Williamson Local Energy Action Plan
2011
A. Introduction

Without easily accessible energy, our modern civilization would not exist. Like the rest of the country, Williamson depends on reliable and affordable energy to keep its buildings illuminated and comfortable, traffic lights functional, and vehicles mobile. This reliance on energy leads to considerable debate on the sources and pricing of energy supplies. Consumers often advocate lower energy prices; however, low prices do not necessarily lead to low total energy bills if consumers live and work in energy inefficient buildings, drive inefficient cars, and/or commute excessive distances. In these situations, increasing energy efficiency measures, rather than decreasing prices, may be a more affordable energy solution for both individual consumers and the greater community.

Many cities in the United States understand that investments in energy efficiency:

- Reduce energy consumption;
- Shield consumers from spikes in energy prices; and,
- Decrease long-term operating costs of buildings and vehicles.

Therefore, these cities are developing plans that promote energy conservation and energy efficiency within city operations and across their community. Cities are uniquely positioned to reduce energy consumption and promote energy efficiency because they operate energy intensive buildings, facilities, and vehicles. They also enact policies and regulations (e.g., building codes) that impact their community’s energy consumption.

Aside from the immediate desire to reduce energy bills, another motivation for adopting energy plans is the concept of sustainability. The basic definition of sustainability is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”¹ Sustainability encompasses three areas of concern for local governments and communities:

- Economic development;
- Equitable social inclusion; and,
- Environmental performance.

Cities increasingly understand that the economy, equity, and environment are not separate silos but rather partners in improving their citizens’ quality of life. Sustainability encompasses many topics that affect the long-term economic, social, and environmental well being of a community including energy, land and water use, transportation, and materials management. The focus of this Report, however, is energy and the steps Williamson can take to decrease its energy bills while at the same time promote local job growth and reduce ecological impacts.

Williamson Local Energy Action Plan

The Appalachian Regional Commission, U.S. Department of Energy, U.S. Department of Agriculture, and local sources have provided funds for a range of projects in Williamson including:

- A Smart-Office to showcase energy saving techniques, spark entrepreneurship, and train 95 individuals in energy efficiency, green building standards, and solar technology;
- Demonstration projects that will result in three solar installations, an Energy Star certification for the Williamson Emergency Services building, and annual savings of at least $2,500 for the City; and,
- A Local Energy Action Plan (LEAP) that seeks to achieve energy savings by investing in cost-effective and low impact technologies.

Southface, an Atlanta-based nonprofit with expertise in energy efficiency, was hired to assist the Williamson LEAP project team with the formulation of Williamson’s LEAP. The planning process for Williamson’s LEAP began with an identification of data required to inventory local energy use (e.g., utility bills). Analysis of this information, the details of which are contained in this LEAP Report, provided insight into the areas of greatest energy consumption. The analysis of data was followed by a Charrette, i.e., collaborative workshop, led by Southface with diverse participants including City personnel, Mingo County employees, members of various City Boards, and Williamson citizens. These discussions helped prioritize goals and revealed local and regional assets than Williamson can leverage to achieve energy savings, as well as barriers that might hinder otherwise viable energy savings strategies.

Williamson LEAP Mission Statement

At the community meeting that kicked off the Charrette on Monday evening, April 25, 2011, the Southface team asked attendees to list words and phrases that describe what Williamson’s LEAP should embody and accomplish. Attendees suggested words and phrase that fall into these general categories:

- Cost effective;
- Efficiency;
- Education; and,
- Collaboration.

The Southface team took these words and phrases and crafted two versions of a mission statement. At the conclusion of the findings presentation on Wednesday evening, April 27, 2011, attendees were asked to select the version that should be the Williamson LEAP Mission Statement. By unanimous decision, the attendees selected the following Mission Statement:
The Williamson Local Energy Action Plan seeks cost-effective energy efficiency solutions for the City of Williamson through energy awareness, waste reduction, and reinvestment of savings.

LEAP Report Structure

The data analysis and discussions with key stakeholders that formed the foundation of this LEAP Report have resulted in a preliminary set of recommendations that will help Williamson reduce its energy expenditures and spur local jobs creation. This LEAP Report also contains information and templates that the City of Williamson can use to create department-, facility, and building-level goals, which will help Williamson reduce its energy consumption and lower its energy bills.

To discuss sustainable approaches to meeting Williamson’s energy needs, we must first understand both the sources and consumers of energy. Therefore, this LEAP Report begins with background information on energy and state-wide data regarding energy sources and end-users. The LEAP Report continues with details of local energy usage, the results of the Charrette, a high-level analysis of municipal buildings, an analysis of viable local sources of renewable energy, and a discussion regarding financing sources. The next section provides recommendations on how to reduce energy consumption of Williamson’s buildings, water and sewage treatment plants, and vehicles, as well as recommendations on how to implement the recommendations and templates that can be used to formulate department-, facility, and building-level goals, action items, and performance measurement metrics that will help the City reduce its energy consumption and lower its energy bills.

2 While precise information regarding Williamson’s sources and consumers of energy is inaccessible, we can gain an understanding of the City’s statistics by referring to state-wide data. For example, the building, sewage treatment facility, and transportation sectors consume approximately 44 percent of all the energy consumed in West Virginia. Therefore, it can be inferred that these sectors also consume at least 44 percent of all the energy consumed in Williamson.
B. Energy Overview

Simply defined, energy is the ability or potential to do work such as warm a building, provide light, or move a vehicle. We can warm a building by burning natural gas in a furnace, illuminate a street light by using electricity, and move a car by combusting gasoline. In these examples natural gas, electricity, and gasoline are the types of energy that perform the work.

Types of Energy

Not all types of energy are the same. Fossil fuels (e.g., coal, oil, and natural gas) and uranium are examples of primary energy sources because they contain energy directly from natural sources. Solar and wind are examples of primary energy sources because they are natural sources of energy. Electricity is a secondary energy source because it is produced from primary sources of energy such as coal, nuclear, natural gas, solar, moving water (hydro), or wind. This distinction is important because it takes a lot of primary energy to generate electricity. According to the Department of Energy (DOE), the nation’s coal-fueled electric power plants convert only a third of coal’s energy potential into electricity. Therefore, consumers save an even greater amount of primary energy sources such as coal by using less electricity.

Another important distinction should be made between non-renewable and renewable energy sources. Non-renewable energy sources such as coal, oil, natural gas, and nuclear are finite and will eventually be depleted. By contrast, renewable energy sources such as solar, wind, hydro, and biomass are either unlimited or can be quickly replenished.

Sources of West Virginia’s Energy

Energy for all Uses

Non-renewable fossil fuel energy sources dominate West Virginia’s energy portfolio. Figure B-1 contains the U.S. Energy Information Administration (EIA) 2009 estimates for West Virginia’s primary energy sources. In that year, West Virginia got 96.3 percent of its energy from fossil fuels, which include coal, natural gas, and petroleum and the remaining 3.7 percent from renewable sources.

Figure B-1: West Virginia Energy Consumption Estimates by Primary Sources (2009 EIA Data)


Energy for Electricity Generation

Most of the electricity consumed in West Virginia is generated in thermoelectric power plants that burn coal to produce heat. This heat boils water and creates steam that turns electricity-generating turbines. In 2009, about 96.6 percent of all electricity generated in West Virginia was from non-renewable energy sources. Only 3.4 percent of the electricity generated in West Virginia in 2009 was from renewable energy sources.5

A Kilowatt Saved = A Kilowatt Earned

In addition to non-renewable and renewable energy sources, we should think of energy efficiency as a source of energy. Every kilowatt of electricity saved is a kilowatt that does not have to be generated. Every gallon of transportation fuel not used is a gallon that does not have to be extracted. By improving energy efficiency, West Virginia can reduce demand for electricity, natural gas, and transportation fuels. Moreover, the nature of energy conservation projects requires local labor for activities such as improvements to existing buildings, which keeps more local dollars within the community.

Consumers of West Virginia’s Energy

Figure B-2 contains 2009 West Virginia energy consumption by end-use sector.6 The residential end-use sector, which consists of living quarters for private households,7 accounted for 21.1 percent of West Virginia’s energy consumption. The commercial end-use sector, which consists of office, government, educational, religious, and civic buildings, institutional living quarters, and sewage treatment facilities,8 accounted for 15.6 percent of West Virginia’s energy consumption. Therefore, buildings and sewage treatment facilities accounted for the largest portion of energy consumed in West Virginia in 2009. The industrial end-use sector, which includes energy used for mining and construction,9 accounted for 38.3 percent and the transportation end-use sector accounted for 23.1 percent. Because of the limited amount of mining and other industrial activities that occur within the Williamson

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city limits, buildings and sewage treatment facilities probably account for more than 38.7 percent of Williamson’s community-wide total energy consumption.

