

## E.I. du Pont de Nemours & Company

### Introduction

Environmentalists have, for decades, engaged in a discussion of ideas with DuPont. These discussions continue into today, but somewhere along the way its nature changed. Today, it seems, everyone sees green.

DuPont has reduced its greenhouse gas emissions 72% below its 1990 levels and reduced its global energy use by 7% over the same period – from a company that earned over \$3 billion in 2006. By 2015, the company will focus ever more on helping its customers be green – to the tune of developing \$10 billion in new sustainability market revenue.<sup>1</sup>



Fig. 1 – Photovoltaic Cells installed at the Bessemer City, N.C. Central Carolina Bank location.

Source: NREL PIX

For major proponents of the sustainability movement, DuPont's interest is very positive news. The company is one of the leading suppliers of fuel cell membranes and sub-assemblies around the world, many technologies likely to drive future development of biofuels, and, as demonstrated by their new \$50-million

<sup>1</sup> [DuPont 2015 Sustainability Goals](#)



### Company Snapshot

E.I. du Pont de Nemours & Co.  
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### Current Operations

R&D Facility in RTP  
Manufacturing facility in Fayetteville, NC

### Overview

- \$50 million expansion announced in August 2006 for photovoltaic components
- Expansion will produce Tedlar®, a polymer used in manufacture of photovoltaic panel backing components
- About 15 new skilled manufacturing jobs
- Average wage of \$874/week plus benefits – double county average

### Awards & Grants

- \$50,000 grant from One North Carolina Fund
- \$500,000 in local incentives (5-year tot.) if plant meets performance requirements

### Summary

DuPont's polyvinyl fluoride polymer, Tedlar®, will be used as a protective film in PV-cell backing sheets. The company estimates the market for this material is growing at about 30% per year. The \$50-million investment brings the company's total facility investment to \$125 million.

investment in North Carolina, solar power technologies.

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expansion will bring 15 skilled manufacturing jobs to the county paying an estimated \$874 per week plus benefits. The expansion also benefited from a \$50,000 grant from the One North Carolina Fund and an estimated \$500,000 in local incentives over five years, contingent upon the expansion meeting growth targets.<sup>2</sup>

DuPont's expansion is emblematic of a broader opportunity for economic development and renewable energy in North Carolina. Many large, old economy companies, such as DuPont, are making major investments to serve rapidly growing demand for renewable energy and energy efficiency products.

As to North Carolina's potential for manufacturing expansions from existing companies serving renewable energy markets, perhaps DuPont Plan Manager Barry Hudson said it best to Fayetteville Online, "We're excited about this new product and these new manufacturing jobs for the Fayetteville region."

### Company Profile

At the time of the expansion's announcement, DuPont employed 60,000 workers worldwide and about 900 total at facilities in Fayetteville, Kinston, and Research Triangle Park.<sup>3</sup>

At the Fayetteville Works facility, DuPont produces component materials for fuel cells, and with the new expansion, will produce Tedlar® polyvinyl fluoride film used in the protective backing layer of solar cells, a renewable energy technology that converts sunlight into electricity.

<sup>2</sup> Jenkins, Venita. "DuPont to make solar-panel film at Fayetteville plant." Fayetteville Online. August 24, 2006.

<sup>3</sup> News Briefs. "DuPont Announces \$50 Million Facility Expansion in Fayetteville, North Carolina." Expansion Management. August 2006

"The photovoltaic industry is experiencing rapid worldwide growth as consumers turn to alternatives to fossil fuels that are becoming increasingly expensive as well as facing diminishing reserves. The new plant, which will help DuPont meet that growing demand, is scheduled for completion in 2007." – N.C. Office of the Governor Press Release, Aug. 2006.<sup>4</sup>

### Technology



Fig. 2– DuPont facility located along the Bladen County line near Cumberland County

DuPont Tedlar® is a fluoropolymer used in the protective backing layer of photovoltaic cells (PV cells). Photovoltaic cells, or solar cells, are renewable energy technology that converts light into electricity. Most often made from silicon, solar cell production involves significant expertise in high technology manufacturing.

DuPont's film serves a number of functions in the operation of a PV cell.

<sup>4</sup> Press Release. "Gov. Easley Announces \$50 Million DuPont Expansion in Bladen County." Office of the Governor. August 23, 2006

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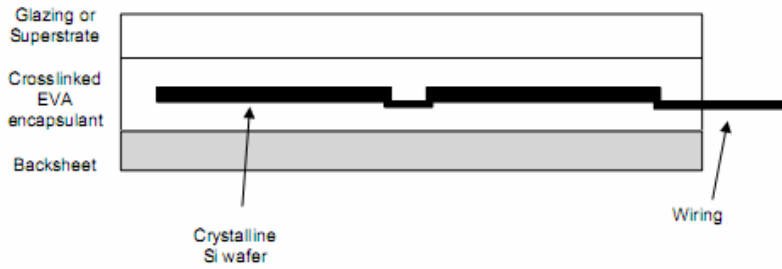


Fig. 3 – Cross-section of PV cell where Tedlar® is a component of the backsheet.

