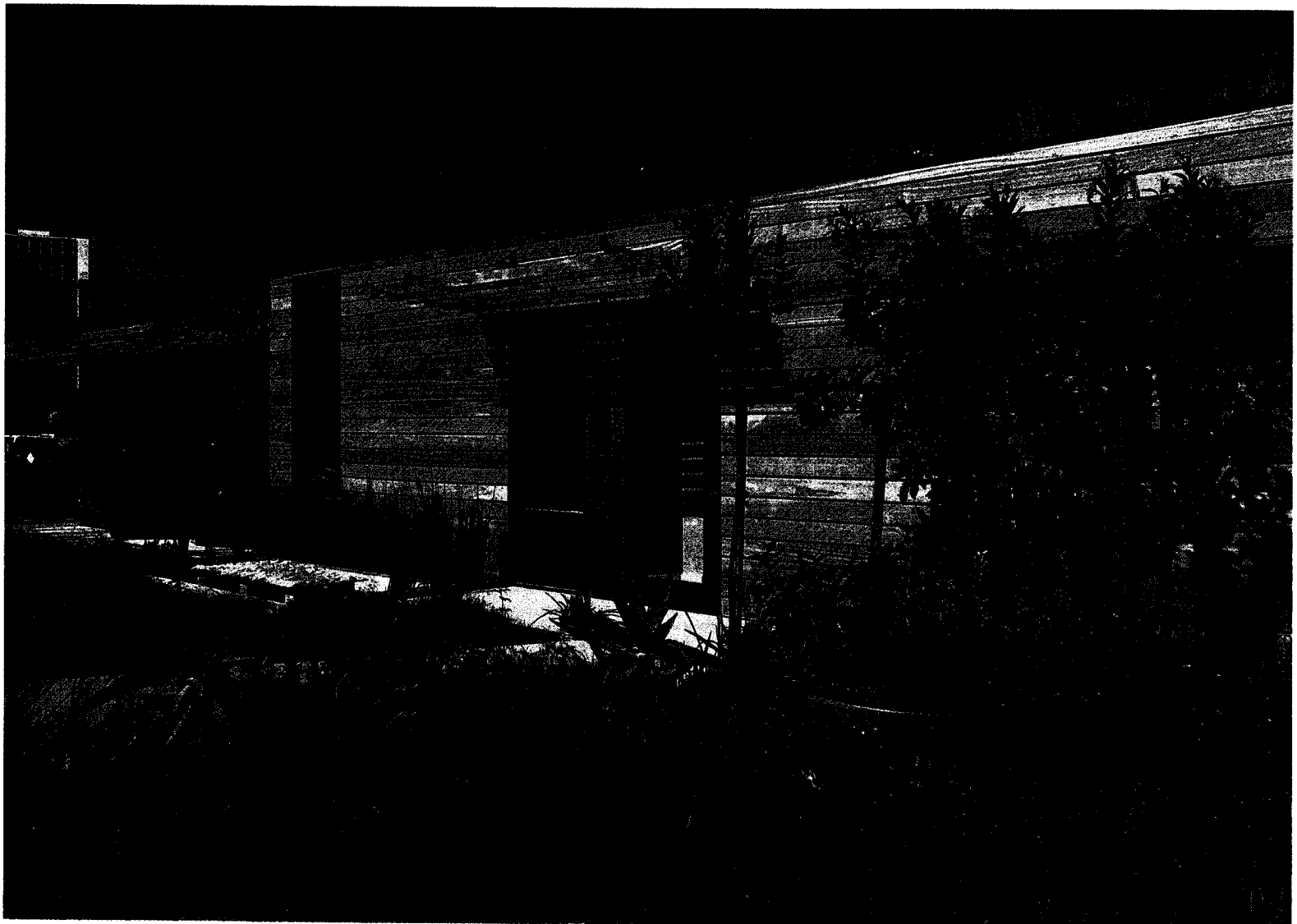


The ECO-PR

Architects around the world are taking interest in prefabrication as a way to change public perception and remake manufactured housing as an ecologically friendly provider of single-family homes.



