



FOUNDATION

# CASE STUDY

2008 AWARDS OF EXCELLENCE

AFFORDABLE HOUSING BUILT RESPONSIBLY

## PROJECT AT A GLANCE

*Location:* Poway, California

*Project Type:* New Construction

*Ownership/Rental:* Rental

*Project Completion Date:* March 2007

### Size:

56 units

52,386 total sq. ft. (50,242 housing)

2.5 acres; 22 units/acre

### Affordability:

56 affordable units (100%); 6 units sold to households earning  $\leq 30\%$  of area median income (AMI); 37 units 31-50% AMI; 12 units  $\leq 60\%$  AMI; 1 unit for property manager

### Project Team:

*Developer:* Community HousingWorks

*Architect:* Rodriguez Associates

Architects, and Planners, Inc.

*Contractor:* Sun Country Builders

*Green Advisor:* Global Green USA

*Photovoltaics:* Solar Power, Inc.

### Development Cost:

*Land cost:* \$0  
(99 year ground lease)

*Hard costs:* \$9,736,000

*Soft costs:* \$5,015,000

*Total:* \$15,851,000

### Cost/(Savings) of Greening:

*Total Cost of Greening:* \$330,000

*PV system:* >\$1,100,000

*Rebates and Grants:* \$300,000

*For PV system:* \$1,022,000

*Net Cost of Greening:* \$108,000

### Standards Used:

California Energy Commission Zero

Energy New Home Program

San Diego Gas & Electric Sustainable

Communities Program

### Key Green Features:

- Integrated design process allowed accelerated regulatory review
- Rooftop photovoltaic panels supply most of project electricity needs
- Mechanical and lighting systems and appliances exceed Title 24 (2005) standards by over 15%
- On-site stormwater collection and treatment system with bioswales
- Recycled and low-VOC materials utilized throughout

## SOLARA

### Community HousingWorks



The SOLARA project includes 56 affordable apartments in six two-story buildings and a community center on 2.5 acres in Poway, CA, a suburb of San Diego. Developed and owned by Community HousingWorks (CHW), SOLARA is an infill project on a blighted site in the Poway Revitalization Area. It is the first apartment community to be fully solar powered, with 836 photovoltaic (PV) panels producing 142 kW of electricity, and has been recognized by the California Energy Commission as the first Zero Energy New Home. Because of CHW's mission and its intention to own the project long term, it made sense to utilize high quality building techniques and durable, low-toxic materials, thereby reducing operating and maintenance costs and enhancing resident health. The close partnership between CHW and the City of Poway was instrumental in the project's success, from the no-cost 99-year ground lease, contributions to project financing, variances for increased density and reduced parking, and an expedited permitting process. CHW also utilized several innovative financing mechanisms for greening SOLARA.

### Greening Goals

CHW identified both general and greening goals for SOLARA. General goals included: revitalizing the neighborhood and provide infill development on a blighted site; providing affordability for families and individuals with incomes between 30-60% AMI; and maximizing the density of development, within local norms and zoning, to provide the highest number of units since land for multifamily affordable housing is expensive and scarce. Specific greening goals were: 70% reduction in electricity use; exceed California's Title 24 energy efficiency standards by 25%; and produce electricity on-site with a PV system and limit the maximum demand for electricity from the grid during peak to 1/kW per day. Additional green goals were to debunk the myth that green is for the wealthy only, promote water conservation through landscape design, and provide healthy interior environments for residents.



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## Green Features

### Integrated Design Process

As part of its integrated design process, CHW convened a design charrette with over 20 members of the project team, the local utility, as well as officials from the City of Poway's Housing, Planning, Fire, and Engineering Departments. Held in January 2005, before the launch of the LEED for Homes pilot and just when Enterprise Green Communities was getting underway, the group deliberated design choices following a LEED-NC (New Construction) checklist. Based on the charrette, the City established an inter-departmental working group that met almost weekly with the project team during planning and design to fast-track the review process and meet the City's accelerated schedule for development. The integrated design process helped identify and solve issues during the design phase, rather than during construction, allowing the project to be completed ahead of schedule and under budget.

### Site Design/Landscape Planning

Part of the SOLARA site lies within a FEMA-designated 100-year floodplain and its western edge borders a stream floodway that serves as a greenbelt. The open space along the stream floodway was raised 9 feet, which brought it above floodplain elevation and provided space for construction of additional units. A 425 foot landscaped retaining wall was installed along the stream with an adjacent winding "riverwalk" that connects to an adjacent City park. No native or sensitive species were found on the 2.5 acre site. The project's landscaping uses mostly climate-hardy native species that reduce the need for irrigation and pesticides. Stormwater runoff flows to the northwest corner of the site where an underground collection and treatment system (a hydro-dynamic separator) removes sediments and oils before releasing the cleansed water to a large bioswale along the stream floodway. A lemon grove and herb garden has been planted both for food and an aesthetic amenity.

