

# STEPS TO AMERICA'S ENERGY INDEPENDENCE

Tom Hildreth -January 30, 2008  
Advanced Building & Development  
[thildreth@AdvancedBD.net](mailto:thildreth@AdvancedBD.net)

The enclosed report, i.e. "McKinsey & CO - A Cost Curve for Greenhouse Gas Reduction" is the key for understanding how America can take a significant step towards energy independence, and where we should invest in the materials and systems that have the greatest return on investment. McKinsey conducted the study and created the report at the request of the European Union.

On page 4 of the report is a chart that compares the cost in Euros for a gigaton of CO<sup>2</sup> for each "alternative energy system" projected out to the year 2030. Each alternative energy system is measured independently on its own merits of initial cost, maintenance cost, versus savings. A negative cost is an alternative energy system saves more than it cost over 30 years. For example: on the chart "Building Insulation", which has the greatest negative cost (or highest return on investment), while "Wind: low penetration" (which includes solar) has a positive net cost and therefore cost more than it saves. Building Insulation has the greatest negative cost because it saves more than it cost and it does not require maintenance or additional investment.

However, McKinsey & Co. did not analyze and calculate the multiplier effect of two systems added together. For example: Structural Insulated Panels (or SIPs) and Solar, which has multiplier affect and a greater savings than each independently, i.e. 1 + 1 = 3. Structural Insulated Panels have the highest energy efficiency and reduces heating & air-conditioning cost by 60% (according to Federal testing at Oak Ridge TN Laboratory), and SIPs are cost competitive (material & labor) with conventional construction using 2x lumber framing, insulation and sheathing. According to a Canadian study the savings is as high as 80.3%.

This heating & air-conditioning savings of 60% represents a reduction of 30% - 44% in the typical residential utility bill for electricity and gas (depending on climate, living habits, and cost of local energy).

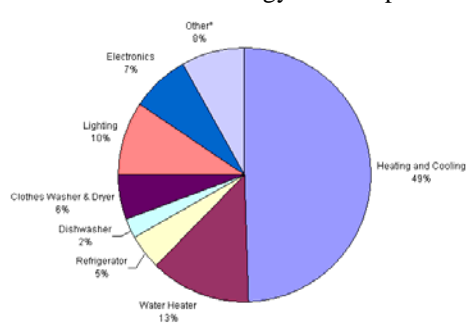
Therefore if we build homes with Structural Insulated Panels, and we add 100% Solar Power; the size and cost of the solar system are scaled down by 30% - 44% due to the energy efficiency of SIPs.

Example: in Colorado a 100% solar "Zero Energy" on-grid system (photovoltaic and hot water) for a typical 2,300 sq. ft. home built with SIPs requires ~3.2 kilowatts. The cost of this solar system (after Federal tax credits and Xcel energy credits) is ~\$13,000. This system provides 100% of the energy during the day when electricity cost is highest and during the night uses electricity from the grid when demand is lowest and the cost is less. If the return justified the additional expense, the Colorado homeowner can also increase the size of the solar PV system and sell the excess power back to Xcel Energy via the Colorado buy-back program at \$0.047/kilowatt/hour. Every solar home becomes a power generating plant. See references below to Germany and Italy's National Renewable Energy programs, whose buy-back program is 13.8 times higher.

The mortgage for this residential solar system would cost \$804/ year (4.6% 30-yr), but the home owner saves annually ~ \$2,300 with oil at \$95.98/barrel as of 12/31/07. (Based on utility bills as of 12/31/07 for 2,920 sf home)

## Where Does The U.S. Residential Utility Bill Go?

Source: Residential Energy Consumption Survey



Currently in Colorado utility cost is 9.6% of mortgage cost, and coal fired power plants provide most of the electrical power. Although the price of oil over the last twelve month increased 63% (\$59 to \$95.98), the cost of electricity and gas in Colorado has only increased 32% and 29% respectively due to use of coal and utility price controls. If the price of oil increases from the December '07 level of \$95.98 to \$200.00/barrel, Colorado utility cost will increase from 9.6% of the mortgage to ~14.4%, and add of \$1,102/yr. in utility cost. Even with a fixed interest 30-mortgage, the cost of owning a home is going to increase.

Other states which are totally dependent on oil to provide electrical power and heat their homes, their utility cost is tied directly to the price of oil and would add \$2,204/yr. in utility cost.

Another key point is that low-income home owners are the least prepared to afford these increases in utility cost. See the attached Stennis Institute Study by John C. Stennis Institute of Government, which states "***The Stennis Institute identified Structural Insulated Panels as a critical element within the comprehensive community redevelopment strategy designed to meet the housing needs of low-income families...***".

Each year there is approximately .7 to 1.2 million single unit new homes built. If all of these homes were built with **SIPs** it would reduce CO<sup>2</sup> emissions by a cumulative 1.9 million tons each year.

But, if these homes were built with **SIPs & Solar** it would save a cumulative ~\$4.6 billion each year in utilities at today's cost, while significantly reducing the demand for new power generating plants, and purchase of foreign oil. This does not take into consideration the potential savings of building with SIPs & Solar for multi-family apartments of 676,000 units built annually, and commercial buildings.

The Federal Government provides a residential tax credit of \$2,000 per home or apartment if it exceeds a 50% energy savings. For commercial construction the tax credit is \$2.40 / sq. ft. of space. Italy is already ahead of the U.S. with their 1/28/07 energy bill with a guaranteed buy back of excess solar energy at \$0.65/kilowatt/hour, which promotes the use of SIPs & Solar. Germany buys back excess solar at \$0.50/kilowatt/hour; and as a result their solar already accounts for 20% of their energy supply. The U.S. does not have a national solar energy buy-back program.