ABSTRACT

AN INTERNSHIP IN ENERGY EFFICIENCY EDUCATION AND CUSTOMER AWARENESS WITH THE CITY OF HAMILTON, OHIO UTILITIES DEPARTMENT

by Sarah Corrin Van Frank

The purpose of this report is to detail my one-year fellowship position with the City of Hamilton, Ohio Utilities Department from July 2011 to July 2012. The City of Hamilton Utilities Department is a municipal owned utility system and has been internationally recognized for the service and quality delivered to the residents of the Hamilton. The fellowship was focused on providing energy efficiency education and utility awareness to the residents. This report discusses the work pertaining to the fellowship, including how knowledge gained through the Institute for the Environment and Sustainability program advanced my environmental career. As the Richard J. Fleming Fellow, I assisted with the Sustainable Living Project, a project developed to provide outside resources to the Hamilton City School District. My role was providing energy efficiency resources to the partners of the project, including information materials, facility tours and energy efficiency/utility presentations.
AN INTERNSHIP IN ENERGY EFFICIENCY EDUCATION AND CUSTOMER AWARENESS WITH THE CITY OF HAMILTON, OHIO UTILITIES DEPARTMENT

An Internship Report

Submitted to the

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Master of Environmental Sciences

Institute for the Environment and Sustainability

by

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LIST OF ACRONYMS

AMP – American Municipal Power
APGA – American Public Gas Association
APPA – American Public Power Association
CFL – Compact Fluorescent Light
CIS – Customer Information System
DSM – Demand Side Management
EEMCP – Energy Efficiency Management Certificate Program
ELT – Executive Leadership Team
ICMA – International City/County Management Association
IES – Institute for the Environment and Sustainability
LED – Light Emitting Diode
MRF – Material Recovery Facility
NGV – Natural Gas Vehicle
NRC – National Research Center
OEP – Ohio Energy Project
PUC – Public Utilities Commission
ACKNOWLEDGEMENTS

First, I would like to give a significant thank you to my family for always giving support, encouragement and loving laughs throughout my educational, career and personal endeavors thus far in my life. I would not be the person I am today with you.

I would also like to thank the Institute for the Environment and Sustainability for providing me with the tools that have been necessary to begin my career in the environmental field. In addition to IES faculty and staff, a thank you to my cohort. I learned so many professional and personal lessons from each of you and am grateful to have had the opportunity to spend my graduate years with you.

Thank you to my internship committee, Dr. Michele Simmons, Suzanne Zazycki, and Dr. Marjorie Nadler. The guidance that has been given was point on what was needed for my particular internship.

Lastly, to the City of Hamilton and its fantastic employees. I appreciated the acceptance that was given to the first year fellows and for allowing me to expand my knowledge from your experiences.
Chapter One

Introduction

The internship that I chose to complete my Master of Environmental Science degree was with the City of Hamilton, Ohio. The position with the City was a one-year fellowship in the Utilities Department under the direction of the Energy Management Group and Electric Department with a focus in energy efficiency management and customer education. This position fit with my goals of providing public outreach and education on environmental management practices. With a focus in environmental management for my degree and the responsibilities of this fellowship was an ideal match. The Richard J. Fleming Memorial Utility fellowship I was awarded is named after Richard J. Fleming, a previous director of the City’s utilities department. He was a highly admired man within the department, organization, and community. Because of his role in shaping the City’s utilities to what they are today, the department decided to honor him with naming one of the new fellowship positions after him.

This was the inaugural year of the fellowship positions and developed by the City Manager. In the City Manager’s previous positions he had instituted the fellowship program. All previous programs had been a success, creating connections for the fellows to continue work in local government. When the City Manager began his role with the City of Hamilton, he knew that this was one program that he wanted to start. This program not only provided a year of work experience for recent graduate students, but it also gave the City of Hamilton three downtown residents living in the newly renovated Historic Mercantile Lofts.

The fellowship with the City began July 11th 2011. This yearlong appointment included responsibilities that were widely diverse, ranging from documentation of department duties (i.e. manual writing) to being responsible for the creation and implementation of the City’s Energy Efficiency Education/Resource Center. In addition, the City asked all fellows to become part of the “fabric of the community”; this meant becoming involved in numerous facets of Hamilton. How I did this is discussed later in this report.
The City of Hamilton was founded in 1791 and named after Alexander Hamilton. The City is located in Butler County, Ohio and sits on the banks of the Great Miami River. The City is home to 63,000 residents and is the county seat. In addition to providing the typically services by a local government, it is also a municipal owned utility.

Figure 1: State of Ohio Map
Figure 2: City of Hamilton Map of Corporation Limits

During my year fellowship the City’s organizational structure had significant change, the below chart represents the structure of the City at the end of my year. My fellowship and the other two that were hired for the inaugural year of this program were assigned to the utilities department and economic development.
Hamilton is unique for being one of the only cities in Ohio having all four major utilities (electric, gas, water and wastewater) and one of the only in the state of Ohio to provide that combination of utilities to its’ residence and businesses. As part of the City’s portfolio of electric generation, the City currently operates a power plant on North 3rd Street in Hamilton and a hydroelectric plant along the Ohio River (Greenup Hydro Plant). Recently the City has committed to three new energy agreements that will allow us to generate 70% of our electricity from renewable sources. A second hydroelectric plant is being built along the Ohio River, Meldahl. The City will half own and operate this plant. The Meldahl Hydroelectric Plant will generate about 45% of the City’s energy, and is being constructed across the river from an already existing lock and dam system. The lock and dam system was built to help with navigation along the Ohio River. Navigation assistance will still be available to boats along the river, while the hydroelectric plant is generating electricity simultaneously. Prairie State Energy Campus, located in Washington County, Illinois, is a coal-fired electric plant that is being constructed with state of the art technologies, to reduce the amount of SO₂ being released into the
atmosphere. The plant is built on the mouth of a coal mine, eliminating the transportation cost of the coal. This plant, as well as the Hamilton Power Plant, has a scrubber system that injects a limestone and water mixture into the air stream capturing the SO\textsubscript{2} and mercury. The City’s contract is for 34 MWs of electricity to be generated from Prairie State Energy Campus. Additionally, an agreement with Fremont Energy provides electricity to the City fueled by natural gas.

Table 1: City of Hamilton Power Plant unit generation breakdown. Only units operated in the City limits.

<table>
<thead>
<tr>
<th>Unit</th>
<th>MW capacity (Max)</th>
<th>Cost per MWH</th>
<th>Generation by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit – 9</td>
<td>48.0</td>
<td>$50.00</td>
<td>Coal</td>
</tr>
<tr>
<td>Unit – 8</td>
<td>23.0</td>
<td>$56.00</td>
<td>Coal</td>
</tr>
<tr>
<td>Unit - 7</td>
<td>15.00</td>
<td>$53.00</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Unit – 5</td>
<td>9.0</td>
<td>$57.00</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>GT – 2</td>
<td>12.0</td>
<td>$77.00</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>JV – 2</td>
<td>28.0</td>
<td>$50.00</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>SWTP Diesel</td>
<td>1.8</td>
<td>$184</td>
<td>Diesel</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>0.9</td>
<td>$0.00</td>
<td>Water</td>
</tr>
</tbody>
</table>

The City’s utility department is a member of American Municipal Power (AMP), American Public Power Association (APPA) and American Public Gas Association (APGA). Each of these organizations provide outside support at the state and national level for our utility system. AMP serves public power communities in Ohio, Pennsylvania, Michigan, Virginia, Kentucky and West Virginia and a joint action agency in Delaware. The nonprofit organization is owned and governed by the members, who as municipal owned utilities are governed by their 625,000 customers.

APPA is the service organization for the nation's more than 2,000 community-owned electric utilities. Collectively, these utilities serve more than 46 million Americans. The nonprofit, non-partisan organization was created in 1940 to advance public policy.
interests for its members and provide services to its members to ensure reliable electricity at a reasonable price with the proper protection of the environment (www.publicpower.org, 2012). The City does not generate all of its own electricity; a portion is still purchased from the national grid. APGA was formed in 1961, and currently has over 700 members in 36 states. This is the only nonprofit trade organization that represents America’s publicly owned natural gas local distribution companies. Similar to how the electric utility operates, the City does not directly provide natural gas to its customer through mining the resource, rather it is purchased and piped into the City limits. This organization is similar to APPA, providing support and representing the interests of the public gas members (www.apga.org, 2012).

