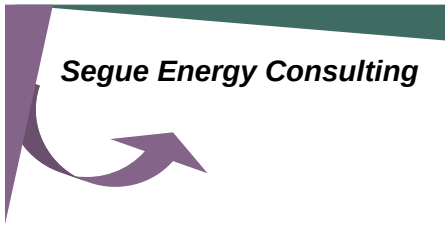

SOLAR CITIES:
LOCAL GOVERNMENT & UTILITY LEADERS IN SOLAR DEPLOYMENT

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INTRODUCTION

Responding to concerns about increasing electricity costs, environmental quality, grid security, and disaster preparedness, many local governments have established policies and programs to foster renewable energy development. Some of these initiatives are directed at encouraging residents, businesses, and developers to install renewable energy systems; such initiatives include outreach and demonstration programs, solar access provisions in zoning and development guidelines, and top-of-the-stack permitting or other enticements for solar builders. In other cases, local governments have committed to using renewable energy resources for a portion of their own energy needs by participating in utility green pricing programs or issuing their own requests for service. And finally, a growing number of local governments are installing solar and other renewable energy projects on public buildings for their own use.

The purpose of this report is to summarize the solar projects and policies of some of the leading "Solar Cities" -- (1) local governments that have made significant commitments to deploy solar energy systems on public facilities or in the community; and (2) municipal utilities (working with or independently from the local government) to add photovoltaics to their generation capacity and/or support projects in the community. ***Table 1*** provides an overview of installed capacity, funding sources, relevant policies, and contact information for each "Solar City."

Responding to exorbitant electricity costs and generous state financial incentives, California cities lead the way -- oftentimes with projects more than 1 Megawatt is size. However, even in other areas of the country where the economics do not seem as favorable, local governments and utilities have implemented policies and developed funding mechanisms to support solar deployment on their facilities. The primary funding mechanisms discussed in the report are as follows.

State Incentives and Financing Programs - *Oroville, Vallejo,* and *Alameda County* took advantage of California's Self Generation Rebate program for large photovoltaics (PV) projects to cover up to 50% of project cost. Bundling PV projects with energy efficiency measures, which also often qualify for incentives, together with PV rebates and low-interest loans from the California Energy Commission or through private financing, make these projects economically feasible.

Franchise Agreements - In addition to using state grants established using public benefits funds to fund PV installations in the City, *Chicago,* as part of its franchise renewal with ComEd, negotiated for a $12M set aside fund for PV projects on public buildings. Another $100M was established to support renewables and efficiency.

1% for Solar - *Tucson* uses savings from a 1% electricity rate reduction from Tucson Electric Power to fund solar projects for city-owned facilities.

Revenue Bonds - *San Francisco* will be using revenue bonds to finance energy efficiency and renewable energy projects on city and county-owned building. Bonds will be repaid with energy savings.

Renewable Energy Mitigation Fees - *Aspen* and Pitkin County building codes require new homes to meet a strict energy budget; homeowners surpassing this budget must install a renewable energy system or pay a fee, which funds energy efficiency and renewable energy projects in the community.

Utility Programs - *Austin Energy* and *Ashland Electric* used voluntary customer contributions to fund PV projects on community buildings. In its recent goal to install 100 MW PV by 2020 and provide customer rebates, *Austin Energy* will rely on company profits and possibly rate increases. *Sacramento Municipal Utility District* invested in PV projects for utility generation and later used systems benefits funds to provide incentives for customer installations. *Anaheim Public Utilities (APU)* similarly uses systems benefits funds to install PV on public buildings and provide incentives for customer installations. *Chelan PUD* created an innovative PV contribution program that distributes funds collected to PV system owners in the community based on PV production.

TABLE 1: SUMMARY OF LOCAL INITIATIVES

State	City/County	Utility	Solar Installations	Funding	Solar Policies/Programs	Contact
AZ	Tucson	Tucson Electric Power	Several 5 kW PV systems on City facilities; Solar development	*1% for Solar* Program directs 1% in electricity cost reduction to solar projects over 5 years; extension possible	*Livable Tucson* Policy calls for commitment to solar	Vinnie Hunt City of Tucson Dept. of Operations, Technical Planning and Resources (520) 791-5111 x311 vhunt1@ci.tucson.az.us
CA	Alameda County	PG&E	1.18 MW on County jail; feasibility study completed for additional 1 MW PV on County buildings	CEC Buy-down PG&E Self Gen Rebate CEC Low-interest Loan	No explicit solar policy; projects resulted from General Services Agency's energy efficiency and cost reduction strategies.	Matt Muniz Energy Program Manager Alameda County (510) 208-9518 matt.muniz@acgov.org
CA	Anaheim	Anaheim Public Utilities	174 kW PV on City buildings; 117 kW PV in community supported by APU rebate program	Systems benefits fund established via California's restructuring law; U.S. DOE co-funded one of the early PV projects; *Sun Power for Schools* (contribution program) will support future systems for schools	PV Rebate Program; Green Pricing Programs - one supports wind primarily, the other supports solar on schools; RPS under development	Dina Predisik Resource Programs Specialist Anaheim Public Utilities (714) 765-4182 dpredisik@anaheim.net
CA	Oroville	PG&E	~690 kW PV on wastewater treatment plant and several other city facilities; 1 MW PV system in progress at the Butte County Center	PG&E Self Gen Rebate ($2.34 M); "Avoided cost" solar company financing structured to maintain current energy budget	"Solar City USA" Mayoral proclamation, April 2003	Greg Kerwin Public Relations/Marketing Manager Sun Power & Geothermal Energy (415) 459-4201 greg.kerwin@sunpowergeothermal.com
CA	Sacramento	SMUD	10 MW PV comprised of ~5 MW PV on residential & commercial buildings; ~5 MW SMUD-owned systems	Utility revenue; Systems benefits fund established via California's restructuring law; Green pricing program for solar in the community funded a couple of small projects	No explicit City policy, but discussions are underway; PV Rebate Program; Green pricing programs supports PV in the community	Jon Bertolino Superintendent of Renewable Generation Assets Sacramento Municipal Utility District (916) 732-5419 jbertol@smud.org
CA	San Francisco	PG&E	675 kW PV on Moscone Center; 250 kW proposed for water pollution control plant; others under investigation	$100M revenue bond approved by voters in 2001 to finance city solar projects	Energy plan calls for 7 MW solar by 2004, 50 MW by 2012; Greenhouse gas reduction goal of 20% below 1990 levels by 2012	Peter O'Donnell San Francisco Department of the Environment (415) 355-3715 Peter_O'Donnell@ci.sf.ca.us

