Ann Arbor Streetlights: Past, Present, Future

Prepared by the Systems Planning Unit, September 2013

Introduction

This paper is intended to describe the efforts to manage streetlight costs for the City of Ann Arbor, including: directions taken; options that have been previously explored; issues looking ahead; a discussion of concerns and requests expressed by some members of the community; and, recommendations moving forward.

Principal among the efforts and directions taken by the City so far, and further described within this paper, are the City's program for conversion of existing conventional streetlight lamps to LED lamps, and the City's moratorium on new streetlight installations that has been in place since July 1, 2005. Since 2005, the estimated daily energy usage for streetlights in the City has been reduced by approximately 32%, from 19,429 kWh (kilowatt-hour) to 13,240 kWh. Despite this tremendous reduction in energy demand and usage, the City's monthly costs for streetlights and signals over the same period have increased by approximately 15%, from $126,353 to $144,985.

Recently, some members of the community have raised concerns about streetlighting in the City and are expressing a desire for additional streetlights in their neighborhoods or other areas of the City. The need to maintain the delicate balance between providing the broad range of services requested by the community, particularly that of streetlighting levels in this case, with the limited resources available to not only provide, but also to maintain and sustain that level of service highlights the need for this paper at this time.

Background

As of the close of FY2013, there are 7,437 streetlights in the City, that are made up of a combination of Detroit Edison (DTE) owned and operated streetlights as well as streetlights owned by the City. Of this total, 5,234 are DTE-owned, which the City pays DTE for their energy use and maintenance; and, 2,203 are City-owned which the City pays DTE for their energy use, but directly funds their maintenance by City staff. Payment for both DTE-owned and City-owned streetlights comes out of the City's General Fund Budget. Since City-owned fixtures are not maintained by DTE, the rates charged by DTE for these streetlights are significantly less than that for streetlights owned and maintained by DTE. Of the total $1,776,247 spent by the City on streetlighting in FY2013, the total of streetlight billings from DTE was over $1,560,000.

With reductions in General Fund revenue during the recent financial crisis, and the desire to maintain key City services provided by the General Fund, such as those in the Safety Services Area, the need to control and even reduce General Fund expenses arose in the mid-2000s. One of the identified areas of opportunity for cost reduction was streetlights.

Ann Arbor is not unique in pursuing streetlight cost control/reduction measures in response to budget challenges. The cities of Muskegon, Flushing, and Jackson examined streetlight shutoffs in their communities, which was actually piloted in Ann Arbor in 2010. Outside of Michigan, Cranston, RI (pop. 79,269) has proceeded with shutting off 3,000 streetlights, while Colorado Springs, CO (pop. 414,658) has shut off approximately 8,000 streetlights. Other communities have proposed a fee to residents in order to keep streetlights on. Fargo, ND (pop. 95,556) is charging residents $2/month and Harper Woods, MI proposed charging $6/month via a special assessment, while a similar proposal in Grand Rapids, MI to create a streetlight utility was defeated in May 2010.

Directions Taken

LED Conversion

The City's Field Services Unit and Energy Office/Systems Planning Unit have taken proactive measures to reduce the cost of operating streetlights, mainly through reducing energy costs, and to a larger extent reducing maintenance costs within the streetlight inventory for City-owned streetlights. This has primarily been accomplished through the conversion of streetlights from incandescent lamps to light emitting diodes (LED). LEDs contain no mercury, generally require half or less the electricity of conventional lights, and last five to ten times longer than the lights they are replacing. The ability to convert DTE-owned lights to LED has only begun more recently to a more limited extent.

LED Traffic Signals

The move to LEDs began with the City's traffic signals being converted. This effort began in 2000 with the final conversions being completed in 2005. This conversion produced a reduction in wattage from 304,352 watts to 124,470 watts for these signals. As a result of this reduction, DTE's charges for energy usage by the City's traffic signals in June 2013 was $6,015 per month rather than $10,445 per month that would have resulted with the former wattage - over $50,000 of annual savings in energy costs. Operation and Maintenance costs are also reduced because LED lamps are replaced much less frequently (e.g., ten years vs. one year).

Unlike streetlights costs which are paid from the General Fund, the energy costs for traffic signals are paid to DTE by Act 51[1] dollars.

LED Streetlights

With the successful conversion of traffic signal and crosswalk lights, and with the rapid improvements of LED technology for street-lighting purposes, the City began piloting test streetlight fixtures in 2006, mostly through donated lights provided by various LED manufacturers. After overwhelmingly positive feedback on the pilot and test locations focused

[1] http://house.michigan.gov/hfa/PDFs/act51.pdf

on Washington Avenue (which included signage to direct public feedback), the City proceeded with the conversion of downtown ornamental "globe" lights - one of the first large-scale streetlight conversions to LEDs for a major City in the world.