The position responsibilities originally detailed in the fellowship description included becoming the utility liaison for the City wide Customer First Campaign, support the Customer Information Systems (CIS) Project, compiling and analyzing energy usage trends and maintain strong industry wide knowledge of marketing and energy management/conversation programs of other utilities. The essential functions of this position also included maintaining and reviewing the utility marketing programs and customer databases; develop customer friendly annual report highlighting utility operational and financial achievements and overall performance for the previous fiscal year, analyzing and supporting City “key-accounts” customers program and economic development department, supporting the Green Committee designed to maximize the City’s regional/national leadership in Green Energy.

The responsibilities assigned to this fellowship were modified better fit the needs of the organization. My duties were to develop a residential energy education campaign, this campaign entailed the planning and coordinating of Public Energy Week 2011, writing grant proposals for funding the residential program, and writing media releases related to energy conservation and efficiency issues. I served as the energy efficiency expert to the Hamilton’s City School’s Sustainable Living Project. This project is a cooperative effort and my responsibilities were to provide energy education workshops to the teachers, supply lesson plans and activities for teachers to utilize in their classrooms and
coordinate any educational displays for the schools.

During the first month of the fellowship the City was in the process of finalizing a new Strategic Plan to help guide the efforts of the City and community. Similar to the organizational structure of the City, the Strategic Plan has had some changes over the past year. The changes have stemmed from personnel changes. The chart below illustrates the four pillars that support the mission and vision of the City.

![Figure 4: City of Hamilton Strategic Plan Overview](image)

My fellowship responsibilities were designed to fit into this plan, with duties falling into each of the four pillars, creating economic development, creating a positive image, connecting people, and creating a sense of place. Becoming a piece of the “fabric of the community” was part of all four of these objectives, as well. To allow for this the City had asked us to attend all city council meetings, enjoy the concerts in the park, movies in the park, and frequent the Historic Hamilton Farmer’s Market. To overall submerge ourselves into the community of Hamilton and to become a part of it. To truly do this,
the City provided an apartment in the newly renovated Mercantile Lofts on High Street. The location of the loft apartments afforded us the opportunity to walk to work, to the gym, coffee shop, and local restaurants. This sustainable lifestyle is one that I have studied in coursework during my time in the IES program, and was finally able to practice.

This fellowship required me to manage multiple projects as once, coordinate with many different departments inside the City and community organizations. With the number of different projects that I worked on during this fellowship, I will be describing each of these in the following chapter. The third chapter will be a focus on one particular project, the Sustainable Living Project. And finally, the last chapter will discuss the Problem Solving Process and how the theories and tools acquired during my coursework with the Institute for the Environment and Sustainability assisted me in having a successful fellowship.
Chapter 2: Overview of Fellowship
The Richard J. Fleming fellowship position consisted of a number of projects. These projects ranged from a couple of weeks to months in length and involved working with multiple departments. The City was also in support of continuing education in the field that best fit your position within the organization. I had a number of different opportunities to expand my knowledge and then to apply that additional education to projects I was assigned to during the fellowship.

Touring the City Utility System
As part of my orientation to the City and its utility system, I was able to tour the Power Plant on North 3rd Street and the South Water Treatment Plant. Both of these tours provide valuable information and the employees of the City that work at these plants were very enthusiastic that myself and the other fellows were interested. The City’s power plant is a coal-fired plant, with the ability to use natural gas in two of the units. The south water treatment plant is one of two plants the City operates. Hamilton was awarded the best tasting water in the nation and world in 2010, and I learned on the tour that they believe it is because the process they use to disinfect the water. It is a different chemical combination than almost any other treatment facility in the country.

Figure 5: Meldahl Hydroelectric Dam Tour
I also had the opportunity to visit the construction site of the second hydroelectric plant the City is building along the Ohio River. Meldahl Hydroelectric Power Plant site is nine miles west of August, Kentucky. A hydroelectric plant is a renewable source of electricity has it is generated by water from the river. The water is not used up, but rather diverted to the plant for a short period time and then deposited back into the river. The plant is a joint venture with AMP and will generate about 20% -25% of the City’s electricity. With the completion of this plant in 2014, the City of Hamilton’s electricity will be 70% renewably sourced.

Energy Efficiency Management Certificate Program
Since the City is a member of APPA I was able to find an Energy Efficiency Management Certificate Program (EEMCP). This program was offered in Coldwater, Michigan. The coursework is a week long, and within that year I had to pass a 100-question online exam and submit an energy efficiency program plan. The plan is evaluated by the APPA board and once approved the certification is complete. The knowledge gained from this training was directly applied to customer education for the utilities department.

The EEMCP was a very different training session than what I have previously attended through with past jobs. And it was the best training session I have attended in my career. Although a long week of sitting in a classroom, the information gained from the instructor and the other participates in the class was extremely valuable.

The certificate program consisted of six parts. Power Supply and Integrated Resource Planning: An Introduction was the first session. This had a focus on generation sources, the electric system, and components of the transmission system. The introduction of Demand Side Management (DSM) was also part of this first session. DSM is similar to energy efficiency programs and can be used interchangeably. This session was the basic introductory information I need to better understand how the City’s electric utility system operated. This knowledge was necessary in putting together customer education information that the average resident would find useful.
Session two was an Overview of Energy Efficiency Programs. The strategies and programs for EE were discussed, as well as the pros and cons of these programs to the different sectors in the utility business (industrial, commercial, and residential). The types of programs discussed were low-hanging fruit concepts like traditional weatherization, and water saving devices to more advanced, long term programs such as smart grid technologies. With different energy efficiency programs possible, this session provided guidance on what my recommendations were to the City on energy efficiency programs.

Session three was Identifying Your Utility’s Energy Efficiency Goals and Developing a Portfolio Strategy. Goals and objectives were the focus of this session. Each utility system is different, whether different size, demographics, services, etc., therefore identifying the goals for your utility system can better define the type of program to best meet the needs of the system and customers. In developing programs cost effectiveness tests are performed. There are five major tests, Utility Cost Test, Ratepayer Impact Measure, Participants’ Test, Total Resource Cost Test and Societal Cost Test. Not all are perform to determine if a program should be done, but depending on the factors, they can be useful. As part of my recommendations to the City regarding energy efficiency programs I had to justify why I had recommended one program over another. These cost benefit analyzes were adequate justifications to present.

Session four was a two-part session with Implementing an Energy Efficiency Portfolio: Part 1 – Planning and Budgeting as part one. Planning before taking action is a necessity to ensuring a successful program. A large part of the certificate program is utilizing what other utilities have done and not reinventing the wheel. The second part of session four was Strategies for Encouraging Customer Participation. This session dealt with how to get your customers involved and excited about these types of programs. Again, planning and doing research before implementing is key. Evaluating our customers’ motivations to be involved in such programs, pilot programs, is how we can begin to predict the success. Once the particular program was decided upon, and justification provided, I
applied the skills learned in these session to plan how the program would be implemented in the community.

Finally, the last session was on Measurement and Evaluation of Program Effectiveness. With any program, EE or other, monitoring and evaluation is essential. This session provide an overview of evaluation process, structuring parameters, and interpreting results. As with any program or solution implemented it is important to monitor the outcome of what was implemented. Part of the plan I recommended to the City included how the program should be monitor.

I received a passing grade for the exam portion of the certificate program. With completion and passing of the exam, the business plan has to be completed. Once the business plan has been approved I will receive my certificate of Energy Efficiency Management.

**Sustainable Living Project**

The Sustainable Living Project was a primary focus of my fellowship once returning from the EEMCP. The principles learned during the certificate program were applied to this project with the Hamilton City School District and other local entities. In the following chapter a detailed discussion of this project is provided.

**Public Energy Week 2011**

During my certificate program I spoke with a number of other municipal utility systems to better understand what they offer to their customers. Once returning from this program, I realized that the most basic of utility information needed to be disseminated to our customers. To start this process I wanted to host a weeklong educational event in the lobby of the City building.

While in Coldwater, the utilities department had an energy bike. The energy bike is a product of Ohio Energy Project that is used as an educational tool for residents to experience the transformation of energy. With the bike, participants can pedal the bike,
which stands on a trainer, and generate the energy to light up an incandescent bulb, CFL, and LED bulbs. Riders are able to experience the amount of energy it takes to light up each one and the how much more energy is required by the system (human body or power plants) to light an incandescent bulb. The bike also includes a small fan and hairdryer to test.

The energy bike was the best educational tool to use with our customers and schools. It is designed so that any person can ride for about a two minutes and learn how much energy it takes to light up different types of bulbs. Ohio Energy Project has numerous teacher/student programs associated with the use of the energy bike available to schools. I was able to utilize the organization’s loaner bike for presentations in the schools. I had planned on using the bike on loan to demonstrate the effectiveness of the tool prior to the City purchasing a bike of it’s own.

