

NLR expects to save bundle on road lights Project is 1st in state to put LED fixtures on highways

BY NOEL E. OMAN



Photo by Rick McFarland

Jonathan Caudle, system electrical engineer for the North Little Rock Electric Department, shows an LED lighting fixture at the department's facility Friday. This one has 120 lights and is expected to last 20 years. The city is installing 172 of the lights on I-30 and I-40.

LITTLE ROCK — The city of North Little Rock projects to save more than a quarter of a million dollars over the next 20 years by installing 172 energy-saving light-emitting diode, or LED, fixtures to illuminate parts of Interstates 30 and 40 in the city.

A bonus is that motorists will be able to see better with the LEDs than with the high-pressure sodium bulbs in place now, North Little Rock officials say.

But the transition from the high-pressure sodium bulbs — themselves an energy saver over previous-generation bulbs when they became widely accepted in the 1980s — to LEDs hasn't been easy because no widely accepted standards for the LED technology exists for their use in roadway illumination.

The North Little Rock project is the first to place LEDs on an Arkansas highway or interstate, said Randy Ort, a spokesman for the state Highway and Transportation Department, which installs poles and lights to illuminate roadways under its control but requires localities to bear the cost of operations and maintenance.

According to a recent survey by an American Association of State Highway and Transportation Officials technical committee studying roadway lighting issues, only 16 states have used LEDs for some lighting applications, ranging from roadway illumination to rest areas to traffic signals. Arkansas was one of 20 states responding to the survey that said LEDs weren't used in road lighting applications.

The survey also reflected concern that no standards were in place for using LEDs to illuminate roadways. LEDs cannot be measured the same way as previous generations of lighting. A 2005 guide on lighting recommendations doesn't address LEDs. The technical committee is now considering how to incorporate new LED research into the guide.

"There are lighting guidelines," Ort said. "But the problem is there's no lighting guidelines for LED lighting. Apparently you measure differently for LEDs than you do for high-pressure sodium [bulbs]."

As a result, it took about a year for North Little Rock and the Highway and Transportation Department to work out an agreement for the LEDs to be installed on the interstates.

"There has been a little bit of trial and error for both North Little Rock and for us to come up with some guidelines that meet their objectives for the sustainability goals and our objective for adequate visibility," Ort said. "This was like breaking new ground. It's been a partnership."

The project has its roots in an incentive grant from the U.S. Department of Energy that was on Jonathan Caudle's desk when the city hired him two years ago as a electrical systems engineer for the North Little Rock electric

department. The grant would pay half the cost of the city's conversion to energy-saving lighting. Caudle was tasked with finding the most effective conversion, which he said turned out to be the interstate lights.

Total cost of the LED fixtures came to \$205,110, with the city's share put at \$102,555. The cost of each fixture ranges from \$1,000 to \$1,150 each. The city also is bearing the cost of installing the fixtures, using its own work force.

The project extends from the I-30 bridge over the Arkansas River to the I-30/I-40 interchange and from the same interchange to Levy on I-40. Both routes have been illuminated with 172 high-pressure sodium bulbs — about 30 poles down the center of I-30 hold two bulbs. The 240-watt bulbs cost about \$8 each but have annual energy costs totaling \$72.33 each, according to Caudle's calculations, or an estimated \$168,555 over 20 years.

Over 20 years, if the bulbs remained, the city would spend about \$113,000 on maintenance costs, which not only include replacing the bulbs about every three years but also the cost of hiring a contractor to close the lanes while the bulbs are changed, Caudle said.

By contrast, the LED fixtures, while far more expensive, will last more than three times as long — about 10 years — before they need to be replaced. Further, their annual energy costs are dramatically less than the bulbs they are replacing — ranging from \$23.44 for each of the 79 90-watt fixtures to \$55.12 for the 30 220-watt fixtures. The 63 120-watt fixtures have annual energy costs of \$30.43. (The different wattages are based on the road conditions and the light-level standards state highway officials required, according to Caudle.)

"We are reducing our energy consumption and we are also decreasing our energy demand on the electrical grid," Caudle said.

The total projected savings over 20 years is \$238,959, Caudle added. "Even if we didn't get the grant, we were saving money on the life cycle of the fixtures."

The project remains incomplete, with about 60 of the fixtures already installed down the center of I-30 last month. The rest will be installed over the next couple of months after some wiring work is completed.

With the LEDs, the lighting will have a different look. The high-pressure sodium bulbs cast off an orange hue, with a Kelvin color temperature in the range of 2,000 to 2,700 degrees. By contrast, the LEDs' color temperature is about 6,000 degrees, which is white with a bluish tint, according to Caudle.

More importantly, he said, the latest research show that people can see better with the LEDs. The lights have a high scotopic value, which is the area of the eye used for lowlight vision, and thus are more effective than the high-pressure sodium bulbs, which have a high photopic value, which is used for normal light.

"What we're trying to do is get the conditions more favorable — to as if they were driving in daylight," Caudle said. Motorists "are going to be able to perceive objects better" at night with the LED fixtures.

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