



# The climate benefits of smart streetlight upgrades

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# Introduction

**U**S cities stand at a pivotal moment. They are facing both persistent and new challenges, from the escalating climate emergency and recovery from the pandemic to an energy crisis.

On the positive side, municipalities are receiving unprecedented federal funding through the \$1.9 trillion American Rescue Plan Act and \$1.2 trillion Infrastructure Investment and Jobs Act. This offers cities the opportunity to make smart investments in modernizing their infrastructure to address priorities and ready their communities for the future.

City leaders must address the urgent issues they face while making sure investments are strategic and deliver the maximum long-term value. This means selecting systems with the greatest impact and making the most of existing assets.

That's why streetlight upgrades are one of the most impactful steps cities can take, particularly when they adopt a holistic approach combining LED lighting and smart controls to save money, energy and reduce emissions, with a smart city platform to support multiple use cases.

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# The climate imperative for cities

**S**cientists have made clear that global warming must be capped at 1.5°C to avoid the most disastrous impacts of climate change.

We are already seeing some of the effects through regular floods, heatwaves, and other extreme weather events.

To have a chance of limiting rises as per the Paris Climate Agreement means achieving net zero by 2050 and halving global emissions in the next ten years, leading some to call the 2020s ‘the climate decade.’

This requires a global effort at all levels of society, and cities play a particularly important role since they [consume](#) 78 percent of the world’s energy and produce more than 60 percent of greenhouse gas emissions.

The US Department of Energy’s Office of Technology Policy notes: “Investing in the clean technologies, infrastructure, workforce, and systems of the future creates an unprecedented opportunity to improve quality of life and create vibrant, sustainable, resilient, and equitable economies.”

While the business case for some emerging technology investments is unproven or nascent, smart streetlights are a proven asset, making modernization a “low-hanging fruit” for cities, says Herb Sih, Smart City Strategist and Advisor to Ubicquia. Ubicquia offers smart city solutions that plug into existing streetlights to provide services including advanced light control, and sensors to improve air quality, mobility, and public safety.



## Slashing emissions with smart streetlights



Lighting accounts  
for 5% of global  
emissions



LEDs could save  
1,400 million tons  
of CO<sub>2</sub>



LEDs with  
controllers cut  
energy by 60-80%



16 million smart  
streetlights in the  
US by 2030

### Lighting opportunity

“The ubiquity of lighting means that any improvements to operational efficiency and energy consumption result in meaningful climate impact nationally and worldwide,” Sih commented.

Lighting accounts for nearly [five percent](#) of global CO<sub>2</sub> emissions. According to The Climate Group, LED lighting offers energy savings of up to 50 to 70 percent compared to traditional sodium lighting. A global switch could save over 1,400 million tons of CO<sub>2</sub> and avoid the construction of 1,250 power stations.

LED lighting has been recognized as one of the most actionable and ready-to-implement technologies for cities to adopt, to become a low carbon economy and reduce emissions in the next

*“Smart streetlights are a proven asset, making modernization a ‘low-hanging fruit’ for cities.”*

**Herb Sih, Ubicquia**

decade, says Sih. But he also urges cities not to “stop halfway.”

Lighting controls can deliver an additional 20 percent in energy savings by enabling remote dimming schedules. LED conversions with smart lighting controls typically result in a 60 to 80 percent reduction in total energy usage compared to high pressure sodium lights, along with a corresponding reduction in carbon emissions, according to market intelligence firm Northeast Group.

More than half the cities in North America have made the conversion to LED lights but less than 10 percent have opted to add lighting controls, highlighting the opportunity to make a significant difference with minimal additional investment.

The US has over 400 million streetlights and Northeast Group expects the number of these that are smart and connected to quadruple to 16 million by 2030.



# Cities combining sustainable with smart

**S**everal cities in North America are already proving the case for investing in lighting upgrades.

Los Angeles has converted 165,000 streetlights to LED, 110,000 are connected, and a few hundred incorporate additional “smart pole” features including EV charging and 4G connectivity. The city is saving around \$10 million per year, alongside [energy savings](#) of 119 GWh and a CO2 reduction of 70,708 metric tons.

Chicago [recently completed](#) a large streetlight modernization project that has improved the quality of night-time visibility throughout the city and is projected to save taxpayers \$100 million in electricity costs over the next ten years.

The Chicago Smart Lighting Program replaced 280,000 high-pressure sodium lights with new LED lights that use less energy and can alert work crews if they burn out.

Wireless nodes are attached to each fixture to create a network that detects streetlight outages, automatically creates repair tickets, and assigns repair crews to the location.

The more efficient lights have already cut the city’s electricity bill in half – saving more than \$8 million



last year, in addition to the \$34 million in rebates it received from utilities firm ComEd for switching the lights.

“Creation of the lighting management system puts us in the forefront of smart cities around the nation,” [said](#) Gia Biagi, Commissioner of the Chicago Department of Transportation, which led the project.

“And the smart lighting management is making our operations more efficient, enabling our workforce to respond to outages more quickly when they occur.”

## 30 cities make the switch

The investment is also paying off for smaller cities and towns.

