

## 3M Products for Solar Energy



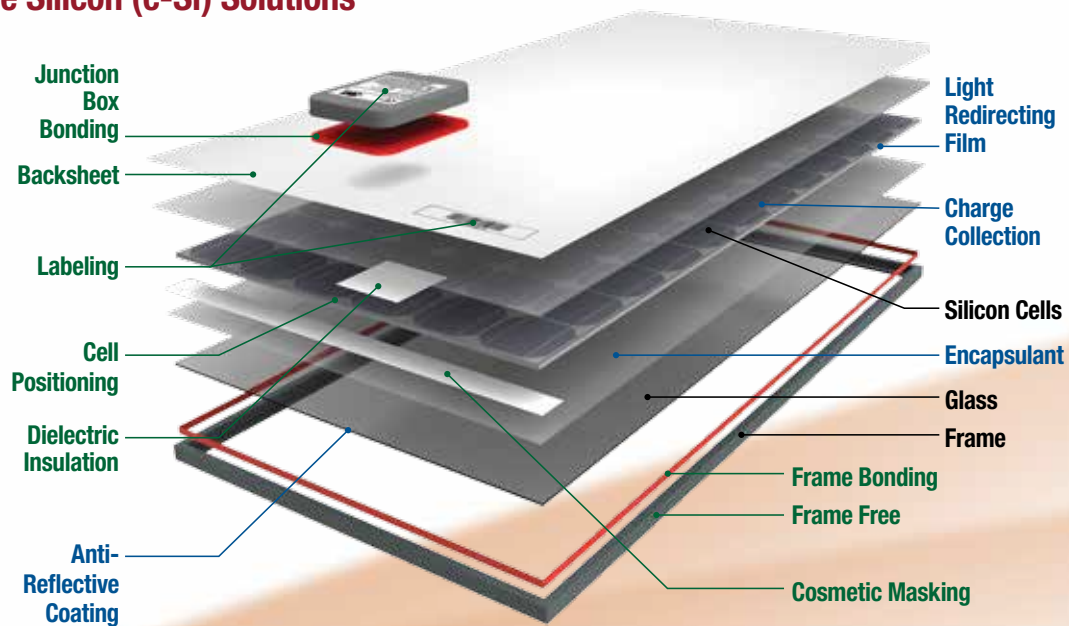
Your ideas.  
Our technologies.

For more than a decade, 3M has been a trusted supplier of advanced materials for the solar industry. Our broad range of products and technologies is designed to enhance performance, improve reliability and drive down the critical cost per watt. As one of the world's leading suppliers of advanced films, tapes, coatings and adhesives, we have the ability to supply products and provide technical support around the world.

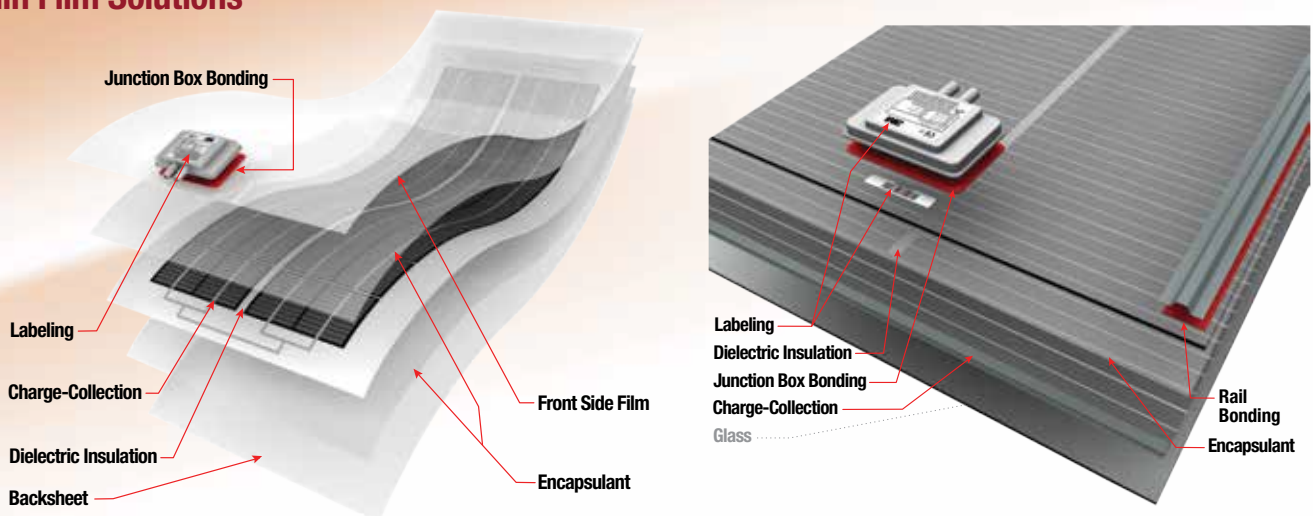
3M Solar materials offer excellent protection from extreme weather conditions, including high temperatures, moisture, sand and other debris that can damage modules and inhibit system uptime. At the same time, these advanced materials are designed to work together to help increase energy output – driving down the cost per watt, while helping to improve your profit potential.

