

CORNING

## Advanced Science & Technology for the Future of India

McDonnell Academy, Washington University

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Executive Vice President and Chief Technology Officer

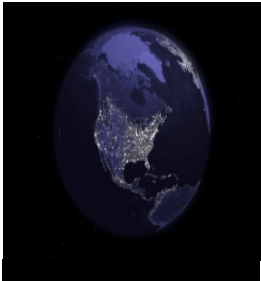
Corning Incorporated

October 19, 2013

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# A legacy of life-changing innovations in materials science

**Electric Bulb Envelope**



**Lighting the World**

**Vacuum Tube Envelopes**



**Radio Radar**

**CRT Funnel**



**B&W and Color TV**

**Cellular Ceramic Substrates**



**Low-Emissions Powertrain Clean Air**

**Optical Fiber**



**Long Haul/Metro/FTTH High Speed Internet**

**AMLCD Substrates**

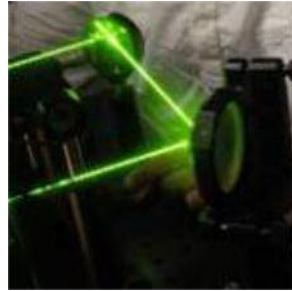


**High-Definition TV/Screens/ Tablets**

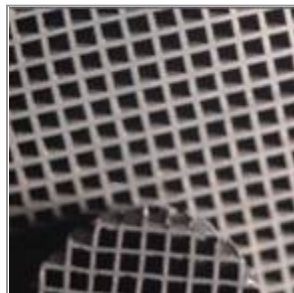
**Gorilla Glass**



**Smart Phones and Tablets**



# Corning Today



# Corning Incorporated Today

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**Founded:** 1851

**Headquarters:** Corning, NY

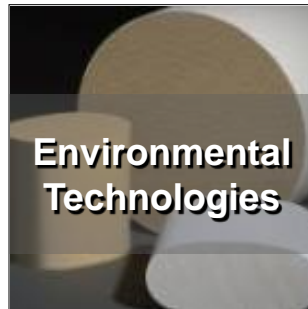
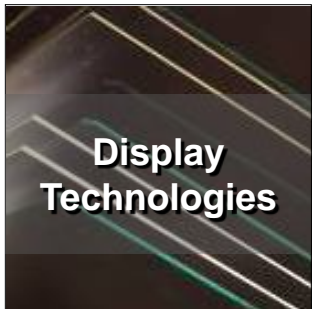
**Employees:** ~29,000

**2012 Sales:** \$8 Billion

**Fortune 500 Rank:**


- Sales: 326
- Net Income: 70

- Corning is the world leader in specialty glass and ceramics.
- We create and make keystone components that enable high-technology systems.
- We succeed through sustained investment in R&D, 160 years of materials science and process engineering knowledge, and a distinctive collaborative culture.

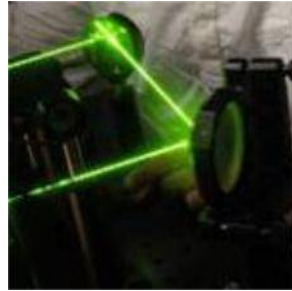


# Corporate Technology Delivers New Products and Processes to Every Business at Corning

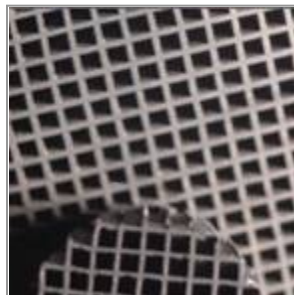
## Market Segments 2012 Revenue Share

 <p><b>Display Technologies</b></p> <p><b>40%</b></p>	 <p><b>Telecom</b></p> <p><b>26%</b></p>	 <p><b>Environmental Technologies</b></p> <p><b>13%</b></p>	 <p><b>Life Sciences</b></p> <p><b>8%</b></p>	 <p><b>Specialty Materials</b></p> <p><b>13%</b></p>	 <p><b>Other Products &amp; Services</b></p>
<ul style="list-style-type: none"> <li>• LCD Glass Substrates</li> <li>• LTPS-LCD Glass Substrates</li> <li>• Hi-Performance Glass Substrates for OLED Displays</li> <li>• Ultra-Thin, Flexible Glass Substrates</li> </ul>	<ul style="list-style-type: none"> <li>• Optical Fiber &amp; Cable</li> <li>• Hardware &amp; Equipment</li> <li>• Next Gen Data Centers</li> <li>• Distributed Wireless Antenna System</li> <li>• Very Short Distance Networking</li> </ul>	<ul style="list-style-type: none"> <li>• Emissions Control Products                             <ul style="list-style-type: none"> <li>– Automotive</li> <li>– Light Duty and Heavy Duty Diesel</li> <li>– Stationary</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Cell Culture &amp; Bioprocess</li> <li>• General Laboratory Products</li> <li>• Drug Discovery Technology</li> <li>• Corning Integrated Pharmacology</li> </ul>	<ul style="list-style-type: none"> <li>• Gorilla® Glass</li> <li>• Advanced Optics &amp; Materials</li> <li>• Display Optics &amp; Components</li> <li>• Semiconductor Optics &amp; Components</li> <li>• Aerospace</li> <li>• Astronomy</li> <li>• Optical Metrology</li> <li>• Ophthalmic</li> <li>• Telecom Components</li> </ul>	<ul style="list-style-type: none"> <li>• New Business Development</li> <li>• Equity Companies                             <ul style="list-style-type: none"> <li>– Dow Corning Corp.</li> <li>– Samsung Corning Precision Glass Company, Ltd</li> <li>– Eurokera, S.N.C</li> <li>– Cormetech, Inc.</li> </ul> </li> </ul>

