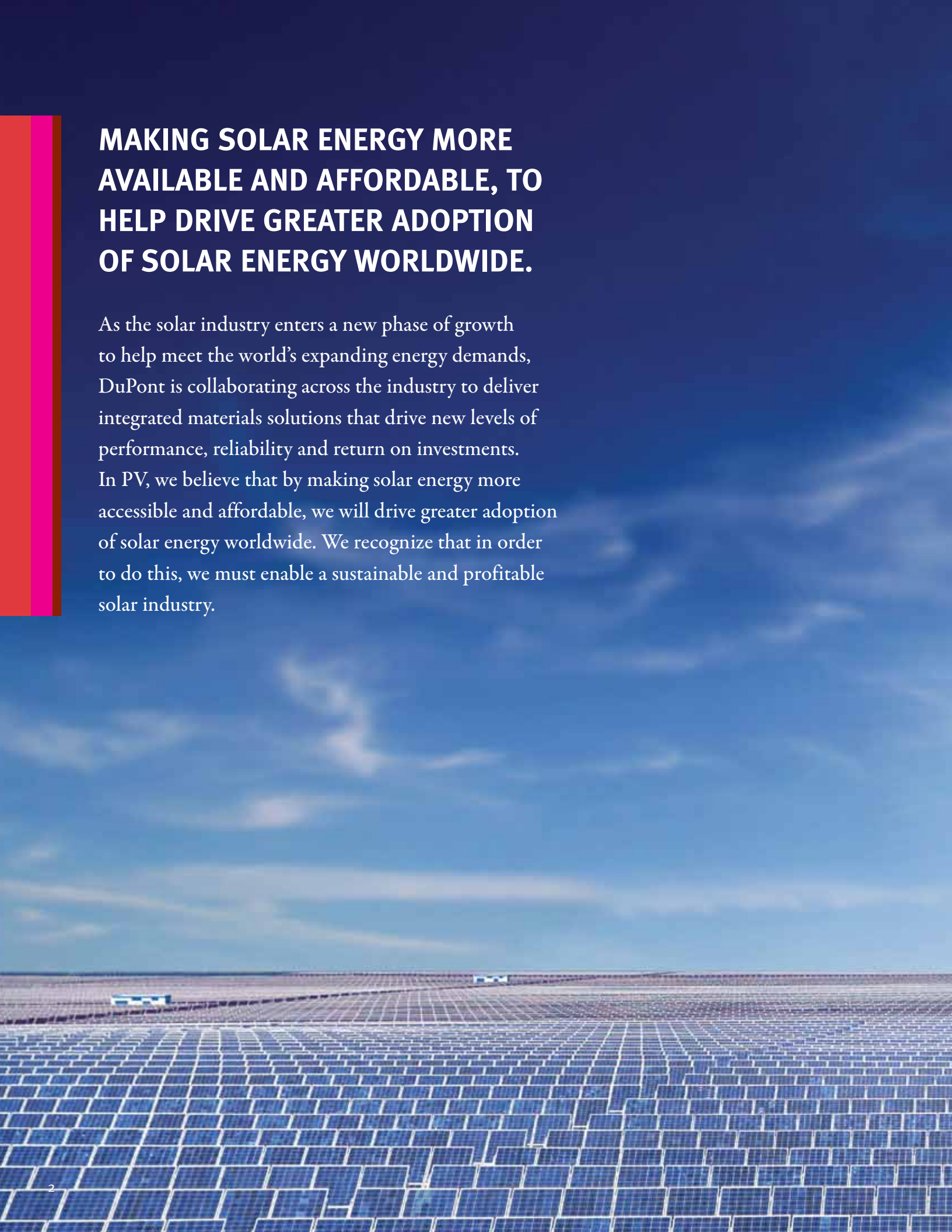
MATERIALS MATTER™

DuPont™ Solamet® Photovoltaic Metallizations
Advancing the Technology that Advances the Industry

MAKING SOLAR ENERGY MORE AVAILABLE AND AFFORDABLE, TO HELP DRIVE GREATER ADOPTION OF SOLAR ENERGY WORLDWIDE.