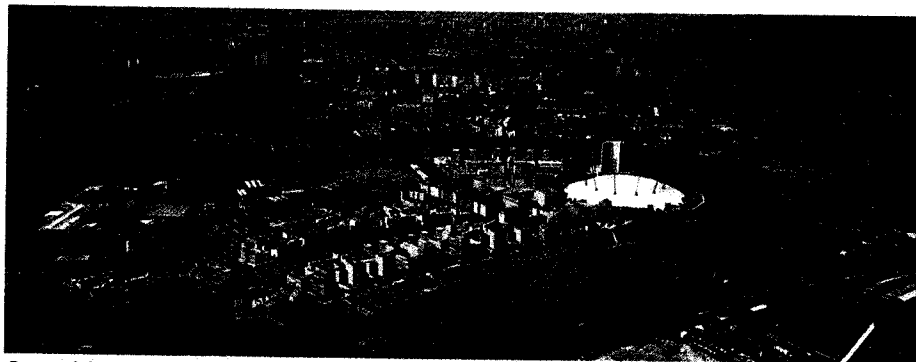
Two Affordable, Sustainable Housing Projects in England and Sweden

GREENWICH PENINSULAR, A RESIDENTIAL development in the east end of London, is incorporating everything a U.K. residential project purportedly should in the 21st century—affordable housing in a central location that is also sustainable. With high home prices showing fewer indications of abating in London than elsewhere in the country and a dearth of space to build residences, this is the type of housing project that should be getting more support from the U.K. government: the project is supported by English Partnerships, the national regeneration agency that is working with the government to create sustainable housing growth in England.

The £100 million (\$198 million) project will include 10,000 residences on 190 acres (75 ha). Also included will be 3.5 million square feet (325,000 sq m) of office space, and 363,000 square feet (33,700 sq m) of retail space that will include more than 150 shops and restaurants—all of which is expected to create 29,000 jobs, including 5,000 during the construction phase.

Greenwich Peninsular will also have 1.6 miles (2.6 km) of riverfront along the Thames, an answer to one of the chief criticisms of waterfront development in London—that almost all such space has gone to luxury flats rather than social, or government-backed, housing. Of the 10,000 residences at Greenwich Peninsular, 3,800 will be set aside for key public sector workers such as nurses or teachers, and for those with lower-than-average incomes.

Sustainability is also a major issue for U.K. housing. Greenwich Peninsular will be London's first low-emission zone. In addition, under Mayor Ken Livingstone's Low Emission Zone initiative, all cars owned by residents at Greenwich Peninsular will need to comply by 2009 with the European Union directive on emissions known as



Greenwich Peninsular will provide housing for 25,000 people in a sustainable development on the Thames riverside in London.

Euro 4. Residents living in the affordable homes will have to comply by the following year under terms of their leases.

Buildings in Greenwich Peninsular will be built to meet the highest environmental standards of the British Research Establishment Environmental Assessment Method (BREEAM). The developer—the Meridian Delta Ltd. joint venture, made up of Australian developer Lend Lease and U.K. developer Quintain—says it is aiming for a four-star rating on a six-star scale under the U.K.'s Code for Sustainable Homes.

The project is located on the same development site as the Millennium Dome. Built with nearly £800 million (\$1.59 billion) in national lottery funds, the dome came in way over budget and was derided both during and after construction for its expense and lack of a real use after the Millennium Experience exhibition closed there at the end of 2000. With the Greenwich Peninsular housing project, the site will no longer remain isolated from the rest of London.

Another example of sustainable, affordable housing—located in Malmö, Sweden—is Västra Hamnen, or Western Harbour, regularly cited as the model residential project in Europe. Like Greenwich Peninsular, it is being built on former

industrial land on the water's edge—in this case, the Øresund strait separating Sweden and Denmark.

Western Harbour began life as the site of a residential expo in 2001, showcasing exactly the kind of methods used to build it. Covering 17.2 million square feet (1.6 million sq m), the development will provide housing for 10,000 people, with an additional 10,000 units for people working or studying in the area; the University of Malmö moved some of its campus to the site in 2005. The first phase, Boo1, opened in 2001 and now has 1,000 homes covering 2.7 million square feet (250,000 sq m). Also at the site is Spanish architect Santiago Calatrava's Turning Torso tower, a 625-foot-(190-m-) tall structure that twists 90 degrees from its base.

Like the London project, sustainability is a priority at Västra Hamnen, with 290 million kronor (\$50 million) being invested in environmental enhancements. The funding has come from the Swedish government and the European Union, both of which are interested in promoting renewable energy in housing.

