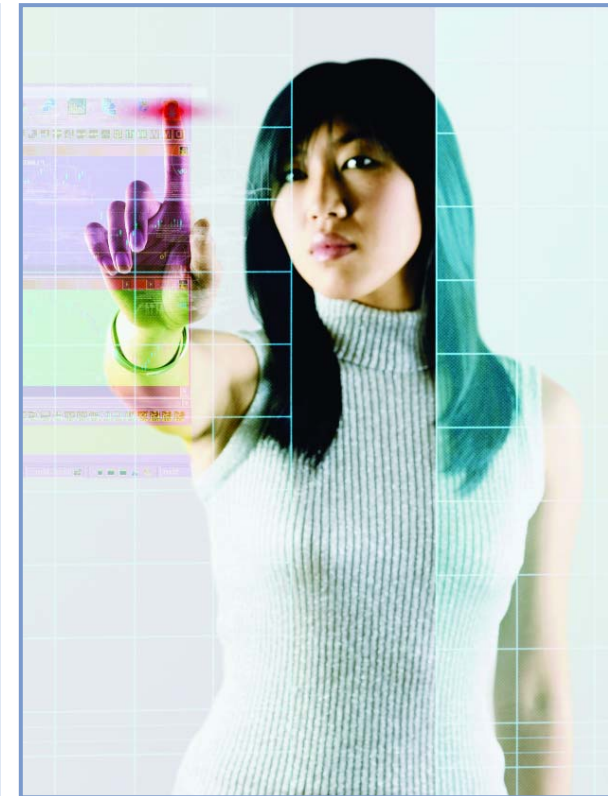
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Innovation leader with unique skill set and R&D centers in all customer countries

Panel makers need best-in-class supplier to build best-in-class displays

Underlying solid LCD TV market growth subject to occasional volatility

High margin technologies dominating sales split



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