City of Holland
Energy Conservation and Efficiency Plan
City Facilities and Operations

Summary Dated July 22, 2011

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Prepared by: Mark J. Vanderploeg, City Planner

2009-2010 Accomplishments

Traffic Signals

All 50+ intersections that have traffic and highway U-turn signals located in the City were converted to LED illumination during the summer of 2009, or during prior projects. An indication of the positive reduction in our costs is summarized with the following costs from FY's 2009 and 2010:

	FY 2009	FY 2010
Maintenance	$ 43,944.76	$ 20,257.55
Capital Cost – LED conversion	-0-	43,000.00
Energy Cost – BPW	77,841.30	39,227.07
TOTAL	$121,786.06	$102,484.62

Electricity costs dropped by 50% and maintenance costs dropped by 54%. The bottom line is even with adding a capital cost installment payment of $43,000 (total of 4-5 such payments are needed to pay off the BPW for the initial capital costs) to the reduced energy and maintenance costs for FY 2010, we were able to realize a 16% reduction in total costs.

Public parking lot/open space/park lighting

Virtually all of the Downtown pedestrian lights have been converted from metal halide lamps to LED's as a component of the Downtown LED Retrofit Project that was funded with $113,000 of Federal ARRA money that was passed through the State. This retrofit project converted 286 fixtures in street right-of-ways along 7th, 8th and 9th Streets along with the avenues in between from Fairbanks Avenue to Kollen Park to highly efficient LED fixtures. All of the similar pedestrian type lights in the City owned parking lots were also part of this project.

Additionally, MAX Transit partnered with the City and replaced all of their pedestrian lights (29 lights total) that are located in their Downtown Transportation Center parking lots with LED fixtures. And last but not least, all of the pedestrian type lights (22 total lights) located on City Hall property were replaced with LED fixtures from generous funding provided by the Holland BPW Energy Smart Program.

Interior lighting upgrades

Lighting upgrades were completed in six (6) municipal buildings as follows:

1. Police Department – Occupancy sensors, day-lighting controls and LED bulb replacements
2. City Hall - Occupancy sensors, day-lighting controls and LED bulb replacements
3. Parks & Cemetery Office/Warehouse - Occupancy sensors, day-lighting controls, LED Exit Signs and lamp replacements (includes T-8 fluorescents and LED bulbs)
4. Central Fire Station - Occupancy sensors and lamp replacements (includes T-8 fluorescents and LED bulbs)
5. Waverly Fire Station - Occupancy sensors and lamp replacements (includes T-8 fluorescents and LED bulbs)
6. DeGraaf Nature Center – LED Exit Signs and lamp replacements (includes T-8 fluorescents and LED bulbs)

Irrigation

"Sentinel" irrigation system was installed in Graafschap Cemetery on the north side of 32nd Street.

Fuel Depot

In September of 2009, the City (Transportation Services and Fire Departments), MAX Transit and Holland BPW started a bio-diesel demonstration project that was designed to run through June 2010. The project included installing a temporary above ground storage tank at the fuel depot to dispense bio-diesel (B5 in winter and B20 in summer) to a set small number of vehicles. The O&M costs for those vehicles would then be charted against vehicles that use regular mineral diesel. The results from this demonstration project are documented and included in this report as attachments.

A decision was made in the summer of 2010 to continue the demonstration project and to analyze the data to determine if the project should be continued. To this end, staff has and continues to experience some difficulty in interpreting the first year of data, especially when trying to address the questions of is this demonstration project something that should be continued? Should it be expanded, or should it be dropped? The data clearly shows that by using bio-diesel we have reduced air emissions (particulates, non-combusted hydrocarbons, carbon monoxide, nitrogen oxide, sulfur dioxide and carbon dioxide) to the tune of 177 short tons, but at the price of $37,269 additional dollars. Is this good? Is this bad? We asked a few knowledgeable people for their comments and this is what they had to say:

Kevin Bush of the Clean Energy Coalition based in Ypsilanti –

"As far as the use of biodiesel goes, Judy's (Visscher HBPW) right, there isn't much of direct monetary benefit. That said, a lot of users report that biodiesel's greater lubricity tends to extend engine life and reduce maintenance costs. This can mitigate the reduced lubricity resulting from the switch to ultra low-sulfur diesel required by the federal government a few years back. Most standard diesel blends now already contain a small amount of biodiesel for this very reason (e.g. B2). That said, most comparison studies don't show much of a difference between good 'ole fashioned diesel and biodiesel.