Not surprisingly, as a newer technology without full market saturation and adoption, LEDs still cost more than conventional fixtures. But, the avoided maintenance and energy savings were significant, and the downtown globe project paid back the upfront investment in approximately four and a half years.[2] This work was possible through a $630,000 grant from the Downtown Development Authority (DDA). Since then, the City has used additional grant dollars, primarily via the American Recovery & Reinvestment Act (ARRA), to complete the LED conversion of the majority of the remaining "cobrahead" and intersection streetlights owned by the City.

LED streetlights in the downtown, arterial streets, and in neighborhoods have reduced energy demand by approximately 700,000 kilowatt hours (kWh) per year, equal to the annual electricity usage of 60 households, or the annual consumption of 1,600 of the most prevalent conventional “cobrahead” streetlights (100 watt High Pressure Sodium) in DTE’s current system.

While the savings from reduced energy demand is significant, at least two-thirds of the cost savings realized by the City in converting City-owned lights to LEDs is in the deferred cost to maintain the fixture (work hours to replace the light and components like ballasts and igniters). The long life of LEDs frees up City labor hours and eliminates the need to hire outside support to operate, maintain, and replace fixtures. In April 2013, staff analyzed fiscal year maintenance orders for the Field Services Unit related to streetlighting to further confirm these estimated savings. Work orders from FY06, prior to LED conversions, showed 486 total hours of streetlight maintenance compared with FY12 which had only 287.5 total hours; a 41% reduction in maintenance time for the City-owned streetlight inventory which grew by approximately 10% over this period, clearly demonstrating the benefits gained by LED conversions. Averaged across the various types and wattages, each City-owned LED fixture saves the City approximately $90 per year in energy and avoided maintenance, or over $50,000 in energy costs and over $130,000 in maintenance costs per year.

Streetlight Moratorium

Much of the work to convert City-owned lights to LEDs was a recognition of not only the advancement in technology allowing for significant gains in energy efficiency, but also the recognition that electricity costs are continually increasing with few other options to abate a quickly burgeoning expense. Therefore, in order to contain expenses to the City’s General Fund, a streetlight moratorium was put in place in FY2006.

Quoted below is an excerpt from the FY2006 Budget Report:

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[2] WHITE PAPER: ANN ARBOR'S LED STREETLIGHT PROGRAM: http://www.a2gov.org/government/publicservices/systems_planning/energy/Documents/LED_Summary.pdf

This budget reduces the projected 2005/2006 General Fund costs by $2.0 million. In order to achieve the required reductions, some services have been impacted. The following General Fund service reductions (or fee increases for selected services) are implemented with this budget:

Public Services

- *Ball field maintenance is reduced to dragging and mowing*
- ***Moratorium on new streetlights is in place.*** (Emphasis added)
- *A millage to remove all Ash trees (due to the Emerald Ash Borer) for safety is planned for the November, 2005 election…*

Questions about the moratorium occasionally emerge and staff has tried to clarify the policy, most recently in this City Administrator response to Councilmember questions on the moratorium, sent via email on July 9, 2013 included the following:

There have been questions regarding whether there is a street light moratorium. As part of the FY2005/2006 Budget process General Fund costs were reduced by $2.0 million, and in order to achieve that reduction one of the service impacts was that a moratorium on new streetlights was put into place. Attached is the page from the Council adopted budget document which put this moratorium in place (quoted above).

Following this moratorium being put into place, streetlights have only been added to either the City's streetlight system, or to DTE's public streetlight system if there was a net reduction, or at least no net increase, in streetlight costs. A net reduction or no net increase is accomplished through replacing incandescent lamps with lower wattage LED lamps to absorb the cost of the additional light(s) in that system; removing incandescent DTE streetlights, with City-owned and operated LED streetlights, which result in lower annual cost impacts to the General Fund; or in the case of two downtown developments, that contributed funds for the lifetime operation, maintenance and replacement of an additional light/wattage.

Streetlight De-Energizing

Lighting guidelines derived from AASHTO (American Association of State Highway and Transportation Officials) for local streets call for streetlights at street intersections. However, the City streetlight specifications go further by requiring a 190-foot spacing between streetlights outside of the downtown, and 40- to 60-foot spacing between streetlights in the downtown. The 190-foot spacing has been the City's standard specification since the late 1970s. In 2010, a preliminary GIS evaluation was performed and it showed that much of City, particularly the downtown, is overlit by the City's own standards with streetlights spaced closer than the specified spacing. Below is another excerpt from the City Administrator in his response to Councilmember questions on the moratorium, sent via email on July 9, 2013

Even with this moratorium in place, the matter of streetlight cost impacts to the General Fund arose again during the FY11 budget process when further reductions in streetlight costs ($120,000) were included in the FY11 General Fund budget. In order to achieve this reduction,

several options were explored including special assessment districts, shifting to "dusk to midnight" service for all DTE streetlights (which were all higher wattage, incandescent lights), and de-energizing locations of DTE streetlights where the streetlight spacing was in excess (closer) than the current published City standards for streetlight installations. The de-energizing option was selected and based on the City's GIS data, which identified streetlight ownership and location, a technical pilot was performed in July 2010 in the area generally south of East Stadium Boulevard and east of Packard.

