

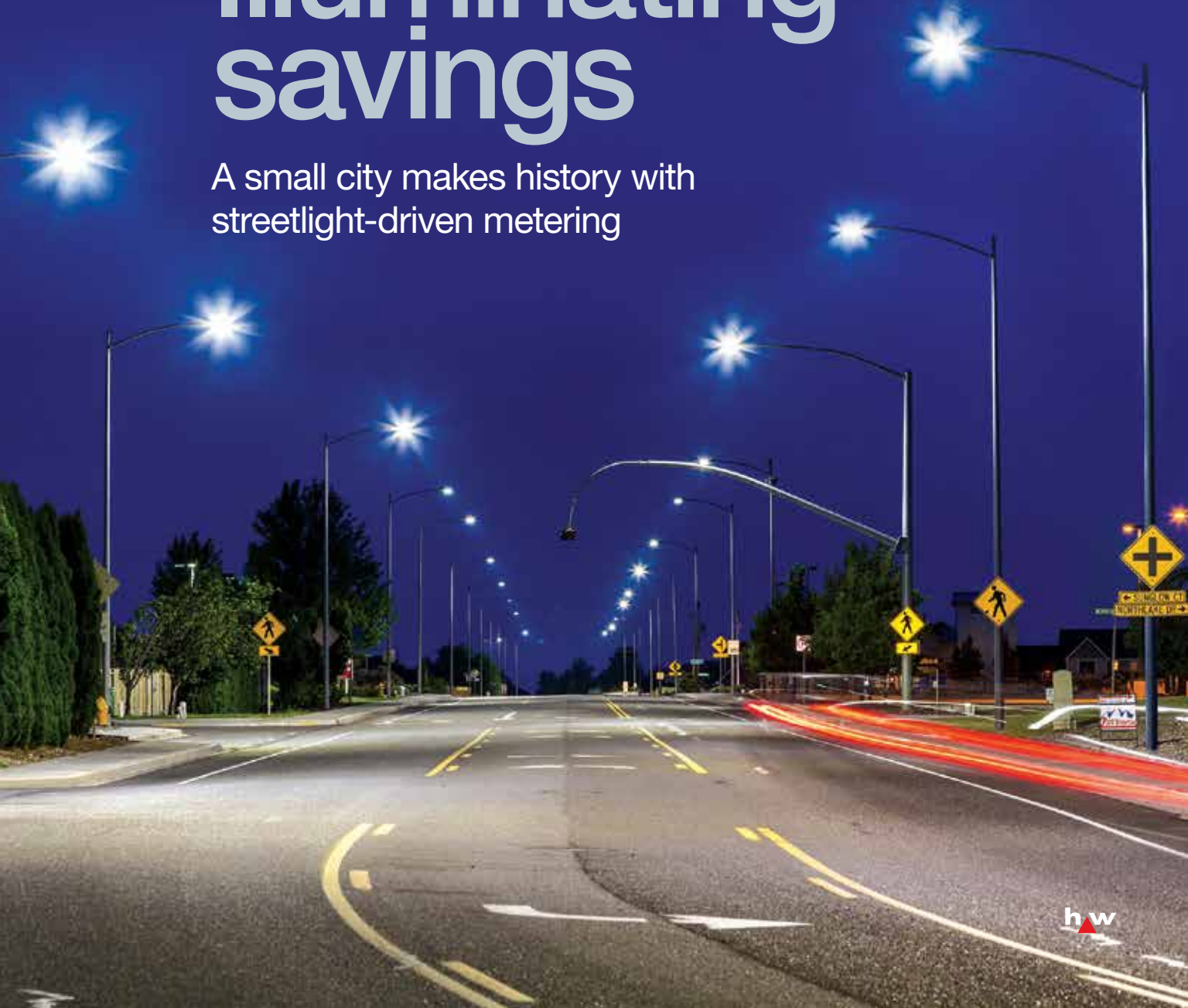
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Illuminating savings

A small city makes history with streetlight-driven metering



Illuminating savings



West Richland, Wash., recently converted all of its 1,097 high-pressure sodium lights to high-performance LEDs operating on a wireless control system, becoming the nation's first city to pay only for the energy its streetlights consume. Photos: Acuity Brands Lighting

A small Washington city makes history with streetlight-driven energy metering.

