

## Maximizing the Potential of Solar Power

by Solaria CEO Dan Shugar

When I started in the photovoltaic (PV) industry in 1988, the annual production of PV worldwide was just 30 megawatts. PV applications were virtually all small off-grid systems such as telecommunications and homes remote from the grid. Now, 21 years later, annual production has expanded beyond 5,000 MW to applications that are predominantly on-grid PV power plants for homes, businesses, and electric utilities. It has been tremendously satisfying to be part of this dramatic transformation. So what has been driving this growth, and what will drive it in the future?

A primary growth driver has been dramatic cost reduction. PV power plants cost about half of what they did in 2004. In contrast, the average cost of building conventional power plants has increased by 78%<sup>1</sup> over the same period, and fuel costs of coal, today's dominant and most environmentally damaging energy source, increased by 64%<sup>2</sup>.

Another catalyst of PV growth is the desire to transition to clean energy. It is widely acknowledged that coal devastates air quality, water quality, human health, habitats, and landscapes – and is the largest single culprit of global warming. Four years ago, 208 new coal plants were planned for North America. 109 of these projects were defeated by communities with support from leading environmental organizations such as the Sierra Club. While people are saying NO to dirty power, they are saying YES to renewable energy; polls – wherever conducted – have customers selecting solar as their preferred energy source by 2:1 margins. Policy makers have responded to these motivations by creating incentives for PV markets in Europe, North America, and Asia. These programs have gained in popularity and greatly stimulated project development.



**The third driver is reliability.** Industry leaders now offer a 25 year warranty on the power produced by every solar panel. What other product in your home or business comes with such a long warranty? While solar power plants are proven, there is also zero risk about the cost or availability of its fuel – we have high confidence the sun will continue shining brightly. Millions of customers in key markets have embraced PV as a practical measure to supply their peak energy needs and enhance their energy security.

**These factors have made PV one of the fastest growing new energy sources.** At a time when most manufacturing sectors are contracting, PV R&D, manufacturing, installation, and service is growing exponentially and offers employment opportunities at all skill and educational levels.

**We've come a long way together in the industry.** In some respects we just arrived as a real player on the world energy stage. So what might the future hold for the PV industry, and how will Solaria contribute to PV becoming a mainstream energy source?

**I believe the PV industry has crossed an inflection point on cost, performance, and value that will drive exponential growth.** The greater volumes we see near-term will yield further cost reduction, and lower costs will further stimulate demand and an expanding cycle of greater market penetration. Leading market research analysts<sup>3</sup> forecast tripling shipment growth to 17,000 MW (+/-5,000) within 4 years – approaching the peak energy demand of all the New England states combined. If PV continues growing in our current decade at the rate it did in the previous one, by 2020 annual shipments in excess of 100,000 MW are possible – more than double the peak power demand of Italy will be added each year!

**For well over a decade, I had the privilege of helping PowerLight Corporation and Sunpower Corporation** (following a successful merger) grow by manufacturing and building some of the world's largest and most productive PV power plants. After 21 years of working in renewable energy, I took a year off for personal priorities. As the year progressed, I spent a great deal of time thinking about the direction of the solar industry and where the next breakthroughs would emerge. It became clear to me that Solaria Corporation was the best place for me to contribute.

**Solaria has developed a very practical approach to scale crystalline PV.** In a nutshell, Solaria's patented technology takes a PV cell, cuts it into strips, and then uses a durable glass lens to effectively double the power that the cell generates. As the cell is the most expensive component of a solar panel by far, this technology dramatically lowers solar panel cost. In the future, even greater multiplying of cell power is planned. Silicon is a good choice for the Solaria technology. Most solar cells are produced with silicon today. Additionally, it offers the highest efficiency of commercialized technologies, is made from non-toxic materials, and originates from an abundant raw material available around the world.

The Solaria product is pragmatic because it uses all the same time-tested and safety certified components of a standard solar panel – glass, encapsulant, conductors, backsheet, junction box, and frame. The Solaria module looks, ships, and installs like a high quality crystalline PV panel – and it has comparable efficiency and productivity. It is optimized for an affordable one axis tracker, which typically produces 15-30% more energy than a fixed panel system.

In addition to reducing panel cost, the Solaria technology will help the industry scale capacity quickly and affordably. Producing a crystalline PV cell requires a polysilicon production, ingot production, wafer production, and finally cell production – and usually these are each done in separate factories. There has been roughly \$20 billion invested in these steps to produce today’s crystalline PV cells. Solaria adds its “doubling” value after all of these steps are completed – at a fraction of the cost of adding that new upstream capacity – and can be readily applied to most crystalline PV cell technologies. Thus Solaria provides an opportunity for the industry to scale up without requiring the capital markets to invest tens of billions more – an important consideration in today’s economic climate.

PV already has an attractive “energy payback” of about 1.9 years, meaning that the energy required to produce a PV module is generated in 1.9 years of operation.

Solaria brings the energy payback to less than 1 year, further contributing to PV’s role as a leading energy solution with negligible carbon footprint in its creation.

There are many technologies and business models required to mainstream PV.

Solaria will be a key enabling technology in the industry and I am extremely excited to be part of the company as we accelerate the adoption of PV everywhere.

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<sup>1</sup>Source: HIS Cambridge Energy Research Associates, North American Power Capital Cost Index (PCCI), December 18, 2009.

<sup>2</sup>Source: US Energy Information Administration

<sup>3</sup>Source: Paula Mints, Navigant Consulting, Report #NPS-Supply3.