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Lighting the Motor City's Streets

The City of Detroit is undertaking a comprehensive restoration of its street lighting system that includes transitioning the existing high-pressure sodium (HPS) sources to LED. Detroit's well-publicized financial difficulties over the last several years have added many hurdles and constraints to this process. Strategies to overcome these issues have largely been successful, but have also brought a few mixed results. An instructive [new DOE report](#) provides an objective review of the circumstances surrounding the system restoration, the processes undertaken and decisions made, and the results to date.

Detroit's lighting transition is still underway, with completion not expected until next year. But the new LED system has already vastly improved on the failed system that preceded it. By mid-2013 it was estimated that as much as half of the city's 88,000 installed HPS units were not in reliable operating condition. When Detroit declared bankruptcy that year, the city's newly appointed Emergency Manager established the Public Lighting Authority (PLA) to manage restoration of the lighting system. In addition to repair and replacement of most of the streetlights, much of the associated wiring and supporting electrical infrastructure also needed replacement, due to its deteriorated condition.

Ultimately, LED technology was selected for use throughout the entire system, despite the higher upfront cost compared with a more traditional HPS system. The resulting energy and maintenance savings are expected to quickly offset the incremental expenditure for the LEDs. The previous number of fixtures, which included alleyways and residential areas where the population has significantly decreased in recent years, was deemed excessive from a budgetary standpoint, so the new system will be limited to approximately 65,000 LED streetlights. Compared to the old HPS system when it was fully operational, the new LED system will cut energy use by 60%, saving about 46 million kWh a year, worth about \$2.9 million. Compared instead to an equivalent replacement system of 65,000 HPS streetlights, the LED system cuts energy use by an estimated 53%, saving 34 million kWh annually, worth \$2.4 million.

Detroit's incremental investment in LED products (compared to a replacement HPS system) was thus easily justified, offering a simple payback of less than 2.5 years from energy savings alone — that is, without taking maintenance savings

into account. Compared to the previous technology, the new system is also expected to improve reliability and safety, improve resistance to vandalism, and decrease opportunities for theft.

The new system generally delivers higher quality illumination than did the previous system, but the quality of illumination in some residential neighborhoods has been slightly compromised because of the budget-driven removal of poles and luminaires. In those cases, the distance between remaining poles is too great for any traditional luminaire to overcome, regardless of the lighting technology used, and areas of darkness as well as glare from nearby streetlights are likely to be issues for some residents.

As with many other municipalities across the country, Detroit's system was already operating with sufficient cash flow (at least, theoretically) to finance a lighting transition, as long as energy and maintenance savings could be retained to repay the cost of borrowed capital. However, given the bankruptcy proceedings surrounding this case, a different source of funds was required —namely, a portion of the proceeds from a utility user's tax.

Detroit's decision to establish an independent agency, the PLA, to deal with funding and manage the transition was necessary to address the multiple challenges the city faced regarding its bankruptcy filing. Going forward, DOE recommends that the city closely document its actual costs of streetlight operation — including energy, maintenance, and repayment of the capital costs — because the current contract between PLA and the local utility has only a three-year lifespan. At that point, the city and PLA will be renegotiating the costs of their continuing utility service, and the city will want to be able to accurately compare the historical data with the expenditures proposed in the new contract.

Detroit has overcome a significant challenge in returning its street lighting system to reliable operation in a very short time and with sharply limited resources. Given the difficult circumstances present at the time the project was planned and executed, however, the question of whether the individual approaches taken are appropriate for other municipalities must be evaluated case by case.

For complete details on this project, see the [report](#).

As always, if you have questions or comments, you can reach us at postings@akoyaonline.com.