When Roscoe Slade heard the sales pitch for a new streetlighting system, the public works director of West Richland, Wash., thought it sounded too good to be true. But the timing was right. Slade's department had been looking for a less expensive way to light the city's streets, as the energy and maintenance costs of its 1,097 high-pressure sodium (HPS) lights accounted for 20% of the street maintenance budget.

Since adopting a greenhouse gas emission reduction policy in 2010, the city of 14,000 residents was also committed to making environmentally responsible infrastructure improvements.

"We'd been working with our power provider, Benton Rural Electric Association (Benton REA), to make a change that would make sense for the city and also direct more money back into our streets program," says Slade. "We knew the best approach was through energy savings, but lighting technology has been changing quickly and we wanted to be sure we made the right choice."

The answer came from Fritz Feiten, manager of business development for the northwest region of Ameresco, an energy service company that specializes

in solving energy challenges. Streetlight conversion projects are a major part of the company's business and Ameresco is currently helping dozens of cities install 100,000 energy-efficient lights.

Feiten estimated West Richland could reduce its streetlight energy consumption by more than 60% and save approximately \$65,000 a year by switching to LED.

"I was skeptical when he said the energy savings would be enough to pay for the project," says Slade. But Ameresco conducted a preliminary energy audit at no cost to the city that supported the figures.

Tapping into resources

Although the numbers made sense, Slade's department needed help implementing a plan. "We didn't have the time or resources to find contractors or apply for grants," says Drew Woodruff, West Richland city engineer and the project's leader.

As a pre-approved energy service company for the Washington State Department of Enterprise Services, Ameresco was qualified to coordinate and implement the city's streetlight conversion. "Our state has a great program that makes it easier for municipalities to undertake large-scale projects," says Slade. "They do the legwork

upfront, vetting agencies, and work directly with the energy service companies throughout the process."

Based on interviews with Slade and Woodruff, Ameresco evaluated contractors and lighting manufacturers and investigated financing options. The project qualified for several grants, energy credits, and incentives, and a low-interest loan that helped offset its million-dollar price tag (see sidebar on page 36).

"Ameresco helped secure the funding that made it possible for a city of our size to take on a project like this," says Woodruff. The company also offered a not-to-exceed cost and energy savings guarantee.

Maximizing the investment

With financing in place, the city began by reviewing its infrastructure inventory and new lighting standards, such as

PROJECT PARTNERS

Owner: City of West Richland, Wash.

Utility: Benton Rural Electric Association, Prosser, Wash.

Energy Service Company: Ameresco, Framingham, Mass.

Installation Subcontractor: Northwest Edison, Woodinville, Wash.

Manufacturer: Acuity Brands, Atlanta

the amount of light needed for arterial versus residential streets. American Electric Lighting Autobahn LED luminaires from Acuity Brands were selected based on their initial fixture cost, cost to operate over time, and high efficacy, or the amount of lumens produced per watt of energy used.

The city replaced 100- and 200-watt HPS fixtures on residential streets with Autobahn ATBO 50-watt and 110-watt LED luminaires and substituted 400-watt fixtures at intersections and on major road with Autobahn ATB2 220-watt LED luminaires.

Initially, Slade and Woodruff considered installing LED luminaires as individual lights failed and in new areas of development. Although it would cost more upfront, a full-city installation of LED technology made the most sense. “If you don’t do a full replacement, you’re losing money,” says Feiten. “Not only do you miss out on the energy savings gained by converting all lights at once, you’ll pay more over time to buy luminaires in smaller quantities.”

A one-time installation can also reduce labor costs, as an experienced road lighting subcontractor can often complete the job more efficiently than city employees. The West Richland installation took about three weeks.

By opting for a full-city conversion, West Richland will also save almost 590,000 kilowatt hours of energy a year, or about the same amount consumed by 60 average U.S. homes. But changing the streetlights was only the first step.

Converting energy savings to cost savings

To fully realize savings, the city also invested in Acuity’s ROAM wireless network to control and monitor the lights. Nodes, or sensors, on each LED light communicate with each other in a wireless mesh network, meaning multiple sensors transmit data so a failure of one link won’t compromise the entire system. The built-in redundancy improves reliability, especially in harsh weather.

SPENDING TO SAVE (ENERGY)

Although replacing all of West Richland’s 1,097 streetlight fixtures with LEDs made long-term financial sense, the project came with a hefty pricetag. However, the energy-saving measure was eligible for a series of grants and incentives.

- \$1,150,765 Total project cost
- \$195,000 Rebates and power incentives from Benton REA
- \$281,937 Energy efficiency grant from the Washington Department of Commerce

The city will pay the remaining \$673,828 with a 12-year, low-interest loan through the Washington State Treasurer.