**Economic Benefits of Energy Efficiency and Renewable Energy**

**Lower Bills**

The immediate benefit of consuming less energy is a lower energy bill. Reducing the bills paid by local governments, businesses, and residents is an important motivator even in a state that has some of the lowest electricity rates in the nation. Table B-1 shows that West Virginia’s residential and commercial electricity rates are considerably below the national average.10

However, lower rates do not necessarily result in lower overall bills. Table B-1 also shows that West Virginia residential and commercial average electricity rates increased more than the national average between March 2007 and March 2011. West Virginia’s average residential electricity rate rose 45.7 percent while the national average residential electricity rate only rose 14 percent. West Virginia’s average commercial electricity rate rose 41.1 percent, which was also much steeper than the national average commercial electricity rate increase of 7.3 percent.

**Table B-1: Comparison of West Virginia and National Electricity Rates**

<table>
<thead>
<tr>
<th>Period</th>
<th>Residential Averages</th>
<th>Commercial Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WV</td>
<td>US</td>
</tr>
<tr>
<td>March 2007</td>
<td>6.26¢</td>
<td>10.21¢</td>
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<tr>
<td>March 2008</td>
<td>6.70¢</td>
<td>10.57¢</td>
</tr>
<tr>
<td>March 2009</td>
<td>7.72¢</td>
<td>11.33¢</td>
</tr>
<tr>
<td>March 2010</td>
<td>8.42¢</td>
<td>11.21¢</td>
</tr>
<tr>
<td>March 2011</td>
<td>9.12¢</td>
<td>11.64¢</td>
</tr>
</tbody>
</table>

**Table B-2: Comparison of West Virginia, Pennsylvania, Ohio, and National Residential Electricity Consumption**

<table>
<thead>
<tr>
<th>Period</th>
<th>WV Monthly Average</th>
<th>PA Monthly Average</th>
<th>OH Monthly Average</th>
<th>US Monthly Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1,120 kWh</td>
<td>868 kWh</td>
<td>923 kWh</td>
<td>938 kWh</td>
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<tr>
<td>2006</td>
<td>1,075 kWh</td>
<td>831 kWh</td>
<td>875 kWh</td>
<td>920 kWh</td>
</tr>
<tr>
<td>2007</td>
<td>1,138 kWh</td>
<td>874 kWh</td>
<td>926 kWh</td>
<td>936 kWh</td>
</tr>
<tr>
<td>2008</td>
<td>1,135 kWh</td>
<td>861 kWh</td>
<td>910 kWh</td>
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<tr>
<td>2009</td>
<td>1,116 kWh</td>
<td>842 kWh</td>
<td>878 kWh</td>
<td>908 kWh</td>
</tr>
</tbody>
</table>

West Virginia local governments, businesses, and residents have been squeezed by these sharply increasing electricity rates. The average West Virginia home paid $94.17 a month for electricity in 2010.11 Improving a home’s energy efficiency is quick way to reduce this bill. As shown in Table B-2, the average home in West Virginia consumes considerably more energy than the national average. Even when compared to its neighbors, West Virginia’s homes have much room for efficiency improvements. In 2009, the average home in West Virginia consumed 32.5 percent more energy than the

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average Pennsylvania home and 27.1 percent more energy than the average Ohio home. Given this difference between West Virginia and its neighbors, there is ample room for reducing the energy consumed in Williamson.

Local governments that have implemented energy efficiency initiatives and increased use of renewable energy sources have seen a reduction in their energy bills. In 2005, the U.S. local governments that participated in ICLEI’s Cites for Climate Protection Program collectively reduced emissions by approximately 23 million tons and saved $600 million in related energy costs. According to the American Council for an Energy-Efficient Economy (ACEEE), if West Virginia implemented a proposed federal Energy Efficiency Resource Standard that results in 15 percent electricity savings and 10 percent natural gas savings between 2011 and 2020, then West Virginia would save 5,132 gigawatts of electricity by 2020. This is enough electricity to power approximately 383,214 West Virginia homes for a year (based on average 2009 electricity consumption). The ACEEE calculates that implementation of such an Energy Efficiency Resource Standard would reduce West Virginia’s energy bill by more than $920 million by 2020, which would result in about $1,280 in savings per household from energy efficiency measures installed by 2020.

**Local Jobs**

West Virginia produces over 13 percent of the nation’s coal and is the second largest producer of coal in the country. It goes without saying that coal mining is a vital component of West Virginia’s and Mingo County’s economy. Coal mining companies employed over 1,500 people in Mingo County in 2008. However, it would be a mistake to view West Virginia as simply a “coal state.” As discussed above, coal is stored energy. And it is just one form of energy that West Virginia exports to other states. In addition to being a net exporter of coal, West Virginia leads the nation in net interstate electricity exports. Therefore, it is more appropriate to think of West Virginia as a net exporter of energy.

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Virginia as an “energy state.” As it does with coal and electricity, West Virginia can tap into its energy efficiency and renewable energy potential to generate local jobs.

Despite the vital importance of the coal industry, it cannot pull West Virginia and Mingo County out of the recession by itself. As of May 2011, Mingo County has an unemployment rate of 9.8 percent, which is higher than the state unemployment rate of 8.6 percent. The Williamson / Mingo County area recognizes that it has to diversify the jobs base. For example, the TransGas Development Systems coal-liquefaction plant in Mingo County will take about four years to build, create approximately 3,000 construction jobs during that time, and provide 300 full-time jobs once operational.

Energy efficiency and increased use of renewable energy sources can also complement the coal industry and spur local economic growth. The nature of energy efficiency and renewable energy projects requires local labor for activities such as improvements to existing buildings and installation of solar panels. A 2009 study by the University of Massachusetts-Amherst and the Center for American Progress calculates that one million dollars invested in fossil fuels creates about 5.3 jobs. In contrast, a one million dollar investment in energy efficiency and clean energy creates approximately 16.7 jobs. The ACEEE estimates that by reaching year 2020 Energy Efficiency Resources Standard targets, West Virginia could create approximately 1,447 jobs.

Diversified Energy Sector

Being a major exporter of coal and electricity generated by coal, West Virginia is uniquely positioned to reap the benefits from expenditures in fossil fuels as well as energy efficiency and clean energy. For example, investing in electricity efficiency will lower consumers’ electricity consumption. This benefits consumers directly through lower bills. It also benefits West Virginia by creating local jobs in the electricity conservation/efficiency sector (e.g., construction jobs). Reduced local electricity consumption can allow West Virginia to expand economic growth using the electricity output of its existing electricity generation plants rather than having to construct new plants to meet increased electricity needs. Moreover, reduced local peak-demand

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Strategies for Williamson to Reduce Impact of Energy Consumption

The cheapest energy is the energy not used. Therefore, Williamson’s sustainable energy policies should first focus on energy reduction and efficiency and then on clean renewable energy sources to maximize the impact of its and the community’s investments. For example, placing a solar panel on a building that has inadequate insulation will simply waste expensive solar energy. The upfront capital required to purchase and install the solar panel will not yield the expected return because of the inefficiency of the building. However, if that capital is first invested in improving building efficiency, then the resulting savings in utility bills can be used towards the purchase of solar panels, which can further reduce the building’s utility bills and reduce the community’s reliance on non-renewable energy sources.

This LEAP Report directs Williamson to prioritize its sustainable energy policies to focus on those that result in the greatest energy savings and cost reductions with the least amount of upfront investment. To this end, Williamson should follow the energy sustainability principles prioritized in Figure B-3 in order to make Williamson’s energy consumption more sustainable. Williamson should keep in mind, however, that there are opportunities to address energy efficiency and renewable local energy production at the same time. Where such opportunities are identified, Williamson should assess the cost effectiveness of concurrently pursuing energy efficiency and renewable local production.

1. Energy Reduction and Efficiency

Williamson should primarily focus on energy efficiency because energy efficiency is cheaper and produces benefits much faster than installing alternate sources of energy. Arguably, the cost of energy efficiency can be zero. It costs nothing to change behavior, for example turning off the lights when leaving the office. Even if we consider energy efficiency capital investments, energy efficiency is still the most cost-effective source of energy. Based on analysis performed by ACEEE, the U.S. average cost for electricity efficiency is 2.5¢ per kilowatt-hour (kWh), with a range of 1.6¢ to 3.3¢ per kWh.23 As shown in Figure B-4, this is considerably lower than the cost of obtaining electricity from any non-renewable or renewable energy source.24

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Moreover, it is much quicker to implement energy efficiency initiatives than install sources of renewable energy. Low cost initiatives like “turn off the light” programs yield immediate energy savings. Governments, businesses, and residents can install energy efficient light bulbs, heating and cooling systems, and insulation in a relatively short amount of time. Obviously, the construction of new coal-fired power plants takes much longer. And even though solar panels can be installed relatively quickly, it is far less effective to place a solar panel on an energy inefficient building.