As the solar industry enters a new phase of growth to help meet the world's expanding energy demands, DuPont is collaborating across the industry to deliver integrated materials solutions that drive new levels of performance, reliability and return on investments. In PV, we believe that by making solar energy more accessible and affordable, we will drive greater adoption of solar energy worldwide. We recognize that in order to do this, we must enable a sustainable and profitable solar industry.



Today DuPont offers the broadest materials portfolio in PV and provides six of the eight most critical materials for manufacturing solar modules. These materials are not only innovative, but also they have delivered demonstrable results, including: nearly doubling cell efficiency over 12 years, providing greater reliability and extending system lifetime, and reducing overall system cost with technology advancements in efficiency, module protection and installation.

Over 16 billion solar cells produced over the past 30 years contain DuPont silver pastes, today known as Solamet® photovoltaic metallizations.

More than half of the world's 400 million solar panels installed since 1975 rely on DuPont materials science. That means many of our innovative materials have been time-tested for decades in more than five trillion panel-hours of outdoor PV field installations all around the world.

Powering 13 Solar Installations on DuPont Sites on Three Continents

We are an owner of PV systems and have 13 solar installations on DuPont land to date, generating 8.1 megawatts of clean energy from solar. Owning our own assets provides a great perspective on the issues of long-term ownership and maintenance issues.

Improving Efficiency of Crystalline Silicon Solar Cells with Use of DuPont™ Solamet® Metallization Pastes

DuPont™ Solamet® photovoltaic metallization pastes have allowed the conversion efficiencies of mass produced solar cells to nearly double over the past 12 years. Through continued investment in research, development and intellectual property, DuPont continues to focus on increasing solar cell efficiency, extending module lifetime and lowering overall system costs to make solar energy more competitive with other sources of electricity.

DuPont™ Solamet® metallization pastes help drive higher energy conversion efficiency, enabling lower levelized cost of energy (LCOE). This is achieved by reducing cost with continuous improvements in material content cost and laydown.

Lowering Levelized Cost of Energy

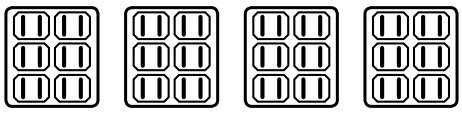
Many experts now advocate the use of LCOE over cost-per-watt, which is often used to express the cost of a PV system.

Cost-per-watt (or $/watt) only describes the purchase price for the initial power capacity for a solar panel; it does not express the overall cost of system ownership.

