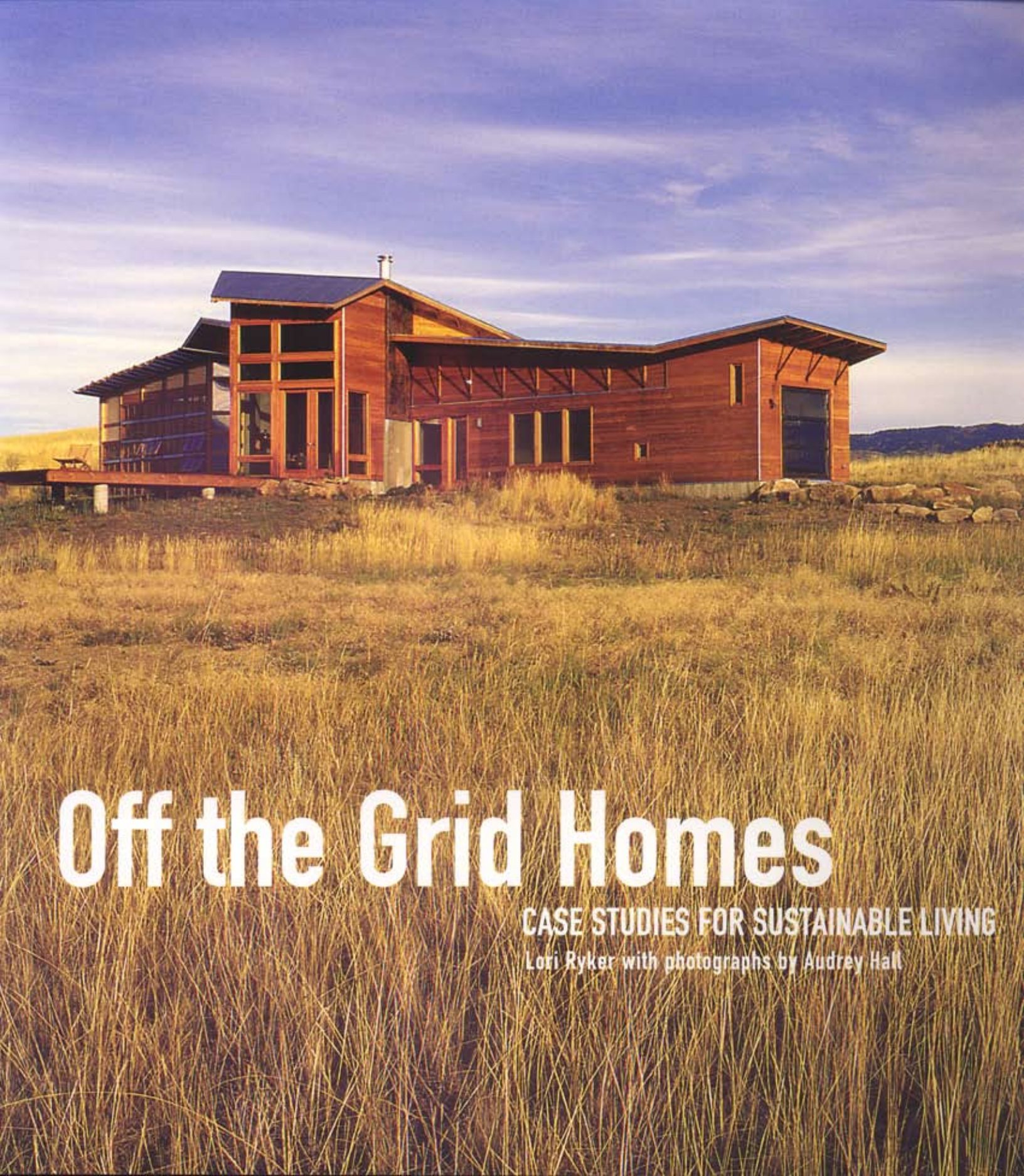


Off the Grid Homes

CASE STUDIES FOR SUSTAINABLE LIVING

Lori Ryker with photographs by Audrey Hall

Above: This remodeled rooftop in Seattle provides a challenging dialogue to its neighbors: a roof can provide more than shelter; it can also generate energy.

Right: In the spirit of the case study houses, this California house opens out onto a courtyard with exterior living spaces.