Source: Corning Incorporated  
2012 Annual Report  
March 2012




## Corning New Product Innovation for India



# India represents a significant opportunity for our technologies and our products



- 850M phone subscribers
- 20M internet users
- > 10Mfkm fiber market
- \$50M PN market
- Increased bandwidth demand expected from 3G/LTE rollouts
- FTTH, Interior Wireless still nascent



**Optical Telecom Technologies**




- Pharma market of \$21B; ranks 3rd globally in terms of production (10% share)
- Potential to be a big Drug Discovery and Bio Pharma base with \$2 billion spend on pharma R&D
- Emerging opportunities for consumables



**Life Sciences**




- Cars and CVs market at 3.9M and growing at 12%
- Future: > \$ 125M opportunity in Heavy Duty Diesel and Light Duty Diesel
- Regulations lag Rest of World



**Environmental Technologies**




- 3rd largest power consumer in the world
- Significant focus on renewable energy with 2020 solar energy target of 20 GW
- > 1 GW installed PV capacity with strong export focus



**Specialty Materials**



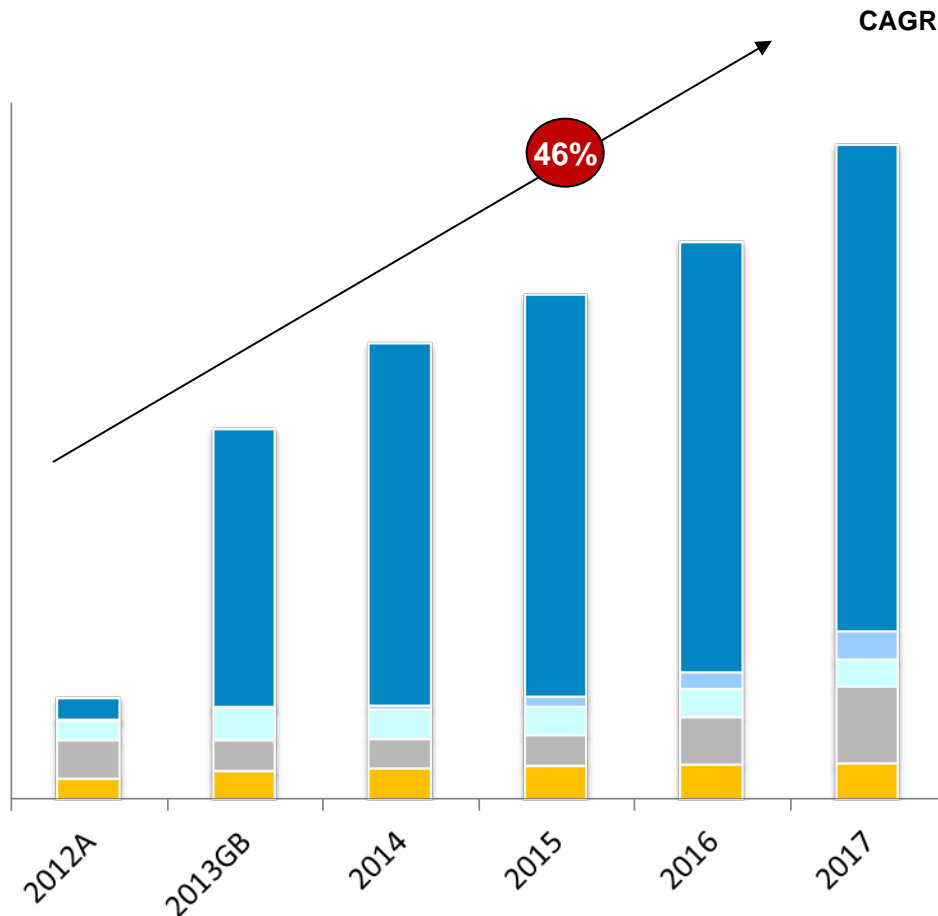
- 3rd largest smartphone market by 2017 (156M smartphones)
- Local players captured ~30% share of smartphones
- 6M tablet sales expected in 2013
- 6M Flat Panel TV sales, expected to grow 2.5x by 2015



