

GreenStep Cities Best Practice #4 - final draft for comment through May 2010 -

Efficient Building & Street Lighting and Signals: Improve the efficiency of public lighting and signals.

Category: Buildings & Lighting

Optional for all cities

Summary

Exterior lighting for buildings, parking lots, city streets and traffic signals can contribute up to 25% of a city's operational carbon footprint. While outdoor lighting and signals are a small percentage of all lighting energy use (public and private) in the city, these uses are particularly important opportunities for city governments to address as they work to improve public sector sustainability. Recent advances in lighting, signal and intersection technologies allow a city to provide better quality and safer lighting for lower costs and energy usage with short capital payback periods of two – seven years.

Best Practice Actions

- Category A cities must complete at least one Action if they choose to implement this best practice.
 - Category B and C cities must complete at least two Actions, including one of Actions (5) through (8), if they choose to implement this best practice.
- (1) Require energy efficient, Dark-Sky compliant new or replacement outdoor lighting fixtures on city-owned buildings and facilities.
 - (2) Require all new street lighting and traffic signals to be Dark-Sky compliant, energy efficient lighting technologies.
 - (3) Modify any city franchise or other agreement with a utility to facilitate rapid replacement of inefficient street lighting.
 - (4) Synchronize traffic signals so as minimize car idling at intersections yet maintain safe and publicly acceptable vehicle speeds.
 - (5) Install solar powered lighting in a street, parking lot or park project.
 - (6) Work with a utility program to relamp exterior building lighting for at least 30% of city-owned buildings with energy efficient, Dark-Sky compliant lighting.
 - (7) Replace at least 50% of the city's parking lot lighting with Dark-Sky compliant, energy efficient, automatic dimming lighting technologies.
 - (8) Replace at least one-third of the city's traffic signals with energy efficient LED or equivalent lighting technologies.

Best Practice Advisor

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Implementation Resources

(tied to the relevant action by number)

- (1) The efficiency of any lighting system is dependent on a number of factors that interact: wattage, light output, illumination requirements, and light pollution. The best reference as to what efficiency standards for outdoor lighting should be is the 2010 Model Lighting Ordinance (MLO) developed by the International Dark-Sky Association (IDA) and the Illuminating Engineering Society (IES). Cities might consider developing a local ordinance for all public and private outdoor lighting using this model: <http://www.darksky.org>

- (1) For outdoor lighting standards, see the Light Pollution Reduction credit (pp. 104 – 106) from the LEED for Neighborhood Development certification program: <http://www.usgbc.org/LEED/ND>
- (1) and (6) Dark-Sky compliant outdoor lighting resources, including fixtures, manufacturers and distributors, from the International Dark-Sky Association: <http://www.darksky.org>
- (2) *Saving Energy in Traffic and Street Lighting* (Brooklyn Park: 2009): <http://www.nextstep.state.mn.us/energyconference/090122brown.pdf>
- (2) and (8) *LED Traffic Signals: Washington County Case Study* (2009): <http://www.nextstep.state.mn.us/energyconference/090122schoenecker.pdf>
- (2) Lighting technology is evolving rapidly; cities may want to track LED street lighting demonstrations at U.S. Dept. of Energy's newly established Municipal Solid-State Street Lighting Consortium: <http://www1.eere.energy.gov/buildings/ssl/consortium.html>
- (3) Franchise agreements represent a largely unused opportunity for municipalities to promote energy efficiency and renewable energy, and some franchise agreements even create disincentives for energy efficiency. See a 2009 study by U.S. EPA Region 5 (MN) and a technical assistance contact: <http://www.epa.gov/r5climatechange/municipalities.html#5>
- (4) *Traffic Signal Timing and Coordination Manual* (MnDOT: 2009) and *Signal Timing Manual* (Federal Highway Administration: 2008): [Traffic Signal Timing and Coordination Manual 2009](http://ops.fhwa.dot.gov/arterial_mgmt/tstmanual.htm) and http://ops.fhwa.dot.gov/arterial_mgmt/tstmanual.htm
- (5) See details and contacts for the 2003 Greenway Project bike path in East Grand Forks, MN: <http://www.wapa.gov/es/pubs/esb/2003/03Aug/esb083.htm>
- (7) Commercial parking lot owners are showing the way for cities: use of LED lights from a Wisconsin firm in the parking lot of a St. Paul Cub Foods store - a first during 2009 among commercial parking lots in the state – cuts energy use 50%: <http://www.betalcd.com/docs/BetaLED-Cub%20Foods.pdf>
- (7) Automatic lighting controls can be set to achieve reduction in light output (and thus energy use) of 30% in parking lots after midnight.

Benefits

- Benefits of replacing 100,000 100-watt high pressure sodium street lights with LED fixtures:
 - Energy consumption saved over 20 years: 656,880 megawatt-hours
 - Reduction in greenhouse gases over 20 years: 512,120 tons
 - Barrels of crude oil not consumed over 20 years: 1,063,340 barrels
 - Payback period: 7.4 years
 - 20-year savings per fixture: \$2,696
- The U.S. DOE and its national laboratories predict that LED parking lot lights will reduce parking lot energy needs by more than 50% and maintenance costs by more than 80% compared to traditional parking lot lights. For parking lots whose lights are on 24 hours a day, traditional lights must be replaced every two years; LED lights need be replaced every 10 years on average.
- Optimizing signal timing is a low-cost approach to reducing congestion, costing from \$2,500 to \$3,100 per signal, and yielding:
 - Traffic delay reductions in the range of 14 - 25%.
 - Fuel consumption reductions in the range of 8 - 10%.
 - Reduction in harmful emissions (carbon monoxide, nitrogen oxides, volatile organic compounds) up to 22%

Relation to State Policy

- The MN Dept. of Transportation has lighting performance standards that must be met for state aide streets. Cities often use these standards for their own streets.
- Direction for developing the state's Outdoor Lighting Fixture Model Ordinance is in the 2009 Minnesota Statutes: 16B.328. The statute directs the Dept. of Administration to develop an ordinance, which may wait for finalization of the International Dark-Sky Association (IDA) and the Illuminating Engineering Society code. The statute sets some standards for state-funded outdoor lighting that demand cutoff luminaires and consideration of energy conservation, reduced glare and minimizing light pollution. It also requires a determination from the MN Dept. of Transportation that passive methods (markers, lines etc) are not sufficient and that artificial lighting is needed. The actions listed in GreenSteps are in keeping with the direction of the statute; and go beyond it in many ways.

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