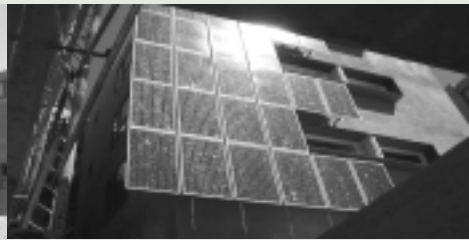
GLOBAL GREEN USA
CASE STUDY



On-Site Energy Generation · Energy Efficiency · Landscaping/Site Planning · Resource Conservation · Indoor Environmental Quality

Colorado Court

502 COLORADO AVENUE, SANTA MONICA, CALIFORNIA

The Colorado Court project sets an ambitious new standard for energy- and resource-efficient affordable housing. An urban infill development, Colorado Court is located in a prominent location at 5th and Colorado in downtown Santa Monica, close to shops, jobs, civic buildings, and public transit lines.

The impetus to make the project a showcase of green technologies and design came from the City's involvement with the Regional Energy Efficiency Initiative, a program that supports municipal energy-efficiency demonstration projects. The City of Santa Monica Environmental Programs Division worked in cooperation with the City Housing Division, the Community Corporation of Santa Monica, and the project architects to identify and implement the green features.

PROJECT INFORMATION

Project Size:
29,900 s.f., 5 floors, 44 studio units

Construction Cost:
$4.3 million

Completion Date:
April 2002

Owner/Developer:
Community Corp. of Santa Monica

Architect:
Pugh Scarpa Kodama

Energy Consultant:
Helios International, Inc.

Mechanical/Electrical Engineer:
Storms & Lowe

Structural Engineer:
Nabih Youssef & Associates

Contractor:
Ruiz Brothers Construction Co.

Construction Manager:
Guccione and Associates

Landscape Architect:
Dry Design, Inc.

GREEN FEATURES

Numerous environmental considerations were incorporated in the early planning and design stages of the project. The architects and energy consultant collaborated from the outset to minimize energy use and best utilize natural features such as the sun and prevailing winds.

The orientation and shape of the building and the placement of windows maximize natural daylighting and natural ventilation and provide shading where needed. Because of these passive design strategies, it was only necessary to provide air conditioning in one small area of office space.

The building's design and technologies allow it to achieve a level of energy efficiency that exceeds both the State of California Title 24 Energy Code and the local standards set by the City of Santa Monica's Green Building Design and Construction Guidelines.

The project's energy consultants expect that the building will exceed Title 24 efficiency standards by 50%, resulting in savings of almost $10,000/year (as of June 2001 energy rates). The consultants also estimate that almost 100% of the power needed by the building's occupants can be generated on the site by solar photovoltaic panels and an on-site gas turbine. Over the course of a year, the site will probably produce more electricity than it consumes.

During and after construction, the energy consultants are conducting tests to ensure that the building's systems and equipment were procured as specified and are working as intended—a process known as commissioning. The commissioning evaluation will continue throughout the first year of the building's operation.

(Continued on Next Page)

In addition to the energy-efficient measures, the project includes design features, materials, and systems that address the building's impact on the site, water use, resource use, and tenant health and well-being (see list of features, below).

The building was designed to meet many of the rigorous criteria of the LEED (Leadership in Energy and Environmental Design) rating system, developed by the U.S. Green Building Council. The project has been registered for LEED certification and its owner and designers hope that it will attain the Gold rating.

On-Site Energy Generation

- Photovoltaic (PV) panels are integrated into the building facade and are on the rooftop. The 25-30 kW system will produce more electricity during the daytime peak hours than needed by residents. If the building is deemed eligible for net metering (see final paragraph of the case study), the surplus electricity that is generated on site can be sent to the power grid; the building owner will then be credited for that by the utility. During non-daylight hours, when the PV system does not operate, electricity will be generated by the turbine/cogeneration system and taken from the grid. However, the electricity obtained from the grid should be offset by the surplus sent into the grid. Therefore, under a net metering system, the residents' electricity bills should be zero.
- A 28 kW natural-gas-powered turbine with cogeneration (waste heat recovery) system operates in the early morning and evening hours, to meet the remainder of the electricity demand. This system also provides 100% of the building's domestic hot water needs and a substantial portion of the winter space heating requirements. This low-emission system has a conversion efficiency of approximately 70% (while primary energy delivered via the utility grid is only about 30% efficient). Also interesting to note is that, in California, the price of natural gas is discounted for consumers who use cogeneration systems.

Energy Efficiency

- Shading for south-facing windows
- Minimal glazing on the west facade
- Double-pane, low-E, krypton-sealed, high-efficiency glazing
- Compact fluorescent, low-mercury bulbs
- Indoor and outdoor motion sensors for lighting
- R-21 insulation throughout the building (recycled blown-in cellulose in 2x6 framing)
- R-30 insulation in the roof
- Integration of the water heating, space heating, and cogeneration waste heat systems
- Compact, energy-efficient, non-CFC refrigerators
- Energy-efficient heat pump with ozone-friendly refrigerant
- Reflective roof coating

Site Planning/Landscaping

- Existing palm trees kept on site
- Permeable gravel alley and underground stormwater retention system will retain 95% of the site's stormwater runoff (and 100% of the entire block's alley runoff) to allow its gradual absorption into the groundwater
- Drought-tolerant plantings, including native plants and ground cover
- Drip irrigation system with seasonal adjustment
- Parking spaces located underneath building to reduce heat island effect

Resource Conservation

- Construction site waste recycling
- Recycling bin storage area
- Recycled-content carpeting

Indoor Environmental Quality

- Operable windows and transoms for natural cross-ventilation
- Natural daylighting through courtyard design and window placement
- Low-VOC paint, formaldehyde-free MDF for cabinetry, natural linoleum instead of vinyl flooring

Alternative Transportation Provisions

- Bicycle racks and storage area
- Parking spaces for tenant vanpool vehicles
- Under consideration: Alternative fuel dispensing station for two vehicles

FINANCING

All of the project's special energy measures, combined, cost approximately $500,000. This added cost is being covered, roughly half and half, by the City of Santa Monica and the Regional Energy Efficiency Initiative. The REEI is a joint program of Southern California Edison, the California Energy Coalition, and the Cities of Irvine and Santa Monica. It uses public goods surcharges from utility bills to fund energy-efficiency demonstration projects in those two cities.

