

Bet on Moore's Law to Capture Sunshine and Change our World

By Dr Reese Halter

The price of fossil fuels is soaring; burning them releases greenhouse gases; and a byproduct from coal energy is toxic mercury vapour, which has contaminated the Arctic and now melt-waters are circulating mercury in our oceans.

For every problem there are at least three solutions.

Silicon Valley venture capitalists like the legendary John Doerr, Vinod Khosla (co-founder of SunMicro Systems), Larry Page (co-founder of Google) and the late John Walton (of the Wal-Mart family) are pouring billions of dollars into start-ups developing photovoltaic cells, which convert sunlight directly to electricity.

In the 1960s innovators and investors believed that the computer industry would revolutionize our lives. They took it from zero machines to almost a billion in 30 years, doubling processing speed every 24 months or less and cutting costs in half each time the speed doubled.

In 1965, Intel co-founder Dr Gordon Moore (an Honorary scientist at Global Forest Science) predicted that the number of transistors on a chip doubles about every two years. He was correct and it's known as Moore's Law.

Innovators and investors today are betting on Moore's Law to capture sunshine and change the world again.

In 2007 the total solar capacity worldwide was just 6.6 gigawatts, compared to more than 1,000 gigawatts for coal. In the U.S., solar cells provided less than 0.05 percent of the electricity supplied. By 2013, solar energy will be producing at least 75 gigawatts or an elevenfold increase from today.

Currently, the shortfall is a cost effective means of storage because of the nature of sunlight not shining 24 hours a day, every day of the year. The same problem confronts other renewable energy source – particularly wind.

Research is forging ahead on improving batteries and developing storage technologies like excess electricity to pump water up into reservoirs for use later in hydroelectric generators.

The cost of solar energy is for the meantime expensive.

There are three different ways the industry is attacking the cost problem.

The first approach is to increase efficiencies of existing technologies while lowering the cost of crystalline-silicon cells.

The second strategy is to jump to cheap next generation nanotechnologies by producing quantities of photovoltaic foil or fabric (likened by some to Astroturf) even if it generates less energy per square foot.

The third plan is a premium price for quality – innovators are cramming the most efficiency onto the smallest possible cells, wrapping the cells into optics using mirrors and concentrating the sun's intensity by 500 to 1,000 times.

The cost of outfitting the average home with solar panels is about \$21,000 or enough to generate approximately 3 kilowatts. Those panels will last for at least 30 years.

That works out to be about \$7 per watt, when it drops to \$1 per watt it out competes coal. But don't forget, in the U.S. the coal industry receives \$20 billion a year in subsidies.

Every hour the sun bathes the earth with as much energy as all human civilization uses in an entire year.

If only 9.5 percent of that energy were converted to electricity – a square of land 300 kilometres on a side could produce enough electricity to power the entire North American continent.

In 2007, China became the third biggest producer of solar cells, behind Japan and Germany. Chinese venture capitalists raised billions and along the way created several new billionaires.

One Chinese company, Suntech, is worth about \$6 billion, employs 35,000 people and sells 90 percent of its output to Germany.

Phoenix-based First Solar was founded in 1990 when John Walton infused a quarter of a billion dollars into the company. Today the company's value exceeds \$5 billion with long-term contracts to generate almost 800 megawatts to European and Canadian buyers –

nearly eight times the total shipped in 2006 from every solar factory in the U.S.

In order to stabilize our climate by mid-century we must globally reduce our dependency on fossil fuels by at least 80 percent.

Innovators, investors and even our children understand that the 19-century fossil-fuel technologies are expensive and outdated; and they are polluting our planet. Clearly, it is time for both Canadian and U.S. federal governments to stop subsidizing fossil fuels, impeding progress with clean renewable energy technologies and once and for all impose a carbon emission cap.

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