

SABIC  
Innovative  
Plastics™

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# Sustainability Solutions

Sharing our futures

“We have a tradition of innovation that has delivered materials that are inherently more sustainable than common practice in the market, and has helped our customers use plastics more effectively to achieve sustainability benefits beyond the gates of our business.”

Charlie Crew  
President and Chief Executive Officer (CEO),  
SABIC Innovative Plastics  
From letter to UN Global Compact



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Sustainable practices are not just the right things to do for the environment, they are also a smart business strategy. Building sustainability into the sourcing, design, manufacture and reuse of products delivers important business advantages, including lower costs from reduced waste, improved customer satisfaction and increased competitive advantage. Improving the environmental sustainability of plastics, from production through use to disposal, is important to our business.

SABIC Innovative Plastics has a long history of positive contributions to the environmental performance of our customers' products and our own. Our operating systems that ensure compliance with safety and environmental regulations are robust and have been strengthened over time as new science and methods become available. We also help our customers and suppliers achieve their sustainability goals. SABIC Innovative Plastics has expanded the Sustainability Solutions portfolio to help customers easily choose high-performance materials that advance their specific environmental goals and contribute to their business success.

With today's emphasis on sustainability, many organizations make "green" claims. We believe that independent assessment of key sustainability claims validated against recognized standards and global regulations, or through scientific life cycle assessment provides value and strengthens our trusted relationships with customers. Where recognized third-party standards do not exist, we collaborate with respected third-party experts such as GreenOrder, a leading sustainability consulting firm, to provide technical analysis and verification.

The following pages describe SABIC Innovative Plastics' growing portfolio of solutions, the rigorous methods we use to validate our environmental claims, and our global efforts to help customers design and manufacture environmentally responsible products.



Saudi Basic Industries Corporation (SABIC), the parent company of SABIC Innovative Plastics, has made sustainability a central aspect of its business strategy, with two key focus areas. First, SABIC is focused on continuously reducing the intensity of our global operational footprint, including reducing carbon intensity, improving energy and water use, and increasing material efficiency – benefits that also ultimately flow to our customers. To this end, SABIC embraces Responsible Care®, the chemical industry's global voluntary initiative to continuously improve safety, health, and environmental performance, as a framework for sustainability. We are building upon our strong management systems and history of responsible manufacturing to create an even safer, cleaner environment.

Second, our sustainability program focuses on the marketplace, where we are committed to sharing our expertise and working even more closely with our customers to develop products, applications and solutions that respond to their sustainability needs. Our product portfolio, coupled with our technological expertise and history of innovation, gives us the opportunity to develop materials that can help our customers tackle a wide variety of environmental issues. SABIC's Sustainability Council, led by Vice-Chairman and Chief Executive Officer (CEO) Mohamed H. Al-Mady, oversees the sustainability program, which encompasses every business unit and all operations across the world.



SABIC was founded in 1976 as the fruit of an ambitious vision. Natural gas, a previously useless by-product of oil extraction, has historically been wasted through environmentally damaging flaring. Our vision has been to transform it into valuable petrochemical products that we could supply to the world. Through this tradition, sustainability concepts have been embedded into the fabric of the company.



## Sustainability Solutions portfolio

SABIC Innovative Plastics is committed to helping customers improve the sustainability of their manufactured goods and services. The Sustainability Solutions portfolio makes it easy for customers to identify, evaluate and select the right SABIC Innovative Plastics materials. This portfolio encompasses five broad categories that address today's most important environmental initiatives:

- Post-consumer recycled (PCR) content
- Automotive weight-out
- Advanced flame retardance
- Energy efficiency
- Bio-based materials

The properties, performance and/or content of these materials can make a significant contribution to reduced environmental impact, from lowering carbon emissions to maximizing use of the earth's limited resources. To support our customers' environmental objectives, SABIC Innovative Plastics plans to expand the Sustainability Solutions portfolio as we innovate in new technologies, improve our manufacturing processes and develop a deeper understanding of how our products and their uses contribute to sustainability.

## Validating sustainability claims

Products and applications in SABIC Innovative Plastics' Sustainability Solutions portfolio are strictly validated in two potential ways: either they meet one or more widely recognized third-party sustainability standards or their environmental benefits relative to incumbent technologies have been verified using the company's new Sustainable Product Scorecard.

For a significant number of products in the portfolio, there are third-party standards defining sustainability features, such as halogen-free flame retardance or post-consumer recycled content. For a number of other solutions, such as automotive lightweight design or footprint reductions, there are no widely recognized industry or third-party standards defining sustainability. For these solutions, it is necessary to verify the environmental benefits over incumbent alternatives using Life Cycle Assessment (LCA) methods for estimating the environmental footprint of products and processes. SABIC Innovative Plastics incorporated these LCA methods into its new Sustainable Product Scorecard to ensure that the verification process is done in a rigorous and credible way.

