And AstroPower, Inc., a tiny start-up venture 10 years ago, now has 145 employees and annual revenues exceeding $10 million, 80% of which are from exports.

Growing Utility Interest

According to the Utility PhotoVoltaic Group (UPVG), "UPVG's market evaluation work has shown that PV can make a contribution to every utility in every part of the country." UPVG is a group of more than 80 electric utilities formed in 1992 to investigate utility applications of photovoltaics. Today, 39 U.S. utilities are actively testing grid-connected photovoltaic systems, including California's Sacramento Municipal Utility District (SMUD), a UPVG member and, with 480,000 customers, the nation's fifth largest customer-owned utility.

More than half of SMUD's projected load requirements have been met with renewable-source electricity, such as the utility's PV Pioneers program, and energy efficiency programs. SMUD also operates the country's largest PV power plant, a 2-MW facility on the grounds of the utility's now-closed Rancho Seco nuclear power plant. These programs have created jobs within the utility's service area and mean that SMUD has to purchase less power from other regions.

"Our customers want more from us than just a good price; they want long-term reliability, a clean environment and local economic development. Solar can help us meet these needs."

— Don Osborn, SMUD solar program manager (*Solar Industry Journal*, Third Quarter, 1995)

A growing number of electric utilities are also becoming familiar with the advantages of photovoltaic power for remote applications. In 1994, Southern California Edison (SCE) started an off-grid PV program called Partnership with the Sun. John Bryson, SCE's chairman, says it is a win-win program: "Homeowners and businesses in remote locations get clean, quiet electricity. Independent contractors get jobs and construction projects. And Edison is able to serve new customers who otherwise have no dependable source of power."

Saving Money for Ranchers

Photovoltaics can be a winner for rural electric cooperatives. KC Electric Association, a rural electric cooperative in eastern Colorado, is saving its members money by providing them with photovoltaic power. The association serves 4000 square miles of prairie with an average of only two customers per mile of distribution line. Every year, winter storms knock out as many as 1000 utility poles and 38 miles of lines. With replacement costs of $10,000 per mile of line, the association has been spending up to $380,000 on maintenance every year.

The lines provide little revenue. About half of the association's customers use the electricity primarily to power small irrigation pumps. In 1990, KC Electric began using photovoltaics as a more practical and affordable alternative to replacing damaged distribution lines serving remote livestock wells or extending lines to new well sites. The cooperative can provide PV-powered water pumping at a cost of $1800 to $6000 per well — saving its members thousands of dollars when compared with the cost of providing grid electricity.

Roger Taylor, NREL/PIX01860

Worker installing a grid-independent, PV-powered street light.