

Prefabulous World

Energy-Efficient and Sustainable Homes Around the Globe

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PREFABULOUS WORLD

is the fourth book in Sheri Koones' revolutionary Prefabulous series. Presenting an international look at sustainable home design, it explores a compelling range of design styles and cutting-edge green technologies. The rising cost of fuel and the growing commitment to protect the environment have sparked exciting innovations in prefab home construction around the world. Showcasing many of the unlimited possibilities offered by prefabrication to build incredibly energy-efficient homes, *Prefabulous World* features fifty sophisticated examples of eco-friendly home design in Australia, New Zealand, Japan, Canada, the United States, England, Germany, South Africa, and beyond.

With detailed floor plans, multiple gorgeous images of the exterior and interior of each home, and an extensive resource section listing architects, builders, and suppliers, this book is a vibrantly illustrated yet practical guide that reveals how living in a beautiful, well-built, energy-efficient home is achievable for us all, no matter where we live.



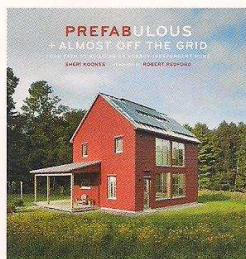
Anne Watson

SHERI KOONES is a bestselling author and expert on prefabrication whose previous books include *House About It*, *Modular Mansions*, *Prefabulous*, *Prefabulous + Sustainable*, and *Prefabulous + Almost Off the Grid*. She won the prestigious Robert Bruss Real Estate Book Award from NAREE in 2008, 2011, and 2013. Koones is also a columnist and speaker.

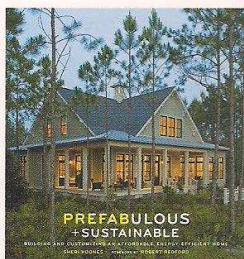
"As we look into the future, it is clear that more and more intelligent materials and energies will be brought to hand as preassembled optimized components and systems, and they will be beautiful—just witness the homes we enjoy discovering in this lovely book!"

—William McDonough, designer, advisor, thought leader, and coauthor of *Cradle to Cradle* and *The Upcycle*

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An important part of my life's work has been to preserve this land we hold so dear, conserve our natural resources, keep the air we breathe healthy, and protect all living things from the disasters associated with obtaining fossil fuel. Although much of the work I have done has been focused in North America, environmental threats know no boundaries, and all countries must work to reverse the results of global warming and halt the decimation of our land in the name of energy.

One of the best ways to deal with these overwhelming goals is to reduce the amount of fossil fuel required to heat, cool, and ventilate our homes and other buildings. With about 40 percent of the energy used in this country and others around the world toward this end, reducing the need for fuel in our buildings and substituting renewable energy for fossil fuel can make a tremendous difference in our environment. The availability of technology to reduce energy consumption in homes is better than it has ever been in the past, and the mechanisms to capture renewable energy are also more readily available and at a lower cost.

Some countries around the world have taken the challenge to reduce the use of fossil fuel very seriously. One of the important goals of the European Union (EU), for example, has been to improve energy efficiency and to meet their commitments on climate change, made under the Kyoto Protocol originally adopted in 1997. In 2008, the EU agreed on an integrated approach to climate and energy policy called the Climate and Energy Package with the aim of transforming Europe into a highly energy-efficient, low-carbon economy. Its midterm targets, known commonly as the 20-20-20 targets, include

a 20 percent reduction in greenhouse gas emissions from the 1990 levels, an increase to 20 percent renewable energies (in the total energy consumption in the EU), and a 20 percent improvement in energy efficiency across all EU countries by 2020.

Other countries around the world have also been working toward reducing the use of fossil fuel and, like the EU, are attempting to reduce the wasting of natural resources and increase the preservation of land. There are a multitude of certification programs for homes around the world, which were created to help reduce energy consumption. Several of the houses certified by these programs are profiled in this book.

In North America, we have established numerous guidelines and certification programs for home construction, as well as other types of construction. These have inspired homeowners, architects, and builders to meet the challenges established by these programs, such as LEED for Homes, ICC National Green Building Standard certification, and Passive House.

Sheri Koones's books have inspired professionals and homeowners to consider using prefabrication methods that reduce waste, inherently conserve energy, and limit the need for fossil fuel. This latest book, *Prefabulous World*, demonstrates the valiant efforts by builders around the world to use prefab methods to build houses that not only are beautiful but also substantially reduce energy usage and drastically reduce construction waste. I hope these examples will inspire you as they have inspired me.

—Robert Redford
Environmentalist, Actor, Director

OPPOSITE: Villa Langenkamp
 (page 80), seen here
 nestled among tall pine
 trees, was the first certified
 Passive House in Denmark. (Photo
 by Thomas Søndergaard)

Villa EntreEncinas

Structural Cross-Laminated
Timber Panels

PHOTOGRAPHER:
Tania Diego Crespo

ARCHITECTS:
Alicia Zamora and Iván G. Duque,
Estudio de Arquitectura Duque y
Zamora

MANUFACTURER:
KLH

BUILDER:
EntreEncinas Promociones
Bioclimáticas S.L.