“For the first 10 to 12 years, we’ll basically break even by using the energy savings to cover our loan payments,” says Public Works Director Roscoe Slade. He also expects to save money on maintenance because the lights are covered by a 10-year warranty.

“The important thing is that it’s a sustainable, long-term solution.”

FOR MORE INFORMATION

ROAMview: How it works

www.acuitybrands.com/brands/controls/roam/roamview

Information about each streetlight, including energy consumption, is sent via Ethernet or cellular connection to a network operations center, which stores and manages data from the entire system. For West Richland, it was cheaper and more secure to use Acuity’s server than to install one in-house.

In addition to a one-time setup fee for providing and hosting the data server, the city has an ongoing service contract with Acuity for server maintenance and support. The vendor also trains public works and Benton REA staff who will use a web-based portal to access the ROAM Concierge software suite.

Woodruff can now check the status of streetlights without waiting for residents to report outages, generate work orders, set on/off and dimming schedules, and monitor energy use down to the individual fixture.

“Adding ROAM controls essentially creates one giant meter,” says Feiten. “But no matter how much energy the

city saved, it will not have resulted in any cost savings without Benton REA agreeing to use the system’s metering capability.” Convincing the utility to switch from an unmetered flat rate tariff to usage-based billing was key.

Acuity Brands’ technical staff walked through the ROAM system with Benton REA representatives, emphasizing its +/- 0.5% metering accuracy and safeguards to prevent data loss in a power outage. Although the utility had never used streetlight data for metering or billing, it embraced the plan to save energy and improve safety for its member-owners: the citizens of West Richland.

“Giving Benton REA access to the ROAM data for metering and billing means we pay for the energy we use, not an estimated amount,” says Woodruff. The city is moving to a consumption-based tariff at \$0.072 kilowatt hours, reducing the average cost per kilowatt hour by more than 26%.

Woodruff also expects to save money on maintenance. Although the city

is now responsible for maintaining the lights, previously maintained by Benton REA, the luminaires are warranted for 10 years with a useful life of 100,000 hours, or more than 20 years of dusk to dawn operation. This can be extended even further with dimming strategies.

Strategic lighting

The department is now fine-tuning its plan to maximize energy-saving benefits and extend the life of the new streetlights. With the control system, West Richland can reduce the lights' energy use by an extra 10% to 20% by adjusting brightness levels. For instance, lights can be programmed to gradually increase and decrease light levels at dusk and dawn, and dim during the night when traffic and pedestrian activity decrease.

"We know the lights will go on and

off gradually, and they will not be used at full power," says Roscoe. While the city won't dim lights on major arterial streets or at intersections, it will develop a schedule to dim sections of neighborhood streets at different levels during the night — possibly 60% or 70% — with input from residents. "We anticipate most of our energy savings to come from mid-block lights in residential areas," he says.

Throughout the streetlight conversion, his department has been mindful of residents' sensitivity to light pollution. The city's streetlights have always been fully shielded or covered on top to direct light downward. The new lights are also shielded, and classified as "full cut-off" LEDs with no light emitted above a horizontal level. Although their white light improves color recognition, it can appear brighter

