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business

## Colorado harnesses the sun

The Denver region draws young solar-energy companies with cutting-edge technology.

By Steve Raabe  
The Denver Post

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(Special to The Post)

The sun may shine brighter in, say, California's Mojave Desert, but Colorado is on the leading edge of a boom in solar energy.

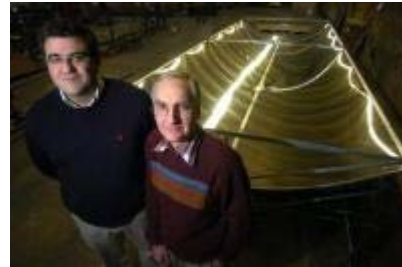
From the San Luis Valley to metro Denver office

parks to Front Range labs and universities, solar energy is emerging as a key sector in Colorado's push toward renewable energy.

Judged by numbers alone, the state's solar industry isn't yet dazzling: a few hundred employees, a few hundred million dollars in grants and investments, a few power plants under development.

The exact numbers are elusive. The competitive startup solar firms in the state keep their strategy and performance measures to themselves.

Yet statistics compiled by national trade groups show that Colorado ranks fourth in the U.S. for



General manager Emiliano Garcia, left, and division director Ken May of Abengoa Solar stand in front of a parabolic trough used for industrial and commercial applications of solar energy. Once installed, the trough can be used to make heat for a variety of purposes. Abengoa Solar is a U.S. unit of a major energy company in Spain that develops large-scale solar-thermal power plants. (Helen H. Richardson, The Denver Post)

solar energy production and boasts the largest

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utility-scale solar-electric plant in the nation north of Alamosa.

The potential is vast, analysts say.

"People have no idea what we can actually do with the sun," said Ken May, division director of Abengoa Solar in Lakewood, a firm working to build large solar power plants. "We've barely scratched the surface."

Nationally, the solar-energy industry has grown at a 40 percent annual clip since 1999.

Depending on the outcome of an effort to resurrect an expiring federal tax credit, it could grow even faster in the next several years.

At least seven solar companies are launching what could become major business initiatives in Colorado, either in manufacturing of solar panels or development of solar power plants.

The attractions? Lots of sunshine, favorable state government policies, and perhaps more than any other factor, brain power.

The solar industry speaks almost in unison about the value of the "intellectual capital" provided by the National Renewable Energy Laboratory in Golden, widely viewed as the nation's premier solar-energy research institution.

"All of these companies have emerged from NREL in some form or fashion," said Ken Zweibel, president of Golden-based PrimeStar Solar, an early-stage maker of advanced solar-electric

panels.

Zweibel worked at NREL for 25 years before starting PrimeStar in 2006. Most of the other firms in Colorado have either NREL alumni or use technology developed at the laboratory.

Solar executives also credit the industry's expanding toehold in Colorado on collaboration between researchers at the Colorado School of Mines, Colorado State University and the University of Colorado.

"We have a magical combination of natural resources and intellectual capital," said Don Elliman, director of the Colorado Office of Economic Development and International Trade. "It's a perfect storm of assets that puts us in a position to be unique."

Elliman said Colorado has relatively little to offer in financial incentives compared with other states, but Colorado has been able to attract startup firms with research expertise and an image as a leader in alternative energy initiatives, especially the renewable power standard passed by voters in 2004.

The positives trumpeted by the solar industry are muted by significant challenges: billions of dollars needed to build solar farms, billions more in new transmission lines to carry the solar power, loss of the federal tax credit, high costs compared with coal-fired generation, and technologies that appear promising but haven't yet convinced major investors and utilities.

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"The outlook in Colorado is not as bright as I'd like to see it," said Rick Gilliam, a regional official of solar-power giant SunEdison.

Colorado's renewable-energy mandate requires less than 1 percent of all power to come from solar by 2025. By comparison, New Mexico's solar requirement is 4.6 percent; Arizona's is 4.5 percent.

Yet the young companies setting up shop in Colorado have big plans.

Ausra Inc. and SkyFuel Inc. — developers of technologies that use the heat of the sun to produce steam for utility-scale power plants — both have proposed multibillion-dollar power plants for the San Luis Valley.

Abengoa Solar, with a similar solar-thermal technology, is talking to utilities about a major plant at an undisclosed location in the Southwest.

SunEdison recently completed an 8.2-megawatt plant near Alamosa that uses photovoltaic technology — direct conversion of sunlight to electricity.

Firms such as Ascent Solar, AVA Solar and PrimeStar Solar are heading toward commercial-scale production of advanced photovoltaic materials that will significantly lower the costs of solar energy and make it easier to apply on homes and buildings.

"The U.S. is still lagging behind Europe and Japan

in solar," said Russ Kanjorski, director of strategic planning for AVA Solar.

"But when we get our act together, we easily could be the biggest market in the world."

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## Colorado's rising solar industry

A look at some of the major solar-energy players

### Abengoa Solar

**Headquarters:** Seville, Spain

**Colorado location:** Lakewood

**Strategy:** Conducting R&D and developing utility-scale concentrating solar-power plants. Talking to regional utilities about a major plant in the southwest U.S.

**Colorado employment:** 20

### Ascent Solar Technologies

**Headquarters:** Littleton

**Strategy:** Developing thin-film photovoltaic materials. Preparing to open pilot-scale production plant this year.

**Colorado employment:** 34

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## Ausra Inc.

**Headquarters:** Palo Alto, Calif.

**Colorado location:** Denver

**Strategy:** Conducting R&D and developing utility-scale concentrating solar-power plants. Proposing a major plant in Colorado's San Luis Valley.

**Colorado employment:** 1

## AVA Solar Inc.

**Headquarters:** Fort Collins

**Strategy:** Developing commercial-scale manufacturing of thin-film solar modules. Initial production scheduled for later this year.

**Colorado employment:** 40

## National Renewable Energy Laboratory

**Headquarters:** Golden

**Strategy:** Supporting research on all solar technologies. Working with private-sector firms on commercial applications.

**Colorado employment:** 1,000

## PrimeStar Solar Inc.

**Headquarters:** Golden

**Strategy:** Developing thin-film photovoltaic modules. Seeking to reach commercial-scale manufacturing.

**Colorado employment:** 45

## SkyFuel Inc.

**Headquarters:** Albuquerque

**Colorado location:** Arvada

**Strategy:** Conducting R&D and developing utility-scale concentrating solar-power plants. Proposing major plant in Colorado's San Luis Valley.

**Colorado employment:** 6

## SunEdison

**Headquarters:** Beltsville, Md.

**Colorado location:** Alamosa and Broomfield

**Strategy:** Wide-scale deployment of solar photovoltaic systems. Recently completed the nation's largest solar-electric facility near Alamosa.

**Colorado employment:** 25

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