2. Local Energy Production

After optimizing energy reduction and efficiency programs, Williamson should focus on local renewable energy sources such as solar and landfill biogas. To reduce energy loss resulting from electricity transmission and distribution, Williamson should also consider locally produced electricity through highly efficient and cleaner conventional sources (e.g., combined cycle natural gas turbines). Locally produced energy has the advantage of lower transmission losses.

Williamson should choose energy sources to maximize their cost effectiveness and minimize their environmental impact. Therefore, even though non-renewable energy sources may be the cheapest form of energy based on utility rates, Williamson should consider the affordability of the final utility bill, as well as the long-term price stability of non-renewable versus renewable sources of energy. Renewable energy systems sometimes have a higher initial cost than non-renewable options but, when coupled with energy efficiency, they can lower the total energy bill and have substantial benefits to a community’s environment and human health. Moreover, using diverse energy resources will reduce Williamson’s exposure to price and supply issues resulting from relying on a few energy sources.
3. Capture and Reuse Wasted Energy

Williamson should identify opportunities to capture and reuse waste heat to power auxiliary energy generating turbines, provide heat for industrial purposes, or provide climate control for buildings. To facilitate the capture and reuse of otherwise wasted energy, Williamson should foster the co-location of complementary energy production/energy consumption facilities (e.g., industrial parks that use biogas obtained from an adjacent landfill or wastewater treatment plants).
C. Analyses and Recommendations

The centerpiece of the LEAP planning process was the Charrette, which the National Charrette Institute defines as “a multi-day, collaborative workshop harnessing the talents and energies of all interested parties to create and support a feasible plan that represents transformative community change.” A charrette engages a variety of stakeholders at levels appropriate to their involvement in the project. It provides short feedback loops to check progress against goals set for the project. A charrette also reduces the chance of repetitive work and revisions by having the professionals, officials, and stakeholders all together in planning sessions.

To prepare for the Charrette, the Williamson LEAP project team and Southface reviewed utility bills, building inventories, and vehicle inventories to gain an understanding of Williamson’s energy consumption. This background information provided Southface and the LEAP project team with insight into Williamson’s current energy landscape and helped the LEAP Team identify a list of stakeholders to invite to a Charrette.

The Charrette was conducted in Williamson by Southface. After substantial preparations by Southface and the LEAP Project team, a community meeting kicked off the Charrette on Monday evening, April 25, 2011. Participants received background information about the LEAP planning process and objectives, an overview of West Virginia energy data, an introduction to energy sustainability principles, an explanation of the tasks of an energy coordinator, and details regarding funding options. This was followed by a full day of interviews with key stakeholders on Tuesday April 26, 2011 and a half-day of interviews with key stakeholders on Wednesday April 27, 2011. The following stakeholders were interviewed:

- John Stallard and Jason Allen – Veolia Water
- Charley McCoy – Tug Valley Chamber of Commerce and First National Bank
- Leigh Ann Ray – Mingo County Grant Writer and Project Manager
- Lisa Vaughn – Williamson Utility Office
- Reverend Settles – Williamson Utility Board
- Jared Fletcher – Mingo County Emergency Medical Services and Downtown Williamson Property Owner
- Pierce Whitt, Curt Phillips, and Chris Ooten – Parks and Recreation Board
- Anne Lambright – Williamson Redevelopment Authority
- Dr. Dino Beckett – Williamson Redevelopment Authority and Downtown Williamson Property Owner
- Margaret Conner – Real Estate 2
- Larry Brown Jr. – City of Williamson

During these stakeholder interviews, Southface and the LEAP Project Team obtained background information, utility bills, technical information, and feedback from the stakeholders, as well as the names of additional individuals with whom to speak. The Charrette closed with a findings presentation on Wednesday evening, April 27, 2011.
After the Charrette, Southface and the LEAP project team requested and reviewed additional data regarding City-owned buildings and utilities, as well as geographic information system data and National Renewable Energy Laboratory data regarding the viable renewable energy sources available to Williamson. The result of these analyses and the Charrette process is a LEAP Report that focuses on energy reduction and energy efficiency strategies that should be effective in Williamson based on stakeholder input and local assets than Williamson can leverage to achieve energy savings.

**Williamson Buildings and Facilities**

**Municipal Buildings and Facilities: Overview**

The City of Williamson has the following buildings and facilities in its inventory:

- Field House;
- Community Center and swimming pool;
- City Hall;
- Emergency Services Building; and
- City Garage.

The City also has four water tanks (Goodwin, Sycamore, Gaujot, and College Hill), traffic lights, miscellaneous outdoor lights, and pumps at the floodwall. The City pays for the electricity consumed by street lights. Veolia Environmental Services (Veolia) operates the City-owned water treatment plant and wastewater treatment plant.

**Municipal Utility Cost Analysis**

In 2010, the City of Williamson spent approximately $125,000 for electricity and Veolia spent over $200,000. As discussed below, the City paid $888 of Veolia’s energy costs. Figure C-1 lists total electricity costs (City and Veolia) and percentages of the costs incurred by the City, i.e., excluding $200,000 paid by Veolia.

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See Appendix 1 for the Williamson “Government Analysis – Buildings and Facilities Inventory and Forecast,” which was prepared by the City and contains 2010 electricity and natural gas consumption and cost figures for the Community Center, City Garage, Street Lights, Field House, City Hall, and Emergency Services Building. Veolia provided the data for the water and waste water treatment plants. Miscellaneous electricity and natural gas charges were tabulated through a review of 2010 invoices.
In 2010, the City spent over $41,000 for natural gas. Figure C-2 lists total natural gas costs. Based on an initial assessment, the water and wastewater treatment plants, City street lights, the Field House, and the City Energy Services Building are the City government’s largest consumers of electricity and natural gas. Therefore, the City should focus on these high energy use areas first and then address lower energy use areas such as the miscellaneous users of electricity and natural gas (e.g., pumps, traffic lights, and Christmas/festival lights).

**Waste and Wastewater Treatment Facilities: Background**

Jonathan Stallard (Veolia District Manager) and Jason Allen (Veolia Project Manager) provided insight into Williamson’s water and wastewater treatment facilities during the Charrette. Veolia has a contract with the Williamson Utility Board to manage the water and wastewater treatment plants. As per Veolia’s contract with the Utility Board, Veolia pays for the electricity bill up to $200,000. The City pays for overages. In the last two years, the water and wastewater treatment electricity bill has jumped ten to 15 percent because of rate increases. In 2010, the combined electricity bill for both plants was $200,888 and for the first time the City had to pay an overage ($888). Figure C-3 below contains the water and wastewater treatment plant electricity costs between 2000 and 2010.

**Figure C-3: Water and Wastewater Treatment Plant Electricity Costs (2000 - 2010)**
Water and Wastewater Treatment Facilities: Current Energy Conservation Initiatives and Recommendations

Veolia is addressing these increases in electricity rates by trying to reduce energy consumption. When Veolia renewed its contract in 2008, Veolia purchased new energy efficiency computers and software for their water and wastewater facilities, as well as motion detectors for lighting in the restrooms. They are also going to purchase a smart metering system that will allow them to establish a direct wireless link from meters to the water office.

In addition, Veolia budgeted $100,000 for energy efficiency upgrades in the water and wastewater treatment facilities. After a discussion during the Charrette, it was decided that the best use of these funds would be to purchase a positive displacement blower for the wastewater treatment plant for approximately $60,000 and use the remaining funds for a water pump motor upgrade at the water treatment plant (purchasing a more efficient water pump motor would cost between $80,000 to $100,000).

The efforts already taken by Veolia and the additional capital improvements identified during the Charrette only address the efficiency of the actual water and wastewater treatment facilities. The City can also reduce energy consumption by treating less water and wastewater. During the Charrette, Reverend Robert Settles of Williamson’s Public Utility Board stated that the Public Utility Board already tries to reduce water usage by identifying buildings that have spikes in water usage, which suggests that the building has a leak. The Public Utility Board gives the property owner one month to fix the leak. If fixed within a month, the property owner does not have to pay the extra amount owed. If the leak is not fixed, then the property owner has to pay the extra amount. Reverend Settles suggested that the City perform community outreach on the utility bills (e.g., informing consumers on how to save money on their utilities). He also suggested that the City list data of water used by each establishment last month and the same month as the billing cycle a year before.