This technical pilot was halted and the de-energizing direction was reversed by Council approval of Resolution R-10-354 on October 4, 2010 which:

- *Directed staff to re-energize the streetlights in the technical pilot area*
- *Suspended any further de-energizing of any additional DTE lights*
- *Appropriated $120,000 from the General Fund fund balance to the General Fund Streetlighting Budget for FY11*

Replacement of DTE Streetlights with City-Owned Streetlights

Recent road reconstruction projects which are funded with STP (MDOT/Federal) funds, such as the phased Stadium Boulevard Reconstruction projects, have included the replacement of existing DTE lights with City LED streetlights if the STP funds are deemed eligible for this work. In this situation, the STP funds pay for 80% of the installation and the City only has to pay the remaining 20%. By eliminating the higher DTE charges for energy and maintenance of their incandescent streetlights, along with the much reduced operating and maintenance costs with the LED fixtures results in a very short payback period for the City's portion of the installation cost and then greatly reduced costs following the payback.

DTE Auditing of Streetlight Inventory

Over the calendar years 2011 through 2013, DTE performed a system-wide audit to verify the number and type of all streetlight fixtures within the city. This process resulted in many additional lights that DTE discovered and added to its billing. When comparing a streetlighting bill for June 2005 to the June bill for 2013, an additional 443 lights are now being billed to the City. This is a 6.5 percent increase over the previous streetlight total. Staff is analyzing GIS information provided by DTE to identify any further discrepancies and needed corrections to the current billing and inventory.

With certain street re-construction projects that utilize STP funds (such as the phased Stadium Boulevard Reconstruction projects, where DTE fixtures were removed and replaced with City–owned LED fixtures), personnel turnover, and non-digitized information transfer in intervening years, it has been difficult for DTE to maintain an accurate streetlight inventory for billing purposes, and this resulted in their auditing streetlight systems across their service territory. Staff is now working closely with DTE to make sure lights added or removed from the system are accounted for going forward.

Options That Have Been Previously Explored

The following text is taken from draft summaries and proposals written between 2008 and 2010 examining 1) special assessment districts for streetlighting and 2) a lighting bank as a means for new development to contribute to the cost of streetlights. These cost management mechanisms were considered, but were not formally codified or pursued fully due to implementation and other feasibility limitations.

Special Assessment Districts (SADs)

Below is an excerpt of a preliminary staff evaluation of special assessment districting written in early 2010. A number of uncertainties remained with this option as a means to help or entirely pay for the cost of streetlights.

At the time of this writing, the City of Ypsilanti is moving forward with special assessing residents the costs to convert their entire inventory of DTE lights to LED (though not to pay for ongoing bills/maintenance).[3] The description below and the values and estimates discussed are not meant to imply present applicability or as a "ready" option to pursue. Rather, the description demonstrates that thought has gone into evaluating SADs. Ypsilanti's present decision to move toward special assessing properties for streetlight conversions demonstrates that some municipalities are proceeding and as such are worth monitoring closely.

> *Systems Planning staff was asked to evaluate the feasibility of using special assessment districts to (1) distribute costs to neighborhoods according to actual costs of providing streetlighting and (2) provide an incentive to neighborhoods to invest in reducing streetlighting costs. Below are preliminary results for evaluations of three scenarios wherein the special assessment is designed to cover:*
>
> 1. *All streetlight operations and maintenance (O&M) costs*
> 2. *Incremental increase streetlight costs for areas which exceed minimum lighting standards (i.e. the "over-lit increment")*
> 3. *Purchase of streetlights from DTE and conversion to LED*
>
> *Using City-wide special assessment districts to allocate streetlighting operation and maintenance costs results in an estimated average annual cost per parcel of $52 at current costs. Separately accounting for the DDA District projects an average $84/parcel assessment in the DDA and $50/parcel outside the DDA. Purchasing DTE lights and converting to LED is preliminarily estimated to cost $95 on average per parcel for ten years. More work will be required to determine the potential revenue from districts based on the "over-lit increment" model.*

[3] http://www.annarbor.com/news/ypsilanti/ypsilanti-approves-first-reading-of-street-light-fee-ordinance/

Finally, our discussion with the City Assessor highlighted a number of additional special assessment considerations that would need to be addressed before going forward. First among these is the need to develop a special assessment formula with which to assign costs. We have used street frontage as the primary variable in the analysis above, but other attributes may need to be incorporated, such as residential vs. commercial status. More analysis and discussion with the Assessor's Office will be needed before moving ahead with special assessment districts.