TRANSFORMING THE HOME

In the 1940s, John Entenza, who was the owner and editor of the journal *Arts and Architecture (AA)*, began the Case Study House program. According to Esther McCoy, the *AA* developed out of "a period of strong social conscience, a reflection of the idealism and Puritanism of the Depression and war years when architecture was first of all a social art."[3] The Case Study House program sprang from Entenza's belief in the necessity of demonstrating the possibilities of a new era of expression for living. He found these expressions in the provocative visions of the young architects of California. The program also provided an ideal format for the general public to explore and learn about architecture.

Entenza recognized great changes in the materials, methods of construction, and technologies available to architecture. He believed the Case Study House program would support the development of a critical body of work, relevant to the time, which would challenge the seemingly endless romanticizing of architectural styles. The house also provided a model that could be easily explored due to its scale and its adoptability by the general public. The initial concepts

Hertz/Fong Residence

Venice, California • Syndesis/David Hertz Architect • 4,200 sq. ft.

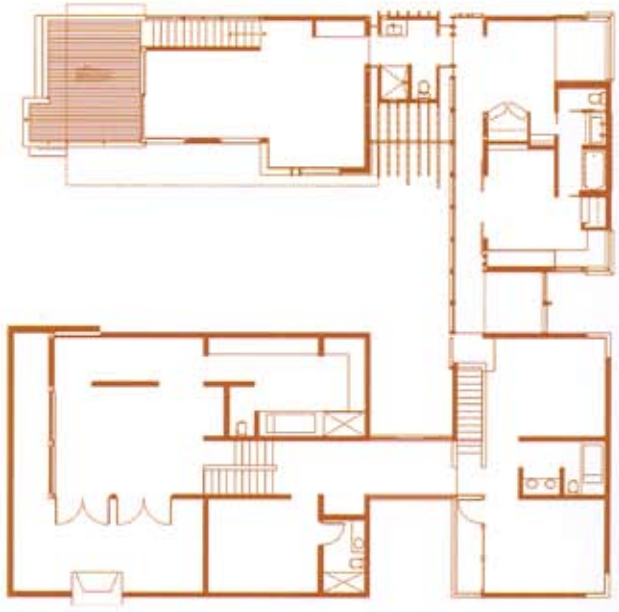
The Hertz/Fong Residence is a dynamic interpretation of Southern California living. The mild weather that makes this area such a wonderful place to be outside plays a dominate role in the design and experience of this home through interior courtyards and living pavilions, which open up to the elements.

The original component of this residence, located within the compact neighborhood of Venice, was completed in 1996. The 2,700-square-foot home was comprised of two "pavilions"—one with the master bedroom above and the living spaces below, the other with two bedrooms above a garage for the children that could be reached through an enclosed "bridge" from the second floor of the master bedroom suite. Exterior balconies and fireplaces combined with small garden courtyards opened the house to the outside, creating the garden living for which California has become so famous.



