



FACT SHEET

PLASTINDIA 2023, New Delhi, INDIA, Feb 01, 2023

PlastIndia is an international plastics exhibition and conference where national and international exhibitors present their new products and technologies. It works as a platform for buyers and sellers, joint ventures etc. and enhancement business prospects, strategic alliance and technology transfer.

SOLAR PHOTOVOLTAIC SYSTEMS

OVERVIEW

In a world that is rapidly reeling under the effects of climate change, the need to transition to renewable energy has never been more profound. Solar energy is at the centre of clean energy conversations and is a popular choice due to its accessibility and affordability. Solar panels are up to 79% cheaper than they were in 2010. Solar Energy is projected to grow to 27.6% in 2050 of global electricity demand,

1. PV industry growth driven by increasing electricity demand and pressure to diversify power generation from fossil fuels to renewables
 2. Cost reductions in PV panel have driven growth; tenders with prices falling to 2 US \$ct/kWh, show PV's competitiveness
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INDUSTRY LANDSCAPE

As a signatory of the Paris Climate Agreement, India aims to reduce carbon emissions by 33-35% by 2030. The Indian Government envisions 450 GW of renewable energy capacity within this period. The installed capacity of renewable energy sources has reached 100 GW.

With an abundance of sunlight in India, tapping into solar energy is a major pillar of a sustainable future. It is estimated that the Solar PV market will continue to have high growth rate approximately 15% CAGR from 2020 to 2027 to meet the Indian Government's vision.

In general, the photovoltaic (PV) technology has evolved as the major renewable power resource in the worldwide green energy sector to meet the future challenge of energy needs. The main industrial challenges for the lifetime this technology is the poor performance and stability of the PV modules in the outdoor climate. Encapsulation of PV modules is one among the multiple ways to mitigate these stability issues and it plays an important role in the enhancement of the device lifetime by providing a encapsulated structure to restrict the penetration of oxygen and moisture

SABIC SOLUTIONS TO HARNESS SOLAR ENERGY

As one of the largest plastic resin manufacturers globally, SABIC has a wide product portfolio to meet the needs of the solar power industry. Further, to provide complete application solutions, SABIC is actively engaging with the solar energy value chain to enable future technologies. SABIC's wide product portfolio, ranging from polyolefins to engineering thermoplastics, has several offerings for sub-component and system-level solutions for photovoltaic solar applications, including PV modules, connectors, and floats.

SABIC POE FORTIFY™ , a family of high performance octene-1 copolymers, offers excellent electrical properties, high transmittance, excellent weathering resistance, good structural stability and water vapor transmission rates are critical influence factors for high efficiency, more durable, longer shelf-life of the PV module . Most importantly, SABIC POE FORTIFY™ addresses the high performance Post Induced Degradation (PID) needs, which is critical for the new market trend changing from Monofacial to Bifacial PV modules, at higher operating voltages, temperature and humidity.

SABIC centres in India that contribute to your sector/industry

The Technology & Innovation Teams at STC-Bangalore, along with our Marketing and Sales teams are engaged in every aspect of PV technology development and transfer. STC-Bangalore is taking a leading role in creating translation packages for our PV customers in India and Southeast Asia to enable a complete solution approach from SABIC for this market.

Being one of the leaders in the Research and Development World organization, our TnI teams are working entireless to improve Solar PV performance to meet the ever increasing demand of the market. Our technology leaders are working on developing new solar panel structures that are more efficient, cost-effective, and versatile, while also improving the aesthetics and integration of solar panels into buildings and other structures. Three main directions are

- 1. PV modules performance improvement: developing innovative plastic in new cell designs for higher efficiency, lower cost, at the same time improve durability and longevity of photovoltaic solar panels. Bifacial PV solar panel is also a new trend which can absorb sunlight from both sides for higher energy generation.
- 2. PV modules integrability : focusing on the flexibility and portability of photovoltaic solar panels, so that they can be easily integrated into various types of buildings and vehicles. SABIC also study how to integrate photovoltaic solar panels into smart grid systems, which would allow for more efficient distribution of energy.
- 3. PV modules support structure: smart way to support PV structures as as Float Solar Platform, which will be one of our highlights in PlastIndia 2023

