Los Vecinos is a 42-unit affordable housing project that meets nearly all of its annual electricity demand through 93 kW of on-site solar photovoltaic power. Located along a light rail line in the southern part of the San Diego metropolitan area, this LEED Platinum certified project is the second Zero Energy Affordable Housing project in the State of California. Solar panels and a transit-accessible location are only part of Los Vecinos’ green story. The project, located on the site of a former dilapidated motel that had the largest number of police calls for any single address in Chula Vista, is a testament to what can be accomplished by a determined development and design team that stands by its commitment to extremely high performance standards.

Los Vecinos’ robust tenant education program ensures that the low-resource-use characteristics of the project are complemented by low-impact resident behavior. Furthering its educational impact to the macro level, Los Vecinos illustrates a number of barriers to implementing low-energy projects and successfully makes the case to have those barriers removed. In doing so, Los Vecinos further solidifies a business model for green building that affordable housing developers are using across California and the nation.

Completion Date
Summer 2009

Project Size
42 units in one 3-story building on 1.35 acres

Project / Construction Cost
$17,301,003 / $8,162,240 ($160 / s.f.)

Owner/Developer
Wakeland Housing & Development Corp.

Architect
Rodriguez Associates, Architects, & Planners

General Contractor
Wermers Construction

Solar Integrator
Solar Power Inc.

Green/Renewable Energy Advisor
Global Green USA

Energy Efficiency Analysis/Monitoring
CTG Energetics

Construction Management
Henderson Consulting

Funding Partners
Red Capital Markets
City of Chula Vista Redevelopment Agency
California Community Reinvestment Corp.

INTEGRATED DESIGN

Starting with a site within walking distance of shopping and services, the project team took a holistic approach to sustainable design. This included achieving extremely high levels of energy efficiency (43% better than California’s strict energy code), cleaning storm water, reducing water use, recycling construction waste, and specifying green products and services.

The amount of solar energy necessary to power the project was minimized by lowering electricity demand through eliminating mechanical cooling and relying on ocean breezes and ceiling fans to keep the apartment units comfortable in the summer. This passive cooling design approach, complemented by open-air corridors on all three floors of the building, also promotes resident health by keeping fresh air circulating through the units on a consistent basis.

Los Vecinos serves families making between 30% and 60% of area median income, and has brought many needed amenities to the community, including a computer room, a community meeting room, and an outdoor play area. In addition to education focused on energy conservation, recycling, and non-toxic cleaning, Los Vecinos tenants were given a folding shopping cart to promote walking to the nearby grocery stores.
**Energy**
- tankless water heaters
- hydronic heating
- Energy Star appliances
- 100% compact fluorescent lighting
- cool roof
- low-E windows
- third-party verified quality insulation installation and duct leakage
- exceeds Title 24 (2005) by 43%

**Renewable Energy**
- 93 kW photovoltaic system supplies electricity to all units, common areas, and parking areas

**Water**
- no turf (all-synthetic turf play area)
- permeable concrete and filtered downspouts
- native plants
- high efficiency irrigation
- roof water capture for irrigation
- low-flow fixtures
- dual-flush toilets
- water sub-metering / resident feedback

**Indoor Air Quality**
- low-VOC paint
- Energy Star ceiling fans
- moisture-sensing bathroom fans
- natural linoleum floors
- urea formaldehyde-free cabinets and countertops
- walk-off mats at building entrances
- 100% smoke-free interior (units & common areas)

**Materials**
- 20% reduction in framing waste
- borate-treated lumber to inhibit mold and pests
- recycled content materials in play area
- fly ash in concrete

**Resident Life**
- ongoing tenant education program: “Simple Green Living in a Small Space”
- residents provided a green house cleaning ingredients and instruction book
- public art program, “Art Verde!,” explores and celebrates a green way of life
- bilingual LEED training on building systems and features for residents and building manager
Los Vecinos has a financial package typical of many affordable housing projects: Low Income Housing Tax Credits, a local government contribution, and conventional debt. This package was augmented to support green objectives and renewable energy installation in two crucial ways. First, Los Vecinos took advantage of a California provision that increases the allocation of Low Income Housing Tax Credits for affordable housing projects that include renewable energy, which raised an additional $344,953. These credits were bundled with an additional $157,930 of Business Investment Tax Credits, both of which were purchased by Red Capital Markets. Second, the project benefited from a special City of Chula Vista utility allowance schedule for projects that are both energy efficient and include renewable energy systems. This schedule – now available in a modified form to other affordable housing projects in California – enabled Los Vecinos to share utility cost savings with tenants while also increasing project cash flow enough to leverage an additional $108,563 in conventional debt. Which tenants ultimately receive such benefits depends largely on their own energy consumption patterns. The second chart below illustrates that photovoltaic production is relatively even on a per-unit basis (most PV units produce between 2,200 and 2,400 kWh per year). However, gross electricity consumption varies widely even within the same demographic and apartment size. This demonstrates that even with all the energy efficient design features built into a net zero project such as Los Vecinos, consumption patterns still matter a great deal.