CA	Vallejo	PG&E	1 MW PV plant; 583 kW PV on various city-owned structures	1 MW plant: Leasing agreement with solar company; $3.5M CEC grant: other systems: PG&E Self Gen Rebate		Mark Mazzaferro Public Information Officer City of Vallejo (707) 649-5462 mmazzaferro@ci.vallejo.ca.us
CO	Aspen	Holy Cross Energy	Small PV and solar water heating systems on affordable housing developments, parks, schools; energy efficiency upgrades; residential PV and solar water heating supported by REMP incentives	Renewable Energy Mitigation Program fees ($2M collected)	Renewable Energy Mitigation Program (REMP): Homeowners who exceed energy budget must use renewables or pay a fee to support efficiency & renewables projects in the community	Val Douglass Community Office for Resource Efficiency (CORE) Aspen, CO (970) 544-9808 val@aspencore.org
IL	Chicago	ComEd	~700 kW PV on museums, schools, and City and public facilities	IL DCCA Renewable Energy Resources Grant Program (public benefits fund); IL Clean Energy Community Foundation Grants; $12M ComEd funding resulting from municipal franchise agreement	Green power aggregation commitment; "Greenest" city goal	Paul Wallace ComEd Chicago, IL (312) 394-4458 Paul.Wallace@exeloncorp.com
OR	Ashland	Ashland Electric	30 kW PV on City/community buildings; 6 kW on homes supported by PV rebate program	Ashland Electric *Solar Pioneers* - contribution program for PV in the community; *Renewable Pioneers* support renewables by purchasing BEF Green Tags; PV and solar water heater rebate/loan supports systems in the community	No explicit solar policy; City Council approved partnership w/ Bonneville Environmental Foundation so that Ashland customers can purchase green tags to support area projects	Dick Wanderscheid Director, Electric & Telecomm. City of Ashland (541) 552 2061 Wandersd@ashland.or.us
TX	Austin	Austin Energy	267 kW PV on city facilities plus 20+ small, off-grid system; 300 kW Decker plant not in operation	Austin Energy Solar Explorers - green pricing program supported 3 PV systems in the community; PV rebate under development funded by utility revenue	Austin Strategic Energy Plan calls for 100 MW by 2020; RPS of 20% by 2020	Roger Duncan VP for Energy & Environmental Policy Austin Energy (512) 322-6157 roger.duncan@austinenergy.com
WA	Chelan County	Chelan Public Utility District	32 kW PV supported by SNAP program; 43 kW PV on schools in progress	*Sustainable Natural Alternative Power* (SNAP) program - green pricing program funds distributed to PV owners in the community; Alcoa fund for solar on schools	No explicit solar policies/goals	Jim White, P.E. Chelan County Public Utility District Wenatchee, WA 98801 (509) 661-4829 jamesa@chelanpud.org

Tucson, Arizona

In 1999 when Tucson Electric Company decreased by 1% the rate they would charge the City Government for electricity, the Mayor and Council authorized that the difference would fund solar projects for city-owned facilities for a period of five years. The first three years have resulted in expenditures of $150,000 to $160,000 for solar water heaters and 5 kW photovoltaic systems on several facilities as well as solar lights, irrigation controllers, safety signals, and data loggers. The current provision for the "One Percent for Solar Program" expires in 2005. The program has been successful at saving the City money, and is expected to be extended even in tight budget times. The Tucson – Pima Metropolitan Energy Commission, the City of Tucson and the City Council are working on extending the program for an additional ten year to allow for developing third party financing of solar energy systems for the City.

Solar energy systems installed in Tucson Area -1999 to 2002	
Solar Electric Capacity (in megawatts)	3.0 MW
Solar Thermal Capacity (in megawatt equivalents)	2.3 MW
Total Solar Capacity	**5.3 MW**
Number of Systems	2380
Annual kilowatt hours (kWhs) produced	**8 Million**

In addition, the City sold a parcel of land to the Community of Civano in 1997 at a reduced rate for development of a "Solar Village". The City also established a Sustainable Energy Standard that all developments in Civano must meet which includes mandatory solar components (usually water heating) along with efficiency and other sustainable building practices. They have an ongoing commitment to monitoring and overseeing development on this project. In December 2003 the agreement between the City and the Community of Civano was updated and modified during the process of the selling the final two residential neighborhoods to Pulte Homes, who is taking on the position of Civano Master Developer and will have responsibility for the rest of the commercial and residential development in the community.

