

FARADAY

Case Study

Toronto Office Building Reduces Lighting Costs by 54% with T8 LED Tubes



211 Consumers Road, since its creation, has been a big consumer of energy. While modern commercial office buildings have leveraged the latest in energy efficient design, this 40+ year-old structure was built when electricity was cheap. Today, during a time of rising electricity costs, it has become imperative to improve the energy efficiency of this building in order to minimize operating costs and maintain its competitiveness in the marketplace. To this end, building management has focused on conservation and energy management solutions, for both the HVAC and lighting systems, that would yield significant energy savings. From a lighting perspective this meant going to LED technology.

The interior lighting at 211 Consumers consisted primarily of first generation T8 fluorescent tubes which were constantly being changed as ballasts and lamps burnt out. This ongoing labour added further to the building's operating costs. As concerns about mercury poisoning grew, management were required to confront the fluorescent tube disposal issue; and in calculating the entire cost of life-cycle costs of T8 fluorescent technology, re-lamping and disposal costs were become a significant share. Five different fixtures were being used which added to the number of tubes and ballasts that were stocked. In the common areas (lobby, hallways and stairwells) these lights are in use 24/7. The lower lobby area also had PAR 38 halogens which consumed a huge amount of power.

The building exterior was lit with a combination of HID spots lights and wall packs, 400 watt and 250 watt respectively, that were needed for property security.

Energy Management Goals

- Reduce overall lighting energy costs by 50%
- Reduce operating costs related to T8 re-lamping
- Find a feasible solution for the ongoing disposal of mercury-poisoned fluorescent lamps
- Maintain high-level of building security, inside and outside, with proper lighting
- Improve aesthetics with lighting solutions
- Achieve a payback period of two years or less

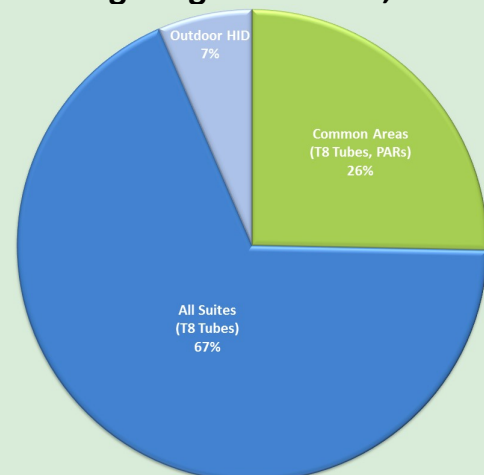
Initial Lighting Energy Consumption

Tenant Suites > 215,650 kwh

Common Areas > 80,070 kwh

Outdoor Lighting > 20,586 kwh

Annual Lighting Total > 316,250 kwh



| Energy Use BEFORE | | Energy Use AFTER | | Energy Drop |
|-------------------|-------------|------------------|-------------|-------------|
| 4' T8 Tubes | 245,087 kwh | LED T8 Tubes | 123,328 kwh | 49% |
| | 60 kW | | 33 kW | |
| 2'x2' U-Tube T8 | 25,229 kwh | 2'x2' LED Panels | 8,673 kwh | 65% |
| | 2.9 kW | | 1.0 kW | |
| PAR Lamps | 25,404 kwh | LED PAR Lamps | 3,155 kwh | 87% |
| | 2.9 kW | | 0.4 kW | |
| HID Exterior | 17,597 kwh | DHID Retrofits | 9,735 kwh | 45% |
| | 4.7 kW | | 2.6 kW | |
| TOTAL | 313,317 kwh | TOTAL | 144,891 kwh | 54% |
| | 70 kW | | 37 kW | |

Implementing LED Technologies

After reviewing the lighting technologies available in the market place, the building management decided to move entirely away from fluorescent and move to LED. This was partly driven by the variety of LED available including T8-styled lamps (for existing fixtures), PAR lamps and even LED flat panels that could replace entire T8 fixtures. These technologies, which last over 50,000 hours, are expected to reduce electricity consumption by 50-65%, depending on the application, and reduce the operating costs due to reduced re-lamping and disposal by 60%. Existing T8 fluorescent fixtures were retrofitted with T8 LED lamps by removing the ballasts and rewiring. This reduced the lamp wattage from 32 watts to 18 watts. 2' by 2' fixtures which consumed 66 watts were replaced with 22 watt LED panels. PAR lamps saw a 87% drop in wattage when replaced with LED lamps. All of the LED products were eligible for rebates from Toronto Hydro under the OPA's save-ON-energy program.

The Results

The results of the retrofit surpassed the original goal with a total energy reduction of 54%. Annual savings from reduced electricity consumption is expected to exceed \$20,000. Based on the capital invested for the retrofit of the common areas, the ROI for the common areas was about 60% with a 20 month payback period based on energy savings alone. The rebate from Toronto Hydro covered about 15% of the cost of the project. Once the original ballasts and fluorescent T8 lamps were replaced with the LEDs, the monthly replacement of burned out ballasts and lamps

ceased. This is expected to result in an additional operational savings of \$1,700 each month, saving the building about \$100,000 in operational and replacement costs over the life of the project.



"T8 LED lamps saved us half the power of normal T8s with no re-lamping for six years or more. We eliminated the use of ballasts altogether because the T8 LEDs have internal drivers. The retrofit was simple, same fixtures just removed the old tubes and ballast."
Frank Adams, Building Manager

Energy Saved → **54%**

Energy Savings per → **\$20,212**

Total Savings Over 5 Years → **\$201,060**

Decrease in Electricity Demand → **33 KW**

Decrease in Electricity Consumption → **168,426 kwh**

Savings by Fixture Type

