

What you need to know about...

LEDs: the economical lighting choice

FIRST INTRODUCED ABOUT 40 years ago as indicator lights or simple electronic read outs, dramatic improvements in efficiency and dropping prices now make light-emitting-diode (LED) bulbs a viable option. Light is produced when electricity jumps between two semiconductor layers and, depending on the semiconductor material, colours can now include the entire spectrum, from deep blue to deep red.

LEDs use 80-90 percent less energy over incandescent bulbs. Five percent of the electricity is lost as heat, compared to 95 percent in incandescent bulbs; they last 6-10 times as long as incandescent bulbs, making them cheaper over the life of the bulb; and they require far less maintenance. LED luminescence varies depending on the number of bulbs and size of reflector, but LEDs don't have filaments that burn out and have about a one-percent-per-year replacement rate.

Because LEDs are expensive – \$120 for the 60 bulbs needed for a red traffic light signal compared to \$2 for one incandescent – they're not yet viable for home use. The exception is holiday lighting, where energy savings with LED strings are so great – \$0.72 for 300 string-hours compared to \$7.20 for incandescent – that hydro utilities in Richmond, BC, and Guelph, Ontario, last year offered string-for-string swaps and other subsidies to homes willing to switch from traditional holiday lights.

Utilization

Canadian municipalities are concentrating most of their switches to LED lighting in areas where improved lighting offers more than just energy savings.

"Traffic signals were our highest lighting priority. For safety reasons, LEDs are the way to go. They're much easier to see in all light conditions, especially in fog and glare or from greater distances," says John Clarke, traffic and street lighting supervisor for Mississauga, Ontario.

A typical red-amber-green display retrofit costs about \$300. Pedestrian walk-don't-walk displays cost about \$200, but because LEDs can be used bi-modally (multiple configurations), only one display is needed, further reducing maintenance costs. Today's retrofits simply replace incandescent bulbs with white-light LEDs, while retaining the coloured plastic lenses. However, with multiple-coloured LED lights now available, new installations won't need these lenses and, because LEDs are brighter, signal-display areas can be smaller. Both provide additional savings.

Impact on safety

Technology improvements reduced prices, so municipalities are looking at broader outdoor usage. LED-illuminated street signs are the newest trend – in Canada, a sizeable portion of the estimated 300 pedestrian deaths and 13,000 injuries each year are caused by poor lighting, according to Transport Canada. This will worsen as the population ages, and drivers and pedestrians alike grow less agile. According to Carmanah Technologies, a leading

distributor of LED road lighting, the night-illumination requirement of a 65-year-old driver is eight times that of a 20-year old.

Other usage includes taillights on public transportation, lights at railway crossings and lighting for road maintenance crews working at night. LED street lamps have the most growth potential, but are still not feasible because LED light intensity is not yet strong enough from about 35 feet above road level. Yet, with minimal energy usage and a low failure rate, more forms of public-space lighting will incorporate this technology, say procurement officials in Toronto, Ottawa, Calgary and Vancouver.

Vendors

Several Canadian vendors and suppliers are found across the country, including:

- Carmanah (Victoria) supplies grid-and-solar-powered traffic signs all over North America (www.roadlights.com; www.carmanah.com);
- Valley Traffic Systems (Langley, BC, and Calgary) manufactures and wholesales LED signs (www.valleytrafficsystems.com); and
- Hexagold (Montreal) custom designs LED traffic signs (www.hexagold.com).

Getting the savings

Ontario, Alberta and British Columbia are considering LED traffic signal retrofits province-wide based on significant savings established in several Canadian cities. Mississauga saved \$400,000 in energy costs and \$100,000 in maintenance costs in the year after replacement; Calgary saved \$670,000 and \$100,000 in the same period and Vancouver saved \$247,000 and \$110,000.

Cities using this technology report a capital-payback period between three and six years, although energy savings are the biggest immediate benefit. BC Hydro figures that province-wide replacement would save enough energy to supply 4,000 homes.

What's next

Fred Schubert, a researcher at Troy, New York's Rensselaer Polytechnic Institute has developed an LED bulb, which he says burns for 50,000 hours, or 100 times longer than an incandescent one, using half the energy of current LEDs. He's also increased the luminescence with an onmi-directional reflector that reflects 100 percent of the light, compared to the current 40 percent.

LED lights still require a dependable power supply. Carmanah Technologies believes its solar-powered LED signs are the next step. "It's the same concept as traffic signals. Because they are self-contained, with wireless communication, there is no trenching or digging to get a power supply to the sign. I think eventually all outdoor signals and signage will [be] solar powered because of energy and logistical considerations," says Marc Hoelscher, Carmanah's director of marketing. *mm*

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