With using the Energy Bike as a tool for spreading energy education, I had a focal point for the weeklong event. 2011 was the 25th anniversary of American Public Power Association’s Public Power Week, American Public Gas Association’s Public Natural Gas Week, and American Municipal Partners celebration of Public Power Week. For this reason, we decided to celebrate our utilities with Public Energy Week. The celebration week was also a customer appreciation week. As part of my fellowship, I was tasked with hosting a customer appreciate day and or week. This day had previously involved educational materials for customers and prizes as well. The experience that I had with the APPA program in Coldwater, I was able to create an education outreach week for the City’s utilities.

October 3rd – 7th was the week designated by the national associations. The City’s utilities has done customer appreciation week in the past, but it had been a few years since. I began to brainstorm ideas of what displays and demonstrations would be most beneficial to our customers and residents. One education material that I developed and provided to customers was the Energy Savings Tips handout, see Appendix A.
I met with the Director of Electric, Director of Gas & Water, and the Manager of Energy Operations to discuss my ideas on the week. All were approved and the planning began. There was a lot of support for the celebration week. The Mayor made a proclamation for that week to be designated as Public Energy Week in the City of Hamilton. I had asked the Public Utilities Commission (PUC) attend the Council meeting of the week prior to the celebration to be the recipients of the proclamation. Our PUC is the committee that provides utility-based recommendations to Council and the City. The celebration was planned for Monday through Friday of that week from 11am to 2pm in the lobby of the Municipal building. The week was kicked off Monday morning with the Electric Line distribution crew hanging the banner out front of the building.

![Figure 6: Electric Distribution Crew hanging Public Energy Week Banner](image)

The events that week included:

Informational table with:

- Energy savings tips flyers – See Appendix A.
- Natural Gas safety tips
- Natural Gas brochures
- Hybrid truck information
- Natural Gas Vehicle (NGV) information regarding our fleet
Lobby Displays included:

- LED vs. High Pressure Sodium street lamp comparison
- Meldahl Hydroelectric Project – coordinating with Mark B. on this information.
  - Slide show of process
  - TV Hamilton footage of bedrock blasting
- NGV transit
  - Vehicle was parked on the Plaza for customers to view
- Energy Bike demonstration
  - CFL giveaway – for those that participate in the demonstration, they received 2 CFL bulbs.
Figure 7: LED vs. High Pressure Sodium Street Light Demonstration of Wattage Cost

Figure 8: Natural Gas Vehicle Transit Displayed on Plaza of Municipal Building
Figure 9: Public Energy Week Displays

Figure 10: Public Participant Experimenting with the Energy Bike
The number of patrons, energy bike riders, raffle entries, home energy audit sign-ups were as follows:

Table 2: Public Energy Week Activity Log

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patrons to visit</td>
<td>173</td>
</tr>
<tr>
<td>Energy Bike riders</td>
<td>115</td>
</tr>
<tr>
<td>Raffle entries</td>
<td>103</td>
</tr>
<tr>
<td>Home Energy Audit sign-ups</td>
<td>10</td>
</tr>
<tr>
<td>CFL bulb giveaways</td>
<td>230</td>
</tr>
</tbody>
</table>

A presentation to City Council and the PUC regarding Public Energy Week was made the week following. In that report I provided considerations for next year’s event. Those included, increased media coverage, displays on the Plaza to attract the street traffic walking past the municipal building, encourage more employees to attend and have the event annual. Both Council and PUC were pleased with the results of the week and were supportive in hosting an event like this again.

City Vision Show

I had an opportunity to film with one of the local cable stations show, City Vision. The show is produced by TVHamilton, hosted by Mark Murray and has a focus on City of Hamilton activities. That month’s show focused on the electric department. I was interviewed about my activities in my fellowship and other department projects. The filming was great, and I was also able to have some of my photos run on the show during the associated topics (Public Energy Week and the LED Christmas light displays downtown). City Vision is a great resource for promoting the City and it was a fast way for information to get out to the public.
Citizen Satisfaction Survey
The City Manager and Director of Information Technology asked that I take the project lead for a Citizen Satisfaction Survey for the City. The survey was a baseline assessment of the satisfaction of city services and perceptions by the residents. I coordinated a brainstorming session with people from multiple departments in the City to discuss potential questions for the survey.

This meeting was not as successful as I had hoped. I had created an agenda of what I thought were appropriate starting points for the survey. But soon realized the direction of the survey had not been truly defined by the Executive Leadership Team (ELT) that had asked me to lead the project. At the conclusion of this meeting a set of questions was put together and a meeting with the ELT was scheduled. After numerous discussions with other cities and researching three different professional organizations that specialize in
citizen satisfaction surveys, I made the recommendation to select the National Research Center (NRC). The NRC is aligned with the International City/County Management Association (ICMA). The City Manager has realigned our City with the standards of that association and a citizen satisfaction survey that meets those standards was seen as the best fit. In the next few months I worked with the NRC to customize our City’s survey with the timeline set to have it complete by the end of January of 2012. The National Citizen Survey results were valuable to City Council and Administration in determining the effectiveness of the strategic plan that had been implemented in the previous year. The survey, as mentioned earlier, also gave the City a baseline of satisfaction for what the City provides to its’ residents. Since this had not been done before, it was important to have a level to evaluate from going forward.

The City Manager has significant authority over the operations of the City, but the City Council plays a vital role as well. Because of this, presentations are made to City Council on a regular basis to keep them informed. My involvement with the both the Citizen Satisfaction Survey and Public Energy Week were major projects of the first few months of my fellowship. These projects were also of great interest to Council. For that matter, I was asked to make two presentations to Council. The projects were presented on the same night. I put together a slide presentation for Public Energy Week and provided a written report to Council. The presentations were successful and I was able to demonstrate my presentation skills to Council, City administration and the citizens present at the meeting.

Butler County Water Festival
One other fellow and I were asked to be presenters at the annual Butler County Water Festival. The festival is a day-long event hosted by the Groundwater Consortium and is for Butler County teachers to bring their students to interactive sessions on water. The session topics varied and as a presenter I was able to develop my lesson on whatever fit best with my job responsibilities with the City. The majority of my work with the Utilities department deals with our electric generation. Hamilton is fortunate enough to own and operate one hydroelectric power plant along the Ohio River, Greenup and is
building another along the Ohio River named after Captain Anthony Meldahl. I volunteered for this festival because it was another avenue for public outreach from the Utilities department, which was a primary focus of my fellowship. The City needed a position that could connect with its’ customers/residents to provide information, and that was my fellowship.

Hydroelectric power plants are the combination of water and electric, which was a perfect fit for a session to teach during the Water Festival. There were several components to this lesson. I was able to use Ohio Energy Project’s Energy Bike again for this session, which I used as a mock hydroelectric plant. Additionally, I had the students build miniature turbines to pour water over and understand how flowing water from the Ohio River moves over the turbines of the hydroelectric plant to spin the large turbines, generating electricity.

The session started with an introduction to power supply and different types of energy generation. Typically the students figured out we were talking about water, since it was the Water Festival. We had a discussion about renewable energy and where hydroelectricity fell into that category. Additional, I asked the students if they knew how water could be turned into electricity. I was impressed by some of the responses, as a few students had studied the concept.

Students separated into groups of two or three and constructed the water turbines. I had partially assembled the turbines to make the time more efficient with the students. The groups took turns pouring water over the turbine. During this part of the session, we talked about the type of energy the moving water is (kinetic) and how the kinetic energy creates mechanical energy as the turbine spins. A major focus of these sessions for the Water Festival was hands on activities, fostering the student’s connection of the concepts with actions.
The final part of the session was the Energy Bike. I had volunteers from the classes pedal the bike to create the electricity to light up the bulbs of the board. This was the same energy bike that I used during Public Energy Week. I asked the volunteers to pretend they were the water flowing down the Ohio River. Their kinetic energy rotated the wheel of the bike (i.e. the turbine) to spin the generator that moved energy to the light board. Additional, students were taught the difference in the amount of energy it takes to power different types of bulbs (i.e. incandescent, compact florescent lights and LED). The Energy Bike was a great success. As different volunteers operated the Energy Bike I had the other students repeat the steps of the energy movement to create the power supply. The repetition was central to students understanding the concept.

Overall, the Water Festival was an exciting and stressful day. I enjoyed the interaction with the students and being able to pass along some of my knowledge to a younger generation. If I can be employed in the area next year, I have committed to presenting again.
IBM Smarter Cities Challenge

IBM Smarter Cities Challenge is a worldwide grant opportunity that again; Hamilton was handpicked to potentially participate. The Challenge, created in 2010, is hosted by IBM Citizenship. The goal was to assist 100 cities over a three-year period to address critical challenges facing cities. IBM provides its best and brightest consultants for three weeks to the selected cities to evaluate where IBM technologies can be utilized. The City was previously a heavy industrial one, the location of the City along the Great Miami River was a prime location for the paper making industry. With the development of the technological age, the paper industry became dying one. The last paper making company closed during my year fellowship with the City. Because of this long history of an industrial city, moving forward as a post-industrial city, and the hiring of a new city manager, we were the ideal candidates for this grant. The three fellows were given the opportunity to collaborate together on writing this grant application. The grant application describes, in detail, one challenge the City faces that hinders its growth. Traffic was the issue that seems to resurface on a regular basis for our city.