As one of the world's leading suppliers of advanced films, tapes, coatings and adhesives, 3M has the ability to supply innovative, high-efficiency products and technical support around the world, for a variety of solar applications, including Crystalline Silicon (c-Si) and Thin Films.

## Crystalline Silicon (c-Si) Solutions



## Thin Film Solutions



# 3M™ Film Solutions

## 3M™ Scotchshield™ Backsheet Film

Moisture, heat and UV rays can seriously damage photovoltaic modules. 3M™ Scotchshield™ Film backsheets are uniquely engineered for maximum protection. Featuring 3M's innovative fluoropolymer technology and backed by years of proven, real-world performance, 3M Scotchshield Film backsheets deliver outstanding moisture protection, heat resistance and UV stability. The low moisture vapor transmission rate allows for excellent retention of interlayer adhesion after environmental aging. Made with a unique solvent-free manufacturing process, 3M Scotchshield Film backsheets feature a durable outer layer of THV fluoropolymer bonded to PET. Then an extra layer of EVA provides exceptional compatibility with encapsulants for strong, durable bonds. The outer surface is treated to facilitate the use of a broad range of adhesives, tapes and labels.



## 3M™ Solar Encapsulant Film

3M™ Solar Encapsulant Film is a fast cure encapsulant designed to work with PV modules. It protects against UV damage and weathering, while allowing the maximum amount of visible light transmission to solar cells. Conformable and flexible film is easy to laminate and features a low shrinkage rate. It provides a durable bond with both glass and backsheet. The film has excellent visible light transparency, strong adhesion and elasticity properties required for solar cell encapsulation, plus decades of protection against UV aging, discoloration and weathering.



## 3M™ Ultra Barrier Solar Film

Transparent 3M™ Ultra Barrier Solar Film can be used to replace glass – enabling high efficiency lightweight, flexible photovoltaic (PV) modules. Designed to address the needs of flexible thin film solar manufacturers, 3M Ultra Barrier Solar Film acts as a replacement for glass with its high light transmission, superb moisture barrier performance and excellent weatherability. 3M Ultra Barrier Solar Film is a multi-layered film made from a 3M proprietary roll to roll vacuum coating process. 3M has combined its knowledge of polymer films, nano technology adhesives and advanced materials to deliver a high-performing front sheet barrier film for the solar industry. 3M Ultra Barrier Solar Film is a UL certified component.



# 3M™ Light Management Solutions

Photo courtesy of



## 3M™ Cool Mirror Film

3M™ Cool Mirror Film is an all-polymeric wavelength-selective mirror film designed to reflect wavelengths of high conversion efficiency in PV modules, transmit longer infrared wavelengths, and absorb ultraviolet wavelengths. The film can be used in low-concentration PV (LCPV) configurations to increase the amount of light on PV modules, thus significantly increasing energy production while limiting module heating and UV exposure. Increases in annual energy production of up to 34% have been demonstrated versus non-concentrated configurations when using Cool Mirror panels in LCPV configurations\*.

\* Energy production improvement varies depending on latitude of installation, time of year, PV module tilt, and mirror panel tilt.

## 3M™ Anti-Reflection Coatings

3M™ Anti-Reflection (AR) Coatings are water-based, durable coatings that increase front glass transmission, thereby raising solar module efficiency. Compared with solvent-based coatings, 3M AR Coatings may result in lower coating defect rates and can reduce costs associated with managing solvent vapors. Designed specifically for OEM use, the products are applied to glass prior to tempering. The glass tempering process increases the coating's durability and resistance to UV, humidity, and abrasion.



# 3M™ Tape Solutions



## 3M™ Charge-Collection Tapes

The tin-plated, deadsoft copper foil tapes with a low outgassing pressure-sensitive adhesive or used in applications requiring excellent electrical conductivity from the substrate through the foil backing. The tin plating facilitates soldering to the backing and resists oxidation and corrosion. Suitable for standard laminating temperatures, these tapes are available in a wide range of configurations for applications as charge collectors or buses within solar panels.



## 3M™ Dielectric Tapes

3M™ Dielectric Tapes are excellent high temperature tapes for solar PV applications. Available in a wide variety of widths, they are reliable electric insulators with low outgassing adhesive and can be applied automatically to allow for rapid application to maximize productivity.



## 3M™ Specialty Tapes

3M provides a wide range of tapes designed specifically for use in PV modules. These durable tapes ensure reliable, long-term application for everything from cosmetic masking to cell positioning.

