Considering a fragile planet

"An architect mindful of our beleaguered planet's resources can address issues of sustainability in several ways – a self-sufficient electricity supply, toxin-free materials, and an energy-efficient construction are all high-impact factors."

Nathan Good, architect, Nathan Good Architect

Natural wave

Sophisticated eco technology, non-toxic materials, and an intelligent design combine to celebrate the environment while minimizing impact on it

The world's population is mounting rapidly and the level of environmental toxins is keeping pace. And as we strive to build bigger and drive faster, our energy resources dwindle. Although planet Earth is facing testing times, a growing interest in environmentally sustainable dwellings provides a small but growing light at the end of the tunnel.

Often, it is architects informing clients of the merits of building an eco-friendly home, but in this case the reverse applied, says architect Nathan Good.

"The owners had already built an environmentally sustainable office building and wanted to apply similar principles to their new coastal residence," says Good. "While the home looks natural and uncomplicated, a lot of planning and behind-the-scenes technology went into its super-efficient design."

The home addresses green issues in several ways. Firstly, a complex solar power system aims to achieve a net-zero energy bill. Secondly, carefully chosen materials and efficient air circulation create a toxin-free environment. Thirdly, the home is designed to feel part of its surroundings, both through the design profile and, again, through an extensive use of local natural materials.

Solar energy retrieval impacts on the house in three ways – for electricity gathering, water heating and passive solar gain.

"Solar panels on the lower roof provide electricity that is metered and delivered to the West Coast grid," says Good. "This is then drawn upon as required for the home's power supply – the idea is that more

energy is produced than is required."

Hot water energy comes from a combination of a system of solar collector tubes and a ground source heat pump.

"The heated water is either added to large water tanks in the basement, or if storage is at capacity, is redirected to two 250ft-deep geothermal wells bored into the basalt rock beneath the house, for recovery as required," says Good. "The dense basalt retains heat and has a natural temperature of around 55 degrees – the rock even preheats cooler water as it enters the

Preceding pages: **This eco-friendly home by architect Nathan Good operates under its own power.**

Facing page: **Solar collector tubes on the hillside provide the home's water and space heating.**

Top and left: **This eco-roof is the upper of two parallel arched roofs on the home. The vegetated roof is sewn with sedums and native wild flowers for storm water control, insulation and the aesthetic pleasure of the neighbors.**

Above: **Cedar shingles on the exterior contribute to the home's earthy, natural appearance.**

property and travels slowly around the wells' closed-loop system."

In terms of passive solar gain, the home has 600 square feet of thermally efficient glazing. The same rock that keeps an even temperature below ground is used as construction material above ground, avoiding heat loss for the home as well. Pest- and rot-resistant Durisol blocks were used to build the home and these also increase the home's thermal mass and heat retention.

The choice of eco-friendly materials, from the Durisol blocks and extensive use of wood right down to mineral-based Aglaia surface treatments keep the interior air toxin free. Air is circulated via an efficient Energy Recovery ventilation system.

The emphasis on natural materials spills over into the third aim of the home – harmonizing with the environment. Wind-felled Douglas firs timber was used for structural beams, and natural elements, such as stone and wood predominate. The eco-roof adds insulation, helps stormwater management, and also blends the home into the hillside. Perhaps the most telling

Facing page: **The heavy Douglas fir columns come from salvaged trees. Most of the wood used in the home has been Forest Stewardship Council certified – harvested from forests managed in an environmentally responsible manner.**

Above: **The cherry wood cabinetry is finished in natural mineral sealants, in keeping with the other interior wood surfaces. The organic sealants contribute to the negligible toxin levels in the home.**

Above: **Windfall-harvested Douglas fir is used for the stair planks and much of the flooring. A large tree trunk forms an interior feature and was actually found on site. The interior walls are covered with gypsum plaster. These were soaked and covered with Aglaia – a natural, aromatic pigment.**

Above right: **Clerestory windows between the two roofs contribute to the home's light-flooded interior. Their strategic placement avoids the need for electric lighting during daylight hours.**

Photography by Tim Maloney

symbol for the home's green agenda is the shape of the home itself. One of the owners had asked Good to incorporate a simple, fluid curve of a sand dune he had seen in a photograph, and the home's graceful side profile reflects this shape.

"We wanted the bio-inspired design to echo the way the natural world sustains itself, by contributing to the environment that supports it," says Good. "The home wraps around a centuries-old Sitka spruce, for example, exemplifying the owner's commitment to the environment."

Architect: Nathan Good Architect, AIA (Portland, OR)
Interior designer: Georgia Erdenberger, IIDA, Czopek & Erdenberger
Landscape architect: George Erdenberger
Energy consultant: Charlie Stephens, Oregon Department of Energy
Solar consultant: Doug Bolyen, Cascade Solar Consulting
Main contractor: Rich Elstrom, NAHB
Structural engineer: Stricker Engineering
Mechanical engineer: Gene Johnson, Solarc Engineering
Siding: Cedar shakes in natural finish from Jacob and Jacob Shingles

Roof: Upper green roof by Lando & Associates; lower roof, two layered modified bitumen by Torch-Down
Roof and underfloor insulation: JM Formaldehyde-free fiberglass batt insulation for roof, rock-wool walls; select use of spray-foam insulations
Solar thermal panels: 5kW Thermomax solar electric panels from Sharp Electronics
Wood: Samuel Aarons
Interior wall, roof and floor framing: Collins pine FSC lumber from Lumberman's
Windows and doors: Custom cedar windows by Bergerson; interior doors from salvaged Douglas fir logs milled by Stella's Woodworking; exterior doors by Anderson Windows
Window and door hardware: Chown Hardware
Building automation and controls: Oregon Technology Institute; Alerton Direct Digital Controls system from Environmental Control Corporation of Portland
Steel handrails: Sopko Steel
Flooring: Douglas fir from salvaged, wind-fallen trees, by Nelson Custom Milling, Aglaia stained and clear sealer finished by Shannon Belthor
Walls: Durisol Wall-forming ICF System
Wallcoverings: Interior walls in gypsum plaster with Aglaia natural stain. Plastered by Brian McEvoy, final finish by Shannon Belthor
Paints: Aglaia Natural Paints
Interior stone work: Maragos Rock Construction
Lighting: Supplied by Globe Lighting, installed by Phillips Northwest
Heating and water heating system: Solar and ground sources assisted heat pump with Energy Recovery Ventilation and in-line hydronic fan-coil delivery system, jointly designed by Oregon Department of Energy and Solarc Engineering, installed by White's Heating and Summers Solar Systems
Kitchen manufacturer, built-in cabinetry: Collins pine FSC Cherry fabricated by Craftsman Interiors
Countertops: Absolute black granite, honed finish. Installed by Astoria Granite
Backsplash: Tile by Bergerson Tile