Traffic is a challenge with economic development, transportation, public perceptions, and public safety. Hamilton has a significant traffic problem, with a heavily used railroad track that splits the City and only one underpass for vehicles. This underpass has on average 25,000 vehicles per day utilized that road. The application discusses these hindrances and steps the City has taken in the past to render the problem. Most have been unsuccessful, which was why this issue was chosen. Other fellows and I felt extremely confident in our application and were anxious to hearing the results, as we felt this would, even further, validate our fellowship positions with the City. The selection process took about three months and in March of 2012 we were informed that we were not selected for the Challenge.

IES Orientation Field Trips

The IES orientation field trips were held during the first few months of my fellowship. When I started IES program I found these field trips to be very helpful and knowing what to expect of the program, but also of the working field after finishing the program. Chris
Lawson (another IES candidate and a fellow himself with the City) and I had an opportunity to meet with the incoming IES class and talk about our fellowships. Doug Childs, my immediate supervisor, was also asked to make a presentation regarding the City of Hamilton’s renewable energy source status. The students seem very receptive to the presentations. I also felt they enjoyed the conversations with Chris and me. As important as it is to see the job opportunities outside of graduate school from individuals who have been in the field for a while, it’s important to see individuals who have just finished what those students are about to start. We also offered our assistance in anything they might need for starting the program. The IES community is a strong, tight knit one, and I am happy to be able to give back, even at such an early part of my environmental career.

My knowledge base on energy efficiency programs and education outreach has grown through the projects and education opportunities during my fellowship. The educational opportunities guided me in how I needed to approach the projects that were assisted to me. The EEMCP provided the outline for how I developed the Sustainable Living Project and Public Energy Week. Both of which were major projects for my fellowship. The inaugural year of the fellowships was the outline for what the following years’ fellowships were going to focus on. My fellowship became the public outreach fellowship because of the projects I accomplished.
Chapter 3: Sustainable Living Project

The last major project that I was assigned to was a cooperative effort between numerous organizations in the community to create a partnership with Hamilton City Schools. The organizations in the community are Butler County Recycling & Solid Waste District, City of Hamilton Utilities Department, Vision 2020 Commission’s Green Committee, and Hamilton City Schools. The goal of the partnership was to increase student participation in environmental issues. The City has tried for numerous years to have an active presence in the schools, but had been unsuccessful. With the creation of this fellowship, the City now had a dedicated position to this program. The new partnership was named the Sustainable Living Project.

The committee met with each school’s principal prior to the start of the year. During these meetings we had an agenda to inform them of what we can offer and a discussion of what they believe would best fit in their school. As a committee, we made the conclusion that each school would have a tailored program to their students based on age, location, etc. Some of the schools felt the sustainable principles being discussed would best fit outside of the current curriculum, which meant the implementation of those principles would be taught during morning announcements, after school activities and at home. Other schools knew how they could fit it into their classroom work and into the standards. This has been a very important discussion during the meetings. Additionally the standards for science and most subjects are changing over the next year. For this reason, some teachers felt it was easier to build these concepts into their students’ daily life, instead of lessons in the classroom. For example, during lunch when the students are done with their food trays to ‘retrain’ them to throw compostable foods in one receptacle, recyclable materials in another, and the rest in the garbage can. As the year proceeded, the goal was to be more involved with the school district and become an outside resource for teachers to utilize for information and presentations.

All schools within the district, elementary to high school, were extremely receptive the information that was presented to them. The teachers were pleased to have additional resources at their fingertips. The results of a few of these meetings were additional
presentations to their schools. Highland and Crawford Woods asked me to attend their open house evenings and host a booth with energy efficiency and recycling information. Riverview asked for a teacher development session with the entire staff. The teacher development session was designed to engage the teachers in these concepts and get them excited first. Garfield Middle School asked that I do a grade and/or school wide assembly. Unfortunately the assembly with Garfield Middle School could not be scheduled.

The committee also wanted for each school to establish a ‘green team’. These clubs would be extracurricular, likely to require students to attend before or after school meetings. The potential difficult with this suggestions, was that it would be teacher driven, not partnership driven. We, as the outside resources, would be able to provide support and I agreed to present to each of the green teams, once they had been established.

In meeting with the high school staff, the partnership was introduced to the school’s Green Club. This club was made up of two teachers and 10th through 12th graders. I was asked to attend one of their meetings to present on possible community projects the students could become involved in. Options available to the club were “Adopt a Street” clean up, neighborhood cleanup, Great Miami River Cleanup, stormwater drain basin sticker placement, “Adopt a Park” program and elementary school teaching program.

After discussion, the students decided on an “Adopt a Street” clean up. The club has adopted a portion of Eaton Ave. near the high school. The students have made the commitment to do a clean up once a month. This type of community involvement is the type of movement we wanted to see from the Sustainable Living Project. The students also showed interest in the Great Miami River Cleanup. This event is annual and is coordinated with the Groundwater Consortium.
The meetings with each school gave the project committee direction as what times of resources were appropriate for each grade level and each school. A variety of options were made available to the district.

Before the project began, Hamilton City Schools had only previously focused on paper recycling. With the new resources from the partnership, the recycling in the district expanded to include all materials that are accepted by Rumpke (paper, cardboard, metal cans, glass bottles, plastic bottles). For teachers and school administration to better understand how to convey the importance of recycling to their students, the partnership felt it was important for them to understand the recycling process. We were able to set up a tour of the Rumpke recycling facility in Cincinnati.

Rumpke’s Cincinnati Material Recovered Facility, MRF for short, services Greater Cincinnati and Northern Kentucky. The facility opened in 1991 and recently went through upgrades that allowed it to be a single stream facility. This means that customers do not need to separate their recyclables. With this new system there has been an increase in the amount of recyclables that can be processed at the facility. The tour of this facility included a presentation at the beginning and then a walking tour of the entire process. The goal of this activity for the partnership was again, to educate the educators so they had hands on knowledge of importance of recycling. Based on the feedback from the teachers, they were pleased with the tour and felt they could better demonstrate to their students what to recycle and why.

As recycling was only one aspect of the program, energy conservation and efficiency was another. I committed to providing energy facts/tips that would be read during the morning announcements at each of the schools. The idea was if a fact or tip were read once a day for one week, the repetition would increase the students’ awareness to the topic. The facts announced were those from the Energy Savings Tips handout (Appendix A) that I developed for Public Energy Week. Each school in the district committed to this daily exercise.
To plan for the teacher development session I met with the district’s Character Education director and a teacher from Riverview. The planning for the session was very effective and we decided on a few different topics for the teacher development session. The development session was planned for about 45 minutes. Topics we planned to cover were the new recycling initiative in the district, and energy efficiency. The Rumpke recycling video was thought to be important enough to show, which demonstrates how the Material Recovery Facility (MRF) operates. Since not all of the teachers and administrators in the district were able to attend the tour, this video would provide them with a virtual tour. My portion of the session would focus on energy efficiency and the energy bike.

The teacher development session was a huge success with one of the elementary schools. The session focused on two sustainable practices, recycling and energy efficiency. My portion of the session I, again, used the energy bike. I had teachers volunteer to demonstrate how it worked to the other teachers and then discussed the lesson plans associated with the Energy Bike program. The result of this session was two teachers signed their classes up for the Ohio Energy Projects, Energy Fair. This is a daylong field trip for classes to experience hands on activities at the Cincinnati Museum Center on energy.

The open house events for two elementary schools included informational material that was given to parents on energy efficiency and recycling. I felt it was an ideal opportunity to provide parents with activities as well, that they could do with their children. An example was called the Energy Hog and was from the Alliance to Save Energy. The activity was structure as a scavenger hunt for parents and children to walk through their homes and determine what areas would be drawing significantly more energy, etc. Each area of the house would be investigated and then scored for energy efficiency. Not only were both parents and children learning something new and they were collaborating together. A total of 150 parents stopped at my booth for information. This was about 60% of the total parents that attended these open house events the schools.
During my fellowship the City signed a new contract with Rumpke to provide recycling receptacles to all residents in Hamilton. So part of the information on recycling provided to parents during the open house events and to the schools was on the new system. With the new contract, each household was able to decide what size of receptacle they would utilize. If no response was provided to the City, the resident would receive the standard bin. There were a lot of questions about the new program, and this gave the City an opportunity to clarify the new policy. Personal interactions with the public are always better than written or phone clarification.

