

# 25 WAYS...AND COUNTING... TO "GREEN" AFFORDABLE HOUSING



**1 BEFORE CARS WERE KING...**  
For much of the twentieth century, it was not uncommon for homes to be built with a carport instead of a garage. A carport utilizes less material and de-emphasizes the automobile.



## DESIGN & ENGINEERING

**PROGRAM**  
3 BEDROOMS  
BATH & KITCHEN  
LIVING SPACE  
CAR & STORAGE  
OUTDOOR SPACE

**APPLY APPLICABLE BUILDING CODES**

## SITE INFRASTRUCTURE

**CALCULATE INFRASTRUCTURE IMPACT REDUCTION**

## ENERGY SYSTEMS

**PASSIVE ENERGY SYSTEMS**

**ACTIVE HVAC SYSTEM**

**CALCULATE ENERGY USE BENEFITS**

## BUILDING ENVELOPE

**STRUCTURAL SYSTEM**

**CLADDING MATERIALS**

## INTERIOR FINISHES

**MATERIALS**

**FURNITURE AND FIXTURES**

**2 SMALL CAN BE BEAUTIFUL**  
Making good design decisions begins with determining how large the house really needs to be in order to function properly. Realizing that many potential affordable housing sites are tightly constrained urban infill properties. This home was designed as a two-story structure to minimize its footprint, with an area of 850 square feet for one to three bedrooms. The minimal area translates to possibilities for higher density developments, less impact on natural resources and small material costs.



**3 MODULAR LAYOUT EQUALS SMART DESIGN**  
Building to a 24" module and using 24" on center wall and floor framing can maximize framing material cost savings. Few homes can be entirely confined to a rigid module because crucial dimensions such as the width of a tub or corridor are not modular. The most important dimensions to keep on the module are overall dimensions to the outside of framing. To maximize savings, window sizes and placement should be coordinated with the module.



**4 FLEXIBLE, EXPANDABLE & TALL**  
Created as a "starter" home, this structure has been designed to be expandable with a possible future detached garage and front porch. Flexibility is created through a second floor that can be easily modified to a one, two or three bedroom space depending on buyer needs. The compact footprint, two-story structure is intended primarily for small, sub-standard urban infill sites.



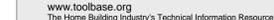
**5 WHAT IS ADVANCED FRAMING?**  
Advanced framing is a series of techniques designed to use less lumber in framing a house, while meeting model building code structural performance requirements. Using less lumber reduces material costs, and opens cavities to allow for higher levels of insulation.



**6 EASYRISER ENGINEERED STAIR STRINGER**  
Conventional practice for building wooden stair stringers is to notch 2x12s, with at best a lot of waste and at worst, an entire mis-cut stringer ending up in the dumpster. This pre-manufactured OSB stringer system allows the use of smaller dimensional lumber, usually 2 x 6's.



**7 THROW AWAY YOUR WATER HEATER TANK...**  
...and shave ten to twenty percent off your water heating bill. That savings results from elimination of standby losses—energy lost from warmed water sitting in a tank. And, since water heating accounts for about 14 percent of the average U.S. household energy budget, this can be a significant loss. Tankless water heaters provide hot water at a preset temperature when needed without storage, thereby reducing or eliminating standby losses.



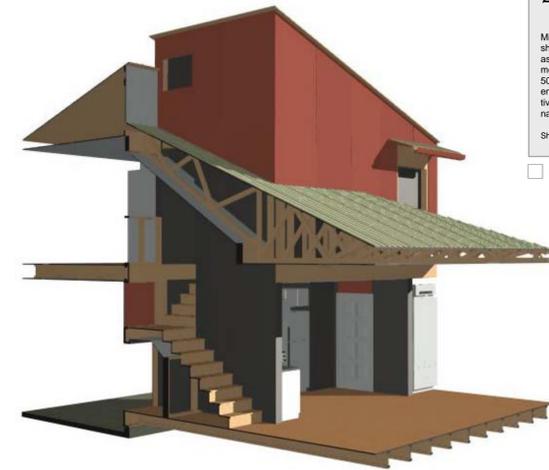
**8 HIGH EFFICIENCY EQUALS LOW OPERATING COSTS**  
With a SEER rating of 16.5, this extremely high efficiency split system ductless heat pump is NOT the least expensive solution for heating and cooling, but with a 30% increase in efficiency over a 13 SEER unit will help the homeowner realize a significant savings in operating costs.



**9 SAVING WATER IS A GOOD THING**  
The TOTO Aquia dual-flush toilet uses 1.6 gallons in the high-flush mode and 0.9 gallons in the low-flush mode. TOTO estimates that a typical family of four will save approximately 7,000 gallons per year by installing this toilet in place of a standard 1.6 gallon-per-flush toilet.



**10 EARTH ADVANTAGE ENERGY PROGRAM**  
Designed by the Reading Electric Utility (REU), this program provides rebates for developers who utilize energy efficient measures in their building design. This program provides a strong incentive to provide better design without suffering the penalty of higher costs.



**20 METAL ROOFING AS A SUSTAINABLE MATERIAL**  
Millions of barrels of crude oil are used in the production of asphalt shingles, which inevitably fail. Annually, over 30 billion pounds of asphalt shingles are disposed of in landfills. The steel used to make metal roofing products and accessories is composed of as much as 50% recycled material, and is itself 100% recyclable. Metal roofing is environmentally friendly - due to its recycled content and solar reflectiveness - and can last 50 years or more with virtually no maintenance.