Ubicquia partnered with RealTerm Energy which specialises in LED streetlighting conversions for municipalities on 30 smart streetlighting projects in the United States and Canada.

By converting to LED lights and adding lighting controls, cities reduced energy consumption by 3,721,673 kWh annually – which is calculated to be the equivalent of taking 568 typical gasoline-powered vehicles off the road.

Ian Aaron, CEO of Ubicquia, said: “RealTerm Energy has a proven LED streetlight conversion program that saves their municipal customers

## Supercharging LEDs

The 30 cities are using the following platforms to deliver savings:



UbiCell Smart Streetlight Controller, which installs in minutes and is compatible with 360 million streetlights worldwide. The controllers allow communities to schedule and dim lights, enabling them to reduce power consumption, carbon emissions and cost.



UbiSmart Air Quality Monitor Plus (AQM+), which gives cities a way to monitor particulate pollution and other air quality hazards. This platform can identify potential environmental risks, such as a forest fire or pollutants, which may be harmful to people's health.



UbiVu, a cloud-based management tool that makes monitoring and operating cities' intelligent street infrastructure easy and intuitive. Cities can use this to monitor energy usage data and air quality, as well as troubleshoot equipment and perform scheduling.

money, energy and reduces greenhouse gas emissions. Our easy-to-install and manage platforms, combined with RealTerm Energy's expertise is making smart city services a reality to cities of all sizes."

*"The town will immediately start saving enough money to pay for the new LED lights."*

**Town of Ogunquit report**

## **CASE STUDY:**

### **Ogunquit, Maine**

The Town of Ogunquit, Maine was looking for ways to provide essential services as cost-effectively as possible.

The town reported that by changing to LED streetlights, instead of paying Central Maine Power \$75,000 annually, the cost to taxpayers will be less than \$12,000. In addition to the cost savings, the environmental benefits through reduced energy usage are estimated to cut the town's carbon footprint by 139 tons annually.

The change will also give control over the light fixtures including brightness and maintenance. A [report](#) noted that "the town will immediately start saving enough money to pay for the new LED lights, be able to set aside funds for any maintenance needed, and still save money each year."

## **Cities making the switch to smart LEDs**

### **LOS ANGELES**

Saves \$10 million per year

### **CHICAGO**

Halved electricity costs

### **OGUNKIT**

Reducing carbon footprint by 139 tons annually

### **NYACK**

Cutting energy consumption by 67%

### **PEPPERELL**

Reduced streetlight energy usage by 75%

## CASE STUDY:

### Pepperell, MA

Pepperell converted 411 streetlights from standard high pressure sodium lights to LEDs and added Ubiqvia smart controls.

The primary goal was to reduce energy consumption as well as supporting the town's Dark Skies Community initiative.

The project has also been a community engagement opportunity for the town, with residents having input on which fixtures to choose.

Andrew MacLean, Pepperell's Town Administrator, [says](#) the town has reduced streetlight energy usage by more than 75 percent, and there are opportunities for future conversions of lights in town parks and play areas.

Longer-term, cumulative savings of \$1 million over 20 years and 81,291 kWh annually have been forecast. An 80 percent reduction in lighting costs and a 72 percent reduction in energy consumption are anticipated.

The smart controls provide an extra 20 percent in energy cost savings, and allow staff to remotely operate and dim streetlights, making "little adjustments as necessary". The technology also notifies staff if a lamp stops working or is damaged.

"Pepperell is strongly committed to climate change issues and considered converting to LEDs as an opportunity to reduce energy consumption," said

MacLean. "We have also declared ourselves a 'Dark Sky' friendly community and strive to eliminate unneeded night-time lighting. This conversion reduces night-time lighting and glare without compromising the public safety benefits of street lighting."

## CASE STUDY:

### Village of Nyack, NY

The Village of Nyack's LED Street Light Conversion Program aims to provide a smarter, environmentally friendly street lighting system that will significantly reduce energy and maintenance costs.

The new LED fixtures are [expected](#) to cut Nyack's streetlight energy consumption by approximately 67 percent and decrease annual streetlight maintenance costs by up to 80 percent because LEDs are a solid-state technology with no moving parts. The lights will last up to four times longer than the village's existing streetlights.

Nyack anticipates that the retrofit will have a significant impact on its environmental footprint and reduce greenhouse gas emissions by an estimated 193 metric tons annually.

"We are very pleased that we have taken on the management of all our streetlights and completed the conversion of our cobraheads and decorative fixtures in the project. We're saving money through reduced operating costs and reducing greenhouse gas emissions, and as an extra perk, we received recognition and a grant award from NYSERDA for the accomplishment," said Marcy Denker, Sustainability Coordinator, Village of Nyack, NY.

The NYS Energy Research Development Authority (NYSERDA) administers the Clean Energy Communities Program, providing the resources and funding to help communities invest in future-focused clean energy solutions. Communities earn points and access grant funding by completing high-impact actions.



# The business case for smart streetlights

**A** number of factors are aligning to make now a good time to invest in smart streetlights, according to Sih.

Public lighting can account for 20 to 40 percent of a municipality's electricity bill. Switching to LEDs and smart controllers therefore allows cities' budgets to go much further so they can invest savings back into other priorities and projects.