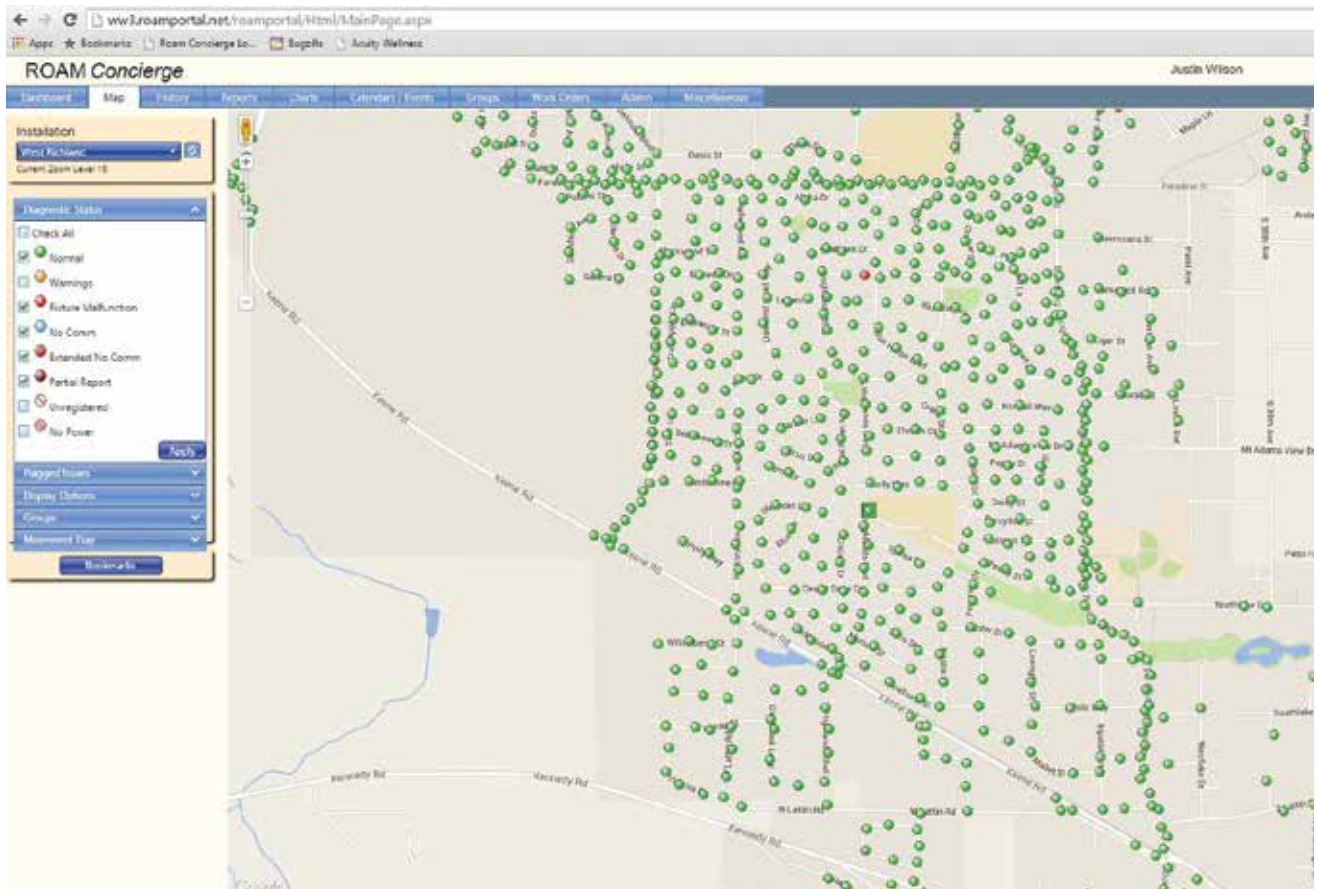
than yellow sodium lights.

"We had some complaints during the first week or so, but we've had more positive feedback than negative," says Woodruff. "When people drive in from another city and see the difference, they say our lights look cleaner." Residents also appreciate the safety afforded by better visibility.

Now that the public is aware of the new streetlights' capabilities, Woodruff has already fielded requests for special occasions, such as a total blackout for fireworks on July 4th. He has invited several residents and police representatives to comment during the dimming test period, as the City Council establishes a formal policy.

The future of intelligent lighting

When the streetlight conversion was finished in June, West Richland became



The West Richland public works department uses Acuity's ROAM Concierge software to monitor and control the city's LED streetlights. The package includes full diagnostics for each light, including energy savings, work order management, and can be expanded to add more lights in the future.

Washington's first city to implement a citywide LED streetlight system that incorporates ROAM technology. It's also the first city *in the nation* to combine adaptive lighting measures such as dimming lights during non-peak hours with ROAM technology to generate usage-based billing.

Feiten stresses the enormous opportunity municipalities have to reduce energy and improve illumination with LED streetlights; and for those currently on flat rate tariffs to tap into the built-in metering ability of control systems such as ROAM. Ameresco is currently implementing streetlight conversion projects across the U.S. and Canada, including 20,000 lights in Tucson, Ariz., and 50,000 in Honolulu.

"This is just the beginning of a new trend in how cities are going to be billed for their streetlights," says Feiten. "It's not a matter of if it's going to happen, but when." **PW**

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West Richland's 14,000 residents typically have more than 300 days of sunshine a year to enjoy the wide open spaces and breathtaking views of southeastern Washington. They also treasure their clear night skies. To minimize light pollution, the city installed full cutoff LED streetlights that prevent uplight and limit light intensity.

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