

## **Small Energy - Big Opportunity**

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Times of great change bring great opportunities. We are at the beginning of a time of change in the way we build, and the way we generate and use power. In the next few years, new materials and technology may change some aspects of our daily living in ways currently beyond our imaginations.

Dr Hayward (The director of Swinburne University of Technology's master of strategic foresight program) says that, "While there will be, for example, a physical answer to global warming (such as changing our energy needs and resources), there will also be a philosophical, values-driven solution. [Ultimately, it is down to individuals' choices ... By people taking individual action, the possibility of that future they prefer actually occurring becomes more likely.](#)"

New building material technology may produce stunning changes in our homes and commercial surrounding. [Already in development is a material that can be used for interior or exterior walls that act something like a giant LCD monitor.](#) The color might change daily or display a different photo or video every few moments. The system could run on solar or wind generated power.

There are a growing number of low voltage, DC fixtures and appliances coming on the market. [Low voltage radiant heat is available.](#) It comes in plastic sheets that can be cut to fit any shape. Power can come directly from solar panels, wind generator, storage battery or can be powered by a transformer connected to the public electrical system.

Low voltage lighting is already commonplace. Higher voltage AC electricity is converted by transformers to power LCD and other types of lighting. Powering these features directly with solar/wind produced low voltage electricity is more efficient.

Electricity is 100% efficient energy, but there is a great amount of waste in the transmission over power lines and through transformers. Harvesting our own electricity and using it at home increases efficiency. Nothing is lost in transportation.

A compact florescent light that works in traditional light fixtures cleans the air and saves electricity. According to the manufacturer, [Bioizer Technologies Inc](#): "This proven process safely eliminates airborne microorganisms, mold, mildew and fungi, germs, smoke, pollution, industrial solvents, and odors while using less energy than traditional lighting technologies."

There has been a lot of resistance to solar power because it has come in unattractive packages. New photovoltaic (produces electricity from sun light) solar products may change that. There are already shingles that extract electricity from sun that look like regular composite shingles and last about 20 years. There are new, higher efficiency, thin film solar materials that can be molded to any surface. Spray-on solar panels are in the works.

The way we supply energy to our homes in the near future could defy traditional thinking. Advances in small-scale energy generation has advanced enough that most Coloradans no longer need to pay for electricity. We have an abundance of sun and/or wind in every part of the state. We have the resources and the technology is available to allow us to harvest energy for our own use and maybe a little left over to sell.

In the near future, we may produce our own hydrogen and electricity using fuel cell technology. Homes powered by fuel cells are already common in Japan. <http://web-japan.org/trends/science/images/sci030723.jpg>  
<http://web-japan.org/trends/science/sci030723.html>

Fuel cells are available in the USA <http://www.fuelcellmarkets.com/home-fcm.fcm?subsite=1>

Systems in development will use electricity from solar or wind sources to make hydrogen and oxygen from water. The hydrogen could be stored and reconverted into electricity for household use with a byproduct of water. The hydrogen might also be used to drive a car. Hydrogen powered fuel cell cars are currently available in Japan.

[Biodiesel will be made from carbon dioxide and algae at, New Belgium Brewing Co, in Ft. Collins.](#) Carbon dioxide from brewing operations will be fed to algae, which grow quickly and can be turned into biodiesel. The process can produce as much fuel per acre as 100 acres of soybeans while consuming polluting gases instead of petrochemical fertilizers.

[National Renewable Energy Lab in Golden, CO](#), is working on even more passive, and environmentally harmless, ways to produce electricity, like energy towers that are essentially nothing more than chimneys. A solar collector of some sort, such as a greenhouse, is connected to the bottom of the tower. The sun heats the air inside. As it rises, it creates currents that drive an electric generator. The process can be reversed by spraying a mist of water into the top of the chimney. The falling mist creates air current at the bottom of chimney that can drive a generator.