Lighting Bank

Similar to the special assessment district evaluations, the following is text drafted for a proposed lighting bank concept explored by staff in recent years.

When developers install new public lighting, they pay for the initial cost of the light fixtures, but it falls on the City to pay the energy and maintenance costs for the life of these lights, which can be up to $300/year per light. The streetlight moratorium requires an equal amount of lighting be removed before new lighting can be installed. Developers have been required to wait for lighting to be removed before proceeding with their projects. This has caused problems for some newly proposed developments. The City has been asked to come up with a more workable mechanism for allowing new public lighting to be installed and these projects to move forward.

The Lighting Bank program was a solution considered for this problem. It would require a developer to pay a set fee per watt of new public lighting installed as part of their development. The funds raised would be deposited into the City's Energy Fund to be used to retrofit existing public lighting with more efficient, less costly to maintain lights. This provides a mechanism for developers to move ahead with new projects, reduces overall public lighting costs and provides an incentive for developers to install more efficient lighting to reduce their Lighting Bank payments.

Guidelines would be as follows:

- *Developers purchase credits before they install new public lighting. The City would not activate new installations unless the appropriate credits have been purchased.*
- *The price for each 100 watt credit is initially set at $2,238. Each credit pays for the necessary investments to offset 200 watts of public lighting operating and maintenance costs for 10 years. (An additional 100 watts has been added to advance the City goal of reducing public lighting costs over time).*
- *Monies from credit purchases are deposited into the Energy Fund to be used to improve the energy efficiency and reduce maintenance costs for the City's existing public lights.*
- *Appropriate lighting cost reduction projects would be identified and carried out by the department responsible for maintaining public lighting (currently Field Operations).*

The primary consideration in selecting retrofit projects will be to maximize reductions in lighting load, with the goal of reducing load by at least 200 watts for each credit.

- *The credit price would be revised as necessary such that each credit pays for the necessary investments to offset 200 watts of street lighting operating and maintenance costs.*
- *50 percent of savings from retrofit projects would be reinvested into new retrofit projects, so that the retrofit fund can become self-sustaining.*
- *At the end of each City fiscal year, a detailed report would be made to the City Administrator by the department responsible for maintaining public lighting (currently Field Operations).*

Issues Looking Ahead

Costs to Remove DTE Fixtures

According to Field Services staff that coordinates with DTE, it costs the City approximately $1,000 per fixture to remove a streetlight, which primarily occurs during road resurfacing projects (e.g., Stadium Blvd), and has been one mechanism for removing DTE lights and later putting in City lights to move from the full DTE rates to energy only rates. DTE has informed the City that for removal requests, planning takes 6 to 8 weeks, and construction an additional 6 to 8 weeks.

Surcharge Surges

Streetlights are also subject to surcharge surges periodically appearing on the City bill, such as a "Restoration Expense Tracker" to deal with the severe storm damage in the spring (April, May, June) of 2013. Below is a table showing the impact of these surges, which in three months added over $25,000 in unexpected charges to the bill.

Fiscal Year 2013 Surcharges

Jul	Aug	Sep	Oct	Nov	Dec
5.302%	5.302%	5.302%	5.662%	5.662%	5.662%

Jan	Feb	Mar	Apr	May	Jun
4.632%	4.632%	5.392%	9.192%	11.492%	13.092%

Potential Rate Increases for 2015

Indications from DTE are that they will file a rate case that will have implications for all classes of streetlights in the City's inventory. It is not clear or disclosed from DTE what these changes will mean to light tariffs, but a likely increase (possibly across the board) should be anticipated, which will further impact General Fund expenditures for streetlights.

Community Concerns and Requests

Citizens approach City staff or City Councilmembers requesting that new or additional streetlights be installed at specific locations in the city. The reason given for these requests is that there is a concern regarding "safety" at the location. There are various types of safety concerns expressed - - pedestrian safety, bicyclist safety, personal property/home safety and driving safety.

As part of the previously mentioned Streetlight De-Energizing Pilot in 2010, feedback was received from residents in the pilot area, and all of these safety areas were mentioned. The following excerpt is from the staff report on the Streetlight De-energizing Project of 2010 regarding this feedback and these concerns.