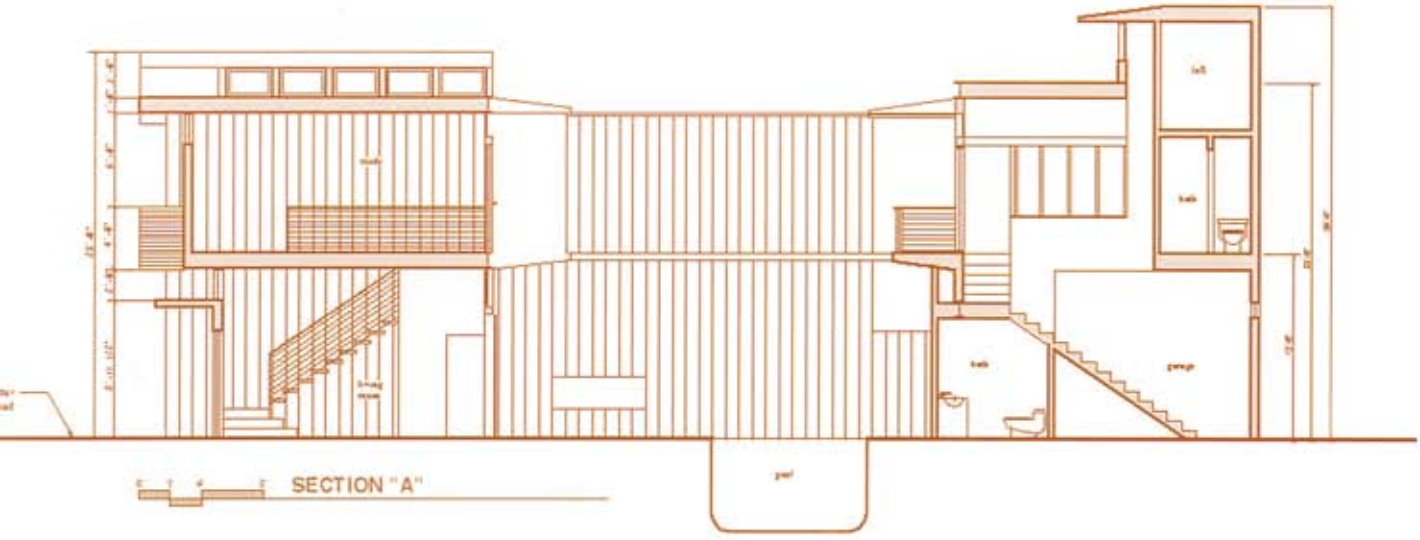


GROUND FLOOR PLAN



SECOND FLOOR PLAN

Although not originally anticipated, the family had the opportunity to expand the home when an adjacent lot came on the market. With the design of the second phase of the home, the potential to live life in a garden flanked by pavilions came into focus. At a minimal setback from the entry side of the home is a rammed-earth garden wall built of fly ash, decomposed granite sand, and cement. The wall provides a backdrop for a thin garden space filled with horsetail reeds and king palms. The street-side garden not only creates a beautiful buffer between the private



court and the public street but also promises an even richer experience beyond the walled court. Completed in 2003, with a 1,500-square-foot addition, the home now focuses around a garden court, complete with lap pool and spa.

With the expansion of the home, two additional pavilions were created, each connected by second-level "bridges." The series of bridges, which connect all bedrooms and play areas for the children, allow the family to circulate at the private second level

Above, left: Louvers over windows at the second floor bridges provide a sun screen for the interior spaces.

Above, right: Rooms easily transition from interior to exterior and back to interior with the large sliding-glass doors that virtually erase the perimeters of enclosure.

Below, right: The new pool house has a kitchen that seamlessly blends with the details and cabinetry of the house, resulting in a space that feels more like an entertainment space than a service area.

Opposite: The custom wood stairs as well as the beam columns, trellis, and decks are all built from sustainable and reclaimed materials that include redwood, Ipe, and mahogany.

without going outside. Balconies and roof decks, an animated part of the outdoor experience, provide a sleeping porch, outside room with fireplace, and small greenhouse where orchids are grown. The home now provides four bedrooms and a master suite at the second level, along with a studio and game rooms for the kids. The ground floor has its original great room, living and dining rooms, plus a pool house with a new kitchen and recreation room and an additional bathroom for showering. Large sliding doors open onto the court, virtually erasing any separation between outside and in. Tropical plants, including black bamboo, giant timber bamboo, king palms, and horsetail reeds, which are easily adapted to the California climate, fill the garden areas of the courtyard. The resulting court space provides a magical place for spending time with the kids or relaxing.

The Hertz/Fong pool has a minimal impact on the environment. The pool's construction provides for both initial and long-term resource savings. Once the hole for the pool was made, it was lined with polystyrene foam, which insulates and helps retain the heat in the water. The pool serves as both a lap pool for exercise and a play area for the kids. Keeping the depth of the pool shallow, from 3 to 5 feet, reduces the overall amount of water that is required. The dark color of the pool walls helps to collect direct solar heat while a series of used RADCO commercial-grade solar hot-water panels heats the pool water through an open-loop system, which moves the water up to the solar panels and back again to the pool. The pool water heat is retained during the cool of the night with a tarp, which mechanically extends over the surface of the water. The pool filtration system replaces the chlorine with an ionization system that is chemical free.

Opposite and left: The court space in the center of the house brings together each of the living pavilions. The pool serves as both a lap pool for exercising and a play area for the kids. A solar hot-water heating system directly heats the water.

Above: The rammed-earth wall is enclosed with a glass-to-glass detail, only feasible in temperate climates.