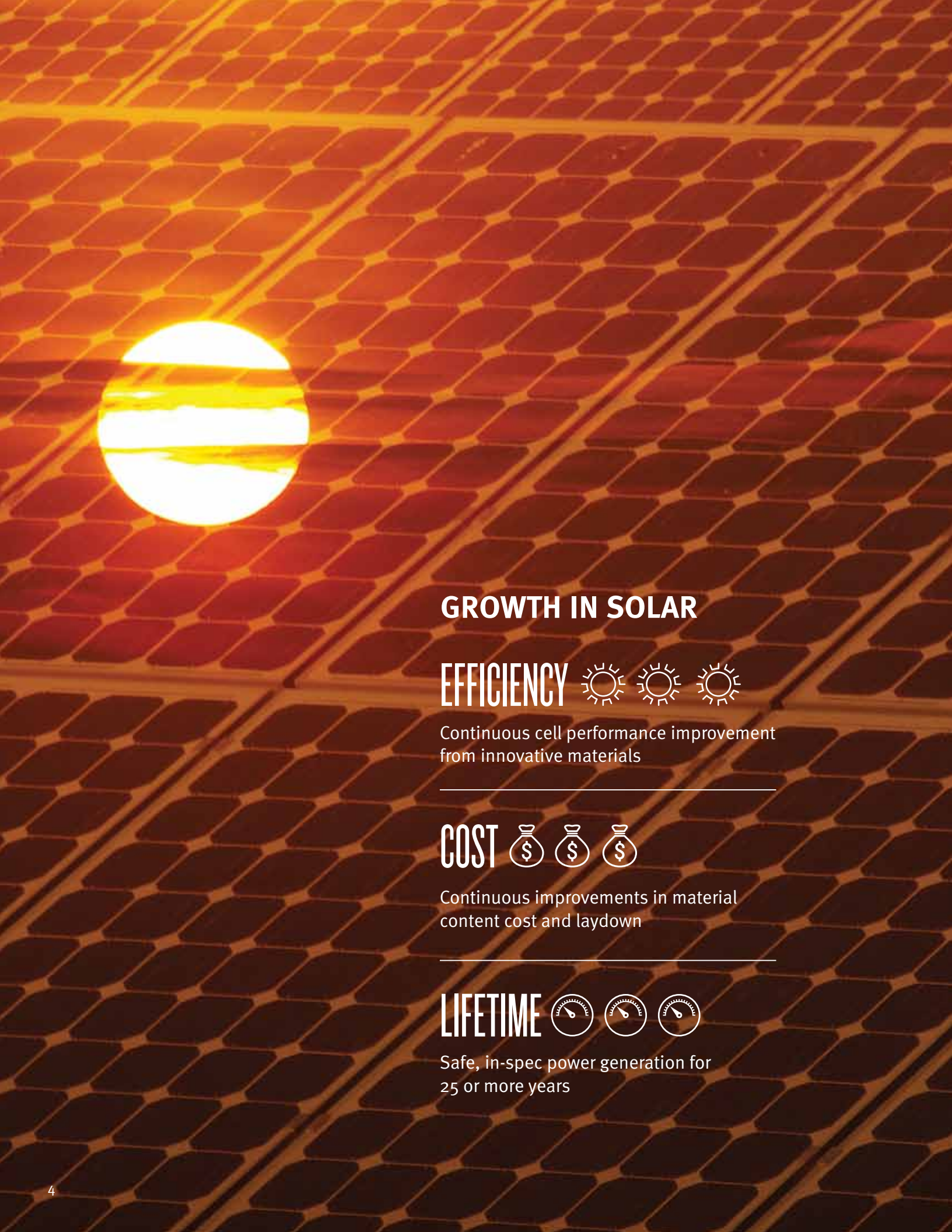
According to many experts, LCOE is a much better performance metric that reflects true system performance and, therefore, true investment returns. LCOE points us toward grid parity as it enables the best cost/performance decisions.

DuPont Solamet® metallization pastes can help lower the overall LCOE by increasing module power output, using less material and improving adhesion, enhancing solderability and reliability.

+50%



More than half of the world's 400 million solar panels installed since 1975 have DuPont materials in them.



GROWTH IN SOLAR

EFFICIENCY

Continuous cell performance improvement from innovative materials

COST

Continuous improvements in material content cost and laydown

LIFETIME

Safe, in-spec power generation for 25 or more years

Three Areas Driving Next Phase of Growth in Solar

Conventional cell structures, efficiency advances to lower LCOE

- Technical differentiation into next generation FS-Ag is reducing, as each parameter nears its theoretical limit. Approx. 0.15-0.25% GAP still available

Conventional cell structures, cost advances to lower LCOE

- Higher adhesion to lower laydown
- Higher adhesion to reduce print footprint
- Silver replacement technology in the future

New cell structures to help lower LCOE

- Local Back Surface Field (LBSF)
- Metal Wrap-Through (MWT)
- N-Type
- Interdigitated Back Contact (IBC)