The costs of LED luminaires including streetlights have fallen dramatically over the past several years and are now on a par with legacy systems.

Further, Sih says, smart streetlights “pay for themselves” with cities beginning to see the return on investment almost immediately.

*“We’re saving money through reduced operating costs and reducing greenhouse gas emissions.”*

**Marcy Denker, Nyack, NY**



## Streetlights as assets

As cities have shown, operational efficiencies from smart streetlights also bolster energy savings and environmental benefits. LEDs have longer lifespans, for example, reducing the frequency of needing to replace lights. Dimmable lights give cities much more control and smart controllers pinpoint outages to streamline maintenance.

They also create a foundation for additional opportunities in line with cities' goals, such as improving air quality, public safety and digital equity.

Cities can integrate a number of applications into platforms such as Ubicquia's. Options include air quality monitors, optical sensors to optimize traffic, and acoustic sensors.

"We're increasingly seeing multiple use cases across multiple budgets on the same platform," said Sih.

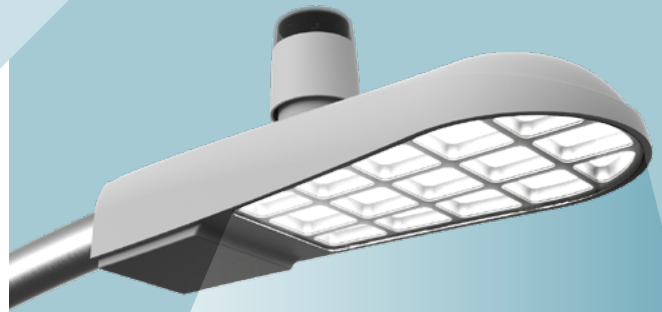
Another trend is US municipalities buying back streetlights from their local utility. This reflects awareness of the savings to be made and a recognition of streetlights as a critical infrastructure asset. There is a growing push for electricity tariffs based on dimmed streetlights.

## Federal funding

Federal aid from the American Rescue Plan Act and the Infrastructure Investment and Jobs Act is now enabling many cities to make the infrastructure upgrades that have long been in their sights.

*"We're increasingly seeing multiple use cases across multiple budgets on the same platform."*

**Herb Sih, Ubicquia**



## Smart streetlight savings

**LOS ANGELES**  
**\$10 million**  
per year

**CHICAGO**  
**\$100 million**  
over ten years

**PEPPERELL**  
**\$1 million**  
over 20 years

**PUBLIC LIGHTING**  
is up to **40%** of a  
city's electric bill



“It makes good financial and practical sense to add controllers at the same time as replacing streetlights,” said Sih. This avoids duplication of labor and resources.

For cities that want to get more from existing LED lights, Ubiqquia’s plug-and-play system and new applications can be deployed “in literally minutes,” because they attach to existing lights.

Smart streetlighting with lighting controls are strong candidates for federal funds, said Sih. To access some of the pots of the infrastructure money, cities will have to participate in a competitive bid process for part of the IIJA funds.

“If you can show how you’re going to use the funds, and show the impact the initiative will have, you’re going to be in a much stronger position to compete for those funds.”



## Federal funds: Need to know

### ARPA

The \$1.9 trillion American Rescue Plan Act makes \$350 billion available for state, local, territorial, and Tribal governments.

Eligible uses are limited, including COVID-19-related expenditures; addressing the negative economic impacts caused by the public health emergency; replacing lost public sector revenue; providing premium pay for essential workers; and investing in water, sewer, and broadband infrastructure.

Deadlines: December 31, 2024 to obligate funds and December 31, 2026 to spend funds.

[Find out more](#)

### IIJA

The \$1.2 trillion Infrastructure Investment and Jobs Act includes \$550 billion in new spending.

Key categories include: roads and bridges, climate resilience and environment, clean energy, ports, water systems, airports, public transport, broadband, and electric grid.

Much of the funding will be competitive and needs to be spent to pre-specified timelines and on specific types of infrastructure projects.

Funding distribution will be in various stages depending on the type of program.

Cities are urged to prioritize capital needs and develop a project pipeline, and consider appointing an infrastructure coordinator to manage the flow of funds.

[Find out more](#)



## About Ubicquia

Ubicquia offers municipalities, utilities, and communication service providers cost-effective and scalable platforms for deploying smart city, connectivity, and smart grid solutions.

The Ubicquia® suite of streetlightmounted smart city and connectivity platforms include UbiCell®, which enables smart streetlight control; UbiMetro™, a streetlight small cell that accelerates 4G and 5G network deployments; and UbiHub®, which delivers high speed wireless internet access and street level video and audio intelligence.

Ubicquia's smart grid platforms include UbiGrid™ DTM+, a platform to monitor a utility's distribution transformers and network in real-time; and UbiSmart™ AQM+, a sensor that monitors a city's air quality index, noise levels and environmental data.

Ubicquia's solutions install in minutes to help communities become smarter, safer, and more connected.

To learn more visit [www.ubicquia.com](http://www.ubicquia.com)