A monitoring system was installed at Los Vecinos to track energy use, solar PV production, and, ultimately, cost savings to the tenants and developer. On an annualized basis, the single-unit PV systems at Los Vecinos are producing 30% more electricity than the apartments they serve are using, making the entire project a net electricity exporter. Monthly electricity bills are an average of 62% lower – a $63 savings – than they are at a nearby affordable housing development ($39/unit vs. $102/unit). There are two reasons why average monthly electricity bills savings are not greater than 62%. First, each dwelling unit is required to pay a minimum charge of 17¢ per day for being connected to the electricity grid, regardless of whether it is a net electricity generator or consumer. Second, tenants of units that are net electricity exporters do not receive payment for the excess energy supplied to the utility. These two factors result in a discrepancy between energy savings and cost savings for units that meet all or nearly all of their electricity needs on-site. However, regulatory changes are underway in California to require that credits be given for excess energy generation, thus raising the possibility that many Los Vecinos residents will one day have electricity bills of $0, and some of the lowest energy users may even receive annual cash payments.

<table>
<thead>
<tr>
<th>FUNDING</th>
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<th>Financing a Zero Energy LEED Platinum Project</th>
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<tr>
<th>Costs</th>
<th>Sources</th>
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<tbody>
<tr>
<td><strong>Photovoltaics</strong></td>
<td><strong>Base Cost</strong> $848,523</td>
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<tr>
<td><strong>Soft Costs/Testing</strong> $49,500</td>
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<tr>
<td><strong>Subtotal</strong> $898,023</td>
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<tr>
<td><strong>Hard Costs</strong> $597,800</td>
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<tr>
<td><strong>Subtotal</strong> $1,495,823</td>
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</tr>
<tr>
<td><strong>Green Building</strong></td>
<td><strong>Soft Costs/Testing</strong> $49,500</td>
</tr>
<tr>
<td><strong>Subtotal</strong> $447,300</td>
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<tr>
<td><strong>Total</strong> $1,943,123</td>
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| Net cost for green building and renewable energy | $266,565 |

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<tr>
<th>Total Funding Sources</th>
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| **Red Capital Markets (Low Income Housing Tax Credit)** $9,435,359 |
| **City of Chula Vista Redevelopment Agency** $5,680,000 |
| **California Community Reinvestment Corporation** $1,716,314 |
| **Solar Rebate** $311,400 |
| **Solar Business Investment Tax Credit** $157,930 |
| **Total** $17,301,003 |

**OPERATING RESULTS**

<table>
<thead>
<tr>
<th>Annual Unit PV Production and Electricity Consumption</th>
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<tr>
<th>Average Unit PV Production and Electricity Consumption</th>
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| PV Production 2,228 kWh |
| Electricity Consumption 2,086 kWh |

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<tr>
<th>21-unit Sample Distribution of PV Production and Electricity Consumption</th>
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The Los Vecinos development and design team faced a number of challenges in the process of creating a successful and innovative low-energy green project.

**Space Constraints** – Dense multi-story projects are challenged when trying to find sufficient roof space for the number of solar panels necessary to offset a large portion of a project’s electricity consumption. Every additional floor adds electricity demand while the amount of roof area remains the same. One solution to this dilemma is to incorporate additional electricity reduction measures, but Los Vecinos essentially exhausted this option with 100% CFL lighting and efficient fans, pumps, and appliances. Another option is to locate the PV panels on the building’s façade or elsewhere on site. Los Vecinos was able to pursue the second option, adding a south-facing carport to accommodate approximately 20% of the solar panels needed for the project. But this option is not always available, especially in dense urban locations.

**Fire Regulations** – Adding to the challenge of roof space were uncertainties regarding what clearances and infrastructure would be required by the local fire department. For projects at or above three stories, fire departments require roof access. Because Los Vecinos was the first three-story residential building in Chula Vista to propose installing solar on the roof, special accommodations were necessary. New California Department of Fire Protection guidance on solar installations ultimately helped get the project permitted, but a significant amount of useable roof space was given up due to firefighting protocols.

**Metering Regulations** – California regulations require individual metering of apartment units – borne of a legitimate desire to save energy through tenant feedback. This meant that each apartment had to have its own solar array, inverter, and two master electricity disconnects. Finding enough space for 42 inverters proved challenging and increased hard costs significantly. Fortunately, the case of Los Vecinos was instrumental in getting California regulations changed so that future projects can individually meter apartment electricity consumption but master meter their PV production.

**Net Zero Electricity to Net Zero Energy** – Los Vecinos is essentially a net zero electricity building. Getting to net zero energy – the goal in California for new buildings in 2020 – will require that the energy needed to heat domestic hot water and provide space heating be produced or offset on site. Given the space and financial constraints experienced at Los Vecinos, additional on-site energy production or energy use reductions would require either subsidies or technological breakthroughs.

**Tracking Performance** – Los Vecinos implemented a technically robust program to monitor electricity consumption and photovoltaic production. This monitoring program uncovered numerous issues – ranging from mislabeled systems to an initial mishandling of billing paperwork by the local utility that could have burdened tenants with higher utility bills than were warranted or expected. While ultimately resolved, future projects should find a way to track performance and catch potential problems early, at a significantly lower cost, and within the expertise of property management staff.

**CONTACTS**

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