Municipal Buildings: Energy Benchmarking

One of the first steps in improving the energy efficiency of a building is energy benchmarking, i.e., comparing the evaluated building’s energy use to that of other similar buildings. Energy benchmarking is especially useful for owners/municipalities with multiple buildings because the comparison process allows them to prioritize energy conservation measures and allocate resources towards the worst performing buildings.

The Energy Star Rating system allows for energy efficiency comparisons of similar buildings. The Energy Star Rating is based on data from the Environmental Protection Agency (EPA) Target Finder tool. Target Finder compares the energy efficiency of commercial buildings of the

An example of a comparative bill showing electricity consumption of efficient neighbors, all neighbors, and the bill payer. The Public Utility Board could generate a similar bill comparing water consumption in an effort to reduce the City’s consumption of electricity related to treating water and wastewater. Image by Kate T, Flickr via Creative Commons Attribution.
same type while accounting for factors that drive energy use such as floor area, occupancy, operating hours, and geographic location. The Target Finder tool produces two metrics with which to assess the energy efficiency of buildings:

- Energy Star Rating; and,
- Site Energy Use Intensity (EUI).

The Energy Star Rating is a statistical percentile score based on where an evaluated building falls in comparison to a building of the same type with similar operating characteristics. An average rating is 50/100 and an extremely efficient building has a rating of 90/100 or above.

The second metric, site EUI, compares building energy use by accounting for differences in building floor area. Site EUI is calculated by converting all energy used within the building to the same units, British thermal units (Btus), and then dividing by the building floor area. Site EUI is beneficial for comparing buildings that do not fit into one of the space type categories in Target Finder. The site EUI for a broader range of building types is available through the Commercial Buildings Energy Consumption Survey (CBECS). The energy performance data from CBECS, however, does not take into account differences in building floor area, occupancy, operating hours, or geographic location. No metric for comparing building energy efficiency is perfect, but an Energy Star Rating and a CBECS site EUI comparison provide a good starting point for assessing building energy efficiency. The results of our energy benchmarking and recommendations appear below.

**Field House: Background**

The Field House is the largest building owned by the City of Williamson. Pierce Whitt, Curt Phillips, and Chris Ooten of the Parks and Recreation Board provided insight into the Field House during the Charrette. The 43,000 square foot building contains a large arena for basketball, two dressing rooms, and offices. It has no fans and no air conditioning, but it does have eight 16,000 Btu space heaters for the main area of the building. According to information provided by Williamson, the heaters keep the upstairs area at 90 °F and the downstairs at 65 °F. In addition, each of the two dressing rooms has a space heater. The press box has a window air conditioning unit. There is also a caboose that has a metal roof from which concessions are served. As of right now, the caboose does not have air conditioning so it does not consume much energy. However, the Parks and Recreation Board would like to provide air conditioning in the caboose.

According to the interviewees, the building has six inches of insulation. The roof needs to be replaced or retreated and the Parks and Recreation Board does not plan on re-installing shingles on the roof. The Field House is paid for by an ad valorem tax on Williamson property. The Parks and Recreation Board plans to install 15 computers in the Field House for learning purposes. They are also trying to get the building declared as a historic building. The facility’s football field has 48 lights (150 watt) that are used for baseball and football games only.
Field House: Energy Benchmarking

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Address</th>
<th>City – State</th>
<th>Year Built</th>
<th>Overall Square Feet (Sq-Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field House</td>
<td>1703 W 3rd Ave</td>
<td>Williamson – WV</td>
<td></td>
<td>43,900</td>
</tr>
</tbody>
</table>

Field House EUI (Btu/Sq-Ft/Yr) | Average Office Building EUI (Btu/Sq-Ft/Yr) | Energy Star Rating |
-------------------------------|---------------------------------------------|--------------------|
49,000                         | 73,000                                      | 80/100             |

An exact match for this building type is not available in Target Finder. When compared to a typical office building, the Field House receives an Energy Star rating of 80/100. However, a typical office building does not provide a suitable baseline for comparison. The usage of the Field House likely varies significantly from a typical office building because the majority of this building is not air conditioned and it is not occupied throughout the year.

Data from CBECS provides a better energy use comparison. According to CBECS, the average site EUI for a Public Assembly-Recreation facility is 65,000 Btu/Sq-Ft/Yr. The Field House uses 32.7 percent more energy than the typical recreation facility, which indicates significant room for improvement.

Field House: Energy Conservation Recommendations

Based on information provided at the Charrette and data provided by Williamson, the City should consider the following recommendations for reducing energy consumption and improving energy efficiency at the Field House:

- Increase air circulation to decrease temperature disparity between the upstairs and downstairs area of the building. Installing a central heating system is the best method to increase air circulation and improve efficiency, especially if the City uses a sealed combustion 95 percent efficient (Annual Fuel Utilization Efficiency) furnace. A less expensive option would be to install an air handling unit with a short amount of ductwork to move the air from the warm upstairs area to the cooler downstairs area. Installing radiant space heaters is another option to decrease the temperature disparity and improve the efficiency of the heating system. Radiant heaters use infrared radiation to transmit heat. The advantage of radiant heaters is that only exposed surfaces of objects and people are being heated instead of heating all of the air in the building. While a radiant heater might be more efficient, special attention needs to be paid to the placement of the heaters to avoid cold spots, i.e., areas not reached by the radiant heat, and turning off heaters when the building is unoccupied.

- For the air conditioning unit in the press box, a ductless mini-split system might be more efficient. However, the press box is likely not used often enough to justify the expense.

- For the concession caboose, installing an expensive air conditioning system is not the best use of funds because the caboose is only used for part of the year. Moreover, the concession area has large openings through which concessions are served. Therefore, increasing air flow through the concession area using fans may be the best option for keeping the area cool, especially if there is a large amount of cooking.

- With regards to insulation and the roof, around 11.5 inches of insulation is needed to comply with the minimum requirement of R-38 as specified by ASHRAE 90.1-2007 for
Climate Zone 4. Additional attic insulation will have a much larger impact on energy performance than a cool roof. A cool roof will lower cooling costs (not for a non-cooled space) by roughly one to five percent for a flat roof building with adequate roof insulation.

- Any computers installed by the Parks and Recreation Board should be Energy Star compliant and should be set on energy savings modes (e.g., computer monitor power save mode and computer sleep mode).

**Community Center: Background**

During the Charrette, the Parks and Recreation Board members also provided details regarding the Community Center and swimming pool. The Community Center building is 50x60 feet and has two floors. The downstairs is a bath house used for showers during the summer. The upstairs is an event space used four times a month during September through May and about six to eight times a week from June to August. The event space is heated and cooled by a ten ton unit. The bath house does not have a climate control system. The parks and Recreation Board is trying to raise the funds for a new heating package. The swimming pool has a large pump that runs full time from May 20 to August 20. The same pump has been used since 1971 and while it is serviced regularly, there might be an opportunity for an efficiency upgrade.

**Community Center: Energy Benchmarking**

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Address</th>
<th>City - State</th>
<th>Year Built</th>
<th>Overall Square Feet (Sq-Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Center</td>
<td>500 Logan St</td>
<td>Williamson – WV</td>
<td></td>
<td>6,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community Center EUI (Btu/Sq-Ft/Yr)</th>
<th>Average Office Building EUI (Btu/Sq-Ft/Yr)</th>
<th>Energy Star Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>95,000</td>
<td>41,000</td>
<td>1/100</td>
</tr>
</tbody>
</table>

An exact match for this building type is not available in Target Finder. When compared to a typical office building, the Community Center receives a rating of 1/100. The usage of this building likely varies significantly from a typical office building. Therefore, a typical office building does not provide a suitable baseline for comparison.

Data from CBECs provides a better energy use comparison. According to CBECs, the average site EUI for a Public Assembly-Recreation facility is 65,000 Btu/Sq-Ft/Yr. The typical site energy use for a medium-sized swimming pool (75x60 feet) is around 60,000 Btu/Yr. The adjusted site EUI (found by adding the energy use for the swimming pool to the typical energy use for a Public Assembly-Recreation facility and dividing by the floor area of the building) for a comparable facility that includes a swimming pool is calculated to be 75,000 Btu/Sq-Ft/Yr. Hence, the Community Center uses roughly 27 percent more energy than a typical recreation facility, even after adjusting for the additional energy use of the swimming pool.
Community Center: Energy Conservation Recommendations

Based on information provided at the Charrette and data provided by Williamson, the City should consider the following recommendations for reducing energy consumption and improving energy efficiency at the Community Center:

- With regards to purchasing a new heating package, if the building is currently heated using electric resistance heating, then switching to a split system that uses a heat pump cycle to produce heating will reduce costs. A heat pump moves heat instead of generating it directly from electric resistance. Therefore, a heat pump can produce the same amount of heat with one third less electricity.

