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Can the Sun Make Things Cool?

Hi, Everyone! I want to say how much I appreciate you reading this newsletter. I hope you are enjoying it as much as I enjoy writing it and receiving all the great comments and questions from everyone.

This subject is a timely one because the Southern Hemisphere is now in the middle of summer, and it's been a hot one. Perth recorded one of its hottest Januarys on record. South Australia and Victoria recently had record-breaking heatwaves accompanied by power outages, bushfires, and a number of tragic deaths. I explain this for the benefit of my many American and European subscribers, who are currently freezing their recessionary assets off in the dead of winter. Well, folks, your turn will soon come, and you'll unpack the bathers and reach for the air conditioner.

Which brings us to today's topic. Air conditioning (specifically, compression-cycle refrigeration) uses more electricity than all the other appliances and lights in a typical home put together, and it can frequently be double this amount. Each year, more and more WA homes, businesses and schools are installing new air conditioning units, placing ever greater demand on an already strained distribution network. Western Australia is facing a possible 50% rise in electricity prices to cope with the increase, which is sure to make people think twice about switching on the air-con. Oh, who are we kidding? On a really hot day, we'll pay any price for relief.

Is it possible to reduce the significant financial and environmental burden of air conditioning? The most obvious way would be to operate our air conditioners from solar photovoltaic panels. For a 6-kW unit, you'd need a minimum of 60 square meters of panels on your roof, at an estimated cost of more than $24,000. Even at that price, you'll still have "availability" issues: it won't always be there when you need it.

There is possibly another way which isn't as widely known. From the obscure science of Thermodynamics comes a technology out of the past that may be useful again today. "Absorption refrigeration," first described in 1858, uses any source of heat to power a refrigerator that has no moving parts. In simple terms, it uses heat to make cool, which may sound like getting something for nothing. But it works. In 1922, two university students in Sweden had the idea of commercializing a practical household refrigerator based on this theory.

Within just 18 months, the clever students were already producing and selling refrigerators! Two years later, the Electrolux company bought them out and began selling the heat-powered refrigerator to households worldwide, raising the standard of living and improving the diet, health and lives of millions with one stroke.

There was just one technical problem: every once in a great while a refrigerator would spontaneously detonate, leaving a large, food-splattered gap where someone's kitchen (and sometimes, themselves or family members) used to be. These tragedies motivated Albert Einstein and his student Leo Szilard between 1926 to 1930 to come up with several improved versions of the heat-powered 'fridge, each one a masterpiece of elegant theory and inspired engineering. Electrolux promptly bought all of Einstein's patents to keep them from falling into competitor's hands. It is doubtful that any Einstein refrigerators were ever mass-produced. Meanwhile, the exploding-icebox problem had been solved with improved quality-control measures and better components.

Few today remember those kerosene-powered iceboxes, but there are still camping refrigerators available that run only on propane or natural gas. Could a similar device be used

to cool an entire house using heat from the sun? Yes, it certainly could. And it may have some distinct advantages:

1. Low added cost. It requires just ordinary glass, steel, and plumbing bits. No space-age materials or complex machinery, no high-tech gadgets, nothing that wasn't available at the close of the 19th century.
2. Nearly silent operation.
3. With proper design, it can continue functioning for hours after the sun is no longer high in the sky.
4. No moving parts, and very little maintenance.
5. Totally immune from summer "rolling blackouts."

You may be asking, "What's the catch? Why aren't we using this technology today?" That is what you *should* ask whenever someone proposes something "new" which is actually something old (like electric cars). Let me put it this way. Currently, a person might drive to a shop, purchase an air conditioning unit, bring it home, and have it installed discretely somewhere in the house. With this technology, it wouldn't quite work that way.

Instead, you'd need to demolish your house completely, build the solar heat-powered air conditioner on the now-vacant block of land, then move all your furniture into it. Essentially, your house becomes the air conditioner, and your air conditioner becomes the house. Who wants to go first?

Perhaps there are less radical ways of putting the idea to work, but it will definitely have a major impact on the visual appearance and arrangement of any house designed without this in mind. This means that the energy problem is really a question of radically changing practices in Architecture and the building industry.

"Yes, we can." We *can* drastically reduce our dependence on fossil fuels, avoid making that deal with the devil known as Nuclear Energy, and still have comfortable spaces in which to live and work. All it requires is that we begin constructing buildings that are "functional" in a far more literal sense than previously considered.

Have a safe summer, winter, or whatever season it is where you are!

Regards,

John

Next time: Fun Science Experiments You Can Do At Your Desk While Pretending to Work.

See John in person at the Gingin Observatory (Western Australia), March 27 2009. "Moon Landing Hoax Theories: The Real Evidence." Bookings essential - this event will sell out! Ring (08) 9575 7740.

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