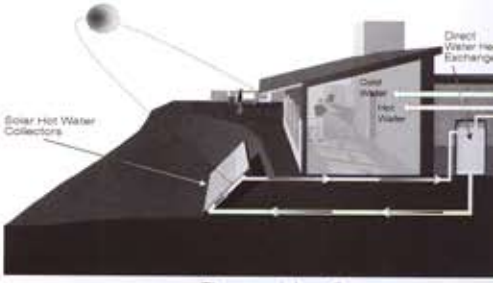
Solar Hot-Water Systems

Solar water heaters are one of the most efficient alternative-energy systems due to the simplicity of the system and minimal "external" accessories required. Some manufacturers and suppliers claim that you can pay for your solar water collectors in energy savings in as little as two years. With the rising cost of energy, this claim could become a guaranteed fact.

In both the solar water heater and solar hot-water systems, a recirculating pump is required, which uses minimal energy. The choice of the system is typically determined by your climate. Solar hot-water systems operate through direct or indirect supply.

Direct Active System

If you live in a mild climate, you could easily employ what is called a direct active system. In this system domestic, potable water is brought directly into your house from your water supply. The water supply splits, with some serving cold water needs and some directed to the solar hot-water panels. As the water moves through the tubes in the panel, it is heated and sent to your hot-water tank. As you require, the solar-heated water is available for use.



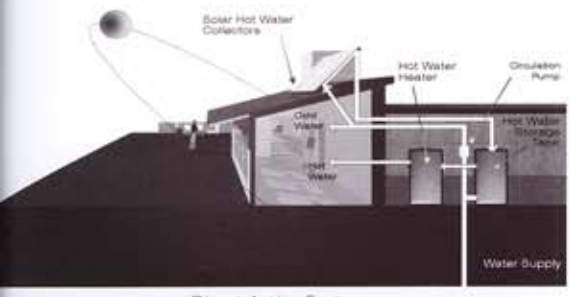
Thermosiphon System

Indirect System

If you live in a cold climate, where subfreezing weather is common in the winter, you would need to install an indirect system. In this system, solar-heated water is stored in the water storage tank. Instead of the hot water running through the tubes of the panels to collect heat, a liquid that has antifreeze characteristics (often this liquid is glycol) is used in the tubes that runs through a loop and the solar heat captured in the glycol is transferred to the water in your water-storage tank. This process is a simple heat-exchange concept.

Thermosiphon

If you have the opportunity to place your solar hot-water panels below the collection/recirculating point of your storage tank, you can employ a thermosiphon system that uses the heat of the liquid to build up the pressure of the liquid, which then moves and circulates without a pump. This system, which often places the panels at ground level to gain the proper relationship of solar collection to storage, will not work if the ground collects snow.



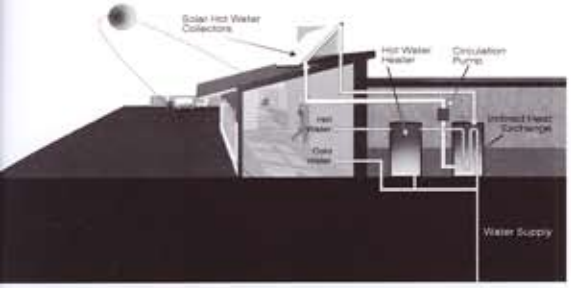
Direct Active System

Systems with Supplemental Sources

In both a direct active and indirect system, the temperature of the hot water that is gained from the sun may not be as hot as we are used to, or that we may need. Because of this, a hot-water heater is placed in line after the storage tank and before the hot water is released for your domestic use. While it may sound as though you are duplicating systems, it is the savings in overall energy generation that is the goal of these systems. The majority of the energy use for heating hot water occurs in the initial task of heating cold to warm or hot water. Using the sun for this task provides great savings for the overall heating of your domestic water.

There are some people who can live without the secondary tank. For the most part, these people live in very hot climates with long solar-gain days. To help retain heat, the storage tanks may be insulated like a thermos. The hot-water tank should be located as close to the panels as possible to reduce heat loss as the water travels from the panel to the storage tank.

Solar hot-water panels can also be used to generate the heat for a radiant-floor system as is used for the Hertz/Fong residence and Kashou/Caron residence. Both of these homes are located



Indirect System

in a mild climate, which allows for the simple generation of the heat from the solar panels to work directly with the radiant systems. This system may require a secondary heat source (such as a boiler or hot-water tank) or secondary energy source in cold climates where storms most often bring cloudy days, thus reducing the ability to generate solar hot water.

With the rising cost of energy, and until the municipalities broaden, stabilize and consider the long-term source of energy; the various configurations of these systems can reduce the costs of your energy consumption and reduce your use of nonrenewable energy.