Another opportunity to interact with the parents was during Riverview’s Family Fun Night. I hosted a table for parents and students to stop by and pick up information on energy savings tips (Appendix A), at home activities (Appendix B), the new recycling program (Appendix C), and natural gas safety. This approach to connecting with parents has seemed to work, and it is just more ‘face time’ with the community that the Utility Department needs.

Public Energy Week was a success within the City and I realized, even more, how effective the use of the Energy Bike is when trying to educate adults and children on efficiency topics. So for the teacher development session I wanted to make sure I had the bike to demonstrate on. With this demonstration I asked at least one teacher volunteer to ride the bike. Unlike the students during the Butler County Water Festival, the teachers were very hesitant to volunteer, but I finally got one brave soul to participant. The session also included leave behinds for the teachers. Those leave behinds are often that last impression that any presenter can provide the attendees, and a way to keep the teachers interested in what we, the partnership, could be to them. The goals of this session were to have more of the teachers become involved with the recycling effort and eventually work energy efficiency concepts into their classrooms.

Ohio Energy Project (OEP) was a great resource for the school district. They host a number of different energy fairs around the state and the Southwest Ohio fair happened to be few weeks after the teacher development session with Riverview Elementary. OEP
had tried, unsuccessfully, in the past to work with the Utilities department and Hamilton City Schools. Since my fellowship was allocated time to work directly with the schools to develop this relationship, OEP provided some of the outside resources I wanted to provide to the schools and I made it a priority and goal to connect these two organizations. Hamilton had two schools attend the Energy Fair, Wilson Middle School and Riverview Elementary. I was able to attend the fair and interact with other school districts and the teachers. The Energy Fair was another success and in talking with the Wilson Middle School teachers they were impressed with the Fair as well. They felt it was a great experience for the students, especially the seventh graders who would be taking proficiency tests in the eighth grade. The proficiency tests included some of the energy concepts presented to the students during the Energy Fair. The Ohio Energy Project and the current state curriculum determined the concepts presented, as teachers had to justify the field trip. Curriculum based field trips is how the Ohio Energy Project markets to teachers. The teachers also felt this would provide hands on experiences that students could draw from while taking the proficiency test.

My last activity with the schools was a presentation to 7th and 8th grade financial literacy classes. This idea was discussed at the beginning of the year when meeting with the middle school teachers and principals. The financial literacy class was new to the curriculum and was replacing the traditional keyboarding class. The district recognized that keyboarding was no longer a necessary course, as computer use by students is significantly higher today than ever before. The financial literacy class was created to provide students with a better understanding on financial responsibility as they move into the high school and beyond and start in the working world.

The request was made to have a presentation on the City’s utilities and how to read a utility bill. Although the topic can be complicated, including complex formulas of how the bills are determined, it is important for students to understand what they are writing a check for each month. This understanding also includes how and where electricity is generated from and how what the student does on a daily basis reflects the amount of energy used on the utility bill. This was also a learning opportunity for me, as I had
never worked through the equations of how my utility bill was complied. The presentation was created for a 40-minute class period, with an exercise for the students to do to start off the session. The activity was for them to pick on appliance they used that morning, from there we discussed, based on a chart I had displayed, how much energy each of those appliances used that morning. From there we calculated how much energy it would use in a month and so on. I wanted to provide a baseline of energy consumption for the students as we moved into the details of the utility bill.

The rest of the presentation included basic information as to how our electricity within the City is generated, the direction the utility department is heading with the coal fired power plant, and how we are diversifying our portfolio of energy sources. Part of my interaction with the students included an informal discuss on energy sources, and what were renewable and non-renewable sources. I wanted to the students have a foundation of basic energy concepts and how their actions effect usage before explaining the utility bill. The second half of the presentation was a step-by-step analysis of how a utility bill is calculated.

The City’s utility bill is different from other utilities, because it includes electric, gas, water, wastewater, refuse and stormwater. Although some of these utilities are flat fees, they are still needed in the final calculation. Water and wastewater are based on the same calculations, electric and gas each has specific riders that are part of the final calculations. A rider is an additional charge to the user that is based on a pre-determined formula. Riders are used by the utility company to recoup some of the overhead expenses, like administrative fees and capital improvement projects. My ‘pitch’ to the students as to why this was important, was that although they do not pay for the utility bill yet, their parents or guardians do. The money that could be saved by being more conscious of the energy they are using could mean more trips to Flub’s ice cream, additional songs on iTunes, another family vacation to the beach. My goal was to create awareness that what they do impacts the bills that are paid by their household and ultimately will be paid by them in the future.
Overall the presentation was a success. I used repetition as a way to have direct interactions with the students during the presentation as we worked through the calculations, and a technique for students to remember how the calculations were done. In addition to the six class periods that I did the presentation for, TVHamilton filmed the session. A Utility Bill 101 had not been done for the general population of Hamilton, and by filming this presentation we were able to provide that to the public. Once the session was aired on TV I had multiple people, including a City Council member comment to me that they learned a lot about our utility bills, and was pleased the City provided that information to it’s customers.

As my yearlong fellowship ended, the longevity of the partnership was unknown. The City’s utility department went through a number of changes during my year there. These changes and my leaving the City will play a role in whether the partnership is still able to continue providing that support to the schools. Ultimately, the school district would benefit from a position that is focused on providing presentations and opportunities to the teachers and students, as well as ongoing monitoring of the new energy efficiency schools. The ideal outcome of my fellowship would be for the school district to be dedicated to hiring a position to provide the ongoing monitoring of the programs implemented during the first year, but to also be able to expand on the project. The programs accomplished throughout my fellowship year, teacher development session, open house nights, Energy Fair participation, daily announcements and school green teams, were all great first steps in incorporating sustainable principles into the local school system.
Chapter 4: Problem Solving Process

The Master of Environmental Science program is based on the Problem Solving Process, a ten-step ‘wheel’ to creating solutions to a stated problem. The basis of this process is by working through the ten steps of the wheel you can develop a solution or solutions to a problem, for the masters program, it would be environmental issues. The process can and should be applied to other industries and fields, as well.

The Sustainable Living Project was the most significant piece to my fellowship year and therefore I applied the problem solving process to what would be a yearlong partnership. The following is the Problem Solving Process Analysis as to how the Sustainable Living Project was developed and structured for the Hamilton City School District.

Figure 13: Problem Solving Process Diagram
Problem Identification:
The Problem Identification step is a direct definition of the issue for with the process is being applied.

The City of Hamilton Utilities Department had a desire to connect with the Hamilton City School District for numerous years. Because the City owns it’s municipal utilities and not a larger privately held company, there was a desire to connect with the residents that the utilities served. The department had been unsuccessful in creating and maintaining this relationship in the past. There had never been a dedicated person to this role, and therefore the City wasn’t able to develop that partnership. With the implementation of the fellowship program this allowed the City to designated a specific position to this task, the Richard J. Fleming fellowship. It was up to this fellow to determine the best course of action in cultivating this relationship.

Establishing Problem Boundaries:
Establishing boundaries is done to set a scope or limits to solving the problem. Often there are several problems presented, setting boundaries becomes an understanding of what can be address with the resources provided and time frame.

Preliminary boundaries (initial evaluation of potential boundaries):
- Unknown number of potential partners, if any, to be involved in creating this relationship.
- Unaware of past interactions and relationships that City Utilities Department had with the school district.
- Unknown level of interest from the school district to have the utilities department involved in their schools and classrooms.

Subsequent boundaries (boundaries once evaluating the problem):
- Variance in the goals of the potential partnership organizations involved.
- Willingness and support from the teachers to include the utilities department in their classrooms or extra curricular activities.
• What the longevity of the solution would be if instrumental individuals were removed from the project.

Goal:
The goal is general and board. The goal may or may not be obtained when the problem solving process has been done, but it is what is strived for during the process.

The goal was to determine how to cultivate a partnership of learning with the City’s utility department and the Hamilton City School District.

Objectives:
The objectives are more specific, and are more attainable. The objectives are actions to be taken to try and meet the goal that has been set.

There are three areas of focus objectives that provided the necessary information to meet the goal of creating a relationship between the two stated entities.

1. Establish a partnership with other city and county agencies that have the same interest and goal as the utilities department.

The interested agencies within the city and county were previously connected and the City’s utility department was able to join them in creating a partnership. The other agencies included the Butler County Solid Waste and Recycling District, Hamilton City School District, and Vision 2020’s Green Committee. A name for the partnership was created to provide consistency throughout the project. The name came out of a brainstorming session and combining what the Green Committee had already started, which was a sustainable demonstration site in Hamilton.