This scorecard has two components:

- **Life Cycle Assessment:** LCA and Life Cycle Inventory (LCI) methodologies, based on the ISO 14040 and ISO 14044 standards, are used to build the first component of the scorecard. The carbon and energy footprints of the products or applications are estimated across the life cycle. The results of the assessment are summarized in the Environmental Product Datasheet.

- **Green Chemistry Screen (GCS):** This component of the scorecard guides the assessment of the chemical composition of the product, including impurities, byproducts and catalysts, against well-established toxicological, regulatory and industry standard criteria.

The output of the scorecard is used to develop well-substantiated environmental claims that undergo third-party verification. These validated claims enable our customers to differentiate their products and showcase the results of their sustainability efforts.

"We commend SABIC Innovative Plastics for its proactive efforts to provide new alternatives to traditional materials across the spectrum of sustainability. The key to this initiative is the verification of environmental benefits using established standards and rigorous validation and testing processes. Our work in independently evaluating SABIC Innovative Plastics' materials helps ensure that they fulfill their eco claims and deliver proven, measurable value to customers."

Truman Semans, Principal, GreenOrder



## Post-consumer recycled (PCR) content

The variety of available plastics and the ease by which they may be customized have been assets in optimizing performance for specific uses and different design objectives, allowing designers to use less material, be more energy efficient, or engineer the plastic to do only the job it needs to do for a specific application and nothing more. This variety, in many ways an advantage for sustainable product design, also makes plastics complicated to collect, sort, handle and reuse.

However, important trends are leading to increased recycling:

- Conservation of finite resources (e.g., petroleum or natural gas)
- Reduction of energy used in manufacturing
- Relieving pressure on landfill space
- Compliance with regulatory requirements and voluntary eco-labels
- Increasing demand for materials to serve “green consumers”

**Post-industrial recycling (PIR)** utilizes plastic materials recovered from the manufacturing waste stream prior to reaching the end consumer.

**Post-consumer recycling (PCR)** utilizes plastics that have served their intended purpose and have been diverted or recovered from the waste stream. Within this PCR category, **closed-loop systems** recycle a single type of plastic into the same production process, while **open-loop systems** make these materials available for other applications.

Further, recycling can be **mechanical** (melting and refining without breaking down the polymer) or **chemical** (breaking the polymer chain down to its chemical building blocks and reusing them to make a new polymer). For example, SABIC Innovative Plastics pioneered a chemical recycling process to “up-cycle” post-consumer polyethylene terephthalate (PET) bottles into durable Valox iQ\* and Xenoy iQ\* polybutylene terephthalate (PBT) resins.

### Potential applications:

#### 1 TV backs/bezels

- Noryl\* PCR resin
- Cycloyl\* PCR resin

#### 2 Computer internals

- Valox iQ resin
- Noryl PCR resin

#### 3 Keyboard keys

- Valox iQ resin

#### 4 Laptop housings

- Cycloyl PCR resin

#### 5 Power adapters

- Noryl PCR resin
- Cycloyl PCR resin

#### 6 Power tools/ consumer goods

- Xenoy iQ resin
- Lexan\* EXL PCR resin
- Lexan PCR resin
- Noryl PCR resin

#### 7 Bumpers/car exteriors

- Xenoy iQ resin



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<sup>1</sup>2008 data from “The compelling facts about plastics 2009” Plastics Europe.  
[http://www.plast.dk/billeder/fakta/Brochure\\_UK\\_CompellingFacts\\_2009\\_22sept\\_Final.pdf](http://www.plast.dk/billeder/fakta/Brochure_UK_CompellingFacts_2009_22sept_Final.pdf)

**Products**

SABIC Innovative Plastics' PCR portfolio, which now includes more than 25 grades spanning 6 resin families, supports customers' needs to design a wide variety of more sustainable products.

- **Cycoloy\* post consumer recycled (PCR) resin** portfolio comprises polycarbonate/acrylonitrile-butadiene-styrene (PC/ABS) resins containing 30 – 50 percent open-loop PCR PC from water bottles, CDs and other sources. Both flame-retardant (FR) and non-FR grades are available, which are intended for electronics applications such as laptop, power adapter and cell phone housings.
- **Lexan\* EXL PCR resin** portfolio comprises products with 10 – 80 percent PCR content. These PC resins offer enhanced durability vs. PC/ABS, easy processing and good aesthetics, and support secondary operations such as overmolding for cell phone housings.
- **Noryl\* PCR polyphenylene ether (PPE) resins** contains 20 percent PCR content and deliver non-halogenated FR capability, low specific gravity, toughness, consistent performance at various temperature and humidity levels, and good moldability for electronics applications including DVD players, modems and printer components.