- With regards to cooling, the Recreation Board should select equipment with an Electronically Commutated Motor for the supply fan and a unit with multiple cooling stages. Using two 5-ton units instead of a 10-ton unit would improve the efficiency and enable better humidity control.

- With regards to the 40-year old pump used at the swimming pool, the Parks and Recreation Board should consider replacing the pump with a correctly-sized pump that meets the needs of the system. Almost all pumps are oversized by a large safety factor to ensure that the system works, and that the engineer/contractor does not have to pay to replace the pump. However, installing an oversized pump causes it to operate at a much lower efficiency than a properly sized system.

- If the required flow rate/pressure varies, then fitting the pump with a Variable Frequency Drive (VFD) would allow the speed of the pump to be varied in response to a variable pumping requirement. A VFD can save a large amount of energy because motor power draw varies exponentially of the pump’s speed (revolutions per minute). At 50 percent speed, a pump will draw roughly 12.5 percent of its rated power at full speed.

City Hall: Background

The City Hall building used to be one of Williamson’s train depots. The entire building is heated and cooled. The building’s basement is used as storage. Regular hours are 8:30am to 4:30pm during the weekdays. There are four part-time employees and one full-time employee. There are also bi-weekly evening town council and city board meetings that have around 30 people. During the Charrette, some interviewees mentioned that they have issues with the temperature in the City Hall building.
City Hall: Energy Benchmarking

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Address</th>
<th>City - State</th>
<th>Year Built</th>
<th>Overall Square Feet (Sq-Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Hall</td>
<td>107 E 4th Ave.</td>
<td>Williamson – WV</td>
<td></td>
<td>5,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>City Hall EUI (Btu/Sq-Ft/Yr)</th>
<th>Average Office Building EUI (Btu/Sq-Ft/Yr)</th>
<th>Energy Star Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>69,000</td>
<td>25,000</td>
<td>1/100</td>
</tr>
</tbody>
</table>

An exact match for this building type is not available in Target Finder. When compared to a typical office building, the City Hall receives a rating of 1/100. While this is not a typical office building, it should have somewhat similar operating characteristics to an office building. The City Hall has very poor energy performance compared to other office buildings. According to CBECS, the average site EUI for a Public Assembly-Social/Meeting facility is 52,000 Btu/Sq-Ft/Yr. The City Hall uses 32.7 percent more energy than a comparable facility.

City Hall: Energy Conservation Recommendations

Based on information provided at the Charrette and data provided by Williamson, the City should consider the following recommendations for reducing energy consumption and improving energy efficiency at the City Hall:

- Improving the thermal envelope by adding insulation and stopping air infiltration through air sealing.
- Checking the duct system to make sure it is installed and balanced properly. A system that is not properly balanced, i.e., too much or not enough air flow, will cause comfort issues. It may be possible for City personnel to re-balance the system by adjusting damper settings without outside assistance. However, a professional test and balance contractor should balance a complex duct system. Note that a duct system that is not properly designed / installed cannot be balanced without correcting the problem (e.g. ducts are too small).
- If one HVAC system serves multiple areas with different heating/cooling loads, then this can cause comfort issues because of poor zoning. The thermostat senses the temperature at only one zone, which may be very different from the temperature in another zone of the building. This is especially true for a building with no insulation and old windows with a high solar heat gain coefficient. The City can address poor zoning by installing multiple smaller systems or by installing a system that allows for individual zone control (e.g., Variable Air Volume units to control zone air flow from a central air handling unit). The comfort problems caused by poor zoning may be mitigated or eliminated by installing insulation and stopping air infiltration.
- Setting all computers on energy savings modes (e.g., computer monitor power save mode and computer sleep mode).
Emergency Services Building: Background

This 20,800 square foot facility houses the City’s Police Department and Municipal Judge on the first floor, the full-time paid Fire Department on the first and third floors, and the public Community Hall on the second floor. All of the building’s area is heated and 70 percent is cooled.

The City of Williamson has received an Energy Efficiency and Conservation Block Grant (EECBG) to perform the following energy improvements to the Emergency Services Building26:

- Replace the existing inefficient HVAC system;
- Replace the existing 24-year old, 160 four-bulb light fixtures, and install high light reflecting ceiling tile;
- Install air lock chamber vestibule at the entrance door; and,
- Replace windows that have lost their insulation value.

Emergency Services Building: Energy Benchmarking

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Address</th>
<th>City - State</th>
<th>Year Built</th>
<th>Overall Square Feet (Sq-Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency</td>
<td>108 East 4th Avenue</td>
<td>Williamson – WV</td>
<td></td>
<td>20,800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emergency Services Building EUI (Btu/Sq-Ft/yr)</th>
<th>Average Office Building EUI (Btu/Sq-Ft/yr)</th>
<th>Energy Star Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>72,000</td>
<td>106,000</td>
<td>80/100</td>
</tr>
</tbody>
</table>

An exact match for this building type is not available in Target Finder. When compared to a typical office building, the Emergency Services Building receives a rating of 80/100. However, a typical office building does not provide a suitable baseline for comparison. The Emergency Services Building, unlike an office building, is continuously occupied. The constant occupancy skews the comparison.

Data from CBECs provides a better energy use comparison. According to CBECs the average site EUI for a police station/fire station is 78,000 Btu/Sq-Ft/Yr. This building consumes 7.7 percent less energy than the average Fire Station/Police Station. The energy efficiency of the Emergency Services Building is better than average, and the improvements being made pursuant to the EECBG application should further improve this building’s performance.

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26 Information obtained from the “Emergency Services Building Energy Efficiency Project” EECBG application.
City Garage: Background

This approximately 6,000 square foot facility houses City and Veolia vehicles. Eight employees work in and out of this building. The natural gas furnaces run while the garage doors are open. The facility has several areas where air can infiltrate the building.

City Garage: Energy Benchmarking

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Address</th>
<th>City - State</th>
<th>Year Built</th>
<th>Overall Square Feet (Sq-Ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Garage</td>
<td>Williamson – WV</td>
<td></td>
<td>~6,000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facility EUI (Btu/Sq-Ft/Yr)</th>
<th>Average Warehouse EUI (Btu/Sq-Ft/Yr)</th>
<th>Energy Star Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>155,000</td>
<td>98,000</td>
<td>20/100</td>
</tr>
</tbody>
</table>

An exact match for this building type is not available in Target Finder. When compared to a typical unrefrigerated warehouse, the City Garage receives a rating of 20/100. However, this building is a garage/vehicle repair facility. Therefore, data from CBECS provides a better energy use comparison. According to CBECS the average site EUI for a vehicle repair/service facility is 77,000 Btu/Sq-Ft/Yr. This building consumes twice the energy of a typical vehicle repair/service facility.

City Garage: Energy Conservation Recommendations

The City should assess the need for heating at the City Garage. Lowering the heater set point temperature or turning the furnace off entirely will drastically reduce the energy use of this facility. The City Garage is a metal building with visible holes in the walls and bay doors. The bay doors are opened every time a vehicle enters or leaves the garage. Heating this building with a central furnace requires a large amount of energy due to amount of air infiltration that is occurring. Repairing the walls and doors will reduce air infiltration, but there is not a reasonable way to prevent cold air from entering the building when the bay doors are opened.

Eliminating the heating system entirely is probably not acceptable. The most efficient way to provide heating for this facility is with radiant heaters. Radiant heaters will heat only surfaces and people rather than all of the air in the building. This is important because the air leakage in the building is quite high due to the large number of air leaks.
**Water Tanks: Background**

Williamson currently has four water tanks (Goodwin, Sycamore, Gaujot, and College Hill) that will be consolidated into one new tank. The City and Veolia are seeking a Rural Utility Service loan, as well as other sources of funding for the tank consolidation project.

**Water Tanks: Energy Conservation Opportunities**

The water tank consolidation is an opportunity to maximize energy efficiency in the new tank. For example, instead of using a pressure reducing value, Veolia is thinking about using micro-hydro generators that can both slow the flow of water going downhill and generate electricity (see Figure C-4). During the Charrette, Jonathan Stallard and Jason Allen stated that the tank upgrade budget contains $200,000 for smart metering that would allow for a wireless link between individual meters and the water office.