Really the only two benefits of switching to biodiesel are 1.) better emissions and 2.) reduced dependence of foreign oil. Some organizations decide that reducing air pollution is important and worth the added cost. A lot of schools have switched over to reduce children's exposure to air pollution."

Russ Wright who is the Associate Director of Research and Technology at GVSU's MAREC facility in Muskegon stated:

Thank you for sending along the information regarding the Holland area biodiesel usage. It is good to see such favorable results from the biodiesel usage initiative.

As for analysis of the data, it appears that the primary benefit of the Holland biodiesel usage has already been estimated and reported. The savings of 175 tons of CO2 and the amounts of associated other evil chemicals is very impressive.

Additionally it should be noted that associated reduced particulate matter favorably influences the reduction of associated maladies such as related carcinogenic, heart disruptive and asthmatic issues. These are hard to quantify but biodiesel makes a positive contribution.

As to cost of the effort, it looks like the cost of the project equates to about $.10/lb of CO2 reduction. Additionally, it would be expected that the use of biodiesel would favorably impact the maintenance costs of the vehicles using it. This is difficult to quantify in a short term test.

From the data presented it appears that the most mileage is achieved by the MAX fleet. So perhaps the effort should be concentrated on the MAX fleet. It might also be a great opportunity to study the long term costs associated with maintenance of MAX vehicles using biodiesel vs. conventional diesel on the same or similar service duty. Of course careful records and administration would be required to achieve meaningful data.

The city and staff are to be commended on their commitment to this Leadership project and the favorable results achieved so far, Congratulations.

Donna Davis, who is the State of Michigan's Biomass Energy Program Coordinator, states the following:
The two things I can suggest is that they (Holland) try to translate the tons of CO_2 reduced and plug their fleet data into the U.S. EPA's Diesel Emission Quantifier (DEQ). I think that you can input biodiesel. It might give them some different outcomes (not sure if both calculators are based on the same data sources and assumptions or even the same type of model used as the DEQ) for CO_2. Plus, the DEQ can give them some estimate economic benefits for health cost savings and monetary impacts of $PM_{2.5}$ reductions. This may be a way to "justify" the increased cost of moving from low sulfur diesel to biodiesel. The DEQ does not give any health assumption data for CO_2 since PM and NO_x are the primary concerns regarding diesel fuel reduction.

I would also suggest that they do some epidemiology and toxicology research for health statistics related to diesel fuel for the Grand Rapids area. I don't think that you may find stats for Holland, but for a larger metropolitan area like Grand Rapids, you might be able to find something. They can then generally apply the level of pollution reductions to help offset some of the health statistics of the Grand Rapids area. The data sources for the impacts CO_2 reductions are a little more limited.

Our Community Energy Plan consultant Peter Garforth noted the following:
"The biodiesel experiment is interesting. When the cost difference is looked at, it comes out to about $210 per metric ton CO2 carbon tax. Compared to the European cap-and-trade trading scheme in force since 2005, the highest has been about 30(euros) and a recent average of 15 ($20). The British Columbia Carbon Tax is $25, and various countries have or are proposing carbon taxes in the $20 to $30 per ton range.