- **Valox iQ\* polybutylene terephthalate (PBT) and Xenoy iQ\* PBT/PC resins** features 12 - 60 percent PCR content. An advanced chemical recycling process yields performance nearly identical to prime material, converting single-use, non-durable polyethylene terephthalate (PET) water bottles into durable automotive, electrical/electronics, lighting and food contact applications.

**Verified environmental performance**

- Each kg of Lexan EXL 8454 (50 percent PCR) resin is designed to save the non-renewable energy equivalent to powering 1,970 7W light bulbs for an hour.<sup>1</sup>
- Valox iQ resin emits approximately 35 percent less greenhouse gas vs. traditional PBT. If all the PBT consumed annually were converted to Valox iQ resin, it would avoid approximately the equivalent of the emissions from ~500,000 passenger vehicles on European roads per year.<sup>2</sup>

**8 Excellent candidates for: Printer/copier housings**

- Noryl PCR resin
- Cycoloy PCR resin
- Chassis/Internals**
- Noryl PIR resin
- Valox iQ resin

**9 Robinson utensils**

Robinson Home Products chose Valox iQ PCR resin for its Green Street™ line of plastic kitchen utensils. The material provides heat and chemical resistance, FDA food contact compliance and an attractive appearance.

**10 Motorola MOTO™ phone**

Motorola's MOTO W233 Renew mobile phone, made with Lexan EXL 8414 PCR resin, is the world's first carbon-neutral phone. The housing is 100 percent recyclable.

**11 Chopsticks**

Sanshin Kako's colorful chopsticks made with Valox iQ 420 HP resin can be washed in automatic dishwashers and used up to 1,000 times, avoiding waste of natural resources from single-use wooden chopsticks.

**12 Carpet**

Convert™ carpet from Interface Americas, Inc., made with PCR nylon fiber, uses a new grade of Valox iQ resin as a critical additive to provide permanent stain resistance and strong, consistent color.



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<sup>1</sup>Lexan EXL 8454 is estimated to save 50 MJ of non-renewable fossil fuel energy per kg of resin over traditional Lexan EXL polycarbonate.

<sup>2</sup>Based on 0.7 million metric tons/year of global consumption on a neat resin basis, avoiding approximately 1.0 million metric tons/year of greenhouse gases compared with traditional dimethyl terephthalate-based PBT.

Reducing vehicle weight helps to lower fuel consumption and the associated release of greenhouse gases into the atmosphere. Regulatory requirements and public demand for better fuel efficiency are causing automotive OEMs and their suppliers to scrutinize virtually every component, searching for new solutions to cut weight while ensuring high performance and safety. By providing lightweight alternatives to metal, glass and even other plastics, SABIC Innovative Plastics' engineering resins help meet these goals while offering greater freedom to design the vehicles of tomorrow. Adding to decades of experience including polycarbonate lenses for lighting, lightweight instrument panels, first-generation plastic fenders, and advanced bumper systems, SABIC Innovative Plastics is committed to further innovating in this area.

### Products

- **Noryl GTX\* polyphenylene ether (PPE) resins** for auto fenders and body panels reduce weight by up to 50 percent vs. steel and, in conductive formulations, enable primerless online painting.
- **Lexan\* polycarbonate (PC) resins** with **Exatec\*** plasma coating and/or wet-coating for abrasion resistance can replace glass in automotive glazing applications for weight savings of up to 50 percent. Aerodynamic styling features can be molded into the glazing to help improve fuel economy even more.

- **Flexible Noryl\* resins** for wire and cable coatings enable designs up to 25 percent thinner and up to 40 percent lighter vs. traditional cross-linked polyethylene (XLPE) systems, providing more room for functionality and helping to reduce fuel consumption.
- **Xenoy\* polycarbonate/polybutylene terephthalate (PC/PBT) resin** used in front and rear bumper assemblies has excellent impact and chemical resistance properties. At SABIC Innovative Plastics, solutions are being developed for bumper energy absorbers that are 30 percent lighter in weight than injection-molded thermoplastic olefin (TPO) solutions.
- **Ultem\* polyetherimide (PEI) resins** for headlamp reflectors can replace glass fiber-reinforced thermosets. With a near-zero scrap rate, Ultem resins avoid hard-to-recycle scrap from thermosets. Also, they reduce volatile organic compound (VOC) emissions vs. thermosets, which need additional base coating steps.
- **SABIC® STAMAX® long glass fiber-reinforced polypropylene (PP)** replaces steel in front-end module assemblies and other semi-structural automotive applications, reducing weight by up to 30 percent and contributing to better fuel economy.

