2004 TAC Environmental Achievement Award

Submission from The City of Calgary, ROADS
March 26, 2004

Project Title: **Light-Emitting Diode (LED) Traffic Signal Retrofit Project**

Category: **Environmental Achievement Award**
The City of Calgary, ROADS' LED Traffic Signal Retrofit Project demonstrates an ongoing commitment to the environment by significantly reducing greenhouse gas emissions through reduced electricity consumption.

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The Best and The Brightest:

Light-Emitting Diode (LED) Traffic Signal Retrofit Project

Overview*:*

Calgary's new traffic lights are proving that you can get more for less, with the right technology on your side. On March 19, 2003, The City of Calgary, ROADS began retrofitting all of The City's existing green, red and pedestrian incandescent traffic signal displays with new energy-efficient light-emitting diode (LED) technology.

Once complete, the project will result in an 80 percent reduction in the energy costs associated with incandescent traffic signal operations and will reduce equivalent CO_2 emissions by 8,660 tonnes a year. When all intersections have been retrofitted, the project will reduce electricity use by approximately 8 million kWh, generating savings of $670,000 a year. The new traffic lights are also brighter and more durable.

The program is being carried out in three phases, with one third of The City's 730 intersections being retrofitted during each phase. Phase 1 was completed during March, April and May in 2003, entailing the retrofit of traffic signals in 281 intersections. Phase 2 and 3 will take place from March through to May in 2004 and 2005, respectively.

Calgary is the first city in Alberta to implement a citywide LED traffic signal retrofit to improve operations and reduce energy consumption.

Project Details:

Shedding Light on LEDs

An LED traffic signal uses light-emitting diode technology instead of incandescent bulbs. LED lamps use a fraction of the energy used by incandescent bulbs because:

1. Energy is not wasted as heat. Unlike incandescent lamps, LED lamps do not create light through the production of heat.
2. Energy is not wasted through filtering. Since incandescent lamps produce white light, filters are needed to block all light energy except for the colour required. LEDs create coloured light directly.

The reduction in electricity consumption has a positive effect on the peripheral devices in the controller cabinet and the overall electrical system inside the LED traffic signal. The LED's lower wattage produces less heat and reduces wear on the internal components. As a result, these components have an extended life and reduced failure rate.

Several Ways to Save

The new LED traffic signal displays use 80 percent less energy than conventional incandescent bulbs do. In 2003, the LED traffic signal retrofit reduced The City's electricity consumption by 1,423,500 kWh. To date, this reduction totals 2,081,900 kWh, resulting in energy savings of $157,700 and growing.

The new LED traffic signals have a life span of about 10 years, which means they last five times as long as regular incandescent bulbs. In any given year, all the incandescent bulbs were replaced in either the north or south portion of Calgary. This signal bulb group change required a three-person crew for a period of three months to replace about 15,000 bulbs. The LED retrofit will save The City an additional $135,000 a year by eliminating the need for the annual group change as well as random calls to replace burned out incandescent bulbs.

Enhancing Safety

The new energy-efficient traffic lights sport several safety features inherent in the LED technology. Being much brighter than the old bulbs, the new LED lights are more visible from the motorist's perspective under all driving conditions, including fog and rain. The fact that LEDs last five times longer than an incandescent bulb significantly reduces the incidence of traffic signal failure. And, unlike the old traffic lights that have internal reflectors, LED signals do not create the illusion of being lit up when hit with direct sunlight.

Once they near the end of their 10-year life span, LED lights fail gradually – only one LED element at a time – which means that motorists will continue to see the proper signal indication. When incandescent bulbs fail, signal indication fails immediately and motorists must rely on the secondary signal head, if available.

Funding

In January 2003, City Council approved capital funds for the LED retrofit project. The budget for this project is $4.65-million to retrofit 730 existing intersections with LED traffic signal displays. Capital funding is in place, with approximately $1.5-million to be expended in each of the three years in which the retrofit project takes place.

At the current energy rate, The City expects to save over $670,000 a year in electricity costs alone. Taking into account the cost savings associated with the elimination of group change and random incandescent bulb replacement, The City estimates it will recover the cost of the project in about 5 years.

The project will also be self-sufficient in the long-term because subsequent energy savings will be placed in an LED Reserve Fund to pay for future unit replacement.

Environmental Benefits

Reduced electricity use leads to reduced greenhouse gas emissions from gas and coal-burning generators. By the end of 2003, the LED retrofit project had reduced The City's electricity consumption by 1,423,500 kWh, which translates into a reduction of 1,374 tonnes of equivalent CO_2 emissions. At the end of March 2004, equivalent CO_2 emissions will have dropped by 2,010 tonnes, resulting from a reduction of 2,081,900 kWh in electricity consumption. Upon completion, the 80 percent reduction in energy use with LEDs translates into a reduction of 8,660 tonnes of equivalent CO_2 emissions per year. This reduction contributes to The City's Corporate and Community Climate Change Strategy.

The retrofit project is also consistent with The City's commitment to continuous improvement in citywide environmental management practices in keeping with its voluntary agreement with the rigorous international ISO 14001 environmental standards audit program.

The City of Calgary's Environmental Management System, known as EnviroSystem, helps promote The City's environmental initiatives and encourages all employees to contribute ideas about new processes and programs to get things done in a 'greener' way. The City of Calgary provides over 500 services to citizens. Therefore, we have an opportunity to use our environmental management system to continually improve on each of these services over time.

EnviroSystem is proudly promoting the LED traffic signal retrofit project for its innovation and environmental benefits.

Intangible Environmental Benefits

The City of Calgary, ROADS is proud to be a leader in establishing best practices in the area of environment protection. With the new energy-efficient traffic signals, Calgarians are taking note of The City's efforts to save money and protect the environment right "where they live." By continuing to communicate with its employees and the public about the success and benefits of projects such as the LED traffic signal retrofit, The City inspires enthusiasm among its residents for ongoing environmentally sustainable initiatives.

Conclusion:

The LED Retrofit Project is an important indicator of The City of Calgary's commitment to environmental protection and sustained positive change. Projects like this one provide tangible evidence that the goals of enhancing service to the public, saving money and protecting the environment are not mutually exclusive. LED traffic signals are a win for drivers, a win for taxpayers and, most importantly, a win for the environment.

Attachments:

- *News Release and Backgrounder from the LED Traffic Signal Retrofit Launch in 2003*
- *LED Flyer from EnviroSystem (The City of Calgary)*
- *Articles from the Calgary Sun and "Urban Perspective" (Newsletter of the Alberta Urban Municipalities Association) Note: These were unable to be included on the CD.*