Tierra Nueva—
A Passive Solar Cohousing Project

California architects take on the formidable challenges of designing a cohousing project, and discover that the end result is well worth the effort.

by Ken Haggard and Polly Cooper

Bruce Gourley

The Tierra Nueva Cohousing Project integrates low-energy, passive solar buildings with the social advantages of a close-knit neighborhood.

"Community is the hidden dimension of sustainability."
-Jim Leach, Wonderland Hill Development Corporation, developer of Tierra Nueva Cohousing project.

"Designing for cohousers is like herding porpoises."
-Ken Haggard, San Luis Sustainability Group, architects of Tierra Nueva Cohousing project.

Somewhere between these two quotes lies the promise and perils of cohousing. We designed and supervised the development of the Tierra Nueva Cohousing Project, built for the Grell Cohousing Group in Oceano, California, on the central coast, and occupied in April 1999.

What is Cohousing?

Cohousing is a form of housing in which the neighborhood is formed first and the physical setting is built to the unique needs and aspirations of community members. Emphasis is on optimizing community and social interaction as well as providing for individual needs. This form of housing was developed in Scandinavia, particularly Denmark, and has been popularized in this country by architects Katherine McCamant and Charles Durrett, who describe it in their book, **Cohousing—A Contemporary Approach to Housing Ourselves** (Ten Speed Press, Berkeley, California, 1988).

The American form of cohousing most often consists of a pedestrian and socially-oriented community plan of attached units with a central common house. The common house usually contains a large meeting space/dining room, a community kitchen and space for guests, teens and child care facilities. Common meals are served on a regular basis using this facility. There may be other common facilities provided as well. Pooling of these facilities allows individual units to be somewhat smaller, more efficient and potentially more economical than other homes in the region with comparable amenities.

Building Community

The Tierra Nueva Cohousing Project consists of living units, a common house, community orchard, community gardens, community play space, space for a future shop and, at the periphery of the site, parking, carports and garages. Its occupants include a range of folks—young families in their 20s to retirees in their late 80s. There is also a variety of income levels. This type of housing offers great social advantages, especially for the very young and the elderly. Infants always have caregivers, kids never want for playmates and the elderly can draw on mutual support from their neighbors.

The price of all these advantages is the continuing effort of self-governance—regular meetings and committees are a way of life. Over time, with the help of facilitators Kay and Floyd Tift, the Grell Cohousing Group evolved very efficient methods of getting to the business at hand and achieving consensus. (For many years we have participated in faculty meetings at several universities, and we found it totally amazing that this could be possible.) The Tifts worked with the community to refine their meeting and decision-making skills until the group was very adept at setting agendas, assigning times to agenda items and managing crises as they arose.

According to Kay Tift, "Today, nearly every member of the community could be a facilitator and embody the principles of consensus. This group met for 10 years before they began physically building the project." Over the years, as new challenges arose, participants created new ways to make decisions efficiently.

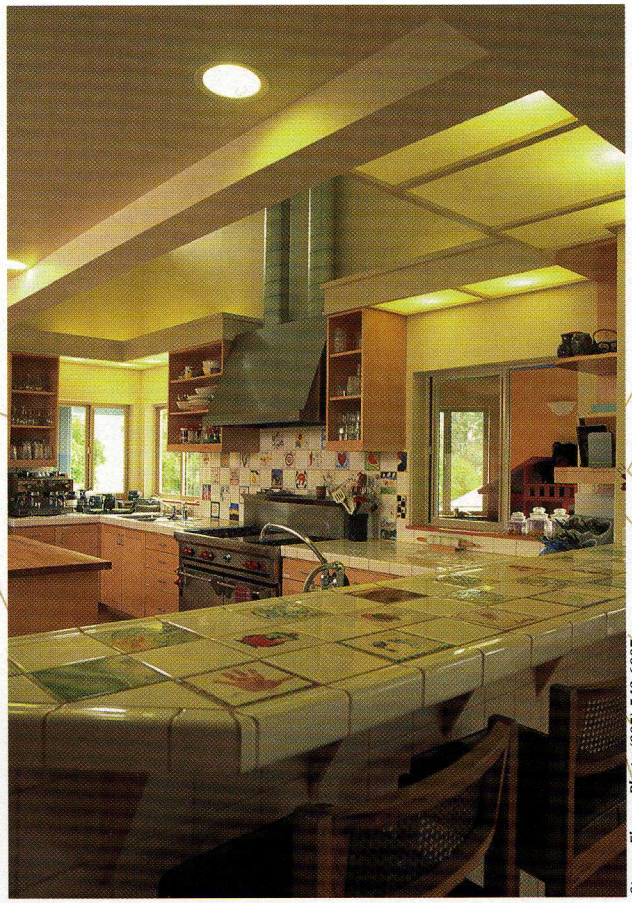
"Today, the group's management skills have gone beyond what we could teach them," says Tift. "By combining efficiency with a heart quality—integrating 'head and heart'—the group has developed a process that accommodates concerns for individuals' feelings while achieving consensus."