**1 Mitsubishi RVR crossover**  
Replacing steel with Noryl GTX resin in its RVR crossover – its second application for the resin – Mitsubishi slashed weight by almost 50 percent and achieved a unique and highly complex geometry.

**2 Steering wheels**  
Using Lexan EXL resin, SABIC Innovative Plastics developed two new steering wheel concepts, including a one- and a two-piece injection molded design as alternatives to a die-cast magnesium armature.

**3 Hyundai ix-onic backlight**  
Hyundai featured Lexan GLX PC glazing with Exatec E900 coating in the 3D backlight of its "ix-onic" SUV concept. The design integrates a brake light and several unique aerodynamic features, including a roof spoiler. Lexan GLX resin delivers crystal clarity, light weight and high impact.

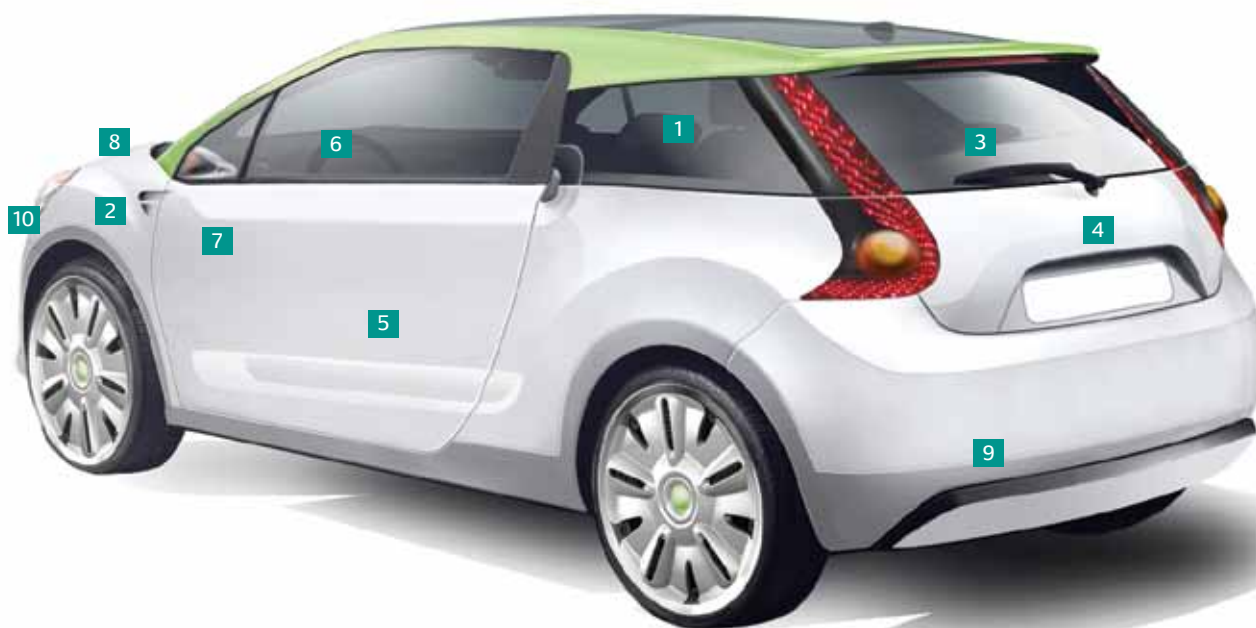


### Verified environmental performance

- From the sourcing of raw materials to the end of the life of a vehicle, a fender made from Noryl GTX\* resin emits up to 40 percent less greenhouse gas than a fender made of steel.
- Ultem\* PEI resins are directly metallizable, eliminating base coating and its associated VOCs. For each 1 million cars with Ultem resin reflectors rather than base coating, 12 MT of VOCs can be eliminated, equivalent to VOCs emitted from paints and coatings used by all homeowners, contractors and businesses in a medium-sized city in a day.<sup>1</sup>

### Key weight-saving technologies from SABIC Innovative Plastics

| Material                            | Estimated Savings vs. Traditional Materials |
|-------------------------------------|---|
| 1. Exatec* PC Glazing               | = 12 kg                                     |
| 2. Noryl GTX* PPO/PA Fenders        | = 3.0 kg                                    |
| 3. STAMAX® PP Tailgate (Inner)      | = 3.0 kg                                    |
| 4. Xenoy* PC/PBT Tailgate (Outer)   |   |
| 5. STAMAX PP Door Modules           | = 2 kg                                      |
| 6. Lexan EXL* PC Steering Wheel     | = 0.25 kg                                   |
| 7. Flexible Noryl* PPO Wire Coating | = 1 kg                                      |
| 8. STAMAX PP Front End Module       | = 2 kg                                      |
| 9. Xenoy* PC/PBT Energy Absorbers   | = 0.5 kg                                    |
| 10. Ultem* PEI Headlamp Reflectors  | = 0.4 kg                                    |
| <b>TOTAL</b>                        | <b>= 24.15 kg</b>                           |



<sup>1</sup>Based on a representative city such as Baltimore, Maryland, United States or similar.