Classification: Internal Use



SABIC MATERIAL SOLUTIONS FOR PV MODULE

PV Module

PV Module	SABIC Solutions	Value proposition	Status
Frame	• STAMAX™ (PP/LGF) Resin	✓ Light weight ✓ Chemical resistance ✓ Creep resistance	✓ Ideation
Front sheet	• LEXAN™ PC Resin • SABIC® PP Compound	✓ Light weight ✓ Impact resistance ✓ Transmission light ✓ FR	✓ PC under-development ✓ PPc ready (Solarge)
Encapsulant	• FORTIFY™ POE Resin	✓ Lower PID ✓ Water vapor transmission ✓ High volume resistance	✓ Commercial ized
Back sheet	• LEXAN™ PC Resin • SABIC® PP Compound	✓ Light weight ✓ Weatherability ✓ Balance stiff & toughness ✓ FR	✓ PC under-development ✓ PPc ready (Solarge)
Junction box, Connector	• NORYL™ PPE Resin • LEXAN™ EXL PC Resin	✓ Chemical resistance ✓ Electricity performance ✓ Weatherability	✓ SHPP

Commercialized solution

 SHPP Commercialized solution

Example of the innovative structure: Lightweight photovoltaic panels: Solar panel front and back covers can made using SABIC® PP compounds show more than 50% weight reduction over incumbent glass-based competitors and can achieve a carbon footprint reduction of more than 25%. They can be used for both new and retrofitting installations on roofs that cannot sustain the weight of PV glass

panels over larger areas, they are fully recyclable and free of toxic components such as potentially hazardous per- or polyfluoroalkyl substances (PFAS)

SABIC SOLUTIONS FOR FLOAT PHOTOVOLTAIC PLATFORM

India Float Photovoltaic (FPV):

FPV systems offer several advantages over on-land solar systems such as space utilization, better cooling effect, reduced land use, reduced water evaporation and increased energy production due to better cooling effects. It is expected that floating solar photovoltaics is implementable for a portion of India's medium and large reservoirs and could be alone has the potential to generate 280 GW of solar power and is expected to grow 20% annually

SABIC Solution for Float Photovoltaic (FPV) support structure:

- A key enabler for the FPV technology is the "Floats" which form the floating platforms to carry the solar payloads of the FPVs. SABIC has developed tailored Polyolefin solutions for these floats that combine easy processability using various processing techniques (like blow-molding or injection-molding), a high performance due to high stiffness and strength, excellent weatherability, durability, and the best-in-class Environmental Stress Cracking Resistance (ESCR) performance. These attributes make these products an optimal choice for Floats applications that need to have a long life while exposed to sunlight, water, salinity, and wind and wave loads
- Float PV platform: SABIC® HDPE used in making of floats for solar PV systems combine good UV resistance and environment stress crack resistance, and these modular and stackable injection-molded floats are lightweight and easy to transport. Floating solar is an emerging theme within this domain as it helps to reduce the dependency on land for solar energy and land can be put to other use such as agriculture and housing. With steadily reducing investment costs (due to advances in manufacturing costs, and material improvements), and bid prices, India can achieve one of the lowest costs for setting up FPV projects.
- Photovoltaic encapsulant film: SABIC FORTIFY™ (POE) elastomers used for encapsulant films in bi-facial high-power glass-glass PV panels combine outstanding stability at elevated temperatures and UV exposure with improved potential induced degradation (PID) performance compared to commonly used EVA (ethyl vinyl acetate) based encapsulants. PID performance of SABIC's elastomers for encapsulants in PV panels help the power of the module over time, maintaining low leakage current, thus extended service life

SABIC centres in India that contribute to your sector/industry

Key aspects of the FPV Translation Package being worked upon at STC-Bangalore include:

- Close engagement with the FPV value chain (Utility-scale project developers, Engineering-Procurement-Construction companies, Float-manufacturers, and Solar Module suppliers) and specifiers for Specification Development & Qualification.
- Detailed R&D on additive packages for achieving good weatherability and durability, formulation Development & Benchmarking to arrive at robust products for the industry.
- Leverage of world-class in-house facilities to carry out accelerated Methods for mechanical performance, and Life Evaluation (Fatigue, Creep, Weathering, ESCR) of the products, using a combination of testing and modeling;
- Leverage deep expertise in application development and predictive engineering for Design, Prototyping, Processing, Performance-evaluation, & Piloting at component, assembly, and system levels to arrive at holistic solutions for FPV
- These capabilities at STC-Bangalore, combined with a dedicated Marketing team, and access to our global know-how, will be playing an eager part in bringing to reality India's vision of a sustainable future in energy.