Many individuals and groups have been involved in the development of Civano over the years, including the original developers, David Case and David Kelly; the Tucson – Pima Metropolitan Energy Commission; local builders; the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy; Tucson Electric Company; community activists; residents; and many others. The City of Tucson has been a consistent force in helping the community meet and overcome challenges.

These two projects are the City's primary ongoing commitment to solar that "Livable Tucson" has to solar. A recent press release on the 1% for Solar Project may be found at http://www.cityoftucson.org/hottopics/opssolar.html The Civano Neighborhood Association Website (http://www.civanoneighbors.com/) has comprehensive info on the community. In addition, Tucson is assisted by Arizona's Environmental Portfolio Standard which requires solar to be part of the energy mix, and a progressive local utility – Tucson Electric Company – that offers a rebate or program for photovoltaic systems on residences.

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Alameda County, California[1]

Over the past decade, Alameda County's General Services Agency has implemented numerous energy efficiency programs to reduce energy usage and costs in County buildings. Projects such as lighting retrofits, upgrading motors, and other energy efficiency measures have saved over $4 million in electricity costs annually. After witnessing skyrocketing electricity costs in San Diego in the summer of 2000 and in their own region in 2001, Alameda County sought to evaluate the feasibility of solar technology for the Santa Rita Jail, the largest energy user of the County's buildings.

In early 2001 Alameda County contracted with a solar company to reduce the Santa Rita Jail's electric utility costs by implementing building efficiency measures in tandem with solar electric power generation which would achieve the County's 10% internal rate of return threshold for energy projects.

The Santa Rita Jail solar installation was performed in three phases: The first solar project, installed in July 2001, consisted of a 519 kW photovoltaic rooftop system located on the top of six of the jail's eighteen housing units, a chiller replacement, a cool roof and an energy management system upgrade. In October 2001, Alameda County took advantage of increased California state solar energy incentives and installed a second solar electric system of 131 kW on top of an additional two housing units. Alameda County purchased a third solar photovoltaic system of 530 kW in April 2002 to further reduce operating costs. At the time it was installed, this project was the fourth largest solar electric system in the world.

Together the systems have a peak capacity of 1.18 MW, encompass about 3 acres of rooftop space, divert over 2.4 million kilowatt-hours of annual electricity from the grid, and generate enough electricity to supply 30% of the jail's daytime needs. This is equivalent to powering more than 1,000 homes in the Bay Area.

Alameda County did not have to authorize any general fund revenues to finance its PV and efficiency projects. Funds for the projects come from the California Energy Commission's (CEC) Emerging Renewable Buydown program, incentives from California Public Utility Commission's Self Generation Program (through PG&E), and energy efficiency incentive payments. The County has also accessed a low interest rate energy efficiency loan from the CEC. The debt service for this loan will be paid by the project's electrical cost savings.

Total gross project costs for the solar photovoltaic system, cool roofing, and energy efficiency upgrades were approximately $9 million. This cost was offset by nearly $5 million in incentives. Net savings to Alameda County in its first year of operation was about $410,000, meeting expectations for savings estimates. These savings are based on February 2002 Pacific Gas and Electric electricity rates. Gross savings to Alameda County over the 25 year life of the project will total $15 million.

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[1] Santa Rita Jail Case Study: Smart Energy Strategies Integrating Solar Electric Generation and Energy Efficiency, County of Alameda, http://www.co.alameda.ca.us/srjp/caseStudy.pdf.; Personal communication with Matt Muniz, General Services Agency, 2/19/04.

Anaheim, California[2]

In an effort to meet a portion of future load growth through energy efficiency and renewable energy generation, Anaheim Public Utilities (APU) has implemented a number of programs to increase the use of solar other renewable resources by its municipal utility, government facilities, and residents and businesses in the community. The utility first made its commitment to solar power in 1998 when California's electric utility restructuring law required the utility to establish a systems benefit fund to support energy efficiency; low income support programs; research, development & demonstration initiatives; and/or renewable energy programs. APU developed the *Solar Advantage Program* as a way to support the renewable energy component of the requirement and as a way to mitigate growing air pollution problems. This program uses a portion of the systems benefits fund to install photovoltaics on city buildings.

Since 2000, Anaheim Public Utilities has sponsored 174 kW of photovoltaics on city buildings. Some of the larger grid-connected PV installations include:

- Anaheim Convention Center: 102 kW
- Anaheim Police Department East: 50 kW
- Anaheim Police Department Main: 10 kW

For the Anaheim Convention Center project in 2000, about eight percent of the project costs were co-funded by the U.S. Department of Energy's Utility Photovoltaic Group's TEAM-UP program and Million Solar Roof initiative. The utility will be focusing on building-integrated PV for future projects, such as carports and shading structures for city facilities.