Advanced flame retardance systems can replace hazardous flame retardant (FR) substances that face increasing restrictions around the world. The 2006 Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC) banned the use of certain hazardous substances in electrical and electronic (E/E) equipment in the European Union (EU). The EU Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) mandates separate disposal processes for products containing any RoHS substance, which adds costs and makes recycling more difficult. Similar legislation is being developed in other parts of the world, and the RoHS list of substances is expected to grow.

Chlorinated and brominated flame retardants have also come under scrutiny due to concerns about byproducts that may form during incineration. Voluntary eco-labels such as the Electronic Product Environmental Assessment Tool (EPEAT), TCO, EU Eco-Flower and German Blue Angel programs all contain criteria pertaining to these flame retardants in E/E equipment.

For years, SABIC Innovative Plastics has offered non-brominated FR resins, such as the Lexan\* 9\_5 resin series, and halogen-free FR resins such as the Lexan 9\_9 resin series and Ultem\* and Flexible Noryl\* resin grades. We continue to expand this portfolio with new functionality and improved technology to help our customers develop applications that will meet their entire list of quality criteria.

### Typical applications

#### Enclosures and housings

- **Flame-retardant Lexan and Lexan EXL resins** are based on non-brominated and non-chlorinated technology. Transparent Lexan 9\_5A resins with >88 percent light transmission and opaque Lexan 9\_5 resins meet UL94 V0 requirements at various thicknesses. The transparent Lexan 9\_9A resin series features chemically halogen-free FR and similar properties. Lexan EXL resins deliver similar FR capability with improved low-temperature impact and chemical or weathering resistance.
- **Cyclocoly\* FR resins** have served the consumer electronics industry for many years. Cyclocoly EXL FR resins are a new generation of blends offering enhanced flow and heat/impact performance, FR at thinner wall dimensions (<1.0 mm possible) and improved chemical resistance.

- **Noryl FR resins** offer tailored heat and flow characteristics combined with good practical toughness while remaining relatively inert to humid conditions. They are being used in diverse applications from TV bezels to electrical films to components in solar panels.
- **Xenoy iQ\* ENH resins** with post-consumer recycled (PCR) content are a new generation of blends offering improved chemical resistance.

#### High-performance E/E connectors and internals

- **Valox\* ENH resin** series for internal parts in the E/E industry meet the UL94 V0 standard at 0.8 mm and provide excellent electrical performance.
- **Ultem polyetherimide (PEI) resins**, known for high heat resistance and strength, also offer inherent FR performance without additives. Ultem resin grades are exceptionally difficult to ignite, with a limiting oxygen index (LOI) of 47 percent, and meet UL94 V0 specifications in sections as thin as 0.25 mm for glass-filled grades. Ultem resins emit extremely low levels of smoke per the National Bureau of Standards (NBS) and the National Institute of Standards and Technology (NIST) smoke evolution test.
- **Extem\* thermoplastic polyimide (TPI) resins** bridge the gap between extreme part performance and improved productivity facing current high-heat thermoplastics such as Ultem resin and thermoset materials. Depending upon formulation, Extem resins may comply with the WEEE/RoHS directives and various eco-labels.

#### Specialty solutions for wire & cable and electrical insulation

- **Flexible Noryl resins** are available in a variety of flame ratings and softness levels and are excellent options for many wire/cable/plug applications. Our newest grades are good candidates for evaluation in UL62- and VDE-compliant AC power cables.
- **Siltem\* resins** are candidates for primary and secondary isolation in wire & cable applications. These amorphous materials combine the high-heat resistance of Ultem resin with the flexibility of silicone elastomers, offering inherent flame retardance due to a high LOI of 48 percent, low smoke density and toxicity, and halogen-free formulations.
- **Noryl EFR** and **Lexan EFR films** are UL94 listed and offer a range of properties to meet the requirements of E/E insulation and other applications. Noryl EFR films are halogen-free, and Lexan EFR films are non-brominated.

### Standards are evolving: we're here to help

Voluntary standards and regulatory requirements related to FR plastics are continuously evolving. Always check with your SABIC Innovative Plastics representative for the latest update. Before calling, determine which standards your product has to meet and the family and grade of plastic you are considering, and our Product Stewardship team will help you verify eligibility of the materials.