Pedestrian Safety

The most frequent comment from residents was that they felt the absence of one or more streetlights made them feel that an area was less safe to walk at night, either for reasons of personal safety or because of potential pedestrian-vehicle conflicts. The pedestrian-vehicle conflict concern was largely addressed by design in only selecting non-intersection lights to be de-energized. However, there was also a concern raised that residents—and specifically children—may continue to cross mid-block, particularly on streets which lack sidewalks on one or both sides. Staff continues to develop and implement communications and outreach efforts under the broad "Walk, Bike, Drive" Safety Campaign. The City has developed messaging including posters providing information about wearing light-colored and reflective gear to ensure visibility.

Staff is also aware of the need to complete the City's sidewalk infrastructure as a way to provide a safer, more comprehensive pedestrian system. The City's Capital Improvements Plan includes line items for new sidewalks. Unfortunately, funding is not presently available to complete these projects.

The concern about personal safety is more complicated, as there is a clear public perception that lighting increases nighttime personal safety. In looking at the data, however, there is no correlation between lighting and incidents of crime in Ann Arbor, and lighting levels vary considerably from one street to the next. For instance, while downtown is extraordinarily well-lit, Shadford Rd. and Morton Ave., north of Stadium Blvd., are mostly lit only at the intersections, leaving the mid-block sidewalks darker. Comprehensive studies of street lighting and crime have found that while lighting decreases fear of crime, there is no statistically significant reduction in crime as a result of increased street lighting, and in some cases, studies have actually shown both daytime and nighttime crime to rise with increased lighting levels.

Bicyclist Safety

Residents also expressed concern about the safety of bicycling after dark in areas where streetlights have been de-energized. State law largely addresses these concerns by requiring, at the minimum, that cyclists riding after sunset use a white headlight visible from at least 500

feet, pedal reflectors, and a red rear reflector visible from at least 600 feet. However, as the Ann Arbor bike map states, "more is better," and bright, retroreflective clothing is also recommended.[4]

Personal Property / Home Safety

Several residents expressed concern that the shutoff of one or more streetlights would increase the likelihood of thefts from homes or other crime on private property as a result of the property being darker. There appear to be differing views regarding the purpose of street lighting. From the City's perspective, street lighting is intended to light the public right-of-way: primarily the roadway, and to a lesser extent, sidewalks. In selecting lights to de-energize, staff mapped two years of nighttime crime data and found no relationship between crime and the presence or absence of streetlights.

However, some residents appreciate the spillage of light onto their private property. For those residents concerned about the safety of their private property, the Ann Arbor Police Department offers a document entitled "How Safe is Your Home?"[5] *with tips for securing residences (and automobiles), and DTE Energy offers an Outdoor Protective Lighting option for additional area lighting*[6,7]*.*

Driving Safety

A couple of comments were also received regarding the safety of driving in neighborhoods where lights have been de-energized. During the process of selecting lights to de-energize, staff mapped vehicle crash data and found no relationship between existing light levels and the frequency of crashes, though crashes were more common at or near intersections. Not surprisingly, national guidelines for roadway lighting[8] *prioritize lighting at intersections. From an automobile safety perspective, the areas of most concern—and the areas where roadway lighting is most recommended—are intersections, and intersection streetlights are being retained. The reason for this is that the potential for conflicts between automobiles and both other vehicles and pedestrian and bicycle traffic is greatest at intersections.*

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[4] City of Ann Arbor Bicycle Map:
http://www.a2gov.org/government/communityservices/ParksandRecreation/Documents/bike.pdf

[5] "How Secure is Your Home?"
http://www.a2gov.org/government/safetyservices/Police/Documents/HowSecureIsYourHome.pdf

[6] DTE Energy Outdoor Protective Lighting Rate:
http://www.dteenergy.com/residentialCustomers/billingPayment/electricRate/oplRate.html

[7] Rate Schedule D9, Third Revised Sheet No. D-44.00:
http://www.dleg.state.mi.us/mpsc/electric/ratebooks/dte/dte10curd1throughend.pdf

[8] ANSI/IESNA RP-8-00 Roadway Lighting (Reaffirmed 2005):
http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2FIESNA+RP-8-00

