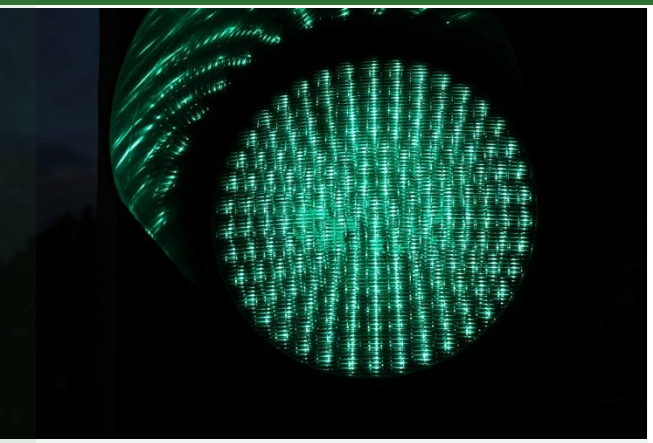
E-8. Replace Incandescent Traffic Lights with LED Traffic Lights



GHG Mitigation Potential

Potentially large reduction in GHG emissions from traffic light electricity use

Co-Benefits (icon key on pg. 34)

Climate Resilience

Installation of more efficient lights can reduce the strain on the overall grid and reduce energy costs.

Health and Equity Considerations

LED signal lights last longer than their incandescent counterparts, potentially improving traffic safety as they burn out less frequently.

Measure Description

This measure will replace incandescent traffic lights with more energy-efficient LED traffic lights. Installing LEDs reduces electricity demand and thus results in a reduction in indirect GHG emissions.

Subsector

Energy Efficiency Improvements

Scale of Application

Plan/Community. Not applicable at the Project/Site-scale, unless the development project requires modification of existing roadway infrastructure, including traffic lights.

Implementation Requirements

New traffic lights are required to be LED and meet minimum federal efficiency standards. User may take credit only if they are retrofitting existing incandescent traffic lights. Also, this measure may not be suitable in areas that receive substantial snowfall, which may cover and block light, unless the traffic lights are outfitted with winter-ready designs that prevent snow accumulation

Cost Considerations

LED lights are much more energy-efficient than incandescent lights, and greatly reduce energy consumption and increase cost savings. LED lights are typically more expensive than less efficient incandescent and incur greater costs from the initial purchase. However, the rated life of LEDs is typically longer than that of less efficient bulbs, which reduces the frequency of replacement costs.

Expanded Mitigation Options

Incorporation of solar fixtures onto the traffic lights would further reduce grid-supplied electricity consumption and associated emissions.

GHG Reduction Formula

$A = B \times C$

GHG Calculation Variables

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from traffic light electricity use	0–85	%	calculated
User Inputs				
B	Percentage of incandescent traffic lights in project study area to be retrofitted	0–100	%	user input
Constants, Assumptions, and Available Defaults				
C	Percent reduction in power consumption from LED lights compared to incandescent lights	85	%	U.S. DOE 2004

Further explanation of key variables:

- (B) – This methodology assumes that all the existing traffic lights only use incandescent bulbs. If the existing traffic lights are a mix of incandescent and LED bulbs, the LEDs should be excluded from the total number of lights that is used to determine the percentage for this variable.
- (C) – The percent reduction of 85 percent in power consumption is based on an average incandescent bulb power of 109 watts and an average LED bulb power of 17 watts (U.S. DOE 2004). The user should replace this default with a project-specific percent reduction in power consumption if the user knows the average wattage of the existing incandescent bulbs and/or the proposed LED bulbs.

GHG Calculation Caps or Maximums

It is assumed that the electricity demand of the project's traffic lights is currently being met by grid electricity that requires *some* amount of fossil fuel–based energy generation, which emits GHGs from fuel combustion. In other words, the local electricity provider has an energy intensity factor (lb of CO_2e per MWh) greater than zero. For projects that are served by electricity providers already with a renewable portfolio of 100 percent, this measure could have no reduction in GHG emissions. If the electricity provider is using REC to meet a 100 percent renewable portfolio goal, then some emissions reductions may be achieved. This measure would still result in the co-benefits of reduced electricity use and enhanced energy security.

Example GHG Reduction Quantification

If the user's project includes incandescent traffic lights, the user can reduce traffic light electricity by replacing the lights with LEDs. If all (i.e., 100 percent) of the incandescent lights are replaced with LED lights (B), the user would reduce GHG emissions from electricity used to power the incandescent traffic lights by 85 percent. The example measure emission reduction is calculated below.

$$A = 100\% \times 85\% = 85\%$$

Quantified Co-Benefits

Energy and Fuel Savings

(C) represents the percent energy savings for this measure. The project's electricity use from traffic lights in the study area would be reduced by up to 85 percent.

Sources

- U.S. Department of Energy (U.S. DOE). 2004. *State Energy Program Case Studies: California Says "Go" to Energy-Saving Traffic Lights*. Available: http://www.nrel.gov/docs/fy04osti/35551.pdf. Accessed: January 2021.