My immediate reaction is that we might want to look at the cost effectiveness of this as a strategy to reduce 177 tons of CO2. In Europe this would be different since the pricing of transport fuels has been graded using taxes to always have the least carbon be the least cost. The most expensive fuel is high-octane mineral gasoline, and the cheapest is bio-diesel. Effectively there is a carbon tax on transport fuels though this not the way it is normally discussed. It makes you think whether a modest carbon tax ($15 to $50/ton) would not be a much more effective mechanism to stimulate efficiency and decarbonization rather than expensive voluntary programmes. This is interesting data. Thanks for sharing."

Please see the 2011 Action Plan for where staff believes we should go with this project.

City Infrastructure – Sidewalks

As a component of the 2010 40th Street Reconstruction Project, sidewalk was installed on the south side of 40th Street from South Washington Avenue east to Pine Avenue.

City Infrastructure – Bike Lanes

As a component of the 2010 40th Street Reconstruction Project, bike lanes were installed adjacent to both travel lanes from South Washington Avenue to Lincoln Avenue.

City Infrastructure – Street trees

The Parks Department planted a minimum of 80 trees in 2009, and a similar number of trees were planted in 2010. Additionally, 100-150 trees were planted along 40th Street as a component of that street reconstruction project in 2010.

FY 2012 Action Plan

The following items are offered as action plan items for FY 2012:

Energy Audits

Energy audits should be prepared for the following facilities:

- Holland Municipal Stadium
- Depot Transportation Center
- MAX Transit Maintenance Facility on 24th Street
- Mainstreet/DDA Office

Intersection Case Signs

This Plan recommends that a determination needs to be made as to whether all of the illuminated intersection case signs be changed from incandescent bulbs to a much more efficient lighting source such as LED's or induction lighting. A component of this determination is the preparation of a cost estimate for the project along with ROI figures. Depending on the estimated cost, a funding mechanism/source may need to be determined to front the cost of this project (possibly HBPW?) as was done in the original traffic signal LED conversion project.

Airport Tunnel Lighting

This Plan recommends a more aggressive study of alternative lighting options to provide acceptable cost saving lighting alternatives (O&M) to the existing lighting system for the South Washington Avenue airport tunnel. The City currently spends over $50,000 a year on electricity for the tunnel using a combination of metal halide and high pressure sodium fixtures for the illumination thereof. If an alternative lighting solution can be determined that meets all required engineering standards, has an acceptable return on investment rate, and if a funding mechanism can be determined, this Plan recommends implementation of a project this year or as soon as possible. (Note: Staff is currently in discussions with a consultant regarding a preliminary study.)

Public parking lot/open space/park lighting

The staff energy advisory committee met earlier this spring and recommended that the following exterior lighting efficiency projects be implemented:

1. Centennial Park - Minor re-wiring of lighting system to provide better system control with an eye towards shutting off some lights earlier in the night/early morning.
2. Downtown street lights - Reduce lighting levels from the current 400 watt HPS lamps to 175 or 250 watt lamps. We would likely need to do a pilot project on a portion of 8th Street, and then evaluate the results with broad input from downtown stakeholders before deciding to undertake a wholesale conversion.
3. Farmers Market canopies - Reduce lighting interval by installing a timer so the lighting or at least a large majority of it is turned off at 12 AM or some other time. – In process or completed.
4. All parks and facility parking lots - Review again the lighting intervals of with an eye towards shutting off some or all lights earlier in the morning. This would require some equipment installations to have lights operating off a photocell and timer.

Interior lighting upgrades

Transportation Services Facility - This facility was not included in the recent interior lighting upgrade that targeted six other municipal buildings. The GMB energy audit for this building that occurred in 2009 red flagged the electrical system and lighting in particular as having much room for improvement.

The largest one item that could easily be addressed is removing the (58) 400 watt metal halide fixtures in the large mechanics room and the sign shop and replacing them with T8 high output fluorescent lights that are specifically designed for large work areas with high ceilings. This new lighting not only provides a better quality light vs. metal halides, but it does so using 50% of the electricity.

The GMB energy audit notes other energy saving ideas that could be accomplished at a nominal expense.