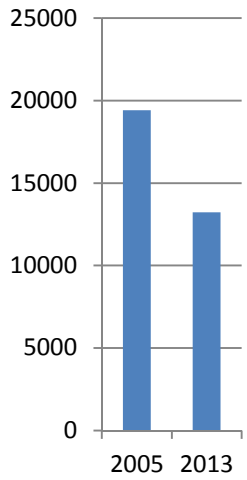
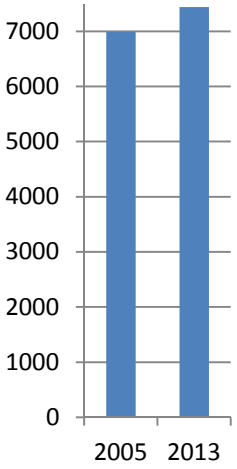
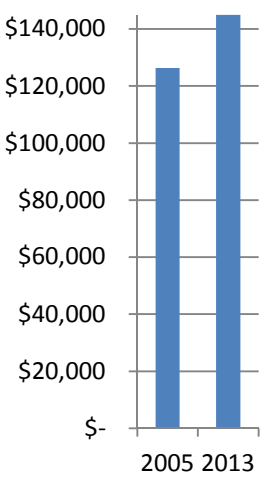
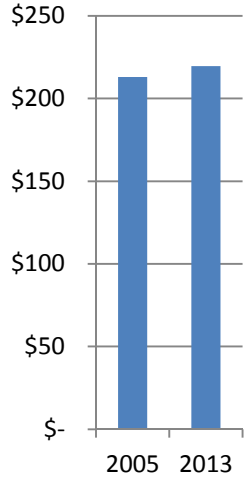
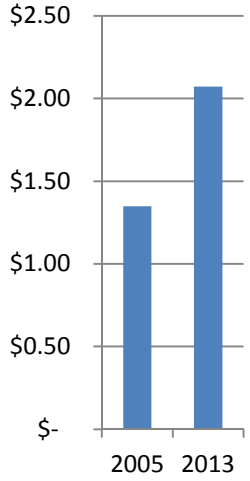
Recommendations Moving Forward

It is recommended that the City continue its efforts to control and even reduce its streetlighting costs and the resulting impact on the General Fund by using the various methods listed below as opportunities arise:

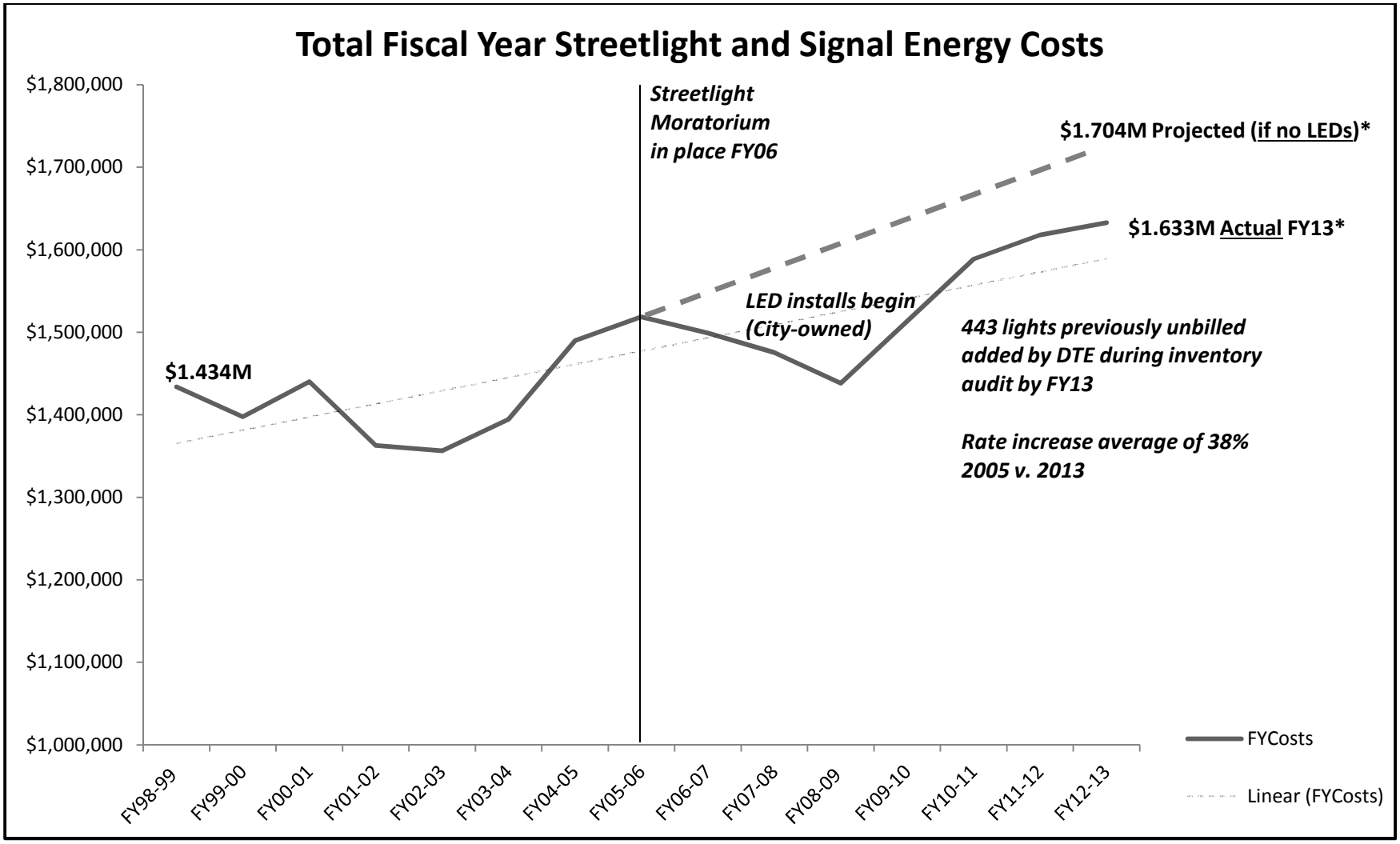
- Remove streetlights in areas where illumination is provided by other means, such as lighting on property adjacent to the right-of-way.
- Only add City-owned lights to the system, and only after there has been a reduction in City costs to the streetlight bill in excess of the costs for the new streetlights, through LED conversion or actual streetlight removals elsewhere in the system
- Continue to utilize STP funds for replacement of existing DTE streetlights with City-owned LED streetlights, and even further leverage those funds by extending project limits beyond the typical focus of the past to the extent allowed by MDOT
- Convert DTE-owned lights to City-owned LED lights through request to purchase if found to be cost effective (past attempts were met with limited cooperation from DTE)
- Utilize existing “cost in aid of construction” terms allowed by DTE whereby the City covers purchase of the fixture only, with cost-offsets coming from state-required Energy Optimization rebate program (used in July 2013 to convert 200 DTE-owned lights to LED)
- Re-examine the establishment of a Lighting Bank Program to allow developments that desire to install new streetlights to do so, while capturing funding for City efforts to reduce streetlight costs
- Engage the Michigan Public Service Commission (MPSC) in any upcoming rate case to seek better rates for both City and DTE-owned streetlights