2. Determine an area of study that would benefit from the knowledge base that the utilities department can provide.
Background research on the current curriculum standards used in the schools will provide an understanding of what the teachers are using as guidelines in their classrooms. An understanding of how the City’s utility department operates and their goals for educating the consumer will identify an area that the City can commit to providing resources. Finally, the discussions with the schools themselves as to what areas they feel could use outside resources to further the education of their students.

The current curriculum standards are typically a moving target from year to year and from grade to grade. But the Sustainable Living project knew that the information we could provide would be able to be utilized in at least one or two grade level curriculum. If it was not going to fit into the curriculum, the extra curricular activities that were available to students, provided the opportunity to have discussions with the students.

3. Provide a wide range of resources to the schools that can be supplemental information in and outside of the classroom.

Once the area of study and group of partners was established the relationship was based on the outside resources that can be provided to the schools. These resources should be fit a wide range of teaching techniques. A list of available resources was created and provided to the school district. These resources included an Energy Savings Tips handout (Appendix A), a scavenger hunt activity sheet (Appendix B), Know Before You Throw recycling handout (Appendix C) and Utilities 101 presentation (Appendix D). The scavenger hunt was developed by the Alliance to Save Energy, a non-profit organization developed to promote energy efficiency. The activity was meant for parents to do with the children, so that all could learn about common energy efficiency issues around the home. The Know Before You Throw recycling handout was developed by the Butler County Recycling and Solid Waste District. During the year of the fellowship, the City was also implementing a new recycling program, providing all residences with new recycling cans. These flyers gave the knowledge to the children and then parents on what can and cannot be recycled. The Energy Savings Tips and Utility Presentation were part of my work with the Sustainable Living Project. These two
resources were information that was general knowledge to the individuals working within the Utility Department. It was my responsibility to pull this information together in a resident friendly and concise format. All of these resources are included in the Appendices.

Methodologies (Tasks/Study Design):
The methodology and study design is the arrangement of conditions for the collection and analysis of data.

The following tasks and study design questions where created and answered in order to ensure that a relationship was cultivated and effective for all partners.

Tasks and Questions based around three objectives:

1. *Establish a partnership with other city and county agencies that have the same interest and goal as the utilities department.* The establishment of the partnership happened when the Vision 2020 Commission’s Green Committee, a volunteer group, developed the concept of project of this substance. The agencies involved all had been involved with the Green Committee and were passionate about a collective group providing resources to a wider public. The different agencies that would be involved with the partnership had already been set up prior to the fellowship inception. With that, the involved parties were City of Hamilton Utilities Department, Hamilton City Schools, Butler County Solid Waste and Recycling District, and Vision 2020 Commission’s Green Committee. These would be the core partners, with the opportunity to expand in the future.

2. *Determine an area of study and project name that would benefit from the knowledge base that the utilities department can provide.* Questions that needed to be asked were; what area of study do teachers feel they could utilize the additional resources? What departments with the schools are most interested in partnering with the outside resources? What does the City’s utilities department feel is the topic that our consumers would benefit from further education on?
In researching Hamilton City School District, Character Education was a top priority for the entire district. This is what I felt and later confirmed was how the Sustainable Living Project would fit into all aspects of the district. The Character Education program was established to provide opportunities and lessons on well-rounded citizens. For science and math curriculums that would not include the topics the project wanted to discuss, the Character Education program would allow for those topics.

3. Provide a wide range of resources to the schools that can be supplemental information in and outside of the classroom. What are the specific resources that the partnership can provide to the schools? What types of resources would best fit within the schools?

Data Collection & Analysis:
The data collection and analysis step focuses on collecting enough information to answer the key questions developed in the goals and objectives step.

To collect answers to the questions detailed above, the partnership set up meetings with each of the schools to meet with the teachers and administration. The discussions were driven by the individual needs of each school and what would work for the schools demographics. The partnership quickly determined that although Hamilton was a small town, the people of Hamilton were diverse and to reach all students, we needed to make our possible resources diverse and flexible.

Once meetings were complete with all of the schools and the partnership had a list of needs from each school, there was an analysis done of what would work for each age group and specific where resources would and could come from. The meetings with the administration and educators in each school were open conversations with input from all parties as to what might fit that specific school best. Those included, national agencies, state agencies, presentations by members of the partnership, and off site tours to the schools.
Development and Assessment of Alternative Solutions:
The development and assessment of the alternative solutions is the establishing the criteria for how the solutions will be selected. This can happen in multiple ways, brainstorming as a group, specific instructions from the client asking for the solution, or the data may point to a solution.

The partners began to pull together ideas, lessons and resources for the Hamilton City School District. Since the partners had the same goal of cultivating a relationship with the schools and similar areas of study interest, it was suggested that the focus be on sustainability. With partners in place, an area of study, a name for the project was developed, The Sustainable Living Project.

With a representative for the schools part of the partnership, we were able to assess our solutions as a group and make the decisions that best fit the needs.

Selection of Alternatives:
The selection of alternatives is when the solution to the problem outline in the identification step has been determined.

The final selection of the solutions was done by the partnership put together for the project. As a group, we determined that all schools were important to this project, which included a wide range of ages. Each school would have a tailored program that fit the teacher’s needs and wants. The partnership, as outside entity, had to respect the desires of the schools. To accommodate the needs of the schools, the partnership wanted to offer multiple types of resources. These ranged from handouts, onsite presentations with students, teacher development sessions and third party assembly presentations to the schools.

Implementation:
Implementation is the solution that was selected being put into action to address the problem defined.

The implementation of the Sustainable Living Project was a joint effort by all partners. There was no plan for how often and to which schools we made the resources available. It was on a need basis. When teachers or administrators saw a fit for the sustainability concepts adding to the lessons they were teaching in the classroom, the resources were brought in.

**Ongoing Monitoring and Evaluation:**
The monitoring and evaluation is often seen as the most important part of the problem solving process, as this step is the continuation of the implementation of the solution. It is also the step where adjustments and modifications to the solution will take place. The problem solving method is not meant to stop once the solution has been selected.

The evaluation process for the Sustainable Living Project was not established at the inception of the project. If the Problem Solving Process had been followed to the end, the perimeters of monitoring would have been determined.

By definition sustainable means using a resource so that it will not be depleted and has longevity. The continuation of this project and the longevity of it could benefit from a staff member, whether through the school district or the City of Hamilton, who would have dedicated responsibilities to the Sustainable Living Project. The staff member would be responsible for coordinating programs, presentations and information for and with teachers and administrators within the school district.

There are numerous organizations nationally that provide grant options for positions of this nature. Specifically, the USGBC (United States Green Building Council), has a program to fund a position similar to what my position was with the Sustainable Living Project that has a three-year succession plan associated with the grant. This is the type
of program that would provide the funding and guidance to continue the great work that was started with the Sustainable Living Project.

In addition to having a dedicated staff member, a program model can be develop that could be transferred to other school districts in implementing similar type programs. Collaboration work was how the Sustainable Living Project was started and creating a program model to share continues the collaboration.
Conclusion:
The Problem Solving Process is a method to assist in developing solutions to any identified issue. The process as it was applied to the Sustainable Living Project was a guide on how to establish a relationship between the City’s utilities department and the Hamilton City School District. With some of the objectives for the solution already established, like the partners involved and a focus on sustainability, the solutions were based on what the outside partnership could provide to the schools that they didn’t already provide their students. Additionally, when the partnership and project were started, there were no ongoing monitoring and evaluation perimeters that were set-up. In reviewing the yearlong process, this was an area that could have improved and potentially led to the longevity of the project.

The Sustainable Living Project was a program that, if structured correctly, could be a successful model for how outside agencies can interact with a local school district. Lessons are always learned after, and if the project were to continue those issues could be adjusted to create a dynamic partnership. As discussed in the Ongoing Monitoring and Evaluation section, the development of a program model would allow for numerous things to happen. One, it would document the program and partnership so that future involved parties understand how and why the project was developed. Two, it allows for the program to be transferable to other school districts and entities interested in creating partnerships of this type. A significant lesson that I learned during my coursework and projects in IES was the ability to take a solution develop through the problem solving process and make that solution transferable to other problems. Although the solution may not provide a specific answer to a problem, it can however, provide groundwork to the new solution.

The IES program provided opportunities and situations that required teamwork, collaboration and trust. All three of these skills were required throughout the entire graduate program, including my work with the Sustainable Living Project. The Public Service Project, coursework and smaller group projects throughout the IES program are
where these skills are developed and to a degree, perfected. My fellowship was where I was able to apply and continue to perfect these skills.