*Figure C-4: Energy Recapture Using Gravity to Generate Electricity*

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**City Street Lights: Background**

Williamson has a contract with Appalachian Power for Williamson street lights. Pursuant to the contract, the City’s street lights are not metered. Rather, Appalachian Power charges the City a contractual rate based on the type of light fixture times the number of units for that type of light fixture. For example, the City has 326 of the 175w light (7,000 lumens) mercury vapor lights. The City pays about $7.05 a month per unit (327 x $7.05) for a total of $2,305.35 a month for this type of street light bulb. Therefore, payment is not pegged to the amount of electricity used by the City for its street lights but rather the type and number of lights. Appendix 2 contains an unsigned copy of the City’s contract with Appalachian Power.

Appalachian Power periodically performs an inventory of street lights. Williamson has not had

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27 Information provided by Randy Saunders (Appalachian Power Customer Service Representative) through phone conversations and email correspondence during August, 2011.
such an inventory since at least 2006. Appalachian Power is willing to work with the City to perform an inventory of the City’s street lights. Such inventories typically result in the identification of street lights that are on a municipality’s contractual inventory that do not work, as well as street lights that work but are not listed in the municipality’s contractual inventory.

**City Street Lights: Energy Conservation Opportunities**

Because Williamson pays Appalachian Power based on type of bulb as opposed to amount of electricity consumed, the City can lower its total costs by replacing the more expensive lights (e.g., $10 or more per unit a month) with less expensive lights that still meet the user requirements and preferences, i.e., lights that the neighborhood will like. The City can request change of street lights prior to the expiration of the contract. Metering each street light is not a cost-effective option due to cost of installation and a base-level charge of about $8.00 per month per meter. Metering is also not an administratively feasible option because of the number of resulting invoices. The City should also work with Appalachian Power to perform a detailed inventory of Williamson’s street lights with the goal of identifying opportunities to eliminate unnecessary street lighting.

**Non-Municipal Buildings: Background**

Based on 2005-2009 U.S. Census Bureau data, Williamson has approximately 1,950 to 2,000 housing units of which 830 are owner-occupied, 730 are renter-occupied, and about 400 are unoccupied. Sixty nine percent are single-unit structures, 29 percent are multi-unit structures, and one percent are mobile homes. Approximately 1,276 homes were built before 1960 and about 86 homes were built between 2000 and 2009. Approximately 820 homes are heated using utility gas and 730 are heated using electricity. A handful of homes are heated using bottled, tank, or liquefied petroleum gas.28

Commercial buildings are concentrated in Williamson’s Downtown and West End areas. For a variety of reasons, it is difficult for the City to facilitate modifications to many of the Downtown commercial buildings (e.g., the building is in an estate or owned by absentee owners). Many commercial buildings in Williamson are either vacant or underutilized.

**Non-Municipal Buildings: Energy Savings Opportunities**

Based on information obtained during the Charrette and observations made by Southface personnel, there are many opportunities to decrease Williamson’s residential and commercial building energy consumption. Newer heating, ventilating and air conditioning (HVAC) systems, 28 U.S. Census Bureau. “Williamson city, West Virginia: 2005-2009 American Community Survey 5-Year Estimates.” Available online at:

and proper insulation provide a reasonable return on investment. While replacing windows can often be economically impractical, some occupied buildings in Williamson have broken windows. In such instances, fixing or replacing the broken windows can dramatically reduce the amount of energy wasted. Moreover, given the number of renter-occupied housing units, Williamson should consider providing landlords, who often do not pay the utility bill, incentives to improve the energy efficiency of their rental unit(s). While Williamson’s LEAP focuses on municipal operations, Energy Goals 5 and 6 in the Recommended Energy Goals section below contain initiatives that would result in community-wide energy savings.

Municipal Vehicles

The City’s vehicles are varied for types of use (e.g., public safety, sanitation, or administrative). They include fire engines, light trucks, heavy trucks, sedans, mobile equipment units, garbage trucks, and vans. A current listing is contained in Appendix 3. Some vehicles are currently being repaired or are going to be put out of commission soon. The City also owns a variety of mobile non-vehicular units (e.g., lawn mowers, air compressors, backhoes, tractors, trash pumps, and generators).

Veolia has a contract with the City for garbage collection. Two garbage trucks and three to four pickup trucks operate a day as needed. The City owns the garbage trucks and a smaller pickup truck. Veolia owns the other waste management vehicles. The commercial garbage truck goes to the landfill in Kentucky about two to three times a week. The residential truck has to go every day. The 60-mile roundtrip to the landfill takes between two and three hours. While Veolia pays for the fuel consumed by the garbage trucks it operates, the City will ultimately have to keep Veolia’s fuel costs in mind during its renegotiation of Veolia’s waste management contract.

Veolia tracks its daily fuel consumption and currently pays about $4,000 to $5,000 a month in fuel for waste management vehicles. For 2010, the City of Williamson paid $87,968.67 for vehicle fuel, which includes 17,000 gallons of unleaded gasoline (87 octane), 13,100 gallons of #2 low sulfur diesel for trucks, and 1,500 gallons of #2 high sulfur diesel for off-road engines. Between January 2010 and December 2010, the City’s fuel costs increased as follows:

- Unleaded gasoline (87 octane) – increase of 12.77 percent from $2.6868 a gallon to $3.0299 a gallon.
- #2 low sulfur diesel – increase of 14.78 percent from $2.7937 a gallon to $3.2066 a gallon.

Municipal Vehicles: Current Energy Conservation Initiatives and Recommendations

Based on discussions during the Charrette, the City has limited ability to purchase newer, more fuel efficient vehicles. Veolia currently reduces fuel consumption by not driving empty trucks to the landfill. Moreover, the City has an anti-idling policy but it is unclear whether the policy is enforced.

Rather than making capital investments, the City should focus its efforts on reducing fuel consumption through driver education regarding optimal acceleration / braking and the impact of idling. The City should enforce its anti-idling policy and should establish a Vehicle Selection Policy that seeks to get City personnel to use the most fuel efficient vehicle while still meeting their application.
For vehicles that run on routes, the City should create a routing system to increase overall efficiency (e.g., by reducing idle time, reducing the number of left turns, and/or decreasing the number of times the vehicles has to travel uphill). An optimized route that saves the most in fuel costs may not necessarily be the shortest route. For example, Mingo County is building a transfer station at Pigeon Creek. Because of the two-lane road, it would most likely take Williamson’s waste management vehicles the same amount of time to get to the Pigeon Creek transfer station as the Johns Creek landfill in Kentucky. Therefore, when assessing which route is the most cost effective, Williamson should take into consideration the efficiency of driving on a highway versus two-lane road, as well as the total cost of tipping fees.
Viable Local Sources of Renewable Energy

The two most promising renewable energy sources for Williamson are solar and biomass. According to the National Renewable Energy Laboratory (NREL), the Williamson area can generate approximately 1,550 kWh per square meter a year. In other words, the amount of electricity generated in one year by a square meter photovoltaic solar panel would be enough to power the average West Virginia home for over five weeks. To put the potential of this solar resource in perspective, Germany is a world leader in photovoltaic (solar) energy production yet its solar capacity is only 1,100 kWh per square meter a year – considerably less than Williamson (see Map C-1).31

Map C-1: Photovoltaic Solar Resource of the United States and Germany

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29 Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude.
In addition to solar, Williamson has biomass resources at its disposal. Biomass sources close to Williamson include methane emissions from its wastewater treatment plant as well as forest residues. According to the NREL, Mingo County can generate between 25,000 to 50,000 dry tonnes of forest residues a year (see Map C-2).32 Forest residue, i.e., logging residue, comprises unused portions of trees, cut or killed by logging and left in the woods.

**Viable Sources of Renewable Energy: West Virginia Incentives**

West Virginia has a net metering law that allows retail customers of utility companies to receive a credit for a portion of the electricity they generate through, among other things, solar thermal, photovoltaics, and biomass. Pursuant to the law, all utilities must offer net metering to residential customers that have qualifying systems (e.g., photovoltaics) up to 25 kilowatts. The law provides different limits for commercial and industrial customers depending on the size of their utility company:

- Commercial customers of investor-owned utilities with more than 30,000 customers may have a net metering system up to 500 kilowatts.
- Industrial customers of investor-owned utilities with more than 30,000 customers may have a net metering system up to two megawatts.
- Commercial and industrial customers of smaller investor-owned utilities, municipal utilities, and co-ops may have a net metering system up to 50 kilowatts.