#### 1 LTK wiring

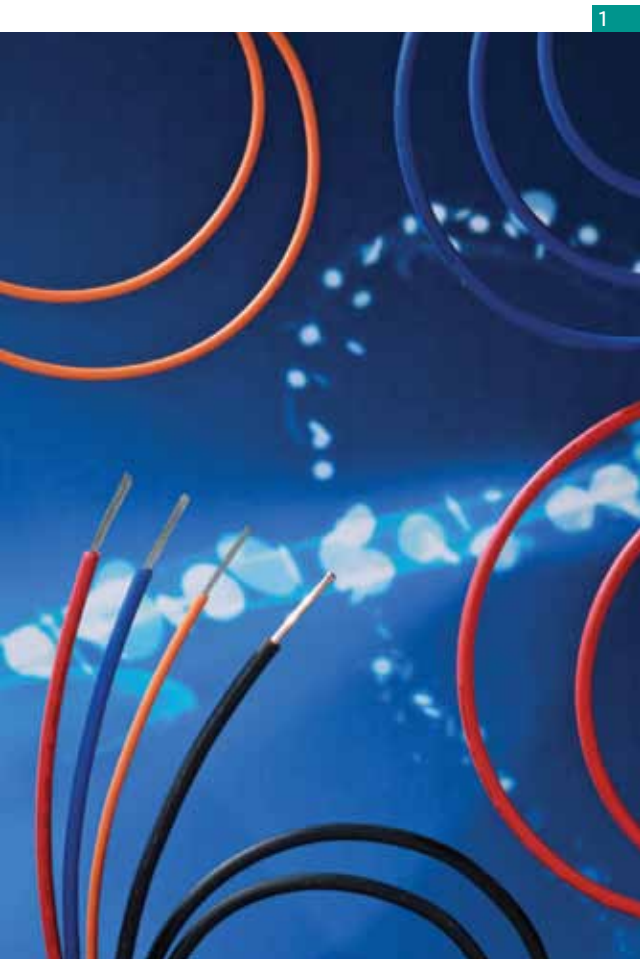
LTK Industries replaced PVC with Flexible Noryl™ resin in AV cable coating for flat-screen TVs. The material delivers VW1 flame retardance, meeting requirements for halogen-free parts.

#### 2 Lexan® EFR film for E/E

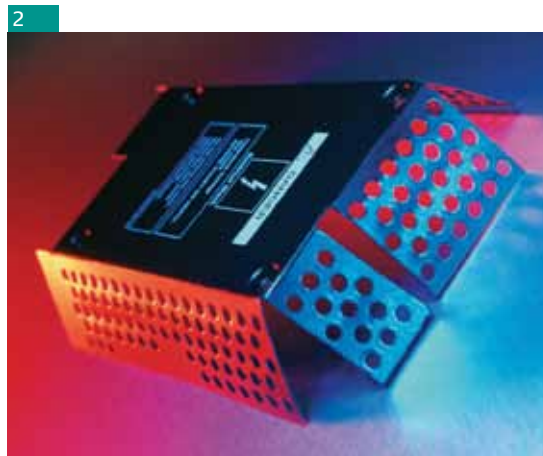
Lexan EFR film delivers non-brominated, non-chlorinated flame retardance at thinner gauges than FR polypropylene (FRPP), allowing OEMs to create flatter, lighter-weight notebook computers and other electronic devices.

#### 3 Acer Gemstone notebook

Acer selected Lexan 9945A resin to create the "Gemstone" design concept for its Aspire notebook – a dark, satin-finish sub-layer with the Acer logo floating on it like a hologram. The resin delivered impact resistance, FR at a very thin wall thickness and excellent flow characteristics for the demanding in-mold graphics process.



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## Energy efficiency

SABIC Innovative Plastics continues to develop materials that promote energy conservation and emissions reduction, particularly in the building and construction sector. They contribute to a range of energy reduction strategies, from solar heat and UV control to improved thermal insulation. SABIC Innovative Plastics' sheet and film products can help contribute to points for the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification and other environmental programs, as well as reduce costs and provide a more comfortable experience at home, at work and in public spaces.

### Products

- **Lexan® Thermoclear® sheet** products for flat or curved glazing applications feature multiwall construction that traps air between layers and provides excellent thermal insulation, noise reduction and ultraviolet (UV) protection for longer product life, as well as light weight for ease of installation. Fire and smoke ratings (CC1-Class A) with halogen-free technology are available.
- **Lexan® Solar Control® IR sheet** absorbs near-infrared radiation but admits high levels of light, helping to reduce cooling and lighting costs in buildings.

- **Lexan® Constant Clear® freezer film**, with a coating on one side and adhesive on the other, provides long-term anti-fog performance for freezer and refrigerator case doors. This film can help stores avoid the need for energy-intensive door heaters.