Source: DeBergalis, Michael. "Fluoropolymer Films in the Photovoltaic Industry." *Journal of Fluorine Chemistry* 125 (2004) 1255–1257

DuPont Fluoroproducts. "The Tedlar® PV2100 Series is another important example of how we are innovating to increase the life of solar modules, improve productivity and, ultimately, continue to make solar power a more viable alternative energy option." – Company Press Release Aug. 15, 2006

**Markets**

According to the company, the Tedlar® film provides physical protection against scrapes and abrasions, isolation of cell from the environment (including resistance to vapor ingress), long-term stability against UV degradation, and a variety of color finishes for multiple application integration.

The draft plan of the Solar America Initiative projects continued exponential growth for solar cell markets. From today's current annual installations of about 2,000 MW, the report predicts growth of annual installed MW to reach 6,000 MW per year by the end of 2009.

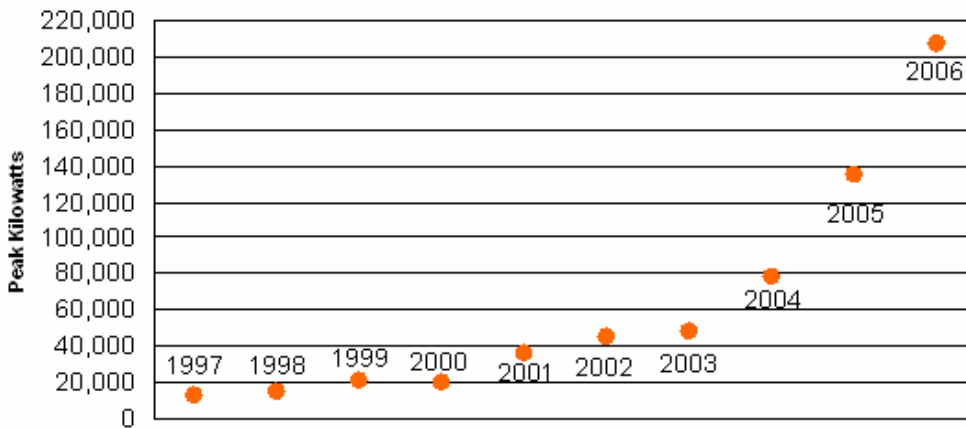


Fig. 4 – Photovoltaic Domestic Shipments, 1997-2006

Source: Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

"As the global demand for photovoltaic energy continues to increase, DuPont is well positioned to help cell and module makers specify the most efficient, high-performing photovoltaic materials," said Hilde Roekens, global segment leader --

The major determinant of this growth will be the availability of silicon – a primary ingredient in solar cells. In the interim period, pending increased production capacity for silicon PV cells, other solar technologies have been gaining market

share. While thin-film and concentrating solar power technologies both use the sun's light to generate electricity neither require silicon feedstock. As a result, thin-film solar has gained an all-time high 30% market share of the solar market, up from only about 10% as recently as 2004.

Supply shortage or not, global industry growth has remained strong over the past decade. As shown in Figure 4, the United States the U.S. domestic market has been growing rapidly during recent years. However, as recently as 2005, U.S. market share was only about 10% of global demand as Europe, the rest of the world, and especially Japan have made major investments in the installation of this renewable energy technology.<sup>5</sup>

Strong demand and industry growth around the world resulted in 2006 being the first year U.S. PV cell imports outpaced exports. The leading export countries purchasing U.S. PV cell shipments were (in decreasing order) Germany, Spain, Portugal, China, and South Korea.<sup>6</sup>

### Summary

DuPont's solar power expansion in North Carolina is an indicator of much broader opportunity. A report on the potential for existing firms to manufacture products and subassemblies for renewable energy markets identified North Carolina as the seventh-ranked state by number of potential new jobs serving solar markets within existing industry.

The Renewable Energy Policy Project reported in November 2006 that nearly 1,100 firms already in North Carolina

have potential to serve solar PV cell markets. If annual solar PV industry production capacity were to expand to 15,190 MW (about five times current annual production capacity, and about twice industry-projected 2009 capacity), North Carolina's share of growth within its existing industry base is over 11,000 new FTE jobs.<sup>7</sup>

Globally, solar is a \$10+ billion industry that in 2006 made capital investment equal to 28% of its industry gross revenue.<sup>8</sup> The boom in solar is being driven by high demand growth rates in industrialized nations around the world.

While North Carolina's potential is obvious, whether the state will successfully maintain its share of existing industry during the growth of renewable energy manufacturing is far from certain. Solar jobs are being created as fast as the market is growing, but few opportunities are as destined for North Carolina as DuPont.

DuPont Tedlar® is a fluoropolymer product – an advanced polymer that DuPont practically invented. Since the Fayetteville Works facility is a primary location for fluoropolymer production, encouraging DuPont to produce these products in Fayetteville required relatively little effort. Because of the high demand for renewable energy manufacturers by states and local areas, adding these new jobs to maintain the state's of these industries will not happen without effort.

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<sup>5</sup> Solar America Initiative. Draft Plan. U.S. Department of Energy.

<sup>6</sup> Energy Information Administration, U.S. Department of Energy. Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey."

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<sup>7</sup> Sterzinger, George, et.al. "Component Manufacturing: Michigan's Future in the Renewable Energy Industry." Renewable Energy Policy Project Technical Report. November 2006.

<sup>8</sup> Marketbuzz™ 2007: Annual World Solar Photovoltaic Industry Report.