Because REEI funds energy *efficiency* features only, the City covered the cost of the energy generation systems (the photovoltaic panels and gas turbine generator). The Community Corporation of Santa Monica expects to receive a buy-down of almost $65,000 from the California Energy Commission for the photovoltaic system, which cost approximately $220,000. And Southern California Gas company is providing a $17,800 rebate on the $57,000 natural-gas turbine and cogeneration system (cost includes contractor's prevailing wage for installation); the company will also be doing field testing on the unit to see how it performs. The system is expected to have a payback in fewer than ten years, and the project's efficiency measures should have a payback (and net monetary benefit) in fewer than five years.

The stormwater retention system was paid for by the City of Santa Monica's Public Works Department, as part of the department's program to capture stormwater at key sites within the city, in order to prevent urban pollutant runoff into the bay.

CHALLENGES

As Colorado Court is a demonstration project, it is not surprising that its designers and developers encountered some obstacles in the course of its development. One of the main lessons learned was that the project never could have been accomplished without commitment towards the project goals from all members of the team. The following are some of the challenges that they faced:

Construction Waste Recycling: A new City of Santa Monica construction waste recycling ordinance will take effect in the spring of 2001. Once services are in place to handle such recycling citywide and the practice becomes commonplace, it is expected that contractors and owners will actually save money by recycling construction waste and thereby diverting it from landfills. Colorado Court served as a demonstration project to prepare for this ordinance. Because construction waste recycling is not yet common, and because the site was too small to allow for easy on-site waste separation, the Community Corporation has had to pay a premium (an estimated $10,000) from its contingency funds to have the site's construction waste recycled.

Flooring: The architects would have preferred to have polished concrete floors with throw rugs in the apartments, rather than carpeting, because hard-surface flooring does not create the health problems that carpeting can, and because it would have saved money. However, it is common practice to include carpeting in affordable housing units, due to perceptions of comfort and to the extra soundproofing that carpeting provides. The architects also suggested natural linoleum flooring in lieu of synthetic vinyl flooring in bathroom and kitchen areas. At first, the higher cost of linoleum was considered prohibitive (even though linoleum is much more durable than vinyl flooring and therefore has a lower cost over its lifetime). In the end, the CCSM was able to negotiate a lower price for the linoleum, because they purchased it and the carpet from the same manufacturer.

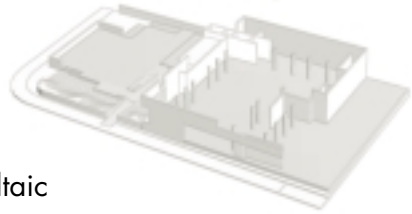
Certified Wood: The original intent was to use wood from certified sustainably-harvested forests for framing. However, because the supply of certified wood was low during the course of the project, its price was prohibitively high.

Concrete: Cement used in this project will only contain up to 10% flyash. Flyash is a waste product from coal-burning power plants and trapping it in cement is a good way to use the waste material while also strengthening the concrete. The architects would have preferred to use cement with a higher flyash content. However, the added curing time required for higher flyash-content cement would have delayed the project, which would have made it more costly.

Equipment Downsizing: It took some time to convince the mechanical engineers to downsize the mechanical/electrical/plumbing equipment (hydronic radiators, piping, water pumps, and heat pump). But once the energy efficiency features were incorporated into the load analysis, downsizing and system integration were deemed feasible.

Tax Credits for Affordable Housing: The Colorado Court project was not selected for the highly competitive tax credits for low-income housing under the 2000 criteria. However, the new 2001 criteria issue points for energy efficiency. Had these criteria been in place last year, the project would have been more competitive.

Energy Generation Regulation: The architects, energy consultants, and CCSM have taken a creative and aggressive approach in incorporating the on-site, distributed power generation technologies into the project. Project team members have been involved in extensive coordination with state government officials. The most significant regulatory challenge they have faced concerns electrical net metering rules. Net metering means that when customers generate more electricity than they consume, the electricity can flow back into the grid and the customer's meter will run backward. The customer is credited for up to 100% of their net generation of electricity. Until recently, the state only allowed for the net metering of systems rated at a maximum of 10 kW of renewable power; the Colorado Court PV system can generate up to 30 kW of electricity. The City encouraged the State Assembly to adopt new legislation to accommodate larger systems. Midway through the construction of Colorado Court, the legislation was passed, allowing for net metering of systems rated up to 1 MW (1,000 kW). However, this will not be applicable to Colorado Court because of the way that Southern California Edison interpreted a Public Utilities Commission ruling that seemingly precludes buildings with more than one source of on-site power generation from net metering. This means that the project cannot reap the full benefits of having both the photovoltaic panels and the gas turbine.



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Preserve Tomorrow.
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A Sustainable Community

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