### Verified environmental performance

- Installing Lexan multi-wall sheet can contribute to LEED Optimize Energy Performance (EA 1) and help the building qualify for up to 53 LEED points depending on the combination of different coating technologies, structures, etc.
- With its highly insulating multiwall construction and UV coating, Lexan Thermoclear Solar Control IR multi-wall sheet can reduce indoor cooling/heating energy requirements from 7 percent to 25 percent compared to double-pane glass (Low E glass/air/glass configuration).<sup>1</sup>



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<sup>1</sup>A typical ASRAE 600 box (~60 m<sup>2</sup>; window and roof glazing; 30-year use period) designed with 16mm- to 25mm-thick Solar IR Control Thermoclear Multi-Wall Sheet in a hotel in Amsterdam will save approximately 1.4 GJ of energy and associated average heating/cooling cost of EUR 61,000 @ 0.15 EUR/kWh residential EU electricity cost.

## Bio-based materials

Bio-based plastics are made, at least in part, from raw materials derived from renewable sources such as agricultural crops, forest residues, or algae. In basic terms, both non-renewable raw materials such as oil, and renewable raw materials such as starch, share common elements including carbon and hydrogen. Therefore, in the future nearly all of today's plastics, with few exceptions, may be converted to bio-based plastics with advanced science and technology.

The use of bio-based materials is an emerging focus area for SABIC Innovative Plastics. As a complement to increased recycling, renewable raw materials can reduce energy and carbon footprints, ensure long-term supplies and help address consumer demand for environmentally responsible products. The use of natural fibers, which often weigh less than glass and other traditional fillers, potentially contributes to the design of lighter-weight vehicles. SABIC Innovative Plastics is committed to increasing the use of natural fibers in its portfolio.

Key materials include LNP\* Fibercomp\* specialty compound, a polyamide (PA) 6 nylon reinforced with up to 20 percent curauá fiber. The curauá plant is a member of the bromeliad family and is cultivated in South America. The fibers extracted from its leaves have high mechanical strength. Another LNP Fibercomp material is polypropylene (PP) reinforced with 30 percent wood flour. In addition to an appearance similar to wood, the composite provides better resistant to fungi and better dimensional stability than natural wood. Still other compounds – LNP Thermocomp\* and LNP Lubricomp\* H Series – are based on 100 percent bio-based PA-11 resin.

Lexan\* HFD resin, offering improved toughness at use temperatures 10°C to 15°C lower than that of standard polycarbonate (PC), achieves this performance advantage via incorporation of a component derived from castor oil, providing up to 7 percent bio-based content.

### Compounding bio-based and recycled materials at LNP

SABIC Innovative Plastics' LNP specialty compounding business offers extensive expertise in developing custom engineering thermoplastic compounds. LNP can tailor the use of recycled or bio-based resin building blocks and sustainable filler technology to target specific performance requirements. In addition to providing wear and friction, structural, conductive, electrically active and color properties, LNP can customize SABIC Innovative Plastics' materials to provide a variety of sustainable solutions.



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#### 1 Farm Fresh

Farm Fresh supermarkets cut amperage of freezer cases by 50 percent by replacing door heaters with Lexan Constant Clear film, which also provides excellent clarity for a better shopping experience.

#### 2 Amsterdam Arena

Transparent Lexan Solar Control IR sheet was used to enclose four escalators at the Amsterdam ArenA Stadium to reduce heat while admitting natural light. The tough material also withstands severe weather and is flame retardant.

#### 3 Perfume bottle

LNP Fibercomp MX07442 and PX07444 compounds are, respectively, polypropylene (PP) reinforced with 30 percent wood flour and polyamide (PA)-6 nylon that is reinforced with up to 20 percent curauá fiber. They are currently available in South America, with expansion being considered with customers in other regions.

#### 4 Curauá plant

#### 5 Face shield

Lexan HFD resin has improved toughness at 10°C to 15°C lower use temperatures than standard PC. This is achieved via incorporation of a soft block derived from castor oil, providing up to 7 percent bio-based content in the resin.



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**Helping customers design sustainable products**

For over 75 years, SABIC Innovative Plastics has built a business based on technical expertise and capabilities that help customers overcome design and manufacturing challenges. Today, as customers design solutions that conserve energy, food and water resources, they often encounter barriers to sustainable material selection, part design and manufacturing optimization. SABIC Innovative Plastics helps to remove these barriers, and can show customers new ways to utilize existing materials, including those from outside the Sustainability Solutions portfolio, to solve challenging design problems cost-effectively and sustainably. Examples include materials for energy-efficient lighting (light

emitting diodes [LEDs] and compact fluorescent lamps [CFLs]), thin-wall designs to reduce resource consumption, computer-aided design optimization for more productive use of materials, coating reduction and paint elimination to avoid volatile organic compound (VOC) emissions and improved molding process efficiency to reduce energy usage.

