Trading Up to a Hybrid Home

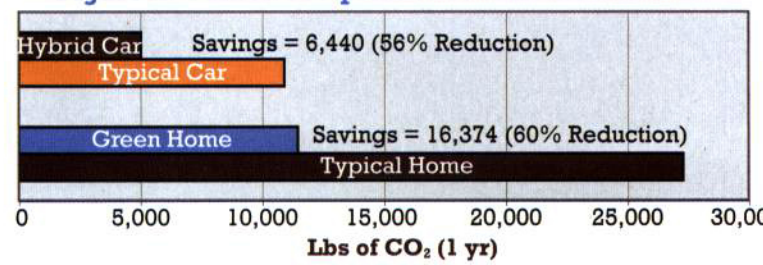
More and more individuals and families are trying to reduce their personal carbon footprint. With so many options, what are the best techniques for achieving this goal?

Well, let's start with the big picture: Where do our carbon emissions come from? In the United States, they come from four major sectors: industrial, residential, commercial, and transportation. According to Energy Information Administration data and Architecture2030 calculations that consider the embodied energy from construction and materials as well as the energy used to operate the building, emissions for buildings across all sectors account for 48%, or almost half, of all carbon emissions nationwide. By comparison, emissions from the transportation sector account for roughly 27%. The residential sector accounts for the highest proportion of emissions from buildings; more than one-fifth of all U.S. carbon emissions come from the operation of residential buildings alone.

So what does this mean for our personal carbon footprint? While trading up to a hybrid car is a great option, trading up to an energy-efficient home with solar might be even better. Let's compare the average carbon dioxide (CO_2) savings realized by switching to a hybrid car to the savings realized by moving into a green home (see Figure A). While the percentage of CO_2 emissions saved is almost the same in both cases (56% versus 60%), the carbon impact of operating a home is significantly higher than that of driving a car. Therefore the net savings from moving into a green home will be significantly higher than the savings from switching to a hybrid car. Consequently, a family with a typical home and two hybrid cars has a larger carbon footprint than one with a green home and two typical cars.

Today, builders across the country are beginning to endorse this idea by building homes that use 60% less energy than typical homes and by selling them at prices that match the prices charged by their nongreen competitors. While this is good news for consumers, builders are also finding that they benefit by building green; green homes mean faster sales. Builders are able to invest additional money in green features—such as double-paned, low-e windows and solar-electric systems—by marketing the benefits to consumers and selling homes faster (see "SolarSmart Homes Sell Faster," p. 10). Faster sales mean lower project carrying costs and more profit. Even if a builder passes some or all of the cost on to the home buyer, a cost-effective green home creates positive monthly cash flow for the homeowner, who sees the savings in utility costs offset the additional mortgage cost associated with the green features. Even with rising gas prices, a hybrid car may not meet this cost-neutral criterion.

Figure A. Carbon Footprint of Your Home and Car



So why have we gravitated toward hybrid cars as opposed to "hybrid" homes? One likely reason is that our homes don't have tailpipes. It is easy to visualize the carbon impact of our car— we can actually see the exhaust. With a home, our power is typically generated miles away and we don't see the emissions that result from turning on our TV or cranking the thermostat down in the summer. In addition, hybrid cars are often equipped with a digital display showing real-time fuel consumption, while our homes are not; however, this is starting to change. For less than $200, you can buy a meter that shows you the real-time electricity consumption of your home, and in many cases the carbon impact of that consumption. These "digital tailpipes" have been shown to reduce a home's energy bills—in some cases up to 10%—when the occupants use them to understand and manage their consumption.

From creating national policy to making individual buying decisions, a home's energy consumption and the carbon impact of that consumption, are important factors influencing global warming and ought to be recognized as such. So when you spend your carbon- fighting dollars, take a second look at a "hybrid" home.

To learn more about the architecture2030 challenge, visit www.Architecture2030.org.

For an inexpensive in-home power meter you can install yourself, visit www.bluelineinnovations.com/powercostmonitor.php.

significance of residential demand at peak. At 5 pm, the ZEH community's demand was 56% below that of the non-ZEH community. Interestingly, roughly half of the peak load reduction was a result of efficiency measures, which were implemented at one-fifth the cost of the roof-mounted PV solar-electric panels.

Many of the ZEHs feature east-facing solar panels, which produce most of their power during the late morning and early afternoon; west-facing panels produce most of their power during the late afternoon, coinciding with most utilities' superpeak hours. With east-facing panels, PV electricity production (the green curve in Figure 1) peaks around noon, rather than later in the day. The PVs could have been oriented toward the west and south in most cases, if peak production had been the primary goal. An analysis was done to determine the impact of having all west-facing PVs on Premier's near-ZEHs. This analysis showed that, had the Premier Gardens development been designed to maximize west-facing PVs, the net grid load could have been shifted almost three hours. In addition, the average demand at 5 pm would have been reduced from 1.3 kilowatts, as built, to 0.75 kilowatts with all west-facing PVs. BIRA found that if PV systems had been allowed on the front of the homes, the as-built development could have eliminated all but 4 of the 23 homes with east-facing PVs. Finally, other roof types could have been used to eliminate all east-facing PVs. However, even without this