The Problem Solving Process, the basis for the IES program, only works when a team of people can collaborate, debate and evaluate the solutions developed for the problem defined. This process was used in everyday tasks that I performed for the City during my fellowship like developing Public Energy Week. I was presented with a problem of no general outreach to our residents/customers; I used the process to determine a solution, Public Energy Week. The problem solving process was utilized for larger scale problems of outreach to the school district and developing a relationship that would be sustained, as it was detailed in Chapter 4. This is a universal model that when applied with an open mind can assist in creating innovative solutions to basic and complex problems.
References

APPENDICES
Energy Saving Tips!

- Turn off the lights when you leave a room.
- Unplug your chargers!
  - Leaving chargers plugged in can create “vampire appliances” that use energy even though they aren’t being used for their intended purpose.
- When your traditional incandescent bulbs burn out, replace them with compact fluorescent lamp (CFL) bulbs.
  - An average household dedicates 11% of its energy budget to lighting. Using CFL’s can reduce lighting energy use in your home by 50 to 75%.
- Turn your thermostat down a few degrees to 68° during the winter time and 78° during the summer time.
  - For every degree you lower the thermostat in the winter or increase the thermostat in the summer you can save approximately 3% on the respective heating and air conditioning operating expenses.
- Turn off your TV, radio and all other appliances when you aren’t using them.
- You own your electricity!
  - The City of Hamilton is a publicly owned utility and provides you electricity 15%-18% cheaper than the area competitor.
- Get outside!
  - Encourage your children to play an hour less of video games during the week and enjoy the great outdoors with them.
- Open up the house!
  - Using ceiling fans and window fans can keep your house cool during the summer heat, while using 1/10th of the amount energy to run the air conditioner.
- Air conditioner + ceiling fan.
  - This allows you to decrease the thermostat setting by 4° and not reduce the comfort level in the home.
- Wash your clothes in cold water.
  - Washing in cold water does not require electric to heat the water, decreasing your electric bill.
- Line dry!
  - Drying your clothes outside on a clothes line or drying rack doesn’t cost a cent!
- Check and clean the filters on appliances.
  - Clean filters mean less energy use, saving money!
- Install weather-striping around doors and windows.
  - Fixing the air leaks in your house will keep you warmer in the winter and cooler during the summer and save on the electric bill.
- When reading or working on homework use your desk lamp instead of the overhead lighting.
- Set the hot water take to 120 degrees.
  - 15%-20% of the totally energy use in your home is used in heating water.

- Blinds and curtains—
  - During winter months, open on sunny days to allow for solar heat during and close at night to insulate against the cold. Reverse for summer months.

- Seal your windows using plastic liners.
  - This simple process can help eliminate air leaks and keep you warm on those snow days!

- Install low flow faucets and showerheads.
  - Decreasing the amount of water that flows can save potentially 500 gallons of water per week.

- You own your water!
  - Voted the best tasting tap water in the world (2010 Berkley Springs International Water Tasting winner). Cost is 11\textsuperscript{th} lowest out of 67 jurisdictions.

- Buy Local!
  - Frequent the Historic Hamilton Farmer’s Market every Saturday!

- Ride your bike or walk to where you’re going, when possible.
  - A savings all around, plus family time!

- Only use your bathroom fan when necessary.
  - Exhaust fans can draw in outdoor air, adding hot air to your cool environment during the summer and cold air to your warm environment during the winter.

- Clean the lint filter in dryer.
  - A clean lint filter creates better circulation of air flow in the dryer, therefore drying your clothes in a timely fashion.

- Make use of the Sun!
  - Whenever possible use the natural lighting from the Sun to light your house instead of flipping a switch.

- Repainting a room? Paint it in a light color.
  - Lighter colored rooms allow for less lighting to be needed.

- Using your dishwasher?
  - Only run full loads – This will save on water and electric by not running more than the necessary loads.

- You own your gas!
  - The City of Hamilton provides you with the natural gas that is used to cook, heat water and your home. You pay 15%-20% less than Duke Energy customers.

CONTACT:
The City of Hamilton
Department of Electric
345 High Street
Hamilton, OH 45011
(513) 785-7100
www.hamilton-city.org

We Do Everything In Our Power,
For Your Power
The City of Hamilton
Do the Scavenger Hunt with your family and find out if you have Energy Hogs lurking in your home. Check the answer box that best matches you and your home. There are no wrong answers, so be honest. As each home is different, only answer 10 of the questions that apply to your home.

1. **Insulation:** Ask an adult at home how much insulation you have in the attic.
   - 6 inches or less (2 pts.)
   - 7-11 inches (4 pts.)
   - 12 inches or more (6 pts.)

2. **Furnace Filters:** Ask an adult at home how often your filters were cleaned or changed in the last year.
   - Not at all (2 pts.)
   - 1-3 times (4 pts.)
   - 4 or more (6 pts.)

3. **Windows:** How many layers of glass do your windows have?
   - Single-pane with no storm windows (2 pts.)
   - Single-pane with storm windows or double-pane (4 pts.)
   - Double-pane with reflective coating or gas-filled (6 pts.)

4. **Thermostat:** At what temperature do you set your thermostat when you are home and awake?
   - **In heating seasons (winter):**
     - 73° or more (1 pt.)
     - 70°-72° (2 pts.)
     - 69° or less (3 pts.)
   - **In cooling seasons (summer):**
     - 74° or less (1 pt.)
     - 75°-77° (2 pts.)
     - 78° or more (3 pts.)

5. **Weatherstripping:** Open your front door and check the condition of the weatherstripping between the door and the door frame.
   - None (2 pts.)
   - Worn out (4 pts.)
   - Good condition (6 pts.)

6. **Lights:** How often do you turn lights off when you leave a room?
   - Almost Never (2 pts.)
   - Sometimes (4 pts.)
   - Always (6 pts.)

7. **Light Bulbs:** Count the number of compact fluorescent light bulbs (CFLs) you have in your house.
   - No CFL bulbs (2 pts.)
   - 1-4 CFL bulbs (4 pts.)
   - 5 or more CFLs (6 pts.)

8. **Cooking:** How often does your family keep the lids on pots and pans when cooking meals?
   - Almost never (2 pts.)
   - Sometimes (4 pts.)
   - Always (6 pts.)
(hint: electronics or appliances)
How many did you find?
☐ No Energy Star® labels found (2 pts.)
☐ 1–2 Energy Star® labels found (4 pts.)
☐ 3 or more Energy Star® labels found (6 pts.)

10. Water Heater: Find the Energy Guide label on your water heater and look at the efficiency rating. How much energy does it use compared to similar models?
☐ Uses the most energy (2 pts.)
☐ Uses average amount of energy (4 pts.)
☐ Uses the least energy (6 pts.)

11. Laundry: At what water temperature do you wash your clothes?
☐ Mostly HOT water (2 pts.)
☐ Mostly WARM water (4 pts.)
☐ Mostly COLD water (6 pts.)

12. Hot Water Use (Shower): How much time do you spend in the shower?
☐ 15 minutes or more (2 pts.)
☐ 10 minutes (4 pts.)
☐ 5 minutes (6 pts.)

How Did You Score?

Total Points = _____

Add up points from the 10 questions you answered for your total.

45–60 Awesome!! You’re doing a great job of busting those Energy Hogs in your home. Keep up the good work!

31–44 Almost! You’re on your way to becoming an Energy Hog Buster, but there’s more to do. Those Hogs might be creeping into areas of your house like your attic (think “Insulation!”)—or add weatherstripping around drafty doors and windows to stop them from sneaking in.

20–31 Oink! Oh Noo!
Taking the Energy Hog Scavenger Hunt is the first step. The next step is to bust the Energy Hogs lurking in your home. They live in places that need insulation, like the attic. In the winter, try to use less heat in your home by wearing warmer clothes. During hot summer days, close the shades and use fans to cool off.

Change 4 for the planet!

Families that replace the four most used 75-watt incandescent bulbs with 23-watt compact fluorescent bulbs can save more than 2000 kWh and $190 over the life of the bulbs. If all U.S. households did this, we’d save as much energy as is consumed by some 38 million cars in one year!
See other side for items that CAN be recycled.

Hamilton Recycles!
Know BEFORE You Throw

NO

- Pill bottles or vials
- Clamshells, trays & lids
- Milk cartons & drink boxes
- Styrofoam (of any kind)
- Plant pots
- Styrofoam egg cartons
- Lids, caps & tops, CDs
- Coat hangers (plastic or metal)
- Glassware
- Scrap metal
- Light bulbs & window glass
- Aluminum foil
- Mirrors, pyrex & ceramic
- Paper towels, plates & napkins
- Dairy tubs & yogurt cups
- Motor oil & hazardous waste containers

RUMPKE
See other side for items that CAN'T be recycled.