Any net excess electricity generation by a customer during a billing cycle will be credited to the customer's next bill at their retail rate, i.e., carried over to their next bill as a kWh credit. The law requires utilities to offer net metering to customers until net metering generation reaches three percent of peak demand during the previous year.33

West Virginia also offers a residential solar tax credit of up to 30 percent (maximum $2,000) of the cost of purchasing and installing solar systems that generate electricity, heat or cool a residence, or provide hot water or solar process heat for use in the residence. To qualify, a solar water heating system must derive half or more of its energy from the sun and cannot be used to

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heat a pool or hot tub. West Virginia homeowners may carry forward unused portions of the tax credit until July 1, 2014.\textsuperscript{34}

**Viable Sources of Renewable Energy: Recommendations**

Given West Virginia’s net metering law, Williamson should identify opportunities to install cost-effective grid-tied solar systems. Because such a system is plugged into the electricity grid as opposed to just providing electricity for the building to which it is attached, owners of the system can benefit from selling electricity back into the grid. For example, after a homeowner has maximized efficiency, the homeowner could take advantage of both the residential solar tax credit as well as the net metering law that would allow for the homeowner to sell electricity back to the grid. It should be noted that any net excess electricity generation by a customer during a billing cycle will be carried over to their next bill as a kWh credit at their retail rate. In addition, Williamson should explore the potential of producing methane from its wastewater treatment plant.

**Recommended Energy Goals**

Based on an analysis of City energy consumption, a high-level review of City buildings, and discussions with key stakeholders, Williamson’s LEAP contains the following six goals related to Energy.

**Energy Goal 1**

*Williamson will reduce its government operations’ energy consumption by eliminating excess energy use, investing in energy efficiency, and encouraging fuel-efficient driving techniques.*

To reach Energy Goal 1, Williamson should first implement the following “Level 1” initiatives:

- By June 1, 2012, identify City policies, codes, ordinances, and development regulations that hinder activities that would promote energy savings.
- By June 1, 2012, review the street light inventory provided by Appalachian Power and submit to Appalachian Power a list of high-cost bulbs (e.g., $10 or more per unit a month) for replacement with lower-cost bulbs.
- Work with Appalachian Power to perform a detailed inventory of Williamson’s street lights to create an accurate inventory of street lights with the goal of identifying opportunities to eliminate unnecessary street lighting.
- By January 1, 2013, reduce City government’s electricity consumption by ten percent from 2010 levels, adjusted for increase in buildings and/or square footage.
- By January 1, 2013, reduce City government’s natural gas consumption by ten percent from 2010 levels, adjusted for increase in buildings and/or square footage.
- Establish a Vehicle Selection and Driving Policy that seeks to get City personnel to use the most fuel efficient vehicle while still meeting their application, as well as provide driver education regarding optimal acceleration / braking and the impact of idling.
- Enforce the existing anti-idling policy for vehicles that lowers fuel consumption while still allowing for City personnel to perform their tasks.

• By January 1, 2014, reduce fuel consumption in City government vehicles by five percent from 2010 levels.

After completing the Level 1 initiatives, Williamson should then implement the following “Level 2” initiatives that are broader in scope and/or more complex than Level 1:

• Establish incentives for City employees to carpool and reduce the amount of vehicle fuel they consume.

• By January 1, 2014, reduce City government’s electricity consumption by 15 percent from 2010 levels, adjusted for increase in buildings and/or square footage.

• By January 1, 2015, reduce City government’s municipal government natural gas consumption by 15 percent from 2010 levels, adjusted for increase in buildings and/or square footage.

• For vehicles that run on routes, create a routing system to increase overall efficiency (by reducing idle time, reducing the number of left turns, and/or decreasing the number of times the vehicles has to travel uphill).

After completing the Level 2 initiatives, Williamson should then implement the following “Level 3” initiative, which is the broadest and/or most complex:

• By January 1, 2016, reduce City government’s electricity consumption by 20 percent from 2010 levels, adjusted for increase in buildings and/or square footage.

The Williamson Buildings and Facilities, City Street Lights, Municipal Vehicles, and Viable Local Sources of Renewable Energy sections above contain specific actions and information that can assist Williamson reach Energy Goal 1.

Energy Goal 2
Williamson will improve the energy efficiency of all new and existing City facilities.

To reach Energy Goal 2, Williamson should first implement the following Level 1 initiatives:

• Promote a culture of efficiency by adopting policies and preparing guidelines to:
  o Integrate sustainable building operations and maintenance principles and practices at all City facilities; and,
  o Perform life-cycle cost analysis that takes into account energy consumption throughout the lifetime of a building upgrade and equipment purchase as opposed to just the up-front costs.

• Irrespective of building size, adopt regulations that require all new City buildings meet energy efficiency building standards appropriate for the building size through sustainable building certification programs such as LEED, EarthCraft, or Energy Star.

• Irrespective of whether a building renovation will seek sustainable building certification, adopt a policy and prepare guidelines to integrate sustainable building principles and practices into the renovation of all City facilities, and City-funded renovation projects, to the fullest extent possible.
After completing the Level 1 initiatives, Williamson should then implement the following Level 2 initiative that is broader in scope and/or more complex than Level 1:

- Irrespective of building size, adopt regulations that require all renovated City buildings meet sustainable building standards appropriate for the building size through sustainable building certification programs such as LEED, EarthCraft, or Energy Star.

After completing the Level 2 initiative, Williamson should then implement the following Level 3 initiative, which is the broadest and/or most complex:

- Adopt regulations that set sustainable building certification levels (e.g., LEED Platinum and LEED Gold, or EarthCraft Light Commercial) for all new and renovated City buildings based on building size or use.

The Williamson Buildings and Facilities section above contains specific actions and information that can assist Williamson reach Energy Goal 2.

**Energy Goal 3**

*After maximizing energy efficiency, Williamson will invest in and promote lesser polluting energy sources and renewable energy sources.*

After completing the Level 1 initiatives under Goals 1 and 2, Williamson should then implement the following Level 2 initiatives under Goal 3:

- Where it is appropriate, promote the use of natural gas, propane, and other alternative fuel vehicles (e.g., hybrid and electric vehicles) for specific City fleet vehicles.
- Adopt ordinances that incent, support, and protect business and home owners who have renewable energy installations (e.g., photovoltaic panels and solar water heaters).

After completing the Level 2 initiative, Williamson should then implement the following Level 3 initiatives, which are the broadest and/or most complex:

- Evaluate the economics of constructing large scale photovoltaic solar arrays on City-owned property and privately-owned land that would otherwise not lend itself well to development for other uses.
- Evaluate the economics and environmental benefits of locally available biomass sources (e.g., landfills and waste water treatment plants); and then incent the development of systems that produce power from the identified biomass sources.

The Viable Local Sources of Renewable Energy section above contains specific information that can assist Williamson reach Energy Goal 3.

**Energy Goal 4**

*The City will identify opportunities to capture and reuse otherwise wasted hydro power and waste heat to power auxiliary energy generating turbines, provide heat for industrial purposes, or provide climate control for buildings.*

To reach Energy Goal 4, Williamson should implement the following Level 1 initiative:

- By June 1, 2012, the City will identify sites and opportunities for the co-location of complementary energy production/energy consumption facilities (e.g., energy recapture at the consolidated water tank, as well as buildings that use waste heat obtained from nearby industries).
The Water Tanks section above contains specific information that can assist Williamson reach Energy Goal 4.

**Energy Goal 5**

*Williamson will focus on community-wide sustainable building standards.*

To reach Energy Goal 5, Williamson should implement the following Level 1 initiatives:

- Ensure that the Williamson Fire Chief and the Williamson Unsafe Building Commission have the tools and support required to enforce the existing building code for new and renovated buildings.

- Offer incentives for homes and commercial projects that meet certified energy efficiency standards for buildings. For example:
  - Expedited permit review;
  - Density or height bonus;
  - Reduced/waived fees; and/or,
  - Free technical assistance.

- Establish an Awards Program that identifies residential and commercial projects within Williamson that have been recognized through an energy efficiency and/or sustainable building certification program.

After completing the Level 1 initiatives, Williamson should then implement the following Level 2 initiatives that are broader in scope and/or more complex than Level 1:

- Offer incentives for homes and commercial projects certified using sustainable building certification programs such as LEED, EarthCraft, or Energy Star. For example:
  - Expedited permit review;
  - Density or height bonus;
  - Reduced/waived fees; and/or,
  - Free technical assistance.

- As soon as possible, begin enforcing the International Energy Conservation Code (IECC) for residential and ASHRAE 90.1 for Commercial buildings; adopt the appropriate high performance building standards for residential and commercial buildings (e.g., ICC Green Construction Code or ASHRAE 189.1-2009) with sustainable building certification programs as compliance options.