To encourage customers to embrace on-site renewable energy generation, APU offers incentives ($4/watt) to residents and businesses who install PV systems. In less than three years, the program has resulted in 25 residential and two commercial PV systems for a total capacity of 117 kW. Participation levels have grown each year while systems costs have declined from around $12/W to $7/W. APU has been able to reduce its rebate level from $5/W to $4/W. APU officials surmise that their solar workshops, which arm potential customers with the technical and financial information they need to become savvy shoppers, has helped drive the cost down. Furthermore, APU customers who wish to support a higher level of renewables in the utility's mix (mostly wind) can participate in a green pricing program called *Green Power for the Grid*. A second green pricing program, *Sun Power for Schools*, supports solar on K-12 schools. The first school installation is currently under way.

On September 1, 2003, the City of Anaheim began purchasing wind-generated electrical energy from the state's largest wind plant, the High Winds Energy Center, in Solano County, Calif. Anaheim Public Utilities' participation in the High Winds Project will add 6 megawatts of renewable resource capacity to its power portfolio. The utility has a proposed goal of maintaining a 15-percent renewable resource share in its power portfolio by the end of 2017. No rate increases are anticipated as a result of this purchase.

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[2] City of Anaheim Web site, http://www.anaheim.net; Personal communication with Dina Predisik, Anaheim Public Utilities, 2/17/04.

Oroville, California[3]

Oroville is a small town of 12,000 inhabitants yet home to some of the largest PV systems in the country. Rolling blackouts and skyrocketing energy costs inspired the SC-OR Superintendent to investigate alternative energy sources that would stabilize the SC-OR's energy supply and reduce its electric bill. In fact, over the two years prior to 2001, SC-OR saw its energy costs skyrocket by 41 percent. That investigation led to the installation of a 520-kW solar PV system on the town's wastewater treatment plant which went online in November 2002. The system has cut power costs for the Sewerage Commission-Oroville Region (SC-OR) in the city of Oroville by up to 80 percent. A $2.3 million rebate from Pacific Gas & Electric, an exclusive "avoided cost" financing program provided by the solar installation company, and California's net metering policy made it possible.

The total cost of the solar system was $4,825,116. SC-OR received an alternative energy generation rebate of $2,342,000 from PG&E's Self-Generation Incentive Program, funded by ratepayers under a mandate by the California Public Utilities Commission to encourage alternative energy. The financing arrangement -- around 5% over about a dozen years -- is structured such that the County's loan payments are the same as its previous electricity bill. Expenditures for utility bills over the loan period are shifted to servicing debt and remain constant, sheltering the County from the escalating energy costs.

SC-OR's 60-acre wastewater treatment plant runs 24/7/365 and has a mission-critical need for a stable power source. It serves 15,000 families and numerous industries in the greater Oroville area, and is designed to treat 6.5 million gallons of wastewater a day. SC-OR is the first solar-powered wastewater treatment in the U.S., and has become a model of energy self-generation for public works projects around the world. It is the largest dual-tilt solar array in the world, the fifth largest solar system in California and among the top ten largest in the U.S.

Oroville Mayor Gordon Andoe proclaimed Oroville "Solar City USA" at SC-OR at an Earth Day 2003 event. One of the most completely solar-powered municipalities in the nation, Oroville has also installed solar systems (totaling 168.7 kW) on City Hall, the Police and Fire Headquarters, the City Maintenance Yard, the Pioneer Museum, and the city-owned State Theater. The city of Oroville has more installed solar energy per capita than any other community in America.

A one-megawatt solar photovoltaic (PV) system is now planned for the Butte County Center in Oroville, the county seat. When it is commissioned in June 2004, the Butte County solar system will be one of the top-ten largest solar energy systems in the U.S. Four solar arrays will power three buildings: the Butte County Administration building, the East Jail and the West Jail. The solar system will feature a variety of installation methods including two ground-mount arrays, one rooftop array, and solar panels mounted on newly installed parking shade structures for a county parking lot. The four PV arrays combined with net metering are expected to eliminate the annual net electric bill for each of the buildings. A renewable energy rebate from PG&E's Self-Generation Incentive Program will provide 50% of project funding. Butte County will host over two megawatts of solar photovoltaic power when the Butte County Center is complete. A web site for this project has been developed at http://www.buttecountysolarcenter.org/index.htm.

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[3] Sun Power & Geothermal Energy Press Release, 4/30/03; http://www.sunpowergeothermal.com/recordcheck_pr.html; Personal communication, Greg Kerwin, Sun Power & Geothermal Energy, 3/5/04.

Sacramento, California[4]

Sacramento Municipal Utility District (SMUD) began investing in PV in 1984, with the installation of the first large array at Rancho Seco and now has over 10 MW of PV deployed in its territory. SMUD installed a number of substation (100kW+) systems in the early 1990s, and then began deploying on customer roofs in the mid 1990s through the PV Pioneer I program. The commitment to pursue solar came from two primary sources - the board of directors, who at that time were very progressive, and David Freeman, who was the General Manager through much of that time. He made it clear that SMUD would show the way in grid-connected photovoltaics. This commitment was reinforced through a 1996 survey of SMUD customers, which showed that solar was preferred over all over primary sources of electricity.

The PV Pioneer II program officially replaced the PV Pioneer I (SMUD-owned systems on customer rooftops) program in 1999. The PV Pioneer II program allows customers to purchase installed roof-mounted PV systems from the utility for roughly half the retail price. SMUD buys down the remaining half of the system cost and also offers a financed loan to the customer. Both traditional PV modules and building-integrated PV "roof shingles" are available under the program. Customers receive net metering, so that when the PV system produces more energy than the customer's load, the customer receives credit for this energy at full retail value.