Appendix A: Snapshot of Two Streetlight Bills: June 2005, June 2013

- Shows reduction in energy demand with LEDs in inventory
- Increase in "discovered" lights added to inventory with DTE system audit
- Increase in total charges results from additional lights and tariff increases

	Total Daily kWh (June)	Total Lights (June)	Total Charges (June)	Cost/Fixture (Annual)	Cost/Watt (June)
2005	19,429	6,994	$ 126,353.01	$213.00	$1.35
2013	13,240	7,437	$ 144,985.38	$219.55	$2.07
% Change	-32%	7%	15%	3%	54%
					

Appendix B: Streetlight Costs



*Portion of FY13 bill for City-owned streetlights equaled $71,200. If no LED replacements City-owned portion would have come to approximately $140,000

Appendix C: FY2013 Streetlight Inventory

CITY-OWNED

Type and Wattage	Qty	Rate	Annual Cost	Installed Watts
Mercury Vapor*				
100	15	$3.60	$648.00	1500
175	4	$6.30	$302.40	700
High Pressure Sodium*				
70				
100	89	$3.60	$5,652.00	8900
150	1	$5.40	$64.80	150
250	168	$9.00	$20,502.00	42000
400	15	$14.40	$2,592.00	6000
LED				
56	877	$1.36	$14,001.20	49112
67	134	$1.61	$2,593.71	8978
77	160	$1.87	$3,496.90	12320
87	416	$2.11	$9,676.46	36192
121	320	$3.12	$11,341.43	38720
267	4	$6.63	$318.24	1068
SUBTOTAL	**2203**		**$71,189.14**	**205640**