For example, because consensus takes time, the Grell group voted to have "community life" meetings once a month rather than try to deal with personal concerns during business meetings. These three-hour meetings deal with issues such as barking dogs, clotheslines and concern about relations with the larger neighborhood and community.

The Tifts were so impressed with this cohousing group that they are now members and residents of Tierra Nueva. As Kay Tift tells it, "The experience of watching the group move from the embryo of two families concerned about a place for their kids to grow up to a powerful force interfacing in larger and larger circles with the community at large has been remarkable." The cohousing project, according to Tift, is dynamic and always in process, which makes it an especially appropriate community for her and her husband, who are retired consultants in group development.

Steven Finson Photo (805) 543-6907

The common house at Tierra Nueva contains a dining/large meeting facility, communal kitchen, children's room, older adult sitting room, teen band room, office, game room and two guest rooms with baths.



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Tierra Nueva community members gather regularly for meals prepared in the communal kitchen of the common house.

The Site and Community Plan

Tierra Nueva Cohousing sits on 5 acres (2 hectares) of land one mile (1.6 km) from the coast, on a south-facing slope with enough steepness to make American Disability Acts Standards a strong design consideration. The site is located on old sand dunes from the time when it faced an estuary and bay thousands of years ago. Its most recent use was—and still partially is—an organic avocado grove. This site was donated to the cohousing group by Gudrun Grell, a organic farmer living adjacent to the site who is committed to the ideals of solar energy and social equity. The only restriction on the gift was that the resulting buildings be a least 75 percent solar heated and passively cooled.

The community consists of 27 living units and a 3500 square foot (325 m^2) common house for a density of 5.6 units/acre. The project also includes a workshop space, community orchard (avocado of course), two drainage retention basins that also serve as play space and a community garden. Access roads, parking, recycling and service facilities are located on the periphery of the site. Two roads that do penetrate the core of the community for fire and service functions are treated as "green" roads, consisting of a porous substrate with grass growing on its surface. (See site plan, page 32).

A great deal of work went into ensuring that all the units and the common house, all of which face

south, had solar access. One-half of the mature avocado trees on the site were saved, with the result that the community enjoys mature landscaping from the beginning plus all the guacamole they'll ever need. Our suggestion to name the community "Guacamole Cohousing" unfortunately did not achieve consensus.

Residential Units

There are four types of units. The smallest is a one-story, 2 bedroom, 1 3/4 bath, 850 square foot (23 m²) duplex (A unit). The largest is a detached 4 bedroom, 2 1/2 bath, 1656 square foot (154 m²) unit (C unit). The medium is a 3 bedroom, 1 3/4 bath unit ranging from 1260 to 1356 square feet (117 to 126 m²) (B unit). Most units are duplexes with private outdoor space on the south side. Some variation in size and plan was achieved by the use of "popouts." These are 4 foot by 12 foot (1.2 by 3.7 m) extensions that could be added during construction or later in all the units.