Some of SMUD's significant PV projects include:

- 3.9 MW Rancho Seco photovoltaic system, comprised of 5 large arrays
- 540 kW Cal Expo Solarport, the world's largest parking lot solar electric shade structure
- 500 kW at SMUD Hedge Road substation.
- 390 kW atop the Cal Expo Barns providing power for the fairgrounds
- 370 kW large-array PV installation at the new state Franchise Tax Board building.

In 2001, SMUD established a portfolio goal of 10% non-hydro renewable energy by 2006 and 20% by 2011. The statewide energy crisis of 2001 greatly increased demand from homeowners and businesses. Of the nearly 1,700 kW of PV installed in 2001, almost 1,200 kW were retrofits in more than 220 residential homes and commercial businesses. In 2002, SMUD eclipsed a milestone: 10 MW of solar electric power installed in more than a thousand systems, representing over half of all grid-connected PV systems in the U.S. at the time. Of the 10MW installed to date, roughly 5MW is owned by SMUD and the other 5MW is owned by customers. The customer owned 5MW is split roughly half and half between residential and commercial sites.

However, due to budget curtailments and other challenges, the scope of SMUD's solar program has been reduced. SMUD's target for 2004 is 140kW or roughly 70 residential retrofit systems and a minimum of 200kW in commercial installations. They also have two Zero Energy Home projects with local developers that are including PV in new homes. They hope to complete another roughly 200kW (or 100 homes) through these projects.

SMUD has initiated a dialogue with the City of Sacramento to promote solar, such as investing in installations at a certain percentage of their own facilities or policies that encourage developers and builders incorporate more efficiency and renewable energy technologies in their new projects.
Press release: http://www.californiasolarcenter.org/solareclips/2002.08/20020820-3.html
Website: http://www.smud.org/green/solar/index.html

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[4] Personal communication, Jon Bertolino, SMUD, 3/10/04.

San Francisco, California[5]

Reacting to rolling blackouts, soaring energy prices, and the threat of global climate change, San Francisco voters in November of 2001 overwhelmingly approved Proposition B, which authorized the City to issue up to $100 million in revenue bonds to finance renewable energy projects – such as solar and wind power – and energy efficiency measures in city and county-owned buildings. At the same time, voters also approved Proposition H, which enables the San Francisco Board of Supervisors to issue revenue bonds to support renewable energy and energy efficiency developments in city, commercial, and residential buildings. The San Francisco Public Utilities Commission (SFPUC) is taking the lead in placing solar panels on public buildings in San Francisco. The initative enjoyed broad supports, including that of the Chamber of Commerce, environmental organizations, the San Francisco Labor Council, women's groups, the American Lung Association, church groups, African American groups, seniors groups, and 90% of the city's elected officials.

On June 5, 2002 the San Francisco Board of Supervisors adopted a long-term energy plan[6] which includes a multi-year solar program. This plan is part of a strategic focus on renewable energy resources, and photovoltaic (PV) energy systems in particular, to help drive down PV prices, and develop highly efficient systems and installation methods. The plan's objectives for renewables are: 7 MW by 2004; 28 MW by 2008; 50 MW by 2012. The solar revenue bonds will help make this possible.

The City is examining a variety of ways to support or purchase renewable and distributed power, including:

- Full ownership, where the City would finance and own the facilities;
- Part ownership, where the City would take an equity position and partner with a developer;
- Build-own-operate-transfer arrangements, where a developer finances and operates the facility in return for a power purchase agreement and then transfers ownership of the facility to the City at the end of the power purchase agreement;
- Straight power purchase agreements, where the City signs an agreement to purchase power and the developer continues to own and operate the system; or
- Facilitating private activity through permitting, incentives and technical assistance.

The first solar project to be completed is a 675-kW system on the roof of the Moscone Convention Center, San Francisco's premier meeting and exhibition facility situated in the heart of downtown. The Moscone Center project consists of two parts: solar power generation and energy efficiency. The solar installation will produce roughly 825,000-kilowatt hours on a yearly basis. The energy efficiency measures to be implemented at Moscone will save an estimated 4.5 million kWh annually. The $7.4 million dollar project received over $2 million in renewable energy and energy efficiency incentives from the state of California. Annual debt service for the 20-year bond is projected to be $429,000. Together, the solar installation and energy efficiency measures is projected to save more than $600,000 per year on electricity bills for an annual savings of more than $200,000.

On October 31, 2003, San Francisco issued a Request for Proposals[7] for the second major photovoltaic installation for the city -- a 250 kW system on the South East Water Pollution Control Plant. Other potential sites are under investigation.

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[5] See Vote Solar Initiative, http://www.votesolar.com; Moscone Center Web site, http://www.moscone.com
[6] http://www.ci.sf.ca.us/sfenvironment/aboutus/energy/resource-plan.pdf.
[7] The RFP can be accessed at http://www.votesolar.org/SF%20SE%20plant%20solar%20RFP.pdf

Vallejo, California[8]

In March 2002 the City of Vallejo undertook the one of the most aggressive solar electric generation program of any city in the United States. Three photovoltaic systems were installed atop city-owned facilities in 2002-03 to supplement electrical usage for a total capacity of 369 kW. As of February 2004, these systems have resulted in savings of over $108,000 in energy costs. At current estimates, all three projects will be paid off in seven years.

