Duke Solar
Trough Markets

John F. Myles

Duke Solar

Five Major Business Divisions

- Power Generation
- Buildings
- Solar Hot Water
- Pre-Engineered Packaged Systems
- Franchising and Licensing

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Team/Resources

- **Solar Expertise – Worldwide recognition**
- **Building Expertise – design & construction**
- **Energy Expertise – Small & large utility scale**
- **Manufacturing Expertise**

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Duke Solar technology approach

- **Duke Solar has selected trough technology as its primary vehicle for large scale power generation**
- **Duke Solar is receptive to deploying or integrating other solar technologies**

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US Market Activity
Power Generation

- **Large scale solar plants**

  California

  Nevada

  Native American sites

  DOD Sites

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International Market Activity

- GEF projects
- Italy,Spain,Turkey,Middle East (2)
- South America
- Australia
- South Africa

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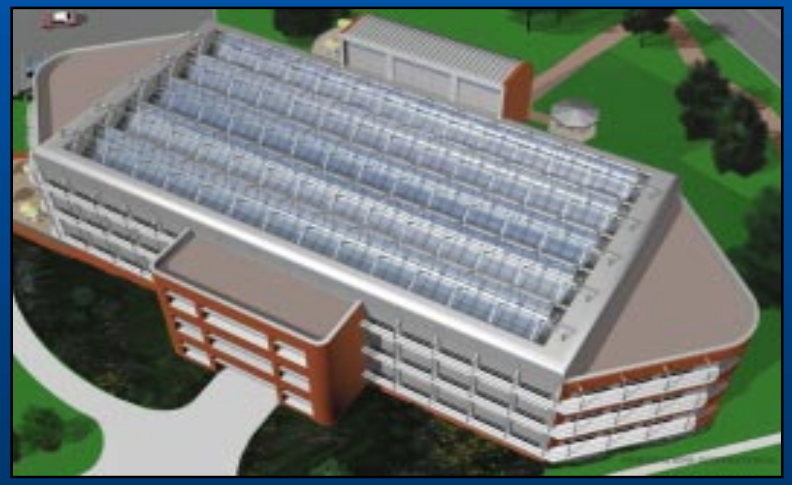
Building Integrated CSP

- Provide sustainable architecture to integrate solar energy features
- Building Envelope
- Daylighting
- Water Conservation
- Distributed Energy
- Heating and Cooling
- Zero Energy Buildings



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US Market Activity

- **Parker Lincoln Office Building – Raleigh, NC**
- **Cambar (CSI) Software office building – Charleston, SC**
- **Sawyer Middle School – Las Vegas,NV**
- **Clark County School Admin building – Las Vegas, NV**

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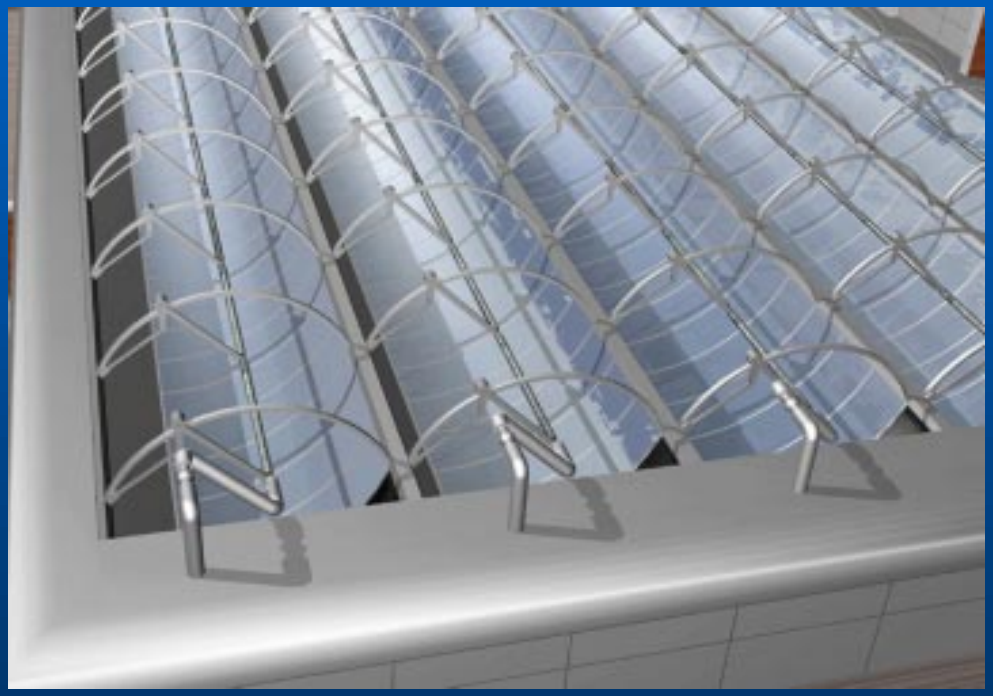
US Market Activity . Cont.

- **Other projects**
- **HI,CA,NV,CO,NC,SC,AZ,TX,NY,IL,FL**

International Market Activity

- Europe
- Caribbean
- South America
- Japan



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Technology – Compound Parabolic Collectors

- New technology based on Non-Imaging Optics Science
- Patented Collectors and Systems
- Manufacturing and Construction cost reduction program

NEW APPLICATIONS FOR SOLAR

- *Environmental consciousness*
- *Introduction of non-imaging optics*

LESSONS LEARNED FROM LARGE SCALE SOLAR POWER PLANTS

- *Design and fabrication techniques*
- *Liability of components*
- *Introduction of sophisticated coatings*
- *Low cost maintenance*

SCIENCE TODAY

Revolutionary optics technology intensifies solar power's potential

By Tim Friend
USA TODAY

Say "solar power" and most people think of solar panels they've seen occasionally on the roof of a house.

New, think again. But think big:

▶ Rows of glass cylinders glistening on the rooftops of factories, schools and businesses, inexpensively generating heat to power commercial air-conditioning units.

▶ Giant solar furnaces at the local utility drawing energy directly from the sun and powering giant turbines to generate electricity.

▶ Industrial sun-powered lasers cheaply making chemicals or generating the high temperatures needed to create lightweight, high-tech materials and electronic components.

All are possibilities within a decade with a revolutionary technology called nonimaging optics. Because of its high efficiency and ability to generate extremely hot temperatures, it makes solar energy practical for widespread industrial and commercial use, bringing us closer to the dream of a sun-powered society.

Unlike solar panels, or photovoltaic cells, which convert sun rays to electricity, nonimaging optics converts sunlight to heat and electricity.

To understand nonimaging optics, Roland Winston, chairman of physics, University of Chicago, says to think back to childhood when we used a magnifying glass to burn our initials in a piece of wood. The magnifying glass brings sunlight to a focal point, just as our eyes or camera lens focus light to form an image.

In nonimaging optics, light rays are instead allowed to scramble so no image or focal point is formed. Eliminating the need to form an image makes concentrating solar energy much easier and more effective.

"Here's a radically new kind of optical design, which can reach the maximum limits of solar concentration and can re-create and even surpass the intensity of the sun," Win-

By Anne Ryan, USA TODAY

MASTER OF THE SUN: Roland Winston's inspiration — that light rays can be scrambled — lead to creation of the compound parabolic concentrator.