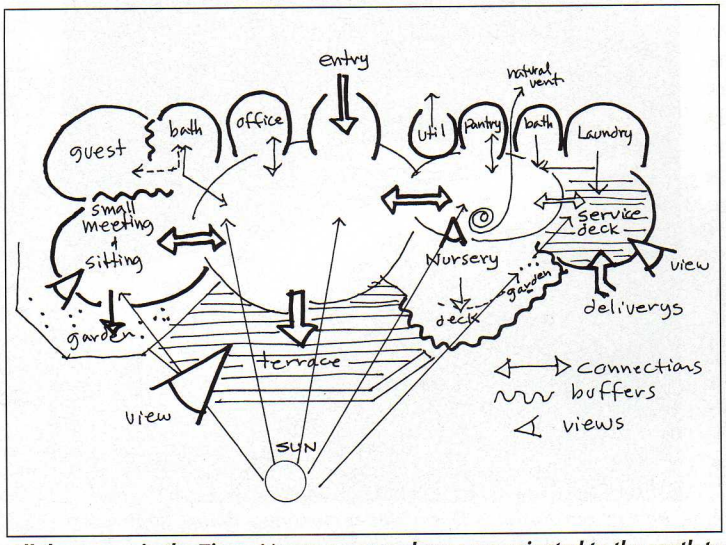
The budget for all units was very tight, particularly the smaller units. For those whose family size was such that they could not quite fit into an A unit, but could not afford a full B unit, there was a fourth type of unit we called a B-1 unit. These were essentially a smaller version of B in which the difference in cost between A and B-1 was partially subsidized by the community as a whole. This device allowed community members who were close to the edge of qualifying financially to make it in. We were quite pleased that overall average cost per unit (without the customization options that were available) came in at $59 per square foot ($637/m²).

Thermal Characteristics

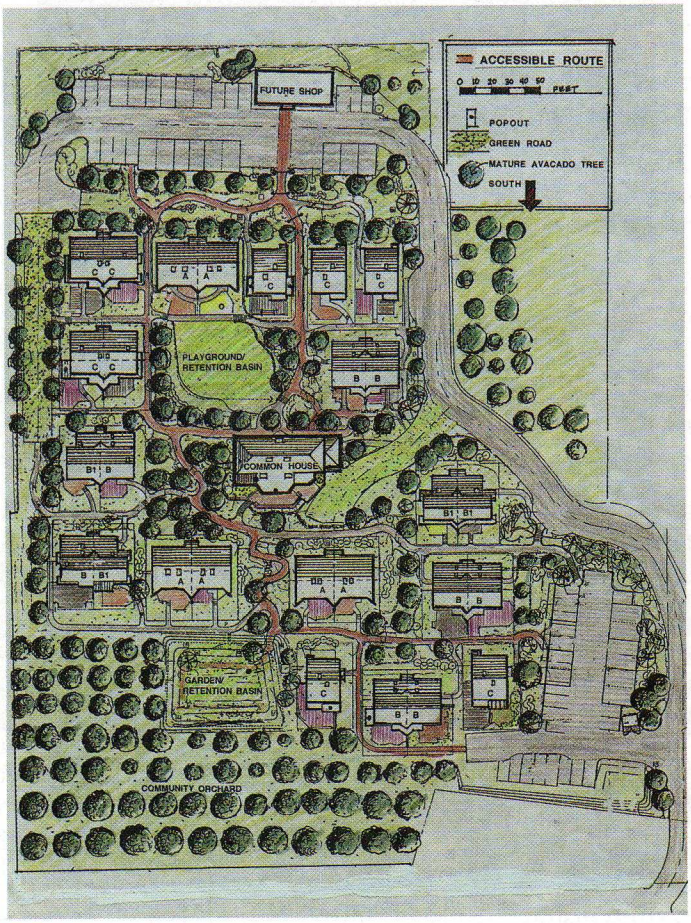
This was our first experience with production housing, after years of doing custom solar residences. We were surprised to learn that perimeter insulation on slabs, the idea of thermal mass and other things we've taken for granted for years are not common practice in production housing. However, the builder, JW Design and Construction, was very quick to understand the necessity of these features in a direct gain/distributed mass building. As usual for our climate, getting enough thermal mass was the trickiest part of the solar design process. Because the buildings were slab on grade, we could use that mass as long as we provided thermal contact through the use of tile or thin parquet flooring. Additional mass was provided by making some of the interior walls 2-inch (5-cm) cement stucco. We determined the amount of mass as well as the glazing area by modeling the buildings with calpas 3. Although this might seem like old fashioned way to go, we like the natural night vent cooling capability of this program.

Using this type of modeling has advantages over just optimizing the amount of mass, glass and insulation as the following example illustrates. Once the buildings were framed up, with roofs on and windows in, concerns with the budget got more attention by everyone, and there was pressure to avoid any more thermal mass than that provided by the thermally exposed slab of the first floor. We have found the tendency to cut thermal mass beyond that needed for good performance often occurs at this point in the construction process, because people who have not lived in passive buildings find it hard to believe that this "extra" mass will really make any difference.