### Location and Linkages

SOLARA is located on an infill site with direct access to existing infrastructure and utilities. It is adjacent to a City park and within ¼ mile walking distance of shopping, a farmers market, schools, and a library. The project is serviced by a commuter bus line. Each household is provided with a heavy-duty shopping cart to encourage walking for local shopping and errands.

### Building Design Greening

**Energy:** SOLARA's six residential buildings are oriented to maximize solar harvesting, with the longer side of the buildings exposed to the southern sun. The buildings are angled to capture the prevailing west and southwest breezes from the ocean, 20 miles away. All but 8 one-bedroom units have a corner and enjoy cross ventilation, mitigating the need for air conditioning. To reduce the use of air conditioning the architect included shade over windows and balconies, while balancing the need for natural light within units. With the goal of constructing a Zero Energy New Home, CHW wanted to achieve maximum energy efficiency prior to sizing the PV system for energy supply. The rooftop PV panels not only provide most of SOLARA's electricity needs, they provide roof shading and reduce heat gain. The energy efficient building envelope includes upgraded R30 ceiling insulation (typically R19), Energy Star radiant barrier in roof sheathing, and Energy Star dual-paned low-E windows with a .35 U-value. The project team emphasized proper installation of insulation to eliminate gaps in the envelope. In addition, Energy Star, appliances, air conditioners, gas-fired high efficiency tankless hot water heaters, and lighting fixtures were installed.

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## GREEN HIGHLIGHTS

- Infill site with access to existing infrastructure and utilities
- Less than ¼ mile walk to shopping, schools, library
- Maximized density with local zoning variance
- Oriented to maximize solar harvesting and capture prevailing breezes to reduce air conditioning
- Households provided with shopping carts to foster walking
- On-site underground stormwater collection and treatment system
- Integrated pest management for landscape and pest control
- Mostly climate-hardy native plantings; no mown grass
- Dual flush toilets in all units
- Fly ash used in concrete
- Linoleum flooring in kitchens and baths instead of vinyl
- Engineered wood for trusses and I-beams; OSB for roof and floor sheathing
- Recycled carpet and padding
- Energy Star radiant barrier in roof
- Energy Star appliances, lighting fixtures, water heaters, exhaust fans, low-E windows
- High-efficiency gas-fired tankless boilers for hot water and hydronic space heating
- ACs have chlorine-free refrigerant
- Recycled materials used in play structure and surface
- Green Operations and Maintenance Manual provided to maintenance staff





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## Green Features *cont.*

**Indoor Air Quality:** SOLARA was developed to be healthy housing, with formaldehyde-free insulation, cabinets, and counters; low VOC paint and carpet; no vinyl flooring; hard flooring in the Community Center; use of low-toxic cleaning products by property managers. Units are well ventilated with operable windows and cross ventilation, bathroom and kitchen exhaust fans vented to the outside, and individually controlled HVAC that has air exchange with outside fresh air. Smoking is prohibited in common areas and outside. Smoking within units is allowed but lease provision requires special air filter.

**Resource Conservation:** SOLARA utilized a number of engineered wood products that reduced raw lumber consumption such as wood trusses, I-beam joists, and oriented strand board (OSB) for roof and floor sheathing. The general contractor planned framing and sub-assemblies to minimize waste. Other materials selected to reduce raw material use include: fly ash in concrete; composite decking from recycled plastic and wood; linoleum flooring in unit entryways, kitchens and bathrooms; recycled glass in pathway along the floodway; recycled content carpet and padding; play structure and surface made from recycled milk cartons and tires, respectively; public art from found items throughout the project. Also, long-lived and/or recyclable materials were used, including for furniture in the Community Center and property management office.

**Water Conservation:** CHW meets the strict water efficiency requirements of the California building code (e.g., low-flow faucets and toilets) and exceeds it with dual flush toilets in every unit and the Community Center. SOLARA has a central Laundromat, rather than washers and dryers in each unit, and the washers under lease are required to be Energy Star and water efficient. The landscape design incorporates a high percentage of hardy native plants that require little irrigation.

**Resident Education:** Residents of SOLARA are required to attend a green orientation session conducted by property management and CHW's Resident Services. With the help of a curriculum consultant, CHW created a bilingual green curriculum for residents, including art projects for families and children. The curriculum was piloted at SOLARA's Learning Center (part of the Community Center) in 2007 and has been shared with other communities. Beyond the residents, green training has been provided to CHW's Asset and Property Management teams. Specialized training has also been given on the operation and cleaning of the PV system, and the tankless hot water boilers.

### Occupant Satisfaction

"I'm very happy living here. Everything works very well; and electricity from the sun! It's very convenient to walk to the market or errands with my grandchildren—and not have to get into the car."

