PROEHLE STUDIOS, STEVE PROEHLE SEBASTOPOL

In 2005, EAH Housing began planning an energy retrofit for its Crescent Park development in Richmond, Calif. The $50 million renovation includes a 900-kilowatt photovoltaic system believed to be the world's largest affordable-housing solar installation.

Living **Green** in Affordable Housing

A nonprofit developer leads the way to sustainable living for all income levels.

Crescent Park is named for its crescent-shaped townhome rows, left. The challenge in designing the solar arrays: every roof has a unique orientation. Only the communal buildings have conventional pitched roofs, right.

CRESCENT PARK, BUILT IN 1968 in Richmond, Calif., has a total of 378 rental units in 24 residential buildings. The 25-acre complex also includes a resource center, maintenance building and several laundry facilities spread throughout the property. Its rooftops hold the nation's largest affordable-housing solar installation, with approximately 900 kilowatts (kW) of capacity. The $8 million photovoltaic (PV) system is designed to provide 60 to 80 percent of the community's electrical needs and is anticipated to replace the generation of roughly 14,000 tons of CO_2 emissions over its lifetime.

By **MARY MURTAGH**

Mary Murtagh is president and CEO of EAH Housing.

By the close of this year, Crescent Park will achieve almost 20 percent of the city of Richmond's goal of 5 megawatts (MW) of power from solar energy by 2010. (Richmond is expected to achieve that goal this November — much earlier than anticipated.)

EAH Housing (eahhousing.org), a nonprofit affordable housing company, has owned and managed the property since 1994. In 2005, EAH began planning for an energy retrofit that would include improved insulation, upgrades to windows, new appliances (including furnaces and water heaters), new roofs, new interior flooring and light fixtures outfitted with compact fluorescent lamps. At the start of the project, EAH Housing asked the design team to reduce electrical operating costs by using solar energy. Okamoto Saijo Architecture (os-architecture.com) retained High Sun Engineering (sunengineer.com) to conduct a feasibility analysis and prepare the design, which was customized to Crescent Park's existing buildings

Crescent Park posed some unique design challenges. Twelve of the apartment buildings are designed with a crescent shape — hence the name — with 14 townhouse units arranged around courtyards forming an open circle. This means that the roof of each unit has a different orientation relative to the sun. In assessing the power

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The Crescent Park redevelopment team

FINANCING

Acquisition of Crescent Park by EAH Housing

- Seller carryback financing
- Union Bank of California
- Limited Partner Equity: National Equity Fund Inc. (acquisition-based tax credits)
- General Partner Equity: EAH Contra Costa Inc.

$50 Million Renovation:

- Union Bank of California (via tax-exempt and taxable bonds issued through the city of Richmond)
- Limited Partner Equity: National Equity Fund Inc. (renovation and energy-based tax credits)
- California Solar Initiative (CSI) Rebates
- Income from operations (residual receipts)

ARCHITECTS & CONTRACTORS

Architects:

- Okamoto Saijo Architecture

Solar Engineering:

- High Sun Engineering

General Contractor:

- West Coast Contractors

Solar Contractor:

- Sun Light & Power

Local Workforce Training:

- RichmondWorks
- Solar Richmond

"EAH Housing accomplished this without any new subsidy loans from any source," said Matt Steinle, EAH vice president for real estate development.

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EAH Housing: A Sustainable Vision

EAH Housing was originally the Ecumenical Association for Housing, founded after the death of Dr. Martin Luther King Jr. on the belief that attractive affordable housing is the cornerstone to solving many social justice issues. Since 1968, EAH has developed, acquired or renovated more than 6,400 affordable-housing units at 77 properties in California and Hawaii. EAH manages 84 properties serving more than 20,000 families, seniors, students and people with disabilities. These communities, in 43 municipalities, range in scope from rural developments in Northern California to the 32-story Kukui Tower in Honolulu.

The vision of EAH Housing has been one of balanced, sustainable communities composed of people of many income levels, educational backgrounds, job skills, religions and cultures. Long before the term "smart growth" was coined, EAH was building infill affordable housing that contributed to the health and diversity of its community. Everything EAH does supports economic diversity, social equity and a more sustainable future for communities. As the organization looks into its fifth decade and beyond, it is acutely aware of the environmental issues that increasingly challenge local and global communities.

As a step to incorporating this awareness into its mission, EAH Housing is developing a Sustainable Communities Initiative. The organization plans to build upon its commitment to the "three E's" of sustainability: environmental quality, economic vitality and social equity.

When assessing the environmental impact of any project, EAH Housing takes into consideration the whole life cycle of the property. This ranges from site selection, land-use planning and architectural design, energy and water usage, to construction materials and maintenance requirements.

EAH Housing's staff have been strong advocates for smart growth policy as a method of reducing greenhouse gas emissions. Smart growth is all about expanding housing options for a variety of household types, with a wide range of incomes, near retail and job centers.