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JEFF HERLITZ

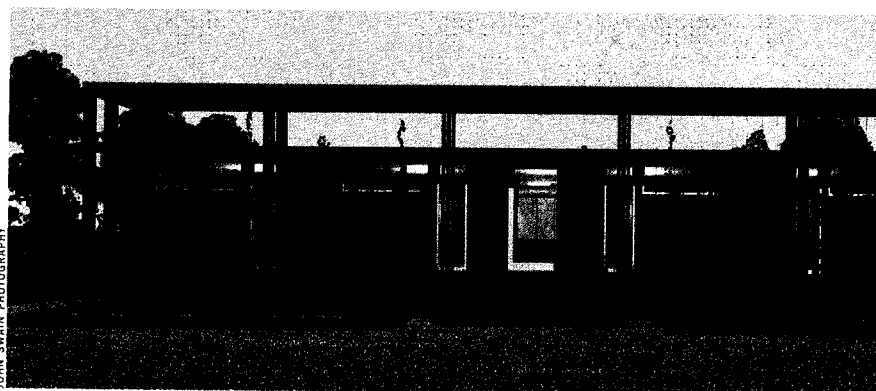
Revolution

TRADITIONAL MANUFACTURED HOUSING IS ABOUT to be eclipsed by a new movement in prefabrication—ecological sensitivity. Prefabrication and environmental concern make a good pairing because materials can be combined in the controlled climate of a factory setting, allowing high-efficiency structures to be constructed more easily and affordably. The prefabrication process also reduces the cost of labor associated with on-site construction, producing an eco-prefab structure costing the same amount as a typical stick-frame, single-family home but able to outperform it in energy efficiency. Prefab structures can also be factory customized, constructed with high-quality materials, and installed in a matter of days rather than months.

The following are some examples of prefab structures currently available.

The mkLotus by Oakland, California-based Michelle Kaufmann Designs debuted last September during West Coast Green, a sustainability-focused conference in San Francisco, where the highly modular prototype sat in front of city hall as an example of the new age of prefabricated housing. It is available as either a one- or two-bedroom house in one of three different designs—Shell, Classic, and Upgrade.

The Shell is the most affordable of the three models, and, true to its name, comes with no cabinets, countertops, fixtures, appliances, or interior doors. The Classic, one step up from the Shell, has these amenities, including cabinets constructed of Forest Stewardship Council (FSC)-certified wood, fixtures from Kohler's low-flow line, and Energy Star-certified appliances. At \$175,000 for a one-bedroom unit and double that for two bedrooms, it is in the



A number of eco-prefab structures are currently on the market, including the mkLotus (facing page) and the ASAP (About Saving a Planet) House (above).

price range of many homebuyers. The Upgrade has higher-quality amenities such as concrete countertops and ecoresin doors.

Other environmental amenities offered in all models include solar panels able to supply all needed electricity, a rainwater catchment system, a graywater system for recycling used water, and a living green roof that reduces energy loads and water runoff.

The ASAP (About Saving a Planet) House by Laszlo Kiss of Sag Harbor, New York, is another example of eco-prefab housing, but with a floor plate of 2,520 square feet (235 sq m), it is significantly larger than the mkLotus. The living room, two studies, four bedrooms, two and a half baths, and full basement are all powered by a ten-kilowatt solar array creating 12,500 kilowatts of energy every year. By combining the array with an external power grid, the house can store energy in the grid during the day



The modular design of the zeroHouse allows it to be constructed in one day.

and take it back at night. Over the course of a year, the ASAP House produces as much energy as it consumes, making it a net-zero-energy structure.

