

Wozniak's New Goal is Efficient Housing

Evan Koblentz, online editor



Op-Ed: [Apple Inc.](#) [1] co-founder and legendary hacker [Steve Wozniak](#) [2] [[book review](#)] [3] recently found a new passion in energy-efficient housing. Last month he told [PC World](#) [4] magazine, "I have a long dream to build my own house in a very energy-efficient approach. That's going to be very soon. It uses the right kind of wood that serves as a heater and as an air conditioner, combined with some other techniques in how the wood is assembled to operate energy life pressure. You don't have to add energy into a house after you build it. I love that concept. It's like the way I used to make computers. I want to build it myself. That's a project that could be finished this summer, next summer, but not too far from now." Here at [ECN](#) [5] we thought you'd like to know more, so we interviewed Woz by email. Here is a transcript of our questions and his answers. His preface: "I'm too busy to do this [interview] now, but I'll do it anyway. I have to say that I'm not a green expert but did encounter some technologies that were very right for a home."

ECN: *Steve, thanks very much for your time. Here are nine questions for you, based on the PC World blurb. How and when did you become interested in energy-efficient construction? Do you have any plans to use your house as model for encouraging other people and companies to design their buildings more cleanly?*

Woz: I am looking for sites but haven't had enough time to narrow one down yet. I'm mostly interested in areas of the California coast, like Half Moon Bay or San Luis Obispo. ... I have always had an interest in my own self-sacrifice to help the environment. I gave much money to groups working for forests and rivers. But I was probably misguided. I have no idea how effectively my money was spent or if it helped save one more tree or patch of river for future generations. Still, most of our charitable giving is in the sense of feeling that we are in some category we want to be in.

The term "energy efficient" is rather vague. At some level it implies some form of conservation. I have great reservations with that concept as well. One aspect of conservation is to use less so that there is more to go around, either to more people or for a longer time. I disagree with this concept pretty strongly. Personally I want to conserve but I wouldn't push that concept on others as a "right" way to live. I only want to serve as an example. I don't want to tell others that they are bad people or doing "wrong" things. That's not a good way to keep open communication. I also have trouble with the concept that we can have more of a "worse" life. It's a conflict between quality and quantity and life should be judged by quality.

The form of energy efficiency that appeals greatly to me is the idea of efficiency of construction. I have always admired getting the same results with fewer parts or

Wozniak's New Goal is Efficient Housing

Published on Electronic Component News (<http://www.ecnmag.com>)

procedures. That's a win for everyone. I used that concept in my design approach in life. I was determined to give my highest regard to engineers and in engineering we always strive for more efficiency, defined mathematically as more out for less in. If you can build a car at the same price, with the same features (size and performance) yet it uses less gasoline or pollutes less, that's a win for everyone, including the car manufacturer. Engineering leads to such advances, even when they seem like tiny steps.

Now, let's get to your point of energy efficient homes (or other facilities). I see two main parts to this issue. The first is using techniques to build homes with the least energy usage (and the least pollution). For example, ram-dirt is a material made of the dirt dug under where your home will be. It uses less energy than any other building material form to create, with a machine right at the construction site. Saving energy is good also in the sense that the energy to make this material usually comes from burning coal and emitting pollutants into our air. When properly applied, this form of construction is very low cost but applicable to luxury homes. I have spoken to builders who build luxury homes out of this material and have friends who are starting a company to manufacture blocks of this material for delivery to the site when the ram-dirt method cannot be used due to soil properties. This material is manufactured with grooved shapes and nails are not used in the construction. A home made of this should last 500 years, not just 75 years.

The other form of energy efficiency in homes is in how much energy your home uses to operate. We emit more pollutants such as carbon dioxide in our homes than in our cars. That includes the coal burned to provide our electricity, but there are other reasons that homes are responsible for such emissions. If you can build a home, with the same effort and cost, that uses less electricity, it's a win for everyone and any engineer can gloat.

Recently I was a judge at a [History Channel Modern Marvels Invent Now Challenge](#) [6] in association with the [Inventors Hall of Fame](#) [7]. A few of us judges were really taken by the winning entry and I suspect that more than myself are moving toward building the sort of home that won.