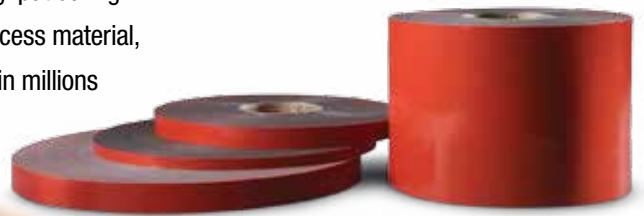


## 3M™ Solar Acrylic Foam Tapes

For over 30 years, industries worldwide have been using 3M™ Solar Acrylic Foam Tape technology to permanently bond and attach many substrates. The acrylic-based chemistry makes it ideal for critical applications that demand durability, including automotive, electronics, signage, glazing and construction markets.

### Frame Bonding

UL-Certified 3M Solar Acrylic Foam Tapes can provide durable attachment solutions for solar module frames. The immediate holding feature allows for high throughput during manufacturing. Compared to sealants, there is no need to clean off any excess material, resulting in less labor and a more professional look. With field experience in millions of solar panels around the world, 3M Solar Acrylic Foam Tape is a time-tested solution for frame bonding.



### Junction Box Bonding

3M Solar Acrylic Foam Tape technology enables rapid attachment of junction boxes to solar modules. The easy, no-mess application allows for faster fabrication and can result in a cleaner look, compared to liquid adhesives and mastics. 3M Solar Acrylic Foam Tapes are all UL certified.

### Rail Bonding

3M Solar Acrylic Foam Tapes are also available in thicker product constructions to provide an easy, no-mess application when bonding rails to solar modules. 3M Solar Acrylic Foam Tapes are all UL certified.



## 3M Renewable Energy Division: Unmatched Capabilities

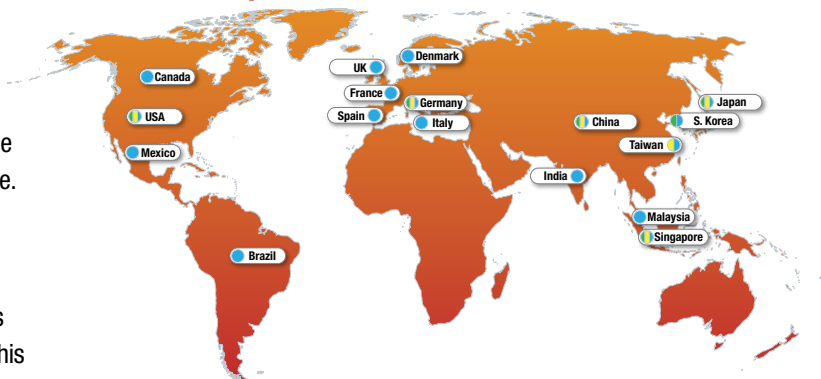
3M's commitment to the renewable energy industry includes a global organization of research and development, sales, marketing, manufacturing and technical service – all dedicated to developing reliable materials that reduce costs and improve performance.

### Expertise

Founded in 1902, 3M has extensive experience developing durable materials for outdoor applications in transportation, commercial graphics and optics. This includes world-class facilities for simulated and real-time weathering exposure and testing.

### Innovation

At 3M, the innovation is never-ending. Whether the free-flow of ideas and solutions is occurring among our people, our technologies, our industries or the geographies where we operate, the human and technological connections within 3M enable infinite combinations and applications of expertise as ideas multiply and solutions expand.



● **Laboratories** ● **Manufacturing** ● **Sales and Marketing**

Laboratories	Manufacturing	Sales and Marketing
USA	USA	USA
Japan	Germany	Canada
Germany	Singapore	Mexico
South Korea	Japan	Germany
Singapore	Taiwan	Denmark
China	China	Spain
		UK
		France
		Italy
		Singapore
		China
		South Korea
		Japan
		Taiwan
		Malaysia
		India
		Brazil

## Collaborate with 3M

3M innovation is fundamentally about solving problems. We extend an open invitation to access our experts – present your challenges so we can work together to develop answers and solutions and put 3M's technology to work for you.

### United States

3M Renewable Energy Division  
800 755 2654

### Germany

49 2131 144450

### Denmark

45 43 480100

### Spain

34 91 3216000

### France

33 1 30316161

### United Kingdom

44 1344 858000

### Italy

39 02 70351

### Singapore

65 6450 8888

### China

86 21 62753535

### South Korea

82 2 3771 4043

### India

91 80 22231414

### Canada

800 364 3577

### Brazil

0800 13 23 33

### Mexico

52 55 52702250

### Taiwan

886 933 896752

### Japan

81 3 3709 8283

### Malaysia

603 78062888

### Other Areas

800 755 2654

For more information on our solar manufacturing product line, contact 3M Renewable Energy at 800-755-2654 or visit us at [www.3M.com/solar](http://www.3M.com/solar).

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