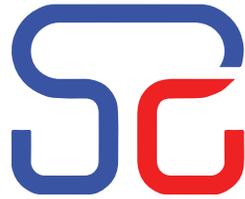


F R O S T & S U L L I V A N



2018 North American Smart Glass
New Product Innovation Award

F R O S T & S U L L I V A N

2018

BEST
PRACTICES
AWARD

2018 NORTH AMERICAN SMART GLASS
NEW PRODUCT INNOVATION AWARD

2018
BEST PRACTICES
AWARDS

Contents

Letter of Congratulations.....	3
Background and Company Performance	4
<i>Industry Challenges</i>	4
<i>New Product Attributes and Customer Impact</i>	5
<i>Conclusion</i>	8
Significance of New Product Innovation.....	9
Understanding New Product Innovation.....	9
<i>Key Benchmarking Criteria</i>	10
Best Practice Award Analysis for Scienstry, Inc.	10
<i>Decision Support Scorecard</i>	10
<i>New Product Attributes</i>	11
<i>Customer Impact</i>	11
<i>Decision Support Matrix</i>	12
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices	13
The Intersection between 360-Degree Research and Best Practices Awards.....	14
<i>Research Methodology</i>	14
About Frost & Sullivan	14

Letter of Congratulations

We are proud to present you with this year's award for best practices in New Product Innovation in the smart glass industry.

Frost & Sullivan has a global team of analysts and consultants continuously researching a wide range of markets across multiple sectors and geographies. As part of this ongoing research, we identify companies that have successfully introduced new and innovative products into their markets, with emphasis on product quality and customer value. This research involves extensive primary and secondary research across the entire value chain of specific products. Against the backdrop of this research, Frost & Sullivan is pleased to recognize Scienstry, Inc. as the New Product Innovation Leader in the smart glass industry.

To achieve leadership in new product innovation is never an easy task, but it is one made even more difficult due to today's competitive intensity, customer volatility, and economic uncertainty—not to mention the difficulty of innovating in an environment of escalating challenges to intellectual property. Within this context, your receipt of this award signifies an even greater accomplishment.

Moreover, we recognize that your receipt of this award is the result of many individuals (employees, customers, and investors) making daily choices to believe in the organization and contribute in a meaningful way to its future. We believe that such an achievement should be acknowledged and celebrated.

Once again, we congratulate you on your achievements and wish you great success in the future. We are here to support you on any future endeavors.

Sincerely yours,



David Frigstad
Chairman
Frost & Sullivan

Background and Company Performance

Industry Challenges

The growing emphasis on light and energy savings and privacy on demand has propelled demand for smart glass products, especially in the building and construction industry. The most popular form of smart glass is made by laminating liquid crystal films between two sheets of glass and sealing the edges. The films consist of a polymer matrix dispersed with droplets of liquid crystals that align in a particular manner when voltage is applied to provide a transparent appearance, and are randomly oriented upon removal of voltage to provide an opaque appearance. The ability for users to control the optical appearance of the film at the flick of a switch gives them command over their comfort and privacy.

Smart glass, however, faces numerous challenges to adoption and market growth in North America, including:

- **Operation temperature range.** Smart glass products have a typical operating temperature range of 0 to +40 degrees C, limiting their usage to only indoor applications.
- **Ultraviolet (UV) stability.** Liquid crystal films have high UV absorption capabilities and can be unstable on continuous exposure to sunlight.
- **Exposure to moisture.** Liquid crystal films are susceptible to failure when they are continuously exposed to moisture, and must be sealed by lamination using glass. Film developers must work closely with the glass industry to market their products.
- **Balance between opacity and transparency.** Smart glass products typically offer either good opacity or good transparency in the stable state, but not both features in the same product.
- **High voltage driving.** Smart glass products need to be driven by about 90V AC, limiting their usage to only a small area.
- **Projection function.** Laminated smart glass can't show a clear image on front projection.

Smart glass manufacturers with products that can mitigate or overcome these challenges can attain a strong market position and influence adoption.