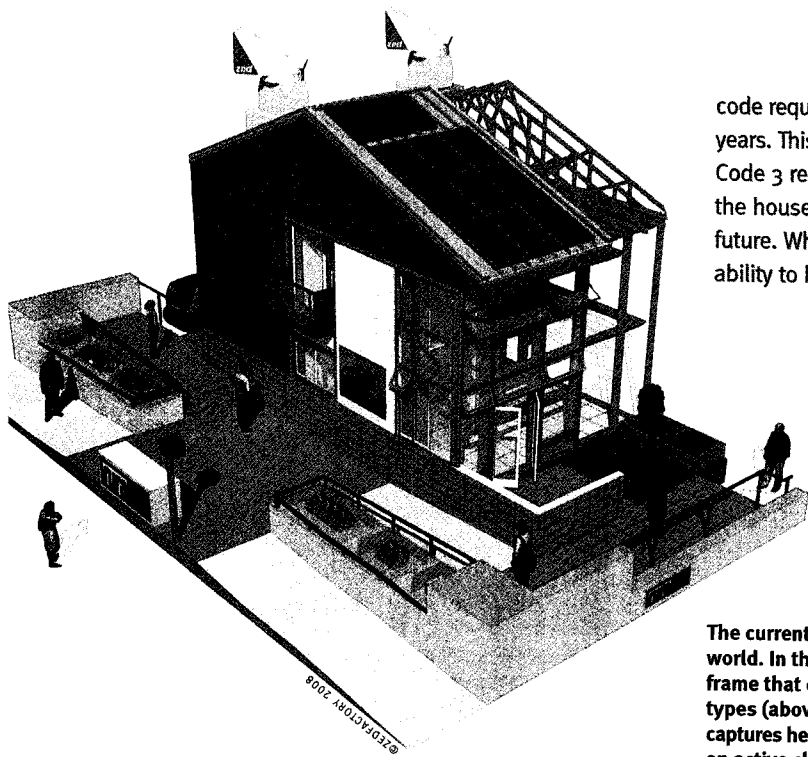
Like the mkLotus, the ASAP House has many green amenities, including a water collection system, high-efficiency appliances and fixtures, a geothermal heating system, and an optional cast-iron, wood-burning stove to further reduce electricity consumption. A solar-heated swimming pool is also optional. The ASAP House prototype debuted in April.

Another high-efficiency house in the eco-prefab market is zeroHouse from New York City-based Specht Harpman. The zeroHouse minimizes site disturbance by sitting atop a foundation of four helical anchors that require no excavation, which means it can be built in environments where typical construc-

tion does not work, such as on steep slopes or in marshy soils. The house also processes waste into compost for a garden, and because of its modular design, it can be constructed in one day.

The zeroHouse comes equipped with many of the same amenities as the previous examples, including 100 percent solar-power electricity, water catchments, super-high-efficiency appliances, insulation with a rating of R-58, and light-emitting diode (LED) lighting. Another option allows wireless communication between the house and a resident's computer in order to maximize efficiency.

To eliminate the need for inefficient water pumps, zeroHouse's water system is gravity-fed from a 2,700-gallon (10,200-liter) cistern mounted on the roof. Above this cistern is the solar array that feeds a bank of bat-



code requirements as they become more strict over the years. This means a homeowner can start by meeting Code 3 requirements now, then inexpensively retrofit the house to meet stricter Code 7 requirements in the future. What makes RuralZED most innovative is its ability to be formed into entire prefabricated sustainable villages. The potential variations on design are enough to allow for use of the same base without creating monotony over a wide area.

In Sweden, the typical cleanliness and beauty of Scandinavian design was used by Kjellgren Kaminsky Architects (KKA) to create the Pas-

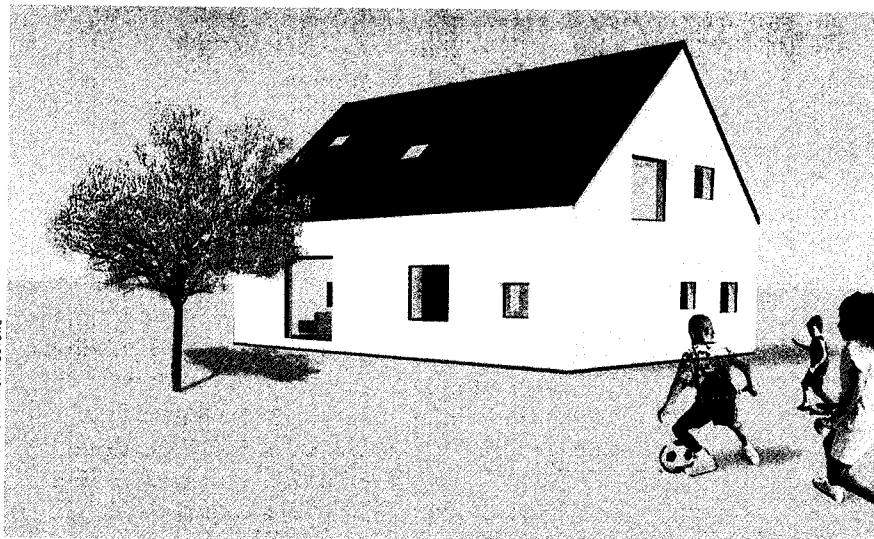
The current eco-fab movement extends throughout the world. In the U.K., the RuralZED has an adaptable skeletal frame that can be fitted with different claddings and roof types (above left). In Sweden, the Passive House (below) captures heat from people and appliances instead of relying on active climate control.

series that can continue to supply zeroHouse for up to one week without sunlight—meaning the house can be completely off grid.