**Energy Goal 6**

*Williamson will advocate for comparative building-level utilities tracking and reporting, leading to improved maintenance programs and reduced energy and water usage in City and commercial buildings.*

To reach Energy Goal 6, Williamson should first implement the following Level 1 initiatives:

- Offer incentives for businesses that meet an ongoing energy efficiency and/or sustainable building performance measure such as ranking in the top ten percent of Energy Star Portfolio Manager and/or LEED Existing Buildings Operations & Maintenance. For example: business license discounts, reduced sewer charge, and recognition.

- Provide historical water use data on the water bill for customers.
After completing the Level 1 initiatives, Williamson should then implement the following Level 2 initiatives that are broader in scope and/or more complex than Level 1:

- To defray the City's electricity costs related to water and wastewater treatment, offer incentives for businesses that reduce their water consumption based on historical performance. For example: business license discounts, reduced sewer charge, and recognition.

- To defray the City's electricity costs related to water and wastewater treatment, consider establishing a commercial water rate structure based on use patterns.

After completing the Level 2 initiatives, Williamson should then implement the following Level 3 initiative, which is the broadest and/or most complex:

- Offer a property tax discount for businesses that perform at a top-tier for water and electricity savings as compared to national standards such as Energy Star Portfolio Manager and/or LEED Existing Buildings Operations & Maintenance.

**Energy Goal 7**

*Reduce energy use in all City water and wastewater facilities by 15 percent by 2025.*

To reach Energy Goal 7, Williamson should first implement the following Level 1 initiatives:

- Perform site survey of existing equipment and power utilization to determine replacement needs to reduce energy use for City water and wastewater facilities.

- Promote the use of autolight sensors, high efficiency light fixtures, energy-saving pumps, and other energy saving technologies and management approaches to reduce energy use.

After completing the Level 1 initiatives, Williamson should then implement the following Level 2 initiative that is broader in scope and/or more complex than Level 1:

- Evaluate the feasibility of developing and implementing a demand charge reduction plan, i.e., a plan to shift energy consumption from expensive peak periods to less expensive off-peak periods.

After completing the Level 2 initiative, Williamson should then implement the following Level 3 initiatives, which are the broadest and/or most complex:

- Upgrade all water and wastewater facilities to maximize LEED Silver or equivalent water conservation credits.

- Evaluate the feasibility of developing alternative energy sources such as methane gas collection and solar panels at City water and wastewater facilities.

The Williamson Buildings and Facilities and Viable Local Sources of Renewable Energy sections above contain specific actions and information that can assist Williamson reach Energy Goal 7. Moreover, reducing water use under Goal 6 will also assist Williamson reach Energy Goal 7.
**LEAP Implementation**

Developing, implementing, and monitoring Department- and Facility-level policies and procedures that help Williamson become more energy efficient requires a concentrated effort by dedicated personnel, otherwise Williamson risks losing the momentum created by the LEAP process. Existing personnel may not have the time or the institutional capacity to undertake such tasks in a thorough and sustained manner.

Fortunately, Williamson has received funds to hire a short-term Energy Coordinator. This Energy Coordinator will work with City personnel to use the information and tools contained in this LEAP Report to articulate Department- and Facility-level energy efficiency goals and action items. The Energy Coordinator will then implement policies and procedures that help Williamson meet its energy goals, monitor compliance with policies and procedures, and track performance. The Energy Coordinator will also leverage investments and funding for energy efficiency and renewable energy initiatives, coordinate energy efficiency programs across Departments and Facilities, and interface with community organizations that promote civic engagement across Williamson.

**Empowering the Energy Coordinator**

To be effective, the Energy Coordinator must have the authority to formulate, implement, incent, and enforce energy policies and procedures for the City government, as well as coordinate community-wide energy initiatives. Otherwise the Energy Coordinator will not be able to implement and monitor policies and procedures that help Williamson meet its energy goals. Therefore, the organizational placement of the Energy Coordinator within the City of Williamson government should be such that the Energy Coordinator reports to an individual or Department that is charged with overseeing the operations of City Departments and Facilities. Irrespective of the Energy Coordinator’s placement on the City government organization chart, the Energy Coordinator should be physically located close to the individual(s) with whom he/she will have the most contact to facilitate the actual implementation and monitoring of policies and procedures.

In addition, Williamson should consider establishing an Energy Board that provides the Energy Coordinator with guidance. The Energy Board should consist of Williamson personnel, Veolia
personnel, and community members who would be charged with implementing policies and procedures in their respective Department, Facility, company, or organization. The Energy Coordinator would periodically provide updates to and receive input from the Energy Board.

**Goals of the Energy Coordinator**

The main goal of the Energy Coordinator will be to oversee the development, implementation, and monitoring of all policies and procedures that help Williamson meet the Energy Goals listed in this LEAP Report. This will require each City Department and Facility to complete action items. For example, goals related to City personnel reducing electricity consumption and following anti-idling policies will require support from all Departments and Facilities. Therefore, the Energy Coordinator will have to work with each Department/Facility Head to develop a Department/Facility Energy Plan. The steps required to create a Department/Facility Energy Plan are detailed below:

- The Department/Facility Energy Plan template (attached to this Report as Addendum A) has been created to assist with the creation of Department- and Facility-level action items. The Energy Coordinator will work with each Department/Facility to:
  - Create the Department/Facility Energy Savings Vision/Commitment Statement that establishes the foundation of the Department/Facility Energy Plan;
  - Summarize the Department’s/Facility’s responsibilities for those Energy Goals that affect the Department/Facility;
  - List action items, the responsible parties, and the measures of success; and,
  - Develop the Department/Facility Employee Communication Plan for communicating with Department/Facility staff regarding the Department/Facility Energy Plan.

- After creating each Department/Facility Energy Plan, the Energy Coordinator will work with designated Department/Facility personnel to populate Reporting Tabs contained in Addendum B, which will list each Department/Facility Action Item, its Status, the Results/Outcome, and applicable Notes/Comments.

- The Energy Coordinator will also review the broad set of performance measurement metrics already included in the Goals Templates contained in Addendum B. These performance measurement metrics can help Williamson develop a baseline and compare progress against that baseline as a means to assess whether goals have been met. The Energy Coordinator will work with designated Department/Facility personnel to delete those metrics for which the City cannot obtain data, as well as formulate new metrics for which the City can obtain data.

- The Energy Coordinator will work with designated Department/Facility personnel to analyze data to set baselines, monitor progress based on performance measurement metrics, and update both the Department/Facility Energy Plan and Reporting Templates.

- The Energy Coordinator will update the Goals Templates to provide a yearly status review to the Energy Board, elected City leaders, and the community-at-large.

Each of the steps listed above are “Level 1” action items for the Energy Coordinator, i.e., the first tasks to be completed by the Energy Coordinator. Additional “Level 1” initiatives for the Energy Coordinator identified during the LEAP planning process are:
• Develop an “Energy Savings Products” Procurement protocol;
• Create an outreach plan to interface with the broader community, including Mingo County government and the schools; and,
• Identify financing options and grant funding that can be used for energy efficiency upgrades and to train employees on energy efficiency, lifecycle analysis, and lifecycle costing.

After completing the Level 1 initiatives, the Energy Coordinator should then implement the following “Level 2” initiative that is broader in scope and/or more complex than Level 1:

• Oversee the creation of a Williamson LEAP website for the community at large that provides information about the benefits of energy savings, current energy savings initiatives, available rebates and grants, and the progress of energy savings initiatives.

**Financing and Available Incentives**

**Self Financing Mechanism**

A short-term focus by a dedicated Energy Coordinator should allow Williamson to lay the groundwork for energy efficiency initiatives. However, many of these initiatives will not be “implement and forget” solutions. They will require monitoring and adjustments based on such factors as reduced vigilance by personnel, changes in utility pricing, introduction of new technologies and best practices, and new sources of funding. Moreover, the scope of what is possible extends beyond a short-term implementation timeframe.

Discussions during the Charrette revealed that the Williamson Memorial Hospital has been engaged in energy savings and efficiency initiatives for five years. The success of their initiatives is due in part to the fact that a facilities manager monitors building performance and adjusts policies and procedures in response to any decrease in energy efficiency. Similarly, to maximize the benefits that come from having an Energy Coordinator, Williamson should create a permanent Energy Coordinator position.

Williamson can fund a permanent Energy Coordinator position by making it self-financing. The Appalachian Regional Commission has already provided initial funding. Williamson can place a portion of