New Product Attributes and Customer Impact

Scienstry, Inc., based in Richardson, TX, has developed the 3G Switchable Film™ series, an advanced level of liquid crystal switchable films used for developing smart glass. The range was launched in 2011, and Scienstry continues to add new products with enhanced features.

Match to Needs

The 3G Switchable Film™ series is based on nonlinear polymer dispersed liquid crystal display (NPD-LCD) technology, where the liquid crystal droplets used in the film are dispersed in a nonlinear solid polymer formed by phase separation processes. Conversely, conventional liquid crystal films are based on polymer dispersed liquid crystal (PDLC) technology, where a matrix of liquid crystal droplets is dispersed in a uniform solid polymer formed by a phase separation. Frost & Sullivan notes that Scienstry is the only company to develop commercialized smart glass products based on NPD-LCD technology.

Unlike the formulation process for PDLC films, the chemical requirement for curing the NPD-LCD film can be easily met to provide a high degree of polymerization and form droplets of high-purity liquid crystals. High purity results in a wider working temperature of the 3G Switchable Film™ for use in both indoor and outdoor applications.

To facilitate outdoor usage, such as building exteriors and automobile windows, Scienstry has concentrated on improving the 3G Switchable Film™'s resistance to weather. The NPD-LCD technology allows any optical, chemical, or physical property to be adjusted independently. As a result, material properties such as anti-moisture and anti-UV can easily be added to the film without affecting optical performance. UV stability tests conducted by the company on 3G Switchable Film™ products with anti-UV properties demonstrate more than 50 times improved UV stability in comparison to conventional liquid crystal films over a test period of 4 years. Additionally, a combination of silicon and fluoride components provides moisture and water resistance properties, allowing the product to be used in either a laminated form or as a stand-alone product that is exposed to air over the long term. Its durability makes it ideal for a wide range of applications, including automobile sunroofs and building windows. PDLC type of smart glass products needs a high voltage driving which is determined by its principle. The need of high voltage hinders large-scale application. Non-linear principle and Cage theory of NPD-LCD technology well resolve this problem. Driving voltage of 3G Switchable Film™ may be as low as 15 volt. Scienstry also reveals an optical mechanism of generating blur on a laminated smart glass in the front projection and provides a solution of switchable projection panel™ for both front and rear projections.

Frost & Sullivan predicts that the successful integration of anti-heat, anti-UV, and anti-moisture properties into the liquid crystal film could create space for development of a

combination of additional physical features that would allow Scienstry to tap into emerging market areas.

Positioning

While competing smart glass products based on PDLC technology have an operating temperature range of only -15 to +70 degrees C, the 3G Switchable Film™ has a much wider standard operating temperature of -30 to +80 degrees C, and in some reported cases can even be used at temperatures as low as -40 degrees C, making it suitable for use in practically any climate.

The standard 3G Switchable Film™ products take 40 milliseconds to switch between light transmission states, and the switching time can be reduced to 2 milliseconds in custom films made for specialized applications. Competing liquid crystal films, on the other hand, have a minimum switching time of 100 milliseconds. In a similar vein, Frost & Sullivan found the 3G Switchable Film™'s optical properties to be superior to the other offerings in the liquid crystal film market by providing net benefits of both high opacity and transparency properties in the stable state. The 3G Switchable Film™ has a minimum haze of 3% in the clear state and opacity of 99% in the opaque state, as opposed to competitors' technologies that have a haze of 7% in the clear state and opacity of 75% in the opaque state. The safety feature of low-voltage driving of 3G Switchable Film™ allows it to be friendly applied in large scale and special fields like automobile or resident windows. Frost & Sullivan recognizes that Scienstry's concentration on offering products with high optical performance with safer operational condition has enabled the company to capture markets beyond standard commercial architecture and venture successfully into the residential building, automotive, marine, train, television, train and building advertising, and home equipment industries.

Design

Scienstry ensures that production of 3G Switchable Film™ is according to client demands. The company supplies films in dimensions of 1.5 x 4 meters, and can make larger-sized films upon request. Scienstry has capabilities of reproducing 600 square meters of film per day at the same time to meet large-volume demands. The company has even installed 40,000 square meters of 3G Switchable Film™ as a sunroof and building wall on an architectural complex worth \$3 billion. Scienstry manufactures all products in Dallas, TX, and has plans to expand its manufacturing facility over the next 5 years to increase production capacity by 100 times to support an expansionist venture into large-volume automotive and high-rise building markets.