"I'd live here if it wasn't affordable housing. That's the strongest endorsement I can think of."

—SOLARA Residents

## Project Financing

The total cost of SOLARA was \$15.85 million. Though the City of Poway spent \$2.7 million to acquire the site, CHW has a no-cost 99-year ground lease on the property. Permanent financing included \$11.3 million LIHTC from the National Equity Fund (NEF), \$2.4 million from Union Bank of CA, \$.9 million in County HOME funds, plus federal ITC, CEC rebates, and local funds.

### Cost of Greening Project

CHW estimated the costs of greening the SOLARA project at \$330,000, not including the \$1.1 million for the photovoltaic system. SOLARA was able to qualify for an additional \$300,000 in equity from the federal Low Income Housing Tax Credit (LIHTC) program under the green incentive boost in the California Tax Credit Allocation Committee. The \$1.1 million cost of the PV system, including contractor profit and overhead, was virtually all paid for by a \$409,000 rebate from the CA Energy Commission, \$405,000 additional LIHTC equity for using a renewable energy source, and \$208,000 additional equity from the federal investment tax credit for solar.

### Life-Cycle Cost Analysis (LCA)

No formal LCA was performed, but the project team, led by its green advisor (Global Green) considered durability, energy/water efficiency, carbon footprint, and health impacts in material selection. Despite a higher first cost, linoleum flooring was used in kitchens, bathrooms, and entryways because it has a longer estimated useful life (25 years) and avoids VOC off-gassing. For the PV investment, life-cycle costing was undertaken, comparing the small incremental cost not covered by rebates and grants with the expected utility costs savings.

## MEASURABLE BENEFITS

- **Electricity Generation:** The rooftop photovoltaic system produces nearly 100% of SOLARA's electric needs.
- **Carbon Footprint:** SOLARA achieved a 95% reduction in its carbon footprint compared with conventional construction of the same size on the same site, as estimated by CHW's green advisor, Global Green.



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**“One of the most impressive aspects of the SOLARA project by Community HousingWorks is that it goes beyond green building and embraces a more comprehensive sustainable community focus. Beyond its immediate achievements – the first Zero Energy New Home designation in the state, an architecturally attractive and dense design – the SOLARA project has paved the way for other projects to innovate in providing community amenities. Also, CWH’s close partnership with the City of Poway shows the important contributions public agencies can make in supporting innovative green affordable housing.”**

- Member, Awards Advisory Committee

## Contacts

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## Looking Ahead

### Challenges

CHW successfully overcame several significant challenges in developing the SOLARA project: (1) There was neighborhood opposition to an affordable housing development. CHW created support for SOLARA through a strong partnership with the City’s elected officials and redevelopment agency staff. It also participated in a series of neighborhood planning meetings and worked closely with the local Chamber of Commerce and other business and civic groups. (2) Part of the SOLARA site is in a FEMA-mapped 100-year flood zone, and adjacent to a FEMA designated engineered floodway. CHW creatively turned this challenge into an opportunity by building an attractive 425 foot landscaped retaining wall that raises the buildable site 9 feet above the floodway and allowed development of 12 additional units. It also created a winding “riverwalk” along the floodway that leads to an adjacent City park. (3) CHW needed to break ground for SOLARA in 2005, less than a year from submittal of initial site plans, so the City of Poway could meet its allocated share of the regional affordable housing goals set by the state. This highly accelerated schedule, especially for a project with significant site challenges and innovative technology (PV), was met by working closely with the City to establish an inter-departmental municipal working group to streamline the review. (4) Financing SOLARA’s green elements, including the PV system, required innovative arrangements with numerous public and private sources.

### Partnerships

In addition to the close working relationships established with local civic groups and businesses, CHW’s partnership with the City of Poway was key to the projects success. The Poway Redevelopment Agency provided a 99-year ground lease for SOLARA at no cost to CHW. The City also accelerated the review of the project, allowing it to begin construction much sooner than standard review procedures would normally allow.

### Policy/Practice Implications

The SOLARA project represents a number of innovations that serve as a model to other developers and municipalities. The most visible achievement is its designation as the first Zero Energy New Home by the California Energy Commission. As part of its efforts to include PV in the project, CHW helped the City to write their first regulations for PV in multifamily developments. CHW also catalyzed a statewide policy discussion on the burdens posed by utility regulatory requirements for individual unit metering on multifamily PV installations. Also important were the variances CHW negotiated with the City to increase density on the site to 22 units per acre and to allow fewer parking spaces per unit (1.6 rather 2.0 as required in the building code). The innovative financing mechanisms for SOLARA – e.g., maximizing credit from the CA Tax Credit Allocation Committee for using solar energy – also represent models now being replicated in other affordable housing projects.