SABIC Innovative Plastics' proven materials are also making significant contributions to the alternative energy industry, including photovoltaics, solar-thermal heating, battery technology and smart electric meters.

Please call your SABIC representative to learn more.

**1 LED lighting**

Lexan® DMX, SLX and EXL resins provide light transmission combined with other performance features such as chemical resistance and unique colors contributing to LED life and efficiency. LNP® Konduit® compounds, with exceptional conductivity performance, help conduct heat away from LEDs into a heat sink or the surrounding air. Extem® resin portfolio of amorphous thermoplastic polyimide (TPI) and polyetherimide (PEI) resins provide high thermal resistance up to 311°C Tg and are inherently flame retardant without use of halogenated additives.

**2 OSRAM GmbH candle bulbs**

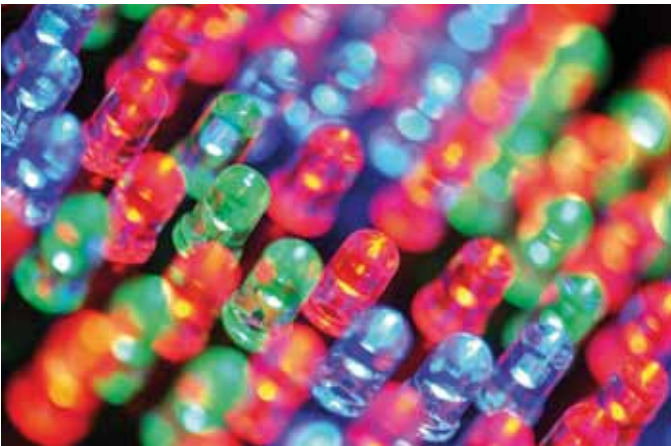
SABIC Innovative Plastics is playing a critical role in the conversion of incandescent bulbs to energy-efficient compact fluorescent lights (CFLs). OSRAM, a leading lighting manufacturer, selected Lexan FXD PC resin for its Duluxstar® Mini Bulbs – which offer a much longer life and up to 80 percent lower energy consumption than conventional incandescent versions – for its outstanding performance, aesthetics and safety.

**3 Photovoltaics**

To support the growth of solar power, Noryl® and Lexan EXL resins offer customers exceptional ease in solar panel use and greater cost efficiency, and meet stringent global regulatory standards. Applications range from PV frames to junction boxes to connectors.

**4 Solar water heaters**

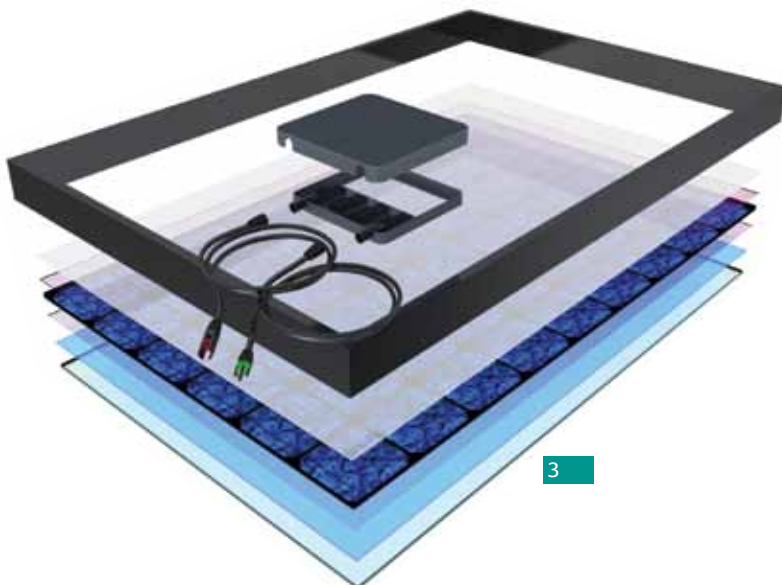
Weatherable Gelyol® resin was chosen by Himin Solar Energy Group to replace painted metal components in its compact, roof-mounted solar water heaters, helping to improve the company's product and drive adoption of residential solar heating in China.



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## Looking ahead

Contributing to SABIC's sustainability program, SABIC Innovative Plastics continues to invest in new solutions for the future. Increasing our recycling capabilities, employing green chemistry and supporting clean technologies such as alternative energy are particular focus areas for our business.

We will also continue to evolve our offerings to keep pace with changing regulations, industry standards, and customer needs, and continue to build on our strengths in developing innovative plastics to help customers solve design problems and maximize our contribution to sustainable products.

“SABIC Innovative Plastics sees continued innovation in the area of environmental sustainability as a growth initiative for our business and continues to invest accordingly.”

Charlie Crew  
President and Chief Executive Officer (CEO),  
SABIC Innovative Plastics

## Contact us

### Americas Headquarters

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