In August 2003, the City of Vallejo dedicated a 214 kW system that will provide up to 80 percent of the energy needed for a nearby water pumping station. In so doing, the City became the number one city in the nation per capita in installed PV capacity at the time of installation. Vallejo views its solar generation system as a way of reducing demand for energy from the utility grid, lowering operating costs and improving air quality. The solar electric system will reduce Vallejo's energy consumption and utility costs by 33%. In addition to generating solar electricity, the solar panels insulate the building, reducing the cost of heating and air conditioning while extending the life of the roof. Energy conservation measures were also integrated with this latest solar installation to lower the facilities' operations and energy costs further, saving $177,000 annually in combined energy reductions costs, and $4.4 million over the 25-year operating life of the system.

In addition, the City of Vallejo negotiated directly with manufacturers to establish leasing agreements to install distributed generation systems -- with BP Solar for a 1 MW PV power plant and with TMA Inc., a wind power company based in Cheyenne, WY, for a 500 MW wind farm. The City contributed 10 acres for the PV plant and obtained a $3.75 million grant from the California Energy Commission. BP Solar donated $3.75 million in construction and equipment costs and installed the $7.5 million modular power plant at no cost to the City. BP Solar and the City will divide revenue from power sales in a ratio to be determined. Financial benefits to BP Solar accrue in the form of depreciation and tax credits, along with revenues from power resale. This project allows the company to increase production, lowering component costs and ultimately making the price more attractive to potential future customers.

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[8] *RENEWABLE ENERGY ASSISTANCE PACKET: A Compendium of Resources for Local Governments*, Third Edition, January 29, 2003. http://www.lgc.org/ps/docs/spire/spire_reap_3rd_edition.pdf. See press release at http://www.ci.vallejo.ca.us/uploads/75/613.pdf and http://www.ci.vallejo.ca.us/GovSite/default.asp?serviceID1=364&Frame=L1. Also see PowerLight case study at http://www.powerlight.com/documents/case_studies/powerlight_vallejo_casestudy.pdf

Aspen, Colorado

In 2000, Aspen and Pitkin County launched the Renewable Energy Mitigation Program (REMP). Designed to promote renewable energy and energy efficiency, REMP is the first program of its kind in the world. By requiring new homes to mitigate their environmental impacts, REMP has raised $2 million for energy efficiency and renewable energy projects.

Pitkin County and Aspen building codes require new homes to meet a strict energy "budget." Homeowners who wish to consume additional energy to snowmelt a driveway or heat a pool can install a renewable energy system or pay a renewable energy mitigation fee instead. The fees are justified because a heated driveway, for example, will use as much energy as a typical house. Houses over 5000 square are required to install a small renewable energy system on site or pay a fee of $5,000. The fee for houses over 10,000 square feet is $10,000.

REMP fees are dedicated to energy efficiency and renewable energy projects in the Roaring Fork Valley. A variety of such projects are underway. The long term goals of the REMP program are to reduce air pollution and greenhouse gas emissions, while speeding the Valley's progress toward a sustainable energy future.

Projects supported by REMP include:

- Energy efficiency features, upgrading the lights in the ice arena, and adding a solar hot water system at the ARC Pool & Ice Rink;
- Solar hot water systems at Burlingame and Truscott affordable housing developments;
- A contemporary glass laminate solar electric system was installed at Wagner Park with REMP funds; and
- Design of daylighting features at the new Aspen High School.

In 1997, The Community Office for Resource Efficiency (CORE) started America's first solar production incentive payment program. CORE pays up to $4000 for solar electric systems, and provide $1,000 rebates on solar hot water systems. REMP also supports a zero-interest loan program for solar installations.

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Chicago, Illinois

The City of Chicago is part of a multi-faceted effort -- the Chicago Solar Partnership -- that has brought together city and state government and labor and community organizations with Commonwealth Edison (ComEd) the City's largest electricity provider, to foster the development of renewable energy. Nearly 700 kW of PV capacity has been installed in about 30 locations around the City, including Chicago museums, schools, city and other public buildings, and a former brownfield site as a result of the Partnership's efforts. Participating organizations include:

- The City of Chicago Department of Environment
- The Illinois Department of Commerce and Community Affairs (DCCA)
- Spire Solar Chicago
- The International Brotherhood of Electrical Workers (IBEW)
- The Chicago Public Schools
- The U.S. Department of Energy Chicago Regional Office; and
- The Illinois Environmental Protection Agency

From the City's perspective, Chicago's Mayor Richard M. Daley viewed environmental leadership as a civic asset and desired to make Chicago the center of the green industry in the Midwest. Funding for current and future projects is derived from several sources:

- Through its Renewable Energy Resources Program (RERP), the Illinois DCCA provided 60% of the funding for school and other projects. The RERP was created using a portion of the state's public benefits fund which was created through its 1997 electric utility restructuring law. The IBEW provided technical expertise and licensed electricians with PV training.
- In May of 1999, the state of Illinois and ComEd came to a settlement as part of the approval of ComEd's merger with PECO Energy of Pennsylvania. The settlement created a $250 million fund for renewable energy and energy efficiency -- the Illinois Clean Energy Community Trust (CECT).
- Also in 1999, through settlement of the Municipal Franchise agreement with ComEd, a $12 million fund was set aside for PV projects.

