

The real costs of air conditioning

By MARY ANNE WHITE

The rising cost of energy is all over the news – stories on high prices at the gas pumps, proposed carbon taxes and increased food costs all relate to the cost of energy. Yet you might be shocked to hear most of the energy we consume is wasted.

An article in *The Atlantic* in May stated the U.S. economy wastes 55 per cent of the energy it consumes. There is no evidence Canada is any better. Only about 30 per cent of the energy of gasoline is used to move the car and run its accessories, and nearly 60 per cent goes out the tailpipe as waste heat.

There are materials – thermoelectrics – which can convert waste heat to power. Thermoelectric devices have specific applications, such as power generation on satellites, but they are not yet efficient enough for widespread use. Research programs worldwide are trying to increase their efficiency. In my lab, we are contributing to understanding of heat conduction that can be used to improve the efficiency of thermoelectrics.

Research leading to increased

efficiency of energy conversion and storage is an essential part of the solution to the projected energy shortage. Other components include enhanced use of renewable energy sources. However, for the individual or family, and even for businesses and government, the most important contribution we can make is reduced energy use.

When I arrived at my hotel in Toronto last week, the air conditioner was set at 18.5 C. Later, at the Metro Toronto Convention Centre, the audience was shivering. The temperature at the John Bassett Theatre during a session ranged from 22 to 18 C.

We would complain if our offices were kept at 18 C in winter! You probably have noticed the seasonal temperature inversion: Room temperature is colder with air conditioning in summer than with heating in winter. Although the Toronto convention centre uses air conditioning based on cooling water from deep in Lake Ontario, which is laudable, it is an irrefutable thermodynamic fact that cooling always gives rise to additional heat elsewhere, with associated environmental costs.

In 2005, the government of Japan initiated a policy that air conditioners in all government buildings from June 1 to Sept. 30 would be set at 28 C. The Cool Biz initiative has spread widely to Japan's companies, retailers, restaurants and grocery stores. In 2007, Cool Biz reduced CO₂ emissions from air conditioning in Japan by over a million tons, equivalent to two weeks of the Tokyo area's CO₂ emissions.

If you don't care about the CO₂ emissions, what about the cost savings? Every degree you raise the thermostat on your air conditioner could save you about three per cent in energy costs. If you normally run your air conditioner at 20 C and increase it to 26 C, you could save nearly 20 per cent, even more if the AC is old and inefficient. The energy savings are greater when the efficiency of power plants is taken into account. Power plants waste up to 70 per cent of their energy as heat!

So, as we start summer, turn up the thermostat on your air conditioner. It will save you money and reduce CO₂ production and energy consumption. It just makes good sense.

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