Some examples of the multi-faceted efforts that EAH Housing and its partners make to decrease communities' ecological footprints:

- PV arrays to reduce operating costs and dependence on fossil fuels;
- Material-efficient framing to reduce construction material use;
- Natural sunlight for passive heating and heat-conserving windows and insulation;
- Locally sourced, recycled materials (concrete, carpet and plastic decking, for instance);
- Energy Star appliances to improve energy efficiency; and
- Low-flow fixtures, irrigation-free native landscaping and water reclamation systems to limit the use of water.

EAH Housing has high standards for environmental quality to directly benefit those who interact with the communities on a daily basis: residents and employees. The EAH Sustainable Communities Initiative guidelines promote the selection of less-toxic materials and products, such as low- or no-VOC paints and formaldehyde-free insulation, and the creation of a Green Operations and Maintenance Best Practices Manual.

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potential, the design team had to take a separate solar reading for each of the units. Other challenges included tree shading, structural limitations of the existing buildings, existing electrical service equipment and interconnection with Pacific Gas & Electric (PG&E, pge.com) for such a large cumulative system.

In the end, the team decided to connect each building's PV system to the existing electrical service equipment via a line-side tap. This avoided the expense not only of installing new electrical service equipment, but also of associated upgrades to the entire utility infrastructure. Approval of this approach was closely vetted, with city building officials and PG&E as active participants.

The renovation, budgeted at approximately $50 million including a new multicultural family resource center and upgraded computer center, was phased over a 25-month period, during which the complex remained occupied. The contractor received three vacant buildings to renovate at a time, staggered one month apart, giving workers approximately 12 weeks to renovate each building inside and out and install the PV system.

EAH Housing and its partners worked closely with the Crescent Park Resident Council to relocate residents within the complex efficiently and comfortably. Buildings were vacated on a scheduled and orderly basis with minimal disruption to residents' lives.

The financing of the project included a sale by its previous owner to an EAH Housing-controlled limited partnership which involved —

- Tax-exempt and taxable bonds issued by the city of Richmond and privately placed with Union Bank of California (unionbank.com);
- Four percent tax credit-based equity syndication through National Equity Fund Inc. (nefinc.org);
- Seller take-back promissory note financing, to permit the entire appraised value of the property to be considered for acquisition basis purposes;
- California Solar Initiative (CSI, gosolarcalifornia.org) rebates; and
- U.S. Department of Housing and Urban Development-authorized (hud.gov) use of residual receipts to be used to pay for a portion of the construction/rehabilitation costs.

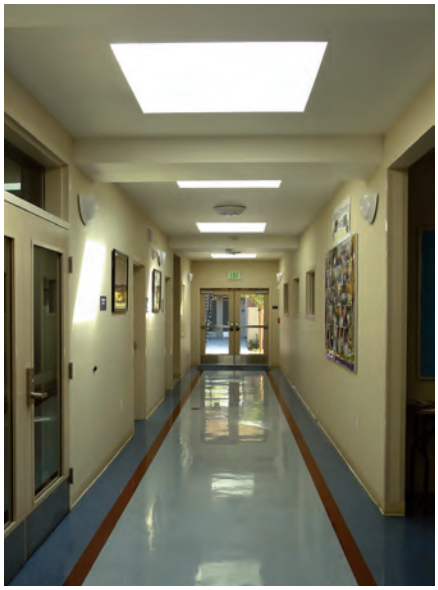
All of the bonds, both the taxable and tax-exempt, were issued by the city of Richmond. Pre-development financing from several sources was repaid at the time of the close of sale to the new owner.

"EAH Housing accomplished this without any new subsidy loans from any source," said Matt Steinle, EAH vice president for real estate development, who structured the transaction.

The PV contractor provided a fixed cost for the modules and maintained a delivery schedule spanning two years. It also required flexibility on the owner's part to work through challenges associated with the general undersupply of solar panels in the marketplace, in order to ensure timely delivery of the panels and CSI rebates. Fortunately, EAH Housing maintained a good relationship with general contractor West Coast Contractors (westcoastcontrs.com) and subcontractor Sun Light & Power (sunlightandpower.com), allowing it to keep the schedule flexible. The PV portion of the renovation is fully paid for via —

- More than $1.7 million in California Public Utility Commission rebates, under the CSI program;
- Renewable energy credits;
- Low-income housing tax credits;
- The reduction in owner-paid electricity costs for this master-metered complex by almost $154,000 per year. This budget reduction permitted almost $3 million more in bond-financed permanent debt to be supported.

Although there are limitations to the benefit of the renewable energy tax credits in low-income housing tax credit and tax-exempt private bond financing, the true value is largely realized by the owner's ability to claim the entirety of tax credit at the time the PV system is placed in service. **ST**



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Above, daylighting strategies brighten corridors of community buidlings. Locally sourced recycled materials are used wherever possible.