Furthermore, Chicago used its leverage as a large energy consumer to form a power purchase pool with 48 other local government bodies in a green municipal aggregation effort, issuing a request-for-services which included a green power requirement in July 2000. To win the group's business, a provider was required to lower costs for each member of the purchasing group and generate 20% of the power (or 80 MW out of 400 MW) from renewable sources by 2005. The consortium selected ComEd to supply 10% of their aggregated electricity needs with renewable power, increasing to 20% after five years. ComEd's profits from the sale of green power to the City will go into a Reinvestment Fund, which will be used to help attract and develop new renewable generation within the area. ComEd will administer the fund through the Environmental Resources Trust, a Washington D.C. based auditing group that also will substantiate and track ComEd's green purchases. ERT recenlty launched a project to construct 100 Solar Homes in Chicago to supply ERT-certified "EcoPower ® " renewable energy to the City of Chicago.

Other activities in Chicago include partnerships with Spire Solar Chicago, Commonwealth Edison, the Illinois Department of Commerce and Community Affairs and the Chicago Departments of Environment and Housing, and local builders to install PV in affordable housing developments.

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Ashland, Oregon[9]

The City of Ashland, through its Electric Utilities Department, has installed 30 kW of PV on community buildings through its *Solar Pioneer Program* and has supported another 6 kW of residential PV through its rebate program. Ashland's *Solar Pioneer Program* is a result of a unique partnership that combined the efforts and the financial resources of a number of organizations, both public and private, as well as citizens and businesses to bring solar power to Ashland. The 30-kW PV project divided among three key sites in downtown Ashland was the largest grid-connected solar electric generation system located in the Northwest at the time of its construction.

From 2000-2002, over 260 citizens and businesses generated nearly $30,000 to finance local solar projects as part of this program. *Solar Pioneers* was discontinued after enough money was raised for the project in just two years. Ashland utility customers voluntarily added a surcharge to their electric bill, paying increments of $4.00/month to support photovoltaic installations at the Civic Center, Oregon Shakespeare Festival, and Southern Oregon University.

The Oregon Shakespeare Festival and Southern Oregon University contributed $15,000 each and are the "hosts" for 5-kW PV systems. The largest system of the project, at 20 kW, is located at the Ashland Civic Center and includes an interactive informational kiosk. Funds from this program are used to reimburse OSF and SOU for solar electricity at $0.25/kWh, until their investments are fully reimbursed, which will take 8-12 years. The projects were also supported by Bonneville Power Administration ($60,000 grant), Avista Energy, and the State of Oregon Office of Energy.

On the heels of the *Solar Pioneer Program*, Ashland initiated a cash rebate or loan program for residents and businesses who wanted to install solar water heaters and solar electric installations on-site. The incentive programs are funded by the Ashland Electric's conservation budget. The $2/watt PV rebate was increased to $3.50/watt in 2003 to match the new PV rebate available to the state's investor-owned utility customers by the Energy Trust of Oregon.[10] It is worth noting that Ashland passed a net metering law in 1996 which established a simple grid interconnection policy and commits the City to purchase, at full retail price, up to 1,000 kWhs of excess electricity per month from small wind or solar generation resources. Oregon's state net metering law only calls for the purchase of net excess generation at avoided cost or it is credited to the customer's next monthly bill.

In March 2003 the *Renewable Pioneers* program replaced the *Solar Pioneer* program. Ashland City Council approved a recommendation from the Ashland Conservation Commission to create an affiliate partnership with BEF that would allow utility customers to support renewable energy. By purchasing Green Tags from BEF, Ashland utility customers can become *Renewable Pioneers* and support renewable energy projects located in Ashland and the greater Pacific Northwest. BEF will direct a portion of the purchase to local renewable energy projects -- for every $20 Green Tag purchased by an Ashland Electric customer, the City receives $1. Funds generated by Renewable Pioneers will be used by the City of Ashland to install local solar energy systems. Ashland Electric was the first utility to form such a partnership with BEF. This new program has about 120 participants thus far, but utility officials anticipate a much greater level once marketing efforts are stepped up and awareness of the program grows.

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[9] Ashland's Web site, http://www.ashland.or.us/Page.asp?NavID=1532; Personal communication with Dick Wanderscheid, Ashland Electric Utilities Department, 2/18/04.

[10] The Energy Trust of Oregon is the state's public benefits fund generated from a surcharge on investor-owned utility customers. Incentives from the trust are not available to municipal utility customers.

Austin, TX[11]

Austin's community-owned electric utility, Austin Energy (AE), is viewed as a national leader in green building, energy efficiency, and renewable energy programs. In fact, the utility began developing renewable energy projects in the early 80s. A 300-kW solar facility located at the Decker Power Plant in Austin was built in 1986 but is not in operation at this time. In 1997, AE launched the *Solar Explorer Program* to help fund PV installations on community facilities. Although the utility currently has about 200 kW of PV capacity in operation, a recently released strategic energy plan calls for 100 MW of solar capacity by 2020.