Scienstry's strategic initiatives to collaborate with television manufacturers over the past 20 years have allowed the company to identify the importance of window projection technology on smart glass panels. The company has worked on improving blurry image problems persistent in front projection. The Switchable Projection Glass™ developed as

part of the 3G Switchable Film™ series allows a 360-degree view, and the same sharpness and brightness at any viewing angle for both front and rear projection. The patented technology enables Scienstry's foray into building advertising, where liquid crystal glass panels covering building exteriors can be converted into marketing tools. Similarly, partitions and windows used in buildings can be converted into projection panels while having energy saving effect. Scienstry's concentration on the privacy and projection aspects of the 3G Switchable Film™ series presents a revenue-generating tool for building developers and helps the company capture new markets in the building industry.

Price/Performance Value

The 3G Switchable Film™ is available in series product names NPD-100, NPD-200, NPD-300, NPD-400, and NPD-500. The higher-range products (NPD-400 and NPD-500) have higher transparency, durability, and waterproof properties, and are more expensive. The higher-range products are in greater demand in North America and Europe, where durability and performance are important features. The lower-range products are more popular in price-conscious Asia. Frost & Sullivan commends Scienstry's recognition of different market requirements and its ability to offer a complete range so customers can realize price-performance value.

Customer Service Experience

Scienstry provides support to partnering companies for synthesizing liquid crystals for custom products, and instructs companies on wiring and electronics for installing the products. The support is supplemented by Scienstry's immense technical know-how and research and development experience, and ensures that partnering companies' devices operate as promised for many years with a near-zero defective rate.

Scienstry holds independent patents and has patent applications pending in areas such as window configuration methods, display technologies, and emerging applications of liquid crystal films. It is open for technology transfer to clients that prefer customizing their own liquid crystal film products or glass products. For certain patents, the company offers free licensing in case the 3G Switchable Film™ series is used by the licensee. The patent licensing model is an additional revenue generator, helping it capitalize on ongoing customer service.

Conclusion

Frost & Sullivan regards Scienstry's proprietary 3G Switchable Film™ series as a notable innovation in the North American smart glass industry for its high performance, durability, and customizability. The product's ability to double as a display unit helps it capture new markets, enabling the company to gain an upper hand in the quest for market dominance.

With its strong overall performance, Scienstry, Inc. has earned Frost & Sullivan's 2018 New Product Innovation Award.

Significance of New Product Innovation

Ultimately, growth in any organization depends upon continually introducing new products to the market, and successfully commercializing those products. For these dual goals to occur, a company must be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.



Understanding New Product Innovation

Innovation is about finding a productive outlet for creativity—for consistently translating ideas into high quality products that have a profound impact on the customer.

Key Benchmarking Criteria

For the New Product Innovation Award, Frost & Sullivan analysts independently evaluated two key factors— New Product Attributes and Customer Impact—according to the criteria identified below.

New Product Attributes

- Criterion 1: Match to Needs
- Criterion 2: Reliability
- Criterion 3: Quality
- Criterion 4: Positioning
- Criterion 5: Design

Customer Impact

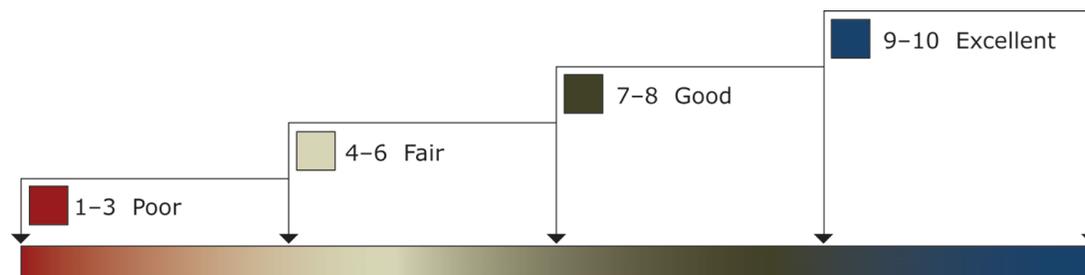
- Criterion 1: Price/Performance Value
- Criterion 2: Customer Purchase Experience
- Criterion 3: Customer Ownership Experience
- Criterion 4: Customer Service Experience
- Criterion 5: Brand Equity

Best Practice Award Analysis for Scienstry, Inc.