LOCATION:
Villanueva de Pría, Asturias, Spain

SIZE:
2,325 square feet (216 sq m)

BLOWER DOOR TEST:
0.39 ACH @ 50 Pascals

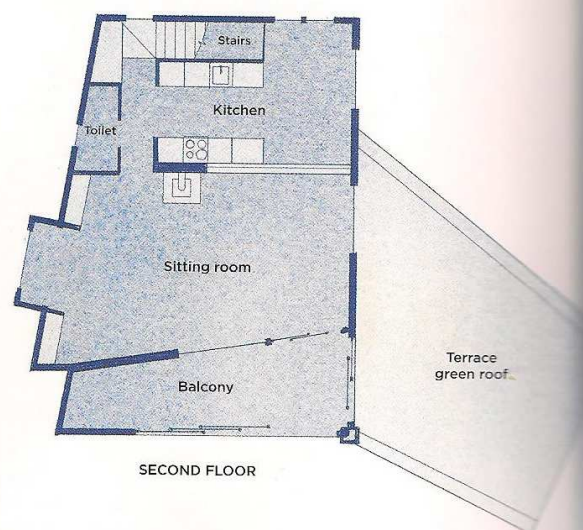
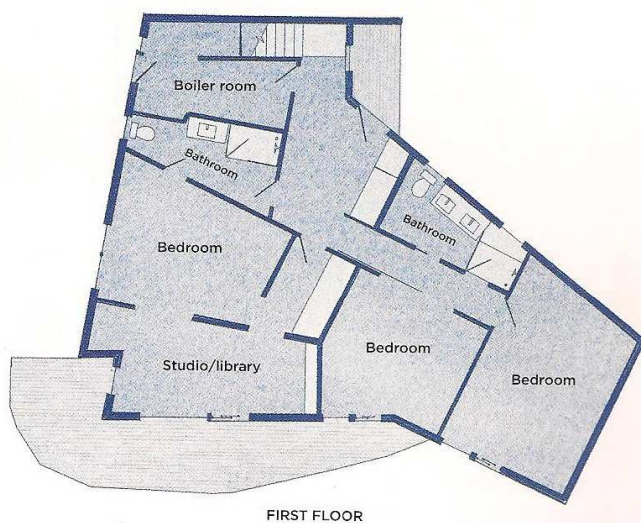
CERTIFICATION:
Casa Pasiva (Passivhaus)

GREEN ASPECTS:

Bamboo flooring
Black water system
Green roof
Natural limestone flooring
No VOCs or formaldehydes in paints,
adhesives, and finishes
No PVC in products
Plastered mortar facade of lime silicate
Rainwater harvesting
Recycled materials

ENERGY ASPECTS:


Cellular glass insulation
Cork insulation
Energy monitoring
Heat recovery ventilator (HRV)
High-efficiency windows
Highly insulated
LED and CFL lighting
Solar hot water panels
Sun screens
Wood stove



OPPOSITE The green roof, which extends over part of the first floor, creates an almost seamless connection between the house and the surrounding landscape.

BELOW The solar panels were placed on the southern exposure of the house to take full advantage of the available solar energy. The exterior facade is constructed with ventilated wood, limestone, and lime silicate plaster.





Villa EntreEncinas was built to Passivhaus standards and adheres to the criteria of bioclimatic architecture (see Glossary, page 288). The goal of the architects was to make the house as self-sufficient as possible. In order to achieve this efficiency, they created an integrated design that guaranteed almost zero energy consumption. They also selected materials and construction systems with a low environmental impact.

The house was built utilizing both active and passive renewable energy, as well as sustainable materials, free of toxic compounds. Even a black water sanitation system was installed because the house is in such a rural location. The challenge was achieving these goals with a budget similar to that of a conventionally built home.

DESIGNING FOR EFFICIENCY

Architects Alicia Zamora and Iván G. Duque first studied the climate and topography of the location before beginning construction. They designed a house that would respect the scale of the property and integrate well with the landscape. The plan also utilized solar energy and minimized energy consumption.

Zamora and Duque designed the house to be compact so as not to overwhelm the scale of the property and also to minimize the thermal requirements. They decided that part of the dwelling should be "hidden" to minimize its appearance. The balance of the house was designed with two floors that are open to the south and sit on the flat area of the lot. The height does not exceed that of the treetops on the property. The natural slope of the property and the many rocky outcrops serve dual purposes: acting

as background for the rooms open to the south and maintaining privacy.

The upper floor, which is level with the top of the slope, contains the common living space: the living room, dining room, and kitchen. Conceived as the "day zone," these areas get the most daylight and an uninterrupted view of both the natural surroundings and the green roof. The ground level, which experiences less natural light, is the "night zone" where the bedrooms and bathrooms are located.