Hamilton Recycles!
Know BEFORE You Throw

YES

Plastic Bottles & Jugs
Glass Bottles & Jars
Aluminum & Tin Cans
Frozen Food Boxes (please flatten)
Paper Egg Cartons
Coffee Tubs
Cereal & Shoe Boxes
Soda & Beer Cartons (please flatten)
Magazines, Catalogs & Phone Books
Newspapers & Junk Mail
Cardboard & Pizza Boxes (please flatten)
Paper Bags & Shredded Paper (place in a paper bag)

Need a bin? Call 867-8661
For recycling information call 887-3653 or visit www.buttercountyreycles.org.
Appliance Reliance...what do you use?

- Write down five of the appliances that you use in your house each day.
  - Examples...
    - Air Conditioner
    - Clock
    - CD player or iPod
    - Hair dryer
    - TV
    - Toaster
    - Computer

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Average Wattage</th>
<th>Average Operation Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air conditioner (windows)</td>
<td>1153</td>
<td>$1.07 / month</td>
</tr>
<tr>
<td>Air conditioner (central)</td>
<td>3600</td>
<td>$15.72 / month</td>
</tr>
<tr>
<td>Clock</td>
<td>2</td>
<td>0.10 / month</td>
</tr>
<tr>
<td>Clothes dryer</td>
<td>4856</td>
<td>4.46 / month</td>
</tr>
<tr>
<td>Coffee maker</td>
<td>600</td>
<td>0.01 / 15 minutes</td>
</tr>
<tr>
<td>Compact disc player</td>
<td>13</td>
<td>0.01 / hour</td>
</tr>
<tr>
<td>Curling iron</td>
<td>40</td>
<td>0.02 / 10 minutes</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>1200</td>
<td>8.50 / month</td>
</tr>
<tr>
<td>Electric blanket</td>
<td>150</td>
<td>0.56 / 8 hours</td>
</tr>
<tr>
<td>Fan (ceiling)</td>
<td>200</td>
<td>1.23 / month</td>
</tr>
<tr>
<td>Fluorescent light bulb</td>
<td>18</td>
<td>0.04 / month</td>
</tr>
<tr>
<td>Grill (electric)</td>
<td>1300</td>
<td>0.11 / hour</td>
</tr>
<tr>
<td>Hair dryer</td>
<td>1500</td>
<td>0.01 / 8 minutes</td>
</tr>
<tr>
<td>Hot plate</td>
<td>1250</td>
<td>0.05 / 30 minutes</td>
</tr>
<tr>
<td>Incandescent light bulb</td>
<td>150</td>
<td>0.27 / hour</td>
</tr>
<tr>
<td>Iron</td>
<td>1100</td>
<td>0.04 / hour</td>
</tr>
<tr>
<td>Microwave oven</td>
<td>450</td>
<td>0.22 / hour</td>
</tr>
<tr>
<td>Personal computer</td>
<td>114</td>
<td>0.01 / hour</td>
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<tr>
<td>Monitor</td>
<td>71</td>
<td>0.05 / hour</td>
</tr>
<tr>
<td>Radio</td>
<td>1450</td>
<td>0.12 / hour</td>
</tr>
<tr>
<td>Range (large surface unit)</td>
<td>2700</td>
<td>0.06 / hour</td>
</tr>
<tr>
<td>Refrigerator-freezer (manual defrost)</td>
<td>300</td>
<td>2.00 / week</td>
</tr>
<tr>
<td>Refrigerator-freezer (automatic defrost)</td>
<td>450</td>
<td>3.00 / week</td>
</tr>
<tr>
<td>Treadmill (black &amp; white)</td>
<td>160</td>
<td>0.08 / hour</td>
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<tr>
<td>Television (color)</td>
<td>250</td>
<td>0.05 / hour</td>
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<tr>
<td>Toaster</td>
<td>1100</td>
<td>0.54 / month</td>
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<tr>
<td>Vacuum cleaner</td>
<td>350</td>
<td>0.04 / hour</td>
</tr>
<tr>
<td>VCR</td>
<td>50</td>
<td>0.04 / hour</td>
</tr>
<tr>
<td>Washing machine</td>
<td>360</td>
<td>0.84 / hour</td>
</tr>
<tr>
<td>Water heater</td>
<td>2500</td>
<td>0.75 / week</td>
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</tbody>
</table>
City of Hamilton Utility Systems Update

- We are the only city in the state to have all four major utilities: Electric, Gas, Water, Wastewater

- Our Municipal Utilities are 100% Customer-owned and do not make a profit
  - No Stockholders to pay dividends to
  - No multi million dollar CEO’s

- We offer some of the lowest utility rates in the mid-west while leading our entire region in environmental stewardship

- In 2010 the average Hamilton Residential Customer spent over $600, or 23%, less for utility service than the regional average. The combined residential savings totaled nearly $14,000,000
Generation of Energy

- Over 45% of our electrical energy from fully sustainable and pollution free hydro power
  - **Greenup Hydro Plant** – 283,000 MWh’s of energy since 1982

- The City and AMP currently constructing largest and most efficient hydro project on the Ohio River
  - **Meldahl Project** – 105 MW Capacity
  - When complete 65% of our energy supply will be completely green and renewable

- The City will be receiving 35MW per day from **Prairie State Energy Campus**
  - State of the art coal-fired power plant

- The City will be acquiring 34 MW of Capacity in the **Fremont Energy Center**
  - State of the art/low emissions gas unit in Fremont Ohio
Greenup Hydro Power Plant
Meldahl Hydro Power Plant
Prairie State Energy Campus
Municipal Owned Utilities

- Gas (ccf)
- Electric (kWh)
- Water (ccf)
- Wastewater (based on Water)
What’s a Rider?

- Monthly charges based on usage to collect various earmarked expenses by the utility.
- Each utility has associated riders to collect for different expenses.
Electric Riders

- Rider A – Power Cost Adjustment
- Rider B – Electric Rate Stabilization Fund Adjustment
- Rider C – Residential Suburban Surcharge
- Rider D – Unfunded Environmental Mandates Adjustment
- Rider E – Unfunded Governmental and Regulatory Mandates Adjustment
- Rider F – Economic Development Cost Adjustment
- Rider KWH Tax – Ohio Kilowatt Hour Tax Rider
**Gas Riders**

- **Rider A** – Unfunded Governmental and Regulatory Mandates Gas Utility Adjustment
- **Rider B** – Economic Development Cost Gas Utility Adjustment
- **Rider C** – Natural Gas Residential Service Line Maintenance Rider
- **Rate Stabilization Fund Adjustment Rider**
Water and Wastewater Usage

Water

<table>
<thead>
<tr>
<th>Minimum Charge</th>
<th>Cost per cf</th>
<th>Usage</th>
<th>Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units 1 to 4</td>
<td>2.6200</td>
<td>4</td>
<td>10.48</td>
</tr>
</tbody>
</table>

Sanathan Santhias

Total Water Bill: 10.48

Wastewater

<table>
<thead>
<tr>
<th>Minimum Charge</th>
<th>Cost per cf</th>
<th>Usage</th>
<th>Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Billing Charge</td>
<td>23.00</td>
<td>124.20</td>
<td>292.95</td>
</tr>
<tr>
<td>Water A</td>
<td>0.7500</td>
<td>20.83</td>
<td>15.66</td>
</tr>
</tbody>
</table>

Total Wastewater Bill: 292.95

The City of Hamilton
Water and Wastewater Riders

- **Rider A** – Unfunded Governmental and Regulatory Mandates Water Utility Adjustment

- **Rider C** – Water Main Replacement Program

- **Rider A** – Unfunded Governmental and Regulatory Mandates Wastewater Utility Adjustment
How much does it cost you to be bright?
The Case of the 65 Watt Light Bulb

- **Mystery:**
  How much does it cost to keep a 65 watt light bulb on for a full month?

- **Solution:**
  A 65 watt light bulb uses 65 watts in an hour (65 watt hours)

  65 watt hours times 24 hours in a day = 1,560 watt hours in one day

  1,560 watt hours times 31 days in a month = 48,360 watt hours

  48,360 watt hours divided by 1000 = 48.36 kilowatt hours (kWh)

  48.36 kWh X $.10 per kWh = $4.84

What else could you do with $4.84?
What Can You Do Tonight?

- Unplug your phone charger
- Turn off any appliances not in use
- Check the filters on appliances
- Wash your clothes in COLD water!
- Clean out the lint filter in the dryer
- Get outside! Enjoying the greater outdoors means you’re not using electricity inside!
Questions, Questions, Questions???