**21 WHAT IS THE IDEA BEHIND IKEA?**  
• Cost consciousness and resource efficiency with the use of fewer raw materials and creation of less waste and discharge.  
• The extensive use of wood in our products. Wood is a recyclable, biodegradable and renewable material.  
• Training co-workers and engaging them in environmental issues



**22 AN ALTERNATIVE TO CARPET FLOORING**  
With the limited durability and relatively high maintenance requirements of carpet flooring, it seems as though a composite wood flooring product from IKEA offers the possibility for solving these issues. Although slightly more expensive in the short term, the durability and low maintenance of this flooring makes it an attractive alternative. Of course, the opportunity for area rugs still exists to soften the acoustical character of the living space.



**23 A DIFFERENT KIND OF BATHROOM TILE**  
Cork is a natural flooring material that's been used for more than a century. Obtained from the outer of the bark of the cork oak, it can be harvested sustainably without killing the tree (the cork regenerates in about 10 years). It is durable, sound-absorbing, and naturally moisture, rot and mold-resistant. As such, it is an excellent floor covering for a bathroom location.



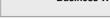
**13 SOMETIMES THE TRADITIONAL WAY IS BEST WAY**  
Historically, almost all buildings were naturally ventilated. An open staircase with a vented clerestory window plus operable windows to provide cross-ventilation can reduce cooling costs 10-30%. Roof overhangs complete the strategy.



**14 STORM WATER DETENTION AND GRAY WATER ALL IN ONE**  
The opportunity exists for reducing the impacts on public utility infrastructure through storm water detention and gray water reuse within individual residential lots. Although not yet accepted by local codes, research into combined systems has the potential for reducing costs and improving the sustainability of the single family residence.



**12 AS EASY AS TWISTING IN A LIGHT BULB**  
Lighting accounts for 15-20% of the average home's electric bill, so using compact fluorescent light bulbs can translate into significant savings. A compact fluorescent light bulb uses about two-thirds less energy, and lasts about 10 times as long as a standard incandescent bulb. Gone, too, are the glaring fluorescent bulbs of yesteryear. Today's compact bulbs cast a warmer, brighter, clearer light than their predecessors.



**15 GREAT ECO-FRIENDLY IDEAS COME FROM AUSTRALIA**  
Hardie Panel exterior siding is a fiber cement product, consisting of a mixture of cellulose fiber from plantation Radiata Pine trees in Australia, portland cement, sand and water. Considering the availability of the raw resource, its freedom from maintenance, excellent product lifecycle and minimum environmental impact, these materials contribute to some of the most energy efficient and environmentally responsible building systems available.



**16 IS VINYL REALLY ENVIRONMENTALLY UNFRIENDLY?**  
There is no easy answer to this question, but when it comes to vinyl windows the argument can be made that yes, there are environmental positives to using this product. The most important statistic may be that the energy lost through poorly designed residential and commercial windows amounts to about \$25 billion a year, a loss comparable to the value of the oil delivered by the Alaska pipeline, according to Lawrence Berkeley National Laboratory. Vinyl windows are energy efficient because of their relatively inexpensive cost, resulting in their widespread use within the



**17 PREFABRICATION IS ALREADY HERE**  
Prefabricated wood roof trusses are now the standard for roof construction in the U.S. for the simple reason that they save builders money. However, built of renewable wood material, they are also a rarer, a "green" product that has achieved widespread acceptance.



**18 MAKING BETTER CONCRETE WITH LESS CEMENT**  
Simply stated, using recycled fly ash reduces the amount of cement necessary in concrete. Although the construction industry is slow to change, increasingly the opportunity to provide a better product while also protecting the environment is gaining acceptance. In the words of ecologically inclined structural engineer Bruce King of Sausalito, California, "It's one of the few clean, simple no-brainers in green building, because the technology is worked out, the cost is usually equal or less, and the quality of the product is far higher. That's pretty easy to sell to clients."



**19 A SIMPLE WAY TO IMPROVE ENERGY EFFICIENCY**  
Radiant barrier sheathing combines standard OSB roof and wall sheathing with a radiant-foil overlay to minimize radiant heat gain. In effect, the builder gets the benefit of two products combined into one, with savings resulting in initial labor to install the product plus the long-term benefits to increased energy efficiency.



**25 CREATING A GOOD SET OF SET OF ASSEMBLY INSTRUCTIONS**  
The idea of a building information model (BIM) is gaining more support as a means to more accurately convey information to the builder. The computer model can be provided to the contractor to include detailed information as to specific material quantities, product specifications and sizes. In addition, detailed framing elevations act as a sort of "shop drawing" to help make the connection between designer and builder more seamless.



**24 THE ADVANTAGES OF STAYING WITH THE OLD STANDARD**  
While there have been several attempts to market so-called "green" wallboard over the past decade, conventional drywall manufacturers like U.S. Gypsum quietly use 100% recycled fiber in their paper facings. Additionally, traditional drywall products rank very highly with their recyclability, just awaiting the availability of large-scale recycling plants in the U.S.



**LEGEND**

- ECONOMICAL
- FLEXIBLE
- SUSTAINABLE
- CONSTRUCTIBLE
- QUALITY