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are illustrated below.

RATINGS GUIDELINES



The Decision Support Scorecard is organized by New Product Attributes and Customer Impact (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criteria are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key players as Competitor 2 and Competitor 3.

DECISION SUPPORT SCORECARD FOR NEW PRODUCT INNOVATION AWARD

<i>Measurement of 1-10 (1 = poor; 10 = excellent)</i>			
New Product Innovation	New Product Attributes	Customer Impact	Average Rating
Scienstry, Inc.	9	9.2	9.1
Competitor 2	8.8	8.8	8.8
Competitor 3	8.6	8.6	8.6

New Product Attributes

Criterion 1: Match to Needs

Requirement: Customer needs directly influence and inspire the product’s design and positioning

Criterion 2: Reliability

Requirement: The product consistently meets or exceeds customer expectations for consistent performance during its entire life cycle

Criterion 3: Quality

Requirement: Product offers best-in-class quality, with a full complement of features and functionality

Criterion 4: Positioning

Requirement: The product serves a unique, unmet need that competitors cannot easily replicate

Criterion 5: Design

Requirement: The product features an innovative design, enhancing both visual appeal and ease of use

Customer Impact

Criterion 1: Price/Performance Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market

Criterion 2: Customer Purchase Experience

Requirement: Customers feel like they are buying the most optimal solution that addresses both their unique needs and their unique constraints

Criterion 3: Customer Ownership Experience

Requirement: Customers are proud to own the company’s product or service, and have a positive experience throughout the life of the product or service

Criterion 4: Customer Service Experience

Requirement: Customer service is accessible, fast, stress-free, and of high quality