This page and opposite: Large sliding doors expand living experiences to the garden court. Concrete floors, with up to 40 percent fly ash in the mix, provide a sustainable and low-maintenance solution inside and out.

In addition to the home providing an almost Edenic experience, it is also easy on the environment. The concepts of sustainability play a large role in the design and construction of the home, making it a wonderful place to live, almost guilt free. A simple material palette of concrete, wood, and glass is employed throughout the house, further emphasizing a holistic experience of the home, inside and out. A conscientious effort was made to use sustainable wood throughout. Reclaimed, resawn Douglas fir timbers were used for roof beams, columns, and trellis members. The addition incorporates Forestry Stewardship Council –certified, sustainably harvested mahogany with FSC-certified Ipe (also called Paulope) hardwood used for the railings and stairs. Naturally pigmented wall and ceiling surfaces are complemented by Douglas fir used as both structure and trim, sealed with a low-VOC, clear finish.

Poured-in-place concrete, with up to 40 percent fly ash in the mix, was not only used for walls but also for furniture and floors. Battered concrete walls employed around the pool pavilion help to emphasize the openness to the court. Syndecrete, a sustainable concrete made with a combination of discarded recycled glass chips, computer products, and vinyl records as the aggregate, is used throughout the home as pool surround, floor pavers, countertops, and wall tiles as well as sink basins, tubs, showers, and fireplaces.

The active energy systems greatly reduce the home's reliance on the municipal energy system. According to Hertz, a 15 kW PV array connected as a grid intertie mounted on the roof provides 70-plus percent of the domestic house power. A solar

Above: A custom resin sink shares space with a rinsing shower for the pool. The floor is made of Syndecrete tiles and loose pebbles that allow the shower water to drain below them.

Right: An outdoor living place is situated in an alcove adjacent to the pool. A gas-fired "flame" is reminiscent of the casual bonfires made on oceanside beaches.

Opposite: At night the house glows, making apparent the interwoven relationships between inside and out, ground and second floor, including a large balcony off of the children's playroom.

Hertz/Fong RESIDENCE Strategies

Passive Techniques

Solar hot-water heaters share rooftop space with PV panels.

- Large sliding-glass doors that open onto the courtyard, double doors, and operable windows all contribute to the passive cooling of the house.
- The dark color of the pool attracts solar gain, thus retaining heat in the pool.
- Concrete slab is used to retain the heat generated by the radiant-heat system.

Technologies

- A 15-kW Shell Solar PV Grid-Intertie system provides more than 70 percent of the energy for the house.
- The inverter is an SMA Sunny Boy.
- A used commercial-grade RADCO solar hot-water panel system heats the pool's water.
- A combined flat plate collector and evacuated parabolic collector panel system generates the hot water for both domestic use and radiant-heat floors.
- An ionizing/chemical-free system is used for filtrating the pool water.

Materials

- Sustainable wood used for beams, columns, trellis, decks, railing, and stairs includes reclaimed redwood, Ipe and mahogany.
- Rammed-earth walls are made from a mixture of fly ash, decomposed granite sand, and 10 percent concrete.
- All concrete is made from a 40-perce high-volume fly ash mixture in partial substitution of Portland cement.
- Invented by the architect David Hertz, Syndecrete, a sustainable concrete product made with a combination of discarded recycled glass chips, computer products, and vinyl records as th aggregate forms the pool surround ar patio, countertops, tiles, and sinks.
- The insulation is encapsulated glass wool in the walls and rigid polystyren (EPS) in the roof, which uses no VOC in its manufacturing process.

Left: The street-side entry to the house is enclosed with a rammed-earth wall, built from fly ash, decomposed granite sand, and cement. A thin garden space is filled with horsetail reeds and king palms.

Above: A series of PV panels on the roof are combined to create an array that produces 15 kW of power for the house.

hot-water system, using both flat plate collectors and an evacuated parabolic collector panel, generates the hot water for both domestic use and the radiant heat floors. Additional energy-saving strategies include automatic ventilating skylights and screened doors and windows, which allow for passive cooling of the home.

The Hertz/Fong Residence brings into focus strategies that may be adopted to create a home that is both relaxing and sustainable. Hot-water solar panels, PV arrays, and sustainable materials all remain in the background to the rich daily experiences of leisure of the home. In contrast to excesses and irresponsibility that we have come to associate with lives of leisure, as was discussed in the introduction to the book, these homeowners can enjoy their home, knowing that it doesn't overly tax the Earth for their pleasure.