The thermal model was very useful in addressing this question. We were able to get a number for the cost of keeping this thermal mass minus yearly savings with the more optimal passive system this would allow, minus the cost of having to install a larger backup heating system. This cost was almost equal to the added cost to each unit of adding "architectural grade" composition shingles with an irregular pattern of tabs. This change in composition shingle from one of equal grade with a more honest regular pattern was something the community had come to consensus on at this time. By using data from modeling the buildings, we were able to convince the cohousers to save on the shingles and leave the thermal mass as designed. In other words, we were able to trade a questionable aesthetic element for improved thermal performance. This trade involved only $600 per average unit, but had strong symbolic meaning at this point in the construction process and a large effect on eventual thermal performance.



All the spaces in the Tierra Nueva common house are oriented to the south to take advantage of the for warmth and light.



Tierra Nueva Site Plan

Common House

Common houses are the essential social architecture—everything about them is related to social function. In this project, the common house contains a dining/large meeting facility, communal kitchen, children's room, older adult sitting room, teen band room, office, game room and two guest rooms with baths. Each of these facilities is interesting in itself, but even more interesting is the relationship each has to the other. Some of them need to be connected, and some must be buffered. Adding a thermal orientation dimension made for a very rich design mix. Due to sometimes chilly winters and summer periods of chilly coastal fog, south orientation was very important to many of these social functions. The diagram on page 32 illustrates some of these functions and their relationships to south orientation.

Living Proof

It has been six months now since people have moved in, and, with the photographer, we are seeing the complex finally as a whole. The landscaping is finished, and enough customization of the private areas at the south of each unit is developed to add richness to the plan. Children of all ages are playing, relaxed and quite free. Parents and neighbors can keep an eye on them from the common house kitchen, the southeast work terrace or a neighbor's terrace over tea. Elderly people are working in flower gardens or raiding the common house refrigerator. There is solitude for lovers in the dark corners of the orchard or the top deck of the common house. Below, serious discussion and laughter can be heard on the south-facing terrace. The avocado trees we were able to save are laden with fruit. There is the beginning of small cottage industries in some of the garages. It's a beautiful day!

Community is the hidden dimension of sustainability, and designing for porpoises is difficult, but at times like this, it is well worth it. ✪

Ken Haggard and Polly Cooper are principals with the San Luis Obispo Sustainability Group, 16550 Oracle Oak, Santa Margarita, California 93453, (805) 438-4452, FAX (805) 438-4680.

Take the Tour!

For tickets to tour the Tierra Nueva Cohousing project, call Mothers for Peace (805) 541-6310.

Tierra Nueva Cohousing Project Details

Project Description: Moderate income production cohousing residential development
Designers:
Architects: Ken Haggard, Polly Cooper and Jennifer Rennick of San Luis Sustainability Group—Santa Margarita, California
Construction Liaison: Scott Clark of San Luis Sustainability Group
Structural Engineering: Lampman and Smith—San Luis Obispo, California
Civil Engineering: EDA—San Luis Obispo, California
Landscape: Firma—San Luis Obispo, California
Developer: Jim Leach of Wonderland Hill Development Company—Boulder, Colorado
Builder: J.W. Design and Construction—San Luis Obispo, California
Location: Oceano, California, 20 miles (32 km) south of San Luis Obispo on the Central California Coast
Size: 27 residential units and 3500 square foot (325 m^2) Common House on 5 acres (2 hectares) of land
Year completed: 1999
Cost: $59/square foot ($637 m^2) for standard residence (additional options were available for additional cost) $90/square foot ($972 m^2) for common house.
Heating degree days: 2500
Cooling degree days: 600

SOLAR DESIGN FEATURES

- All buildings face south with clear solar access and optimized overhangs
- Insulation R-19 walls, R-30 ceilings, 1.5 foot (.5 m) perimeter insulation on concrete slabs
- Double-glazed low-e windows of optimized size and location
- Distributed thermal mass using thermal exposed floor slab and 2-inch (5-cm) cement stucco walls in selected areas
- Natural ventilation capability
- Natural lighting in most of the spaces
- Solar water heaters as a option

ENVIRONMENTAL FEATURES

- South-facing private exterior spaces
- Maintenance of 1/2 of existing mature avocado trees
- Multiuse of drainage and runoff retention spaces
- Green roads for interior circulation and services
- Parking access roads and garages to periphery of community
- Accessibility beyond American Disability Standards

Steven Finson Photo (805) 543-6907

The attractive living room of a typical B unit at Tierra Nueva faces south for heat and light.