Staff invited Haveman Electric, who was our contractor for the recently completed interior lighting upgrades, to do a walk-through of this facility and provide a cost estimate for upgrading the mechanics room and sign shop with lighting as noted above and to provide other suggestions and cost estimates for electrical savings.

This plan recommends that we issue a change order with Haveman Electric (use the same contract we have with Haveman Electric for the interior lighting upgrades to the six buildings), and have that contractor undertake a lighting upgrade project per the estimate they supplied.

Irrigation

This Plan recommends installation of the Sentinel irrigation system in Matt Urban Park, as well as the installation of a new pump system at the Maplewood Youth Complex. Regarding the later, quotes are in hand for a new pump system that would provide very good electrical savings and would provide enough water to cut the irrigation time by 50% for this highly used signature complex for our youth.

Vehicle Fleet

- Vehicle idling policy – This should be defined and rolled out City-wide this year.
- Plug-in electric vehicles – Per the Vehicle and Equipment Purchasing Policy dated April 6, 2011, this plan recommends that the City closely evaluate the purchase of plug-in and/or all electric cars and light duty trucks when making vehicle purchases this year.
- Bio-fuels - This Plan recommends that all new City vehicles be able to accommodate bio-fuels in the form of E85 and other E blends for gasoline vehicles, including regular hybrid, plug-in hybrid, or traditional internal combustion powered vehicles. Regarding the actual use of bio-diesel (B5 – B20) in our diesel fleet and the potential use of E blends in our gasoline fleet of vehicles, this Plan recommends that our Community Energy Plan (CEP) consultants be asked to further analyze the pros and cons of using these fuel blends within the context of "are there more efficient and cost effective means of reducing green house gas emissions and other pollutants with the incremental cost we are forced to pay for bio-diesel in particular"? In other words, we spent $210 per short ton of GHG emission savings by using bio-diesel vs. mineral diesel during the first phase of the demonstration project. Could we have used the $37,000 additional incremental expense that went to purchase bio-diesel and instead have used it towards attic insulation in City Hall, or replacing a boiler in

the greenhouse, etc. and have saved more money and have reduced GHG and other emissions more so than by using bio-diesel?

- Propane and CNG fuels - This Plan recommends that the CEP consultants also be asked to provide a report or narrative in the CEP regarding the pros and cons of using these fuels as alternatives to regular liquid mineral and bio-fuels.

Building HVAC Systems

Per the Energy Use Reduction Policy that was approved by the City in 2009, each municipal building's HVAC and duct work system will be assessed for potential air leakage and what needs to be done to seal those leaks. The results will be compiled and placed into a bid package for a subsequent bid process and implementation.

Alternatively, this Plan calls for the City to request the HVAC maintenance contractor for each municipal building to undertake this assessment as a component of their maintenance contract. If the contractor states this is beyond the scope of the contract, then we should either negotiate with each contractor for a price, or undertake a process for one contractor to assess all of the buildings through the process noted above.

Building Insulation

A professional assessment that builds on the information we already have from the GMB Energy Audits of 2009 and from the additional building energy audits called for in this Plan should be completed for each municipal building. Attic insulation levels will be of primary concern, but wall insulation and adequate caulking of windows and weather stripping of doors and other building openings should also be assessed.

Such an assessment has already been completed for City Hall, and the finding that the level of attic insulation is very inadequate causes this Plan to recommend that estimates be requested and if funding is identified that that project precede ASAP.

City Infrastructure - Sidewalks

This Plan recommends that sidewalks be installed on both sides of the street for the following street reconstruction projects scheduled for this year: Matt Urban Drive from South Washington Avenue west to the City limits; 48th Street from Waverly Road east to the City limits. Additionally, this Plan supports the plans to install a sidewalk/shared use path along Lincoln Avenue (M-40) from 40th Street south to 48th Street, then south on M-40 to the I-196 overpass.

City Infrastructure – Bike Lanes

The Plan recommends that striped bike lanes be included in the Matt Urban Drive, Central Avenue and 48th Street reconstruction projects.