You build a home out of a type of wood that keeps the temperature constant without air conditioning or heaters. The miracle wood in this category is [Southern Yellow Pine](#) [8]. As for renewable resources, more Southern Yellow Pine trees are planted each year than are used. I'm told this is the only tree with this benefit. The Southern Yellow Pine has a resin inside that melts and freezes at 71 degrees F., a very comfortable temperature for humans. The chemical actions of melting and freezing work to balance the temperature. If it's a hot day, some small amount of the resin melts (it takes a huge amount of energy to melt a tiny amount) and the melting process pulls heat from the surroundings, from the home. When it gets colder at night, the resin-wood emits heat as it freezes.

In high school chemistry we had the latent heat of fusion concept. You let ice settle in water. You can measure the temperatures. The ice and water are both 32 degrees F. It seems like the tiniest amount of energy would cause the ice to melt. After all, you only have to change it maybe a hundredth or less of a degree. But it

Wozniak's New Goal is Efficient Housing

Published on Electronic Component News (<http://www.ecnmag.com>)

takes a huge amount of energy to accomplish melting. This represents the difference in energy between the solid and liquid states. In this way, large amounts of energy can be stored. In the case of Southern Yellow Pine, energy from the summer can even be stored in the wood until a later season in some cases.

This company [Enertia](#) [9] prepares blocks of this Southern Yellow Pine with grooves and sells the pieces as kit homes that you build yourself. The only tool you need is a power drill. No nails are used in the construction. I suspect that's because the metal of nails helps outside temperature conduct to the inside. The homes are also designed in an envelope fashion with 2 layers of wood and a space between them for natural air circulation around the home. The Southern side is all glass to collect sunlight. The homes are designed for more sunlight getting in during the Winter, when the sun is lower in the sky, than during summer, when the sun is higher in the sky.

All of these simple principles wind up with a very attractive house that is as normal and livable as any other, but without insulation or air conditioning or heating. The typical energy bill might be as low as \$30 a month, depending on where you live. The outside temperature can be 50 degrees hotter or colder than the inside temperature of 71 degrees.

Recently I bumped into the builder of my first home. We reminisced and I told him of my plans to build one of these Enertia homes. He had built many homes with the efficient ram-dirt process and for one of them he used the resin-wood (presumably Southern Yellow Pine) for the roof. With only the roof being of this resin-wood the temperature inside never varied more than 5 degrees he told me. So the combination of approaches is one thing I'm considering too.

I like things simple with fewer parts and fewer added technologies. Just think out the right ways to build a home and do it. So few people know how easily all our homes could have been energy efficient rather than energy wasters. I suppose it's an outcome of the fact that energy is so cheap and abundant now. I think of it this way. The timeline of history and of man will be many millions of years long. Over that timeline, at some point man was going to find oil and ways to use it. Whenever in time that had happened, the generations it happened for would have used it up. We are those generations using it up, but if we saved it and didn't even touch it at all, some future generation would quickly use it up. The time that mankind has oil may be a short blip on the long timeline of humans. Whenever the discoveries were made, that blip would have appeared. We needn't think of ourselves as bad just because we were the lucky ones to have the oil blip.

ECN: *Many experts say the clean-tech industry is today where the home computer industry was 30 years ago, where it's just a couple of companies and many amateurs. If true, what can the clean-tech industry learn from it?*

Woz: No, it's not comparable to personal computers. Personal computers didn't have to tear down an infrastructure. Even if a few people like myself are building energy efficient homes (and a ton more are building things that are barely energy efficient or they are using one thing that's energy efficient in a very inefficient home

Wozniak's New Goal is Efficient Housing

Published on Electronic Component News (<http://www.ecnmag.com>)

that swamps the gains) we are moving out of our inefficient homes, selling them to someone else. So only new homes can be built this way. It will take many decades or centuries to replace the existing inefficient homes with efficient ones. The best you could do is to tear down an inefficient home and replace it with an efficient one. But few of us can afford to do that. It's normally done out of vanity instead - to build a home the way you want.

Eventually the word will get around and good examples will be noticed.

I do fear that big companies will build inefficient homes in other countries for the sake of making money. Those people will be stuck with homes that would cost a lot to air condition. If the right technologies were exported then they would have nice cool homes from the start. I don't know how to spread the word. Education in the world does a poor job in these areas and even when you have the education you are at the mercy of the sellers you encounter. The mass media does a poor job of educating in these areas also.

ECN: *In PC World, you said, "It's like the way I used to make computers" -- how so? Also, are you hearing about any user groups for people who are building efficiency homes, a la the [Homebrew Computer Club](#) [10]?*

Woz: Simple design. Think about the right way to build something and take a lot of time to get it the best that can be done with the fewest resources used. No waste. Build it right and with few parts it does a lot. Don't cover things with more and more and more technology for features. Design them in from the start. It starts with the architect, of a home or a computer, working from a knowledge of the building materials and a desire to choose wisely.