The great opportunity that comes with efficient small-scale generation of power is that it is small-scale. Net metering laws that require power companies to buy power produced by individual users creates opportunity. Power companies are required to supply net metering devices to feed home produced power into the grid. Individual homeowners can harvest and sell small amounts of energy to the power company.

Maybe the next self-made billionaires will come from the ranks of entrepreneurs leasing solar panels to homeowners, or leasing space from homeowner to harvest energy. Co-op or HOA owned private generation facilities, that produce and sell excess power, could become common. This assumes no legislation to define small generation systems as power supply plants subject to federal regulations and bureaucracy.

There are many proposals in the state legislature that deal with promoting the use of renewable, clean energy. Thinking big, these proposals mainly focus on power generated by large power companies. Focus has been on the lack of transmission lines preventing large-scale use of solar and wind energy. Thinking small, a system is already in place that delivers electricity to nearly every spot in the country. This system may not allow for huge amounts of electricity being fed into it by large wind or solar farms, but it carries electricity to nearly all homes and businesses in the state. At least an equal amount of electricity could flow back into the grid from small energy harvesters.

If all Colorado homes and businesses harvested their own electricity from wind and sun and fed the excess power to the grid, electricity production would be increased greatly with no new transmission lines. Theoretically, each home or business could eliminate its own need for power from the grid. The power grid, relieved of the burden of transporting that amount of energy, could accept at least that much back. We could provide electricity for our own needs and the needs of another home or business in a less sunny/windy state.

New ways of thinking combined with new technology will provide new solutions for satisfying consumer demand. Colorado farmers and ranchers may find that energy harvesting is more profitable per acre than livestock, produce or grain. Electricity harvested from sun or wind can be converted to hydrogen and oxygen. These gases can then be piped or trucked to market.

There are currently [mortgage programs](#) that will add in the cost of energy improvements that pay for themselves. The cost of the improvements can be rolled into a first mortgage or added as a second. [Tax incentives](#) exist at federal and local levels for solar and wind energy. Power companies are offering [rebates](#) for systems installed and are paying premium prices for the energy produced.

The legislators talk about the cost of change and who will pay it. There is only one answer. We will pay the cost of change. It may come through spending tax dollars to subsidize the power companies, or from increases in energy costs. We will pay for it. We should own it.

There are an abundance of new opportunities for small businesses and homeowners. As new technology becomes more widely used the costs will come down. Rebates are available from power companies that can pay for up to half of a solar photovoltaic system or a wind generator. Tax incentives cover more of the cost. There is a demand and there is the capital to drive it.

Opportunities seem to abound in energy related fields, yet at a recent home remodeling show in Denver these technologies were almost unrepresented. I saw only a single, bulky, low efficiency solar panel.

Small businesses can drive big changes and unforeseen fortunes can be made in times of shifting paradigms. A few years ago in India, a man started a microbank with a few hundred dollars. He made loans for small amounts of money, mostly under \$100, to

entrepreneurs in poor places. In only a few years, the bank now has billions of dollars to loan. The default rate on these micro loans is almost zero and many borrowers have risen from poverty to wealth. Sometimes small is huge.

Energy technology is starting to grow at a rate similar to personal computer technology in the 1990s. Opportunity is great now for delivering renewable energy and energy saving products. Incentives exist to enhance these opportunities and more incentives from the government and the energy industry are in the works. Demand for this technology is growing in response to environmental concerns.

Now the advantage in this field belongs to small, innovative companies. Microsoft, Apple and HP had their time of golden opportunity. That time is here for personal energy production and related products and services. What's your Apple?

Additional Resources:

[American Solar Energy Society](#), 303-443-3130

[Colorado Renewable Energy Society](#), 303-279-1446

[Smart Energy Living Colorado](#), 303-216-2026

[E-Star Colorado](#), (303) 482-2072

[Rocky Mountain Institute](#), 970-927-3851

[Solar Energy International](#), 970-963-8855

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