

MILLION
Solar
 ROOFS

**SUCCESS
 STORIES**

The goal of the Million Solar Roofs Initiative is to install one million solar energy systems on U.S. buildings by 2010. President Clinton announced the Initiative on June 26, 1997 in a speech before the United Nations Session on Environment and Development. The Initiative focuses on two types of solar energy technology — photovoltaics that produce electricity from sunlight, and solar thermal systems that produce heat for domestic hot water, space heating or heating swimming pools. The U.S. Department of Energy leads this effort in partnership with the building industry, other federal agencies, utilities, the solar energy industry, financial institutions, state and local governments, and non-governmental organizations. These partnerships concentrate on removing market barriers and developing and strengthening demand for solar energy products and applications. As progress is made toward the goal of one million solar roofs, greenhouse gases and other harmful emissions will be reduced, high tech jobs will be created, and the U.S. solar energy industry will retain its competitive edge.



Project: Indian Pueblo Cultural Center

Type: Grid Connected PV

Location: Albuquerque, New Mexico

Background: A photovoltaic system was installed at the Indian Pueblo Cultural Center (IPCC), located in Albuquerque, NM, on land held in Trust by the All Indian Pueblo Council, a consortium of the 19 pueblo communities in New Mexico. The IPCC solar project was devised to increase the public's awareness of the benefits of renewable energy including economic development, decreases in the IPCC's energy bill, conservation of natural resources including soil and water, and reduction in greenhouse gas emissions.

The solar energy system is located on the carport adjacent to the Cultural Center Building providing power to the building. The carport and PV system are clearly visible to the over 400,000 people who visit the cultural center each year, making this solar energy system an ideal educational tool. In addition to the Million Solar Roofs Initiative, the Cultural Center is also a member of the U.S. Department of Energy's Rebuild America Program.

Diversified Systems Manufacturing, the Native American-owned and operated contractor who oversaw the installation, seeks to promote the construction of more PV carports for businesses around the city and region. They cite four accounting reasons to install them: accelerated depreciation, tax credits, expense reduction, and asset accumulation. In addition, the installations would provide jobs in the management, design, engineering and construction of the array. Local manufacturing of related PV components is the next step the organization would like to see taken.

System Description: The solar carport is designed to produce 11,040 watts of dc power per hour at peak while also providing summer car shading. Diversified Systems Manufacturing selected Energia Total, Corrales, NM, a Hispanic-owned company, as its systems integrator. Other sub-contractors on the team were Laguna Industries, Inc., owned and operated by the Pueblo of Laguna, who manufactured the steel frame and aluminum components; JWB Engineering Albuquerque, who designed the steel and aluminum components; Klinger Construction Albuquerque, who erected the steel structure; and Altair Energy, Golden CO, who engineered the electrical system and is supplying the computerized performance monitoring data acquisition system. Sandia National Laboratories provided engineering review services.

The solar carport includes a 10 kW ac Trace Technologies inverter for use in large PV, grid-tied systems; and 92 AstroPower 1206 PV modules, each producing 120 watts of power.



The Cultural Center participates in net metering provided by the Public Service Company of New Mexico. The solar carport provides power to the Cultural Center building and then ultimately to the Public Service Company of New Mexico electric utility grid, reducing the load on it by producing approximately 25 megawatts per hour of clean free electricity annually. The building's electric meter runs backward when the system is producing more electricity than is being used by the building, then the IPCC is credited for this on its monthly electric bill.

The solar carport incorporates some unique features. For instance, the aesthetic *Zia Panel* in the center panel of the carport was designed to provide additional shading. Laguna Industries, Inc. manufactured the aluminum panel, which has the *Zia Sun Symbol* stamped in the center. This allowed for artistic license, given that the carport is located at the IPCC. The IPCC requested and was granted permission from the Pueblo of Zia Tribal Council and Zia Governor to use the symbol.

Financing information: The New Mexico Department of Energy, Minerals, and Natural Resources provided grant funding to the All Indian Pueblo Council for the project from the stripper well Petroleum Violation Esrow files settlement. The All Indian Pueblo Council chose Diversified Systems Manufacturing as its prime contractor. Diversified Systems Manufacturing developed a business plan application to the Bank of America, Albuquerque Small Business Office for an operating capital loan to finance the project. Financing for education outreach and information dissemination activities was provided through a MSR grant to the State Energy Office.

Climate: Albuquerque temperatures range from the average yearly low of 42.2 ° Fahrenheit to the average high around 70 ° Fahrenheit. There are approximately 167 clear days, 111 partly cloudy days, and 87 cloudy days annually, with an average yearly rainfall of approximately 8.9 inches. Albuquerque averages about 6.77 of sun/hours per day.

Installed Cost: \$86,300.00

Optimum Maintenance Costs: The estimated set-aside for any unexpected maintenance is \$250.00 annually. However, few maintenance issues are expected.

Direct Savings: The installation results in a \$3,421.15 savings per year on the electric bill of the IPCC (based on the annual power generated by the PV system [25,531 kWh] times the current utility rate of \$0.124/kWh).

Environmental Benefits: The equivalent of 30 pounds of coal are avoided every peak hour of operation. Installing the grid-connected PV system reduces carbon dioxide emissions by 27.06 tons annually. Furthermore, the emission of 201.69 lbs. of nitrogen oxides and 347.22 lbs. of sulfur dioxide is avoided each year. The carport also has the added benefit of providing shade to cars in the summer.

This installation will also save over one million gallons of water per year by reducing the amount of power generated from coal and nuclear power plants. Thirty-seven gallons of water per kilowatt-hour (kWh) are required annually for coal-fired plants and 54 gallons are required for nuclear plants. The Public Service Co. of New Mexico, the utility serving the IPCC, obtains 70% of its power from a coal-fired plant and 30% of its power from a nuclear power plant. Accordingly, this installation will avoid the use of 660,045 gallons of water from the coal-fired plant and 413,100 gallons from the nuclear plant each year.

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