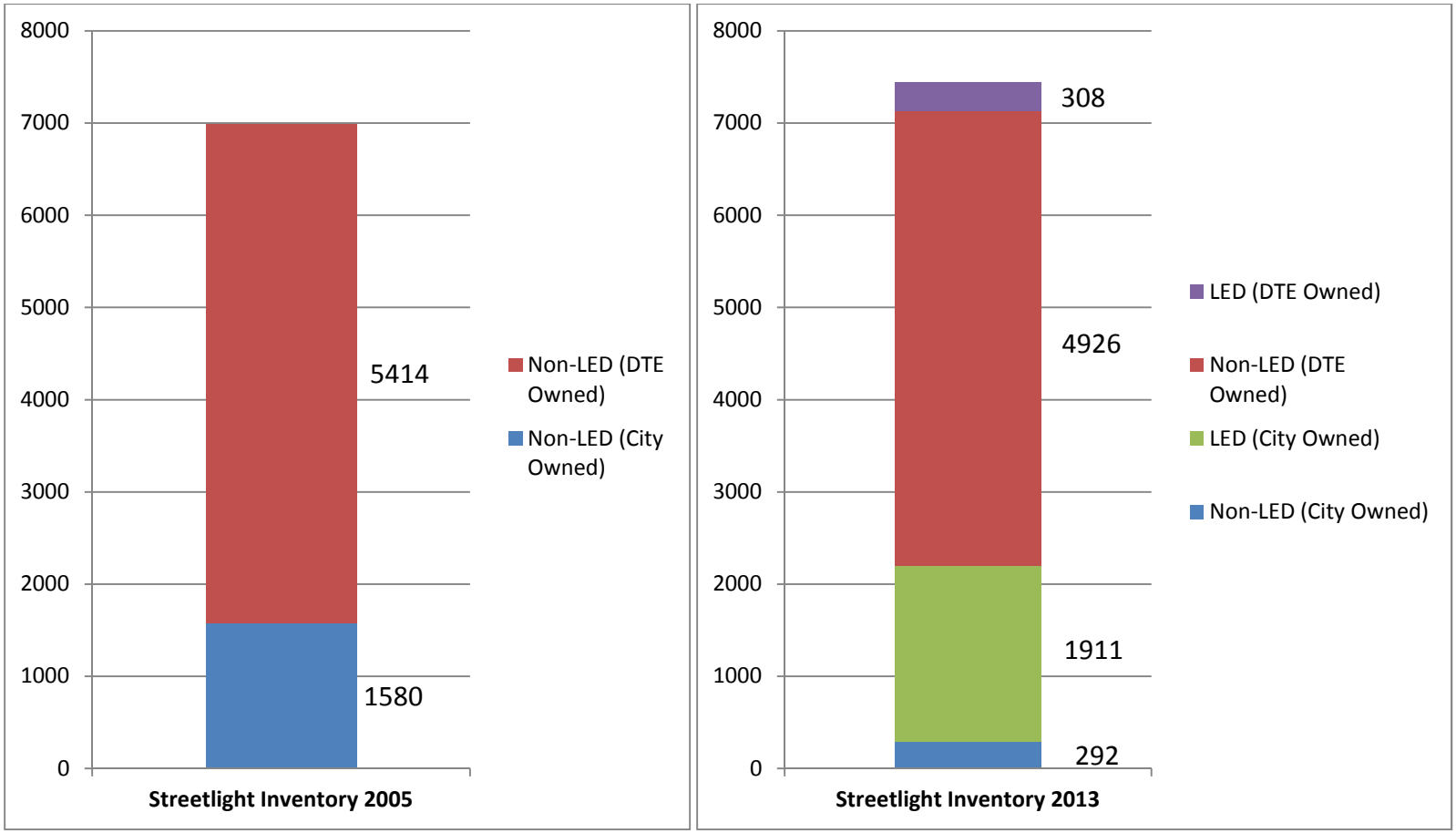
*Intersection lights and subdivisions with globe style lights which are planned to receive re-used downtown globes in 2014 (Earhart, Earhart West, High Orchard and Pine Brae Estates)

DTE-OWNED

Type and Wattage	Qty	Rate	Annual Cost	Installed Watts
Overheads E1A				
Mercury Vapor				
100	10	$12.94	$1,552.80	1000
175	835	$16.76	$169,410.08	146125
250	23	$18.87	$5,208.12	5750
400	14	$25.13	$4,221.84	5600
High Pressure Sodium				
70	6	$14.57	$1,046.16	420
100	2067	$15.33	$379,555.47	206700
100	1	$14.27	$171.24	100
150	2	$16.76	$217.88	300
250	232	$19.55	$54,133.95	58000
400	7	$25.51	$2,142.84	2800
Metal Halide				
70	2	$21.07	$505.68	140
LED				
050-059	1	$8.02	$104.26	
070-079	1	$8.73	$104.76	
95	64	$9.43	$7,242.24	6080
120-129	1	$10.48	$125.76	
157	28	$11.53	$4,219.98	4396

Underground				
Mercury Vapor				
175	5	$33.78	$1,486.32	875
400	10	$44.34	$4,833.06	4000
1000	1	$62.27	$1,432.21	1000
High Pressure Sodium				
100	957	$27.51	$313,971.63	95700
250	890	$35.05	$374,719.55	222500
400	64	$42.76	$32,839.68	25600
LED Rate 303				
050-059	2	$22.63	$543.12	
95	9	$24.26	$3,396.40	855
120-129	1	$25.49	$509.80	
157	1	$26.71	$320.52	157
SUBTOTAL	**5,234**		**$1,364,015.35**	**788,098**
TRAFFIC SIGNALS			**$68,911**	**124,470**
FY 2013 Avg. Surcharge %			**6.78%**	
TOTALS	**7,437**		**$1,632,777.84**	**912,568**

Graph of Streetlight Inventories: 2005 & 2013



NOTE: 2013 includes 200 lights that DTE is converting to LED in August/September 2013 as part of a discontinuation of mercury vapor lights campaign, though not at present reflected on the (June) streetlight bill appearing in Appendix C