**Display Technologies**

# Grow Corning India to be strategically important and financially material to the performance of the company

## Corning India Revenue Trajectory (2013-2017)



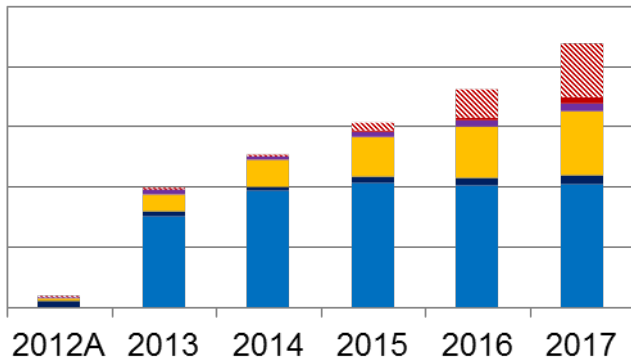
## Key Elements

- Telecom Technologies
- Environmental Technologies
- Life Science Technologies
- Specialty Materials Technologies
- Advanced Flow Reactor Technologies
- R&D in India



# India's optical telecommunications sector is poised for growth with Corning's support

## Corning's Growth Projections



## Production Capability Installed

### Corning Celebrates Opening Ceremony of Optical Fiber Plant in India

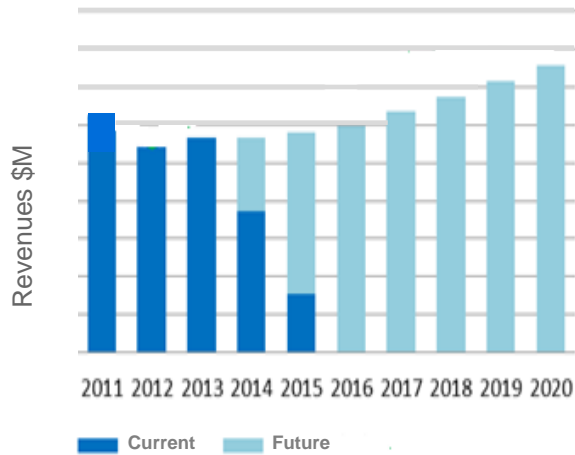
**Chief Minister Prithviraj Chavan inaugurates the Corning facility at Chakan, Maharashtra**

CORNING, N.Y., September 26, 2013 – [Corning Incorporated](#) (NYSE:GLW) today hosted an inauguration ceremony for its new optical fiber manufacturing facility in India. Located in Chakan, near Pune, in the Maharashtra Industrial Development Corporation (MIDC) Phase II industrial park, the plant is the company's first manufacturing facility in India.

The Indian government is striving to create 600 million high-speed broadband connections in the country by 2020. Large privately owned telecommunications carriers are planning high speed 4G/LTE and fiber-to-the-home networks.

"With its large cellular subscriber base, growing smart phone and data usage, and plans to deploy high-speed networks, India is the next frontier for optical fiber demand," according to Steve Miller, vice president and general manager of Corning's optical fiber and cable business.

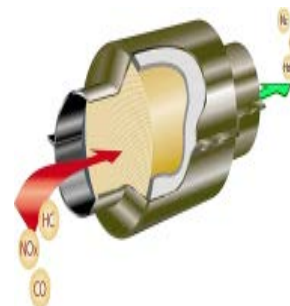
# Mobile emissions technologies from Corning will help clean India's air as regulations are implemented



- Significant vehicle growth opportunity
- Projected market grows at ~10% CAGR (2013-17) and 7% thereafter
- Regulation BS4 will be implemented nationwide from April 2015

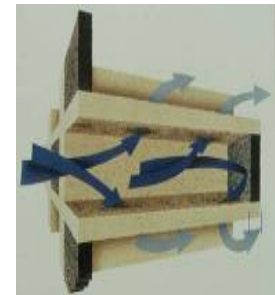
**40** 40 years of clean-air technologies  
Environmental Technologies