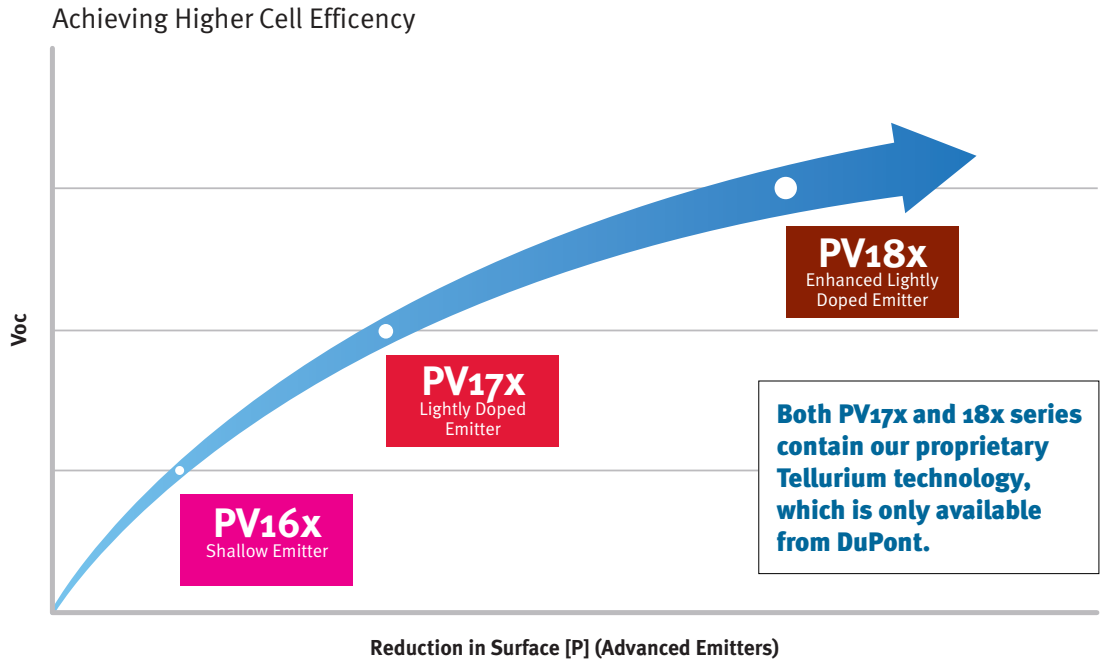
DuPont™ Solamet® Leads the Way to Achieve Higher Cell Efficiency

From Solamet® PV17x to PV18x today, Solamet® metallization pastes continue to set the standard for cell efficiency. We have a robust innovation roadmap to deliver >22% cell efficiency by 2015. Only DuPont™ Solamet® metallization pastes combine proprietary Tellurium technology with Lightly Doped Emitters (LDE), which has set today's standard.

The Solamet® PV18x series, which is the newest advancement in the technology, delivers improved efficiency for solar cells over the PV17x series, which is the leading frontside metallization paste and current industry benchmark. Solamet® PV17x + LDE delivers a 0.4% efficiency improvement over previous technologies.