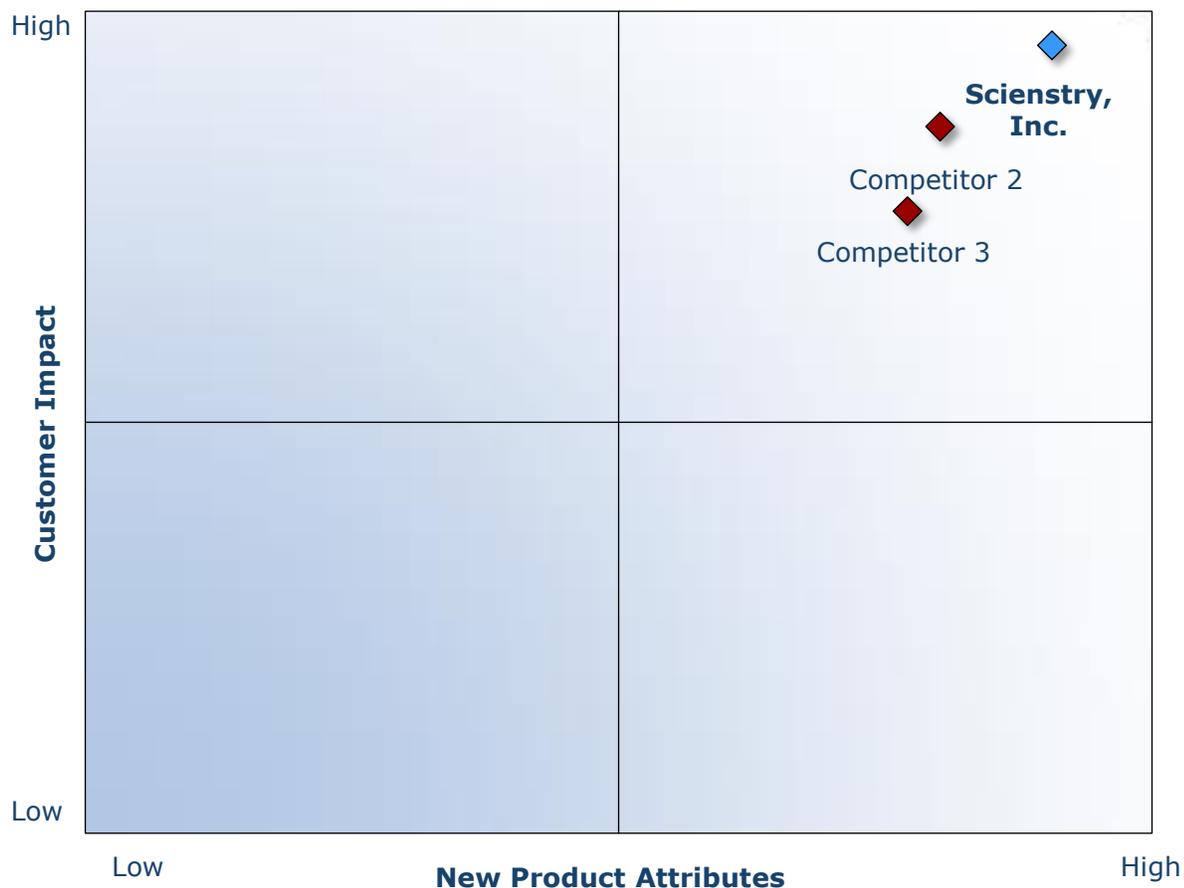
Criterion 5: Brand Equity

Requirement: Customers have a positive view of the brand and exhibit high brand loyalty

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts can then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.

DECISION SUPPORT MATRIX FOR NEW PRODUCT INNOVATION AWARD



Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan Awards follow a 10-step process to evaluate award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

STEP	OBJECTIVE	KEY ACTIVITIES	OUTPUT
1 Monitor, target, and screen	Identify award recipient candidates from around the globe	<ul style="list-style-type: none"> • Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies 	Pipeline of candidates who potentially meet all best-practice criteria
2 Perform 360-degree research	Perform comprehensive, 360-degree research on all candidates in the pipeline	<ul style="list-style-type: none"> • Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • Rank all candidates 	Matrix positioning all candidates' performance relative to one another
3 Invite thought leadership in best practices	Perform in-depth examination of all candidates	<ul style="list-style-type: none"> • Confirm best-practice criteria • Examine eligibility of all candidates • Identify any information gaps 	Detailed profiles of all ranked candidates
4 Initiate research director review	Conduct an unbiased evaluation of all candidate profiles	<ul style="list-style-type: none"> • Brainstorm ranking options • Invite multiple perspectives on candidates' performance • Update candidate profiles 	Final prioritization of all eligible candidates and companion best-practice positioning paper
5 Assemble panel of industry experts	Present findings to an expert panel of industry thought leaders	<ul style="list-style-type: none"> • Share findings • Strengthen cases for candidate eligibility • Prioritize candidates 	Refined list of prioritized award candidates
6 Conduct global industry review	Build consensus on award candidates' eligibility	<ul style="list-style-type: none"> • Hold global team meeting to review all candidates • Pressure-test fit with criteria • Confirm inclusion of all eligible candidates 	Final list of eligible award candidates, representing success stories worldwide
7 Perform quality check	Develop official award consideration materials	<ul style="list-style-type: none"> • Perform final performance benchmarking activities • Write nominations • Perform quality review 	High-quality, accurate, and creative presentation of nominees' successes
8 Reconnect with panel of industry experts	Finalize the selection of the best-practice award recipient	<ul style="list-style-type: none"> • Review analysis with panel • Build consensus • Select winner 	Decision on which company performs best against all best-practice criteria
9 Communicate recognition	Inform award recipient of award recognition	<ul style="list-style-type: none"> • Present award to the CEO • Inspire the organization for continued success • Celebrate the recipient's performance 	Announcement of award and plan for how recipient can use the award to enhance the brand
10 Take strategic action	Upon licensing, company may share award news with stakeholders and customers	<ul style="list-style-type: none"> • Coordinate media outreach • Design a marketing plan • Assess award's role in future strategic planning 	Widespread awareness of recipient's award status among investors, media personnel, and employees

The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.