The current eco-prefab movement is not confined to the United States: many companies and countries throughout the world are pursuing the goal of bringing sustainable housing to the average buyer. One prominent example is the U.K.'s RuralZED project, which was undertaken to fulfill the needs of British citizens living in housing with a density of 20 units per acre (50 units per ha) or less—about half the country's population.

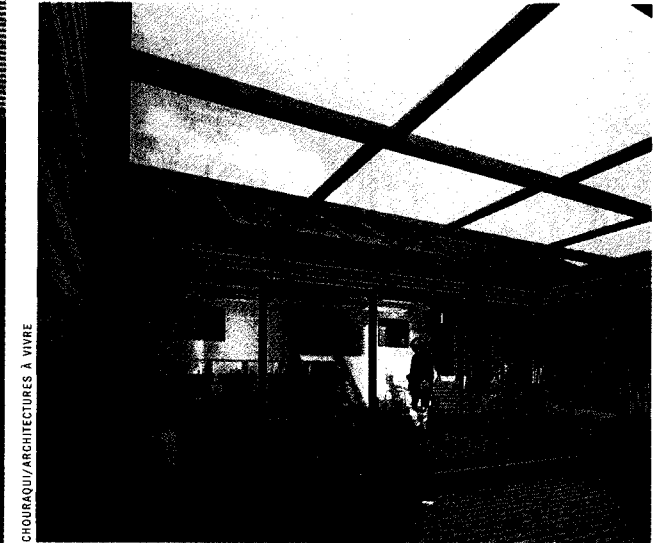
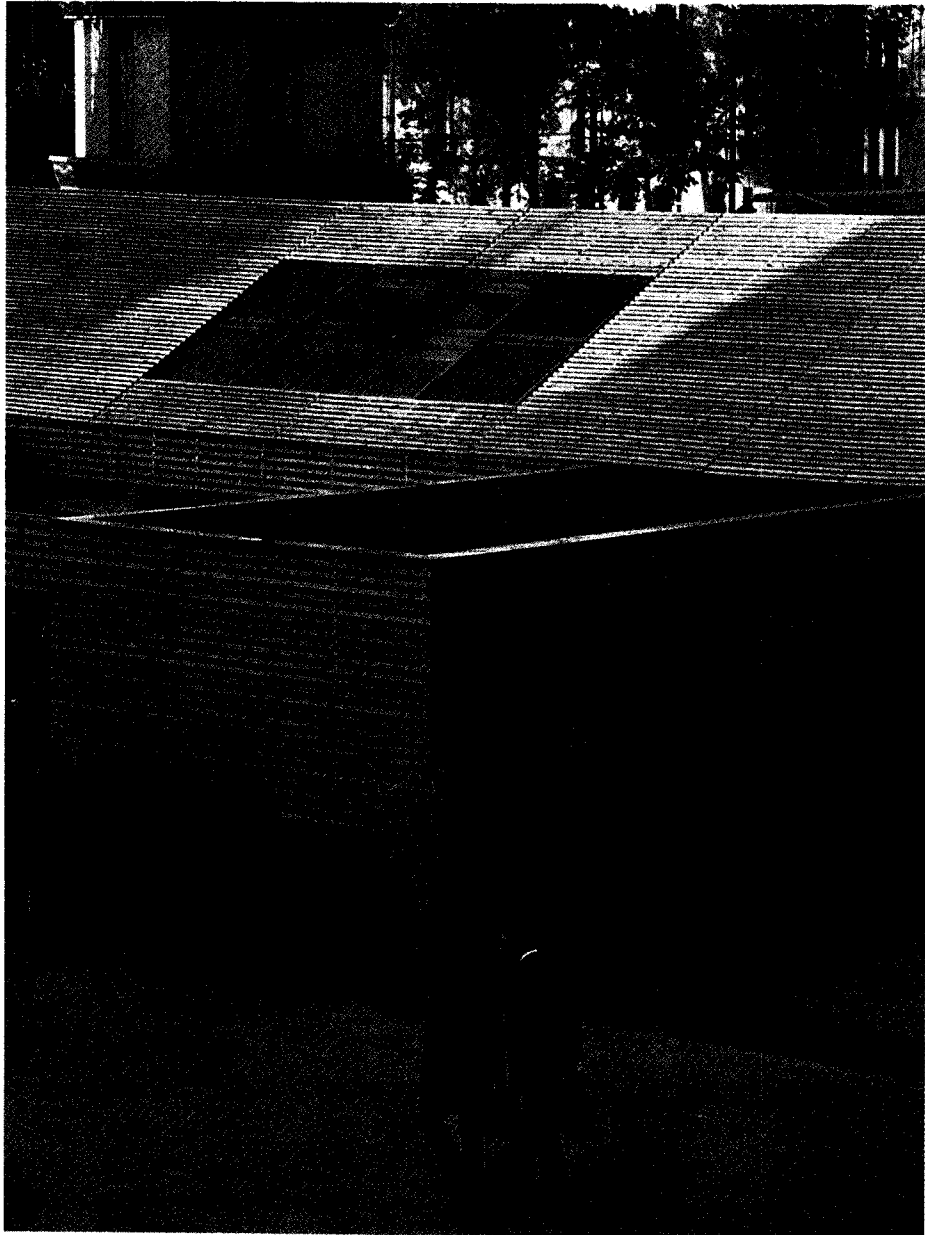
The skeletal frame of the RuralZED is completely adaptable and can be fitted with different claddings and roof types, creating a range of options from detached, single-family residence to multifamily row-houses. It also can be adapted to provide mixed-use office and retail space—with all options being carbon neutral. RuralZED comes with either a flat or pitched roof with a choice of finishes such as standing-seam aluminum, tiles, sedum, or solar photovoltaics. The house also has an optional wood-pellet boiler that can be used to feed a radiant floor heating system.