## Flow-through Substrate



Flow-through ceramic honeycomb

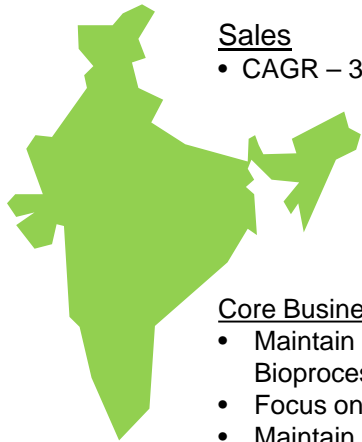
## Diesel Particulate Filter



Plugged channel honeycomb

# Life Sciences is another growth sector in India for Corning's technology capabilities

Strategy: Maintain, Grow and Create New Opportunities, New Geographies, and Product Lines

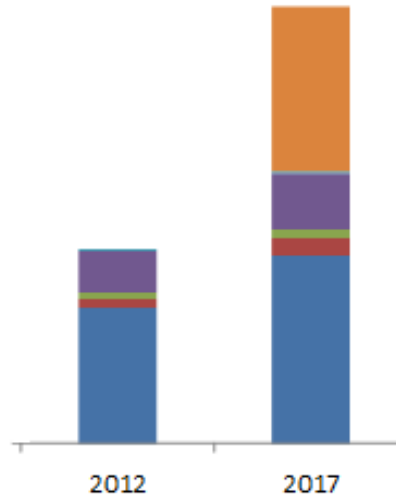


Sales

- CAGR – 31% (2008-2012)

Core Business Strategies

- Maintain Leadership Position in Bioprocess Segment
- Focus on Axygen
- Maintain and grow Discovery Labware



- GDP growth back to > 6%
- Strong bioprocess market drive sales growth for India region
- Competition from local, Chinese and Korean suppliers is increasing

- Access new opportunities in drug discovery and cell biology
- Develop local/contract manufacturing for high volume, price-sensitive product lines

## Cell Culture and Bioprocess

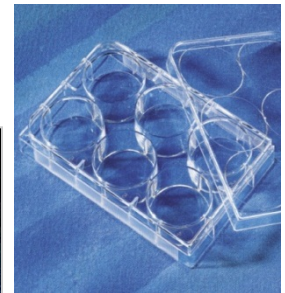
HYPERFlask®



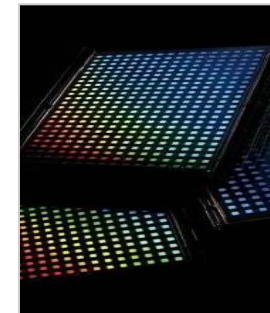
HYPERStack™



Synthemax™



Microplate



# Advanced Flow Reactors – a new technology for specialty chemical and pharma manufacturing

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- Sales Projection
  - India will be a significant contributor to AFR business global revenue
  - Small now, but plan is grow sales >10X from 2013 to 2017
- Key Success Factors
  - Technology adoption rate will increase progressively
  - Customers will move from R&D reactors to production platforms
  - Repeat customer rate will increase over time as experienced in other regional markets



## Advanced Flow Reactor Module

- Smaller footprint
- Lower capacity
- Higher yields
- Scalable to large volumes
- Better process safety

# Corning's strong presence in consumer smartphones, working with nearly all leading players, will expand to India



Tough,  
yet beautiful.



CORNING® GORILLA® GLASS IS ON MORE THAN

**1000 PRODUCT MODELS**  
**1.5 BILLION DEVICES**  
**33 MAJOR BRANDS**

Is it on yours?

Due to customer agreements, we cannot identify all devices that feature Gorilla Glass, but here are some of the brands that are putting Corning® Gorilla® Glass on their mobile devices:



**ECONOMIC TIMES:** Are smartphones in India at a tipping point of explosive growth with 10% overall mobile share?

## INDUSTRY FORECAST FOR INDIA

- 20 million smartphones sold in 2012 and a forecast of 50 million for 2013
- 3 million tablets in 2012 and a forecast of 6 million for 2013

# Corning Research Center in India

Project	Status
Photovoltaics on Willow™ Glass	<ul style="list-style-type: none"><li>• Corning Willow™ Glass for photovoltaic solar technologies: joint program with U.S and India including IIT Bombay. Corning's in-kind contribution is \$700K per year</li></ul>
Telecom in emerging markets	<ul style="list-style-type: none"><li>• Proposal to study optical communication network evolution in India and other emerging markets, especially wireline and wireless convergence</li></ul>
Modeling for CET	<ul style="list-style-type: none"><li>• Developing mathematical modeling competency based in India, starting with Corning Environmental Technologies (CET)</li></ul>
Contract development	<ul style="list-style-type: none"><li>• Evaluating process development and manufacturing operations for emerging innovations like materials for ultracapacitors</li></ul>



CORNING

Making  
Possibilities Real