The *Solar Explorer* program gave residents, businesses and organizations the opportunity to sponsor one or more 50-watt "blocks" of Solar Explorer's PV systems for $3.50 per block per month. Although the program is fully subscribed and no longer accepting new participants, about 800 utility customers continue to support the development local PV installations through monthly donations. The program gave rise to three grid-connected PV projects. Installations are located at the Howson Branch Library (10 kW), Palmer Auditorium (32 kW), and Austin-Bergstrom International Airport (111 kW). Funding to construct Solar Explorer facilities was provided one-third by the Department of Energy, one-third by Austin Energy and one-third from public support. In addition, AE installed 16 1.5-kW PV systems on the rooftops of residents who volunteered as hosts. These systems are owned by Austin Energy are being monitored for performance. Finally, more than 20 off-grid solar powered projects are scattered through out Austin; sites include Austin Youth Hostel, ECHO Village Senior Housing Power Plant, Barton Creek Greenbelt Hike and Bike Trail.

In 1999 Austin City Council Resolution set a goal for Austin Energy to achieve 5% of the energy in its portfolio mix from renewable resources by December 31, 2004. AE's green pricing program, GreenChoice, which has ranked number one in green power sales nationally, helps fund the development of these resources -- primarily wind. The *Solar Explorer* systems help supply the small solar portion of renewable energy to GreenChoice.

In 2003, Austin Energy developed a strategic energy plan committing the utility a renewable portfolio standard of 20% by 2020 and an energy efficiency target of 15% also by 2020 as directed by the City Council. This is one of the most ambitious local government renewable energy commitments in the country. In fact, A City Council Resolution declared that it is the City's goal to be the "Clean Energy Capital of the World."

Another key component of AE's energy resource strategy is its commitment to solar energy -- 15 MW by 2007, escalating to 100 MW by 2020. Funding for this initiative is still under development but is likely to be derived from AE profits. Rate increases are another potential funding mechanism. A group of solar advocates, organized as the *Solar Austin Campaign* was instrumental in the inclusion of a strong solar commitment in the strategic plan. Other solar initiatives will also include a residential/commercial PV rebate program for a minimum of 10 years and a public awareness and demonstration program. Furthermore, Austin Energy, in partnership with the City of Austin Neighborhood Housing and Community Development Office, will develop a subdivision of affordable Net Zero Energy Homes (100) -- each powered 100% by solar-generated electricity.

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[11] Austin Energy Web site, http://www.electric.austin.tx.us. Austin Energy Press release, http://www.austinenergy.com/About%20Us/Newsroom/Press%20Releases/Press%20Release%20Archive/2003/solarGoal.htmAustin Energy's Strategic Plan, http://www.austinenergy.com/About%20Us/Newsroom/Reports/strategicPlan.pdf; personal communication with Ed Clark, Austin Energy, (512) 322-6514, 2/20/04.

Chelan County, WA[12]

In August 2001 Chelan County PUD launched an innovative program, Sustainable Natural Alternative Power (SNAP), that links PUD customers who want to support the development of renewable energy with local producers of that energy. PUD customers who pay a little more -- from $2.50 to $50 a month -- on their energy bills for SNAP are in effect purchasing solar and wind power from grid-connected installations in the community. About 730 or about 2% of Chelan County PUD customers are SNAP purchasers. The PUD's initial goal is to have 3% to 4% of customers participate as purchasers.

All of the funds designated by PUD customers for SNAP are divided in April of each year among SNAP producers, based on their energy production. The greater the amount contributed by SNAP purchasers, the greater the amount that will be distributed among participating SNAP Producers. The program currently has five local solar power producers (totaling 32 kW) and two local wind power producers. For the 2002-03 period, the program generated 30,722 kilowatt hours of electricity. The producers shared a total of $35,869 for this period, resulting in a production payment of $1.20/kWh. The maximum payment is $1.50 per kilowatt-hour. In 2001-02, producers received the full $1.50/kWh. This year the production payment is expected to be about $0.70/kWh -- not due to decreased SNAP purchasers but rather as a result of more than two dozen planned installations as described below. Chelan County PUD was a recipient of the Interstate Renewable Energy Council (IREC) 2003 Innovation Award for the implementation and management of SNAP.

Chelan PUD developed the SNAP program in response to customer requests to purchase energy from alternative sources and Washington State's requirement that utilities offer customers a green power option. Furthermore, the electricity generated by SNAP producers may provide additional capacity to meet the needs of Chelan County PUD customers.

In 2003 Alcoa's Wenatchee Works initiated a program to fund the installation of solar panels at schools and nonprofit agencies in cooperation with Chelan County PUD. The aluminum maker's endowment will provide direct funds to purchase $439,740 in solar power equipment, plus arrange for labor valued at $666,810 to be donated by Alcoa employees to install the solar systems. Installation of 1.3-kW systems is in progress at 29 schools and four non-profit organizations -- a total of about 43 kW in the community. These installations together with existing solar SNAP producers will yield a total PV capacity of about 75 kW.

Half the revenue from solar power generation at each site funded by Alcoa will be returned to the school or nonprofit organization -- an amount estimated to be $164,000 to $300,000 over 10 years, depending on the number of panels at specific locations, the amount of energy generated and the community support for SNAP. The other half will be placed into a trust fund to be used at Alcoa's discretion for community projects.

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[12] Chelan PUD Web site, http://www.chelanpud.org, and personal communication with Jim White, SNAP Program Manager, 2/17/04. Chelan County PUD is owned by its customers and governed by a Board of Commissioners elected by the customer/owners. Though it is not regulated by another governmental unit, a PUD is, by state statute, a nonprofit corporation. Although it is not a local government entity, it is included in this report as a model that could be used by municipal utilities.