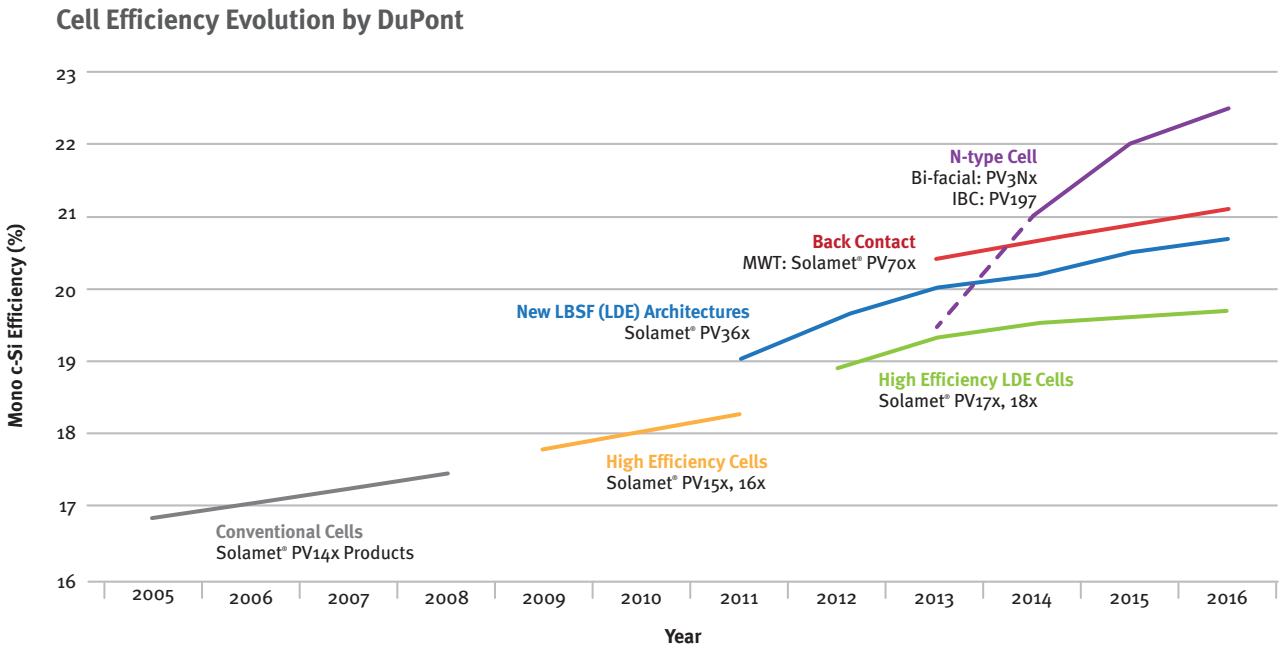
Both PV17x and 18x series contain our proprietary Tellurium technology, which is only available from DuPont. No one is licensed to use our proprietary Tellurium technology. Solamet® PV18x expands productivity further than the PV17x series by delivering greater efficiency from even better contact to LDEs with less material required.

We continue to innovate the Solamet® PV18x technology to achieve even finer lines, to support further reductions in cost of ownership of multi-crystalline cells with higher efficiency results.



Innovative Materials Science enables contact to Enhanced LDE → Increased V_{oc} and Efficency

LCOE Reduction through Efficiency Improvement Roadmap



DuPont™ Solamet® is on target to boost cell efficiency to 22% in 2015

DuPont™ Solamet® Metallization Pastes – Advancing Industry Cell Efficiency

#1 Brand in metallization pastes in multi-generation cell efficiency

0.4% Efficiency improvement with Solamet® PV17x PV18x with LDE

44 Product launches in the last six years

Efficiency Leadership

- First to offer Lightly Doped Emitters (LDE) technology, enabling contact of LDEs on a large commercial scale
- First to offer silicon inks, enabling simple, cost-effective solutions for selective emitters
- First to offer frontside chemistry, enabling >75 ohm emitters
- First to offer co-fire metallizations, enabling double-digit cell efficiency

By delivering new and innovative solutions, we aim to improve power efficiency (efficiency and lifetime) by as much as 30% by 2020.

DuPont is developing circuitized backsheets using advanced Tedlar® and Solamet® materials that we expect will start to become ubiquitous within 5 years.

What We Tell System Developers, Investors, Owners

- Ensure your system uses proven bill-of-materials, system design and manufacturing processes
- Know what materials are in your module – because not all modules are created equal. There are big performance differences. Specify and make sure you get what you paid for. Request that your module manufacturer certify that the materials used are what you specified. Use proven, industry standards.
- Work with proven and reliable industry leaders – up and down the value chain – who will prevail long-term and who will continue to invest in and advance the technology that advances the industry.
- Materials do matter. Select DuPont as your partner to help deliver better long-term system performance and high financial returns.

+30%

We aim to improve power efficiency (efficiency and lifetime) by as much as 30% by 2020.

Materials Matter™ for long-life systems and higher returns.

For more information about how DuPont can help you grow your brand and your business, visit photovoltaics.dupont.com

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