City Infrastructure – Paths

This Plan recommends that the City step up its engagement with the Ottawa County Parks Department to see the construction of the Macatawa Greenway Trail segment located on the old Holland Country Club site be constructed this year.

City Infrastructure – Storm Drainage System

A local storm water ordinance that includes standards for development activities and post development activities should be written by City staff and adopted by City Council in 2011. Additionally, the City should evaluate the use of Best Management Practices (BMP's) and Low Impact Design standards in our street reconstruction projects scheduled for this year.

City Infrastructure – Snowmelt and Potential District Heating System

The Community Energy Planning consultant is currently studying and evaluating what can be done to expand the current snowmelt system and potentially create a new district heating system.

City Infrastructure – Street Trees

This Plan calls for the planting of 100 trees, plus the planting of trees to be associated with street reconstruction projects. This Plan also calls for the summoning of creative ways to quite simply plant more trees so the ratio between removals and plantings is at least equal. An evaluation needs to be completed as to whether homeowners should be allowed to plant trees in curb lawn areas upon approval of the Parks Department.

Solid Waste/Recycling

This Plan recommends that a study be undertaken to evaluate the pros and cons of diverting organic materials in the municipal solid waste stream to be used as renewable energy sources before the materials are composted. This Plan recommends that the Community Energy Planning consultant be asked to evaluate this issue.

Amendments to the City Code of Ordinances

Within the context of the Community Energy Plan, this plan recommends that the City review the notion of having an ordinance that requires each dwelling unit, commercial and industrial building to meet certain basic energy performance standards at the point of sale. At a minimum, incentives should be developed to implement a voluntary energy performance evaluation program for larger buildings.

FY 2013-2016 Potential Action Plan Components

The following items are all budget driven and are offered as potential action plan items for 2013 and beyond:

Street Lighting

The HBPW and City staff have been and continue to study options regarding much more energy efficient and cost saving methods of lighting the streets of the City. Options to date include LED and induction type lighting methods. Cost reductions and technology improvements continue at a steady pace to the point that staff is fairly confident that the City could begin the process of converting to another system within 2-3 years.

Public parking lot/open space/park lighting

This Plan recommends that we continue converting the fixtures in the decorative pedestrian light system with LED retrofit fixtures. Areas that we should focus on include but may not be limited to the following:

- Centennial Park
- 16th Street – Pine Avenue to Century Lane
- Hope College area on College, Columbia and Fairbanks Avenues and a few on 10th, 11th, 12th and 13th Streets
- Historic District

Included in this time frame we should also be studying the possibilities of beginning to convert our park lighting systems to LED and/or other advanced lighting systems.

Irrigation

This Plan calls for the systematic installation of the Sentinel irrigation system in all City parks and cemeteries that are irrigated.

Vehicle Fleet

This Plan recommends that the City systematically continue to update its vehicle fleet by purchasing plug-in and/or all electric cars and light duty trucks, when appropriate.

Regarding flex-fuel vehicles that include plug-in hybrids, the City should continue purchasing these types of vehicles that can use E ethanol and B bio-diesel blends.

Building Insulation

Based on the assessments and prioritization of insulation needs for the various municipal buildings, this Plan calls the systematic improvement of building insulation levels and maintenance improvements to assure that all windows, doors and other openings are properly caulked and weather stripped to stop air infiltration.

City Infrastructure – Open Space and Park Operation Plans

This Plan calls for a study to be completed this year regarding management plans for the less used public spaces and parks. The major theme of this study is to determine which public spaces/parks may revert to a more natural state, which may provide real cost savings in the form of reduced

irrigation and lawn and tree maintenance, would have positive environmental impacts by reducing air emissions from equipment, and would reduce or eliminate fertilizing and herbicide applications as well as leaf removal activities.

A preferred way to begin implementation of new park management plans is to pick a pilot project for this year, such as Prospect Park and begin documenting the cost savings and monitoring the state of the park and seeking opinions from neighborhood residents regarding the changes.

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