The RuralZED, designed to meet the specifications of the U.K.'s new Code for Sustainable Homes, has flexibility that allows affordable retrofitting to meet changing



sive House, a concept based on capturing heat from people and appliances instead of relying on active climate control. There are four Passive House models available from KKA—the Villa VY, the Villa Sadeltak, the Villa Vinkel, and the Villa Atrium. Ranging in size from two to four bedrooms, the villas all offer modern, family-oriented housing.

The design of each villa is different, with some being more conservative than others. The classically



CAMILLE FALLET/ARCHITECTURES À VIVRE

The French-designed Construisons Demain, with its wooden-slat cladding, is focused on a 26-foot- (8-m-) square interior courtyard, which brings natural ventilation and lighting into the building's interior.

styled Villa Sadeltak is intended to blend seamlessly into a neighborhood without overpowering the existing aesthetic. The Villa VY is a more modern-styled structure with a unique attribute: interior storage is located on exterior walls to act as a second layer of insulation and increase energy efficiency. The Villa Vinkel, with its L-shaped design, uses centralized storage to define the interior spaces and circulation. The more avant-garde Villa Atrium is a doughnut-shaped house focused on a central garden space that can be used by the family to grow food.

Construisons Demain by French architect Eric Wilmot is another variation on eco-prefab structures. Closer in size to the 2,520-square-foot (235-sq-m) ASAP House, Construisons Demain, reminiscent of a Roman villa, is focused on an 26-foot- (8-m-) square interior courtyard, which brings natural ventilation and lighting into the building's interior. The wooden-slat cladding of FSC-certified lumber gives the house a unique character. It has many of the same ecofriendly

amenities as the other eco-prefab houses, including solar photovoltaics, high-efficiency appliances, radiant floor heating, and sustainable finish materials. Its green roof doubles as a water capture and filtration system and, like zeroHouse, it is wired for remote control to maximize efficiency.

These eco-prefab homes represent only a small sampling of the worldwide market. Architects are working on eco-prefab structures in countries as varied as Australia, New Zealand, Poland, and Switzerland, to name just a few. Eco-prefab is a new movement in manufactured housing expected to help bring sustainability one step closer by creating customizable, efficient, attractive, and environmentally friendly houses that are within the budget of a typical consumer. The combination of prefab technique and sustainable technology is creating a wave of innovation that—with so many architects working on it—could result in an ecofriendly housing revolution. **U**

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