ECN: *Will you be using any other alternative energy sources, such as biofuels, solar cells, or wind power? Do you plan to sell any energy back to the local utility company?*

Woz: I plan on a very low electricity bill that could justify solar cells. I worry that if it takes more energy to make and install a solar cell than it returns in its lifetime, then it's a loser. But you can't lose if it's a small addition to the home. I also may install AC/heating but hopefully never use it. I am deathly afraid of cold or hot homes but I'm willing to jump in the water and take my risks for something I believe in.

I may wind up buying some commercial solar cells with all the stuff to sell electricity back. But my electricity needs should be so small (clothes washer, lights, computers, TVs) that it may not amount to a significant amount.

ECN: *Of the energy-saving techniques you will use, which are the most cost-effective or appeal to you the most? Are there any specific green technologies that you'd like to have today, but which aren't yet feasible?*

Woz: I haven't analyzed if these Enertia Southern Yellow Pine woods are cost-effective. The total cost of the materials for a home seems reasonable to me but I'm not a builder. Once the home exists however, the energy savings and cost savings

Wozniak's New Goal is Efficient Housing

Published on Electronic Component News (<http://www.ecnmag.com>)

will come principally from the resin in the wood, but also from other carefully thought out aspects of the design. The designer is a civil engineering professor at BYU and cares a lot about saving the environment in every step of these homes, including how he makes the wood blocks for you.

ECN: *Regarding the electronics that you anticipate using, do your concepts require any special advancements or new techniques? Or do you just plan to use existing systems in new ways?*

Woz: I don't expect many changes. I want a large LCD TV and I use a laptop too. I buy energy efficient clothes washers and dryers at Sears too. As for house lights, I hope that LEDs make it further toward lighting normal homes by the time I build mine.

ECN: *What are your plans for sharing the knowledge gained during the design, construction, and long-term living phases of this house? Maybe you could make a web page so others can learn from it.*

Woz: Maybe. Not my first priority but it should be high. I expect accidental articles in papers and magazines featuring me because such happens a lot when reporters hear that I'm doing anything. *[Editor's note: this article is a case in point!]*

ECN: *Do you envision the house as being just a cool hack that also helps the environment, or are you looking to invest in or even get personally involved with any startups for such technology?*

Woz: Both. But I don't have a lot of investment money. I'm already on the advisory board for the ram-dirt startup I mentioned. It's called Integrity Block but is not off the ground yet.

ECN: *What are your thoughts on balancing energy efficiency vs. overall environmental impact? Urethane-foam, for example, works well as an insulator but it takes oil and energy to produce and transport.*

Woz: The total formula for saving energy can be quite deceptive. It's not correct to say that you are energy efficient when it's only in one way but your net is negative. For example, an electric car may use only half as much, or a third as much, energy as the same sized car using gasoline. But if it costs \$100,000 then you realize that you wouldn't spend that much on gasoline over the life of any car. And even using the car uses some gasoline or coal used to create the electricity, to charge your batteries. If the car is inefficient in some ways it may even use more coal per mile but you'll be telling all your friends that it uses none. The cost of something is a reasonable estimate as to how many resources (of the Earth) you used to build the device. Don't take your instant opinion on energy efficient technologies to be correct. Ask a lot of deep questions and hold off until you are very sure.

ECN: *This is great stuff, well worth the wait! Thanks, Woz. Readers, please comment using the form below.*

Wozniak's New Goal is Efficient Housing

Published on Electronic Component News (<http://www.ecnmag.com>)

Source URL (retrieved on 03/13/2014 - 12:31pm):

<http://www.ecnmag.com/blogs/2007/08/wozniaks-new-goal-efficient-housing>

Links:

- [1] <http://www.apple.com/>
- [2] <http://www.woz.org/>
- [3] <http://www.ecnmag.com/iWoz-How-I-invented-the-personal-computer-co-founded-Apple-and-had-fun-doing-it.aspx>
- [4] <http://www.pcworld.com/article/id,134826-pg,1/article.html>
- [5] <http://www.ecnmag.com/>
- [6] <http://www.history.com/invent/>
- [7] <http://www.invent.org/>
- [8] <http://www.southernpine.com/whatis.shtml>
- [9] <http://www.enertia.com/>
- [10] <http://www.digibarn.com/history/05-VCF8-HomeBrew30/index.html>