GREENHOUSE EFFECT

A gallery in the entire southern front of the first floor acts as a greenhouse, which serves many functions throughout the year. It performs well in varied environmental conditions. During the colder months, the limestone floors serve as thermal mass, absorbing the heat throughout the day and releasing it at night when heat is needed. In the warmer months, the glass doors can be opened to access the gallery area, creating natural ventilation and keeping the house cool.

BENEFITTING FROM BIOCLIMATIC AND PASSIVE DESIGN

Alicia says, "Architectural design should be the result of a complex process, which must synthesize climate analysis, the functional, the technical, and the aesthetic with user needs. Passive strategies related to reducing heating, cooling, lighting, and power should be combined with other priorities at an early stage of the project. The fact that the building can be designed under bioclimatic design parameters can reduce energy consumption by 40 to 50 percent free of charge." Energy savings for Villa EntreEnci-

nas exceed 80 percent compared with other Spanish houses located in similar climates. The annual heating demand for this house is 12 kW/m²a and the annual cooling demand 0 kW/m²a. The typical house in this area requires 73 kW/m²a.

This house won the first prize in one of the most important competitions for national sustainable construction in Spain—Premios De Construcción Sostenible, España.

BELOW The kitchen appliances are all high energy efficiency, and the countertops are made from 75 percent recycled material.

BOTTOM The glass separating the kitchen from the living room prevents smoke from entering the living room area and allows for natural light to flood into the kitchen.



Kingspan (ceiling panels)
www.kingspanpanels.com

Lightplan (lighting)
www.lightplan.co.nz

Newton Gordge Cabinetmakers
www.newtongordge.co.nz

Rinnai (callfont)
www.rinnai.co.nz

SMEG (appliances)
www.smegusa.com

Tanaki (cabinetry)

Vantage Aluminum Joinery
www.apinz.co.nz

Wooden Floor Company (laminated flooring)
www.woodenfloors.co.nz

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PRISPA

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Suppliers
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SOUTH AFRICA

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www.ecomohome.com

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www.solar-geyser.com

Stable Marketing (cedar cladding)
www.stablemarketing.co.za

SPAIN

JP House

Photographer
FG+SG
Fernando Guerra Sergio Guerra
http://ultimasreportagens.com

Architect
MYCC
www.myc.es

Manufacturer/Builder
Ageco Scotman
www.algecoscotman.com

Quantity Surveyor
Raul Olivares

Suppliers
IKEA (kitchen furniture)
www.ikea.com

JUNG (electric)
www.jung.de/en

Quick Step (flooring)
http://us.quick-step.com

ROCA (bathroom fittings)
www.in.roca.com

Simonin (larch rain screen)
www.simonin.com

Smeg (refrigerator)
www.smeguk.com

Villa EntreEncinas

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www.taniacrespo.com

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Estudio de Arquitectura Duque y Zamora
www.estudioduqueyazamora.es

Manufacturer
KLH
Zulziri S.L. + Biohaus Egorri S.L.
www.klh.at

Builder
EntreEncinas Promociones
Bioclimáticas S.L.
www.entreencinasbioclimatica.es

Blower Door Test
Micheel Wassouf
Energiehaus-scp
www.energiehaus.es

Suppliers
Bosch (refrigerator and washing machine, rated A+++)
www.bosch-home.com

Caparol (silica siding)
www.caparol.es

Duron Paints & Coverings (interior paint)
www.duron.com

Eco by Cosentino (countertops)
www.ecobycosentino.com

EPDM (roofing)
www.epdmroofs.org

IKEA (kitchen furniture)
www.ikea.com

Livos (wood stain)
www.livos.com

Moso (bamboo flooring)
www.moso-bambu.es/parquet/
bamboo-elite

Muebles Joya (furniture and lighting)
www.mueblesjoya.es

Rika (wood stove)
www.rika.at/en/esprit

Siemens (dishwasher, rated A+++)
www.siemens-home.com.au

Wolf (solar panels)
www.wolf-heiztechnik.de

Zinco (green roof)
www.zinco-greenroof.com

SWITZERLAND

Lugano House

Photographer
Grandpierre Design GmbH
Visuelle Kommunikation
www.grandpierre.de

Designer/Manufacturer/Builder
HUF HAUS GmbH u. Co. KG
www.huf-haus.com

Suppliers
Axel Meise (lamps)
www.architonic.com/pmpo/
axel-meise/8100467/2/2/1

B&B Italia (furnishings)
www.bebitalia.it

Boley (fireplace)
www.boleynl

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www.hansgrohe.com

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www.ingo-maurer.com

Jaso (American cherry parquet flooring)
www.jaso.de

Siematic (main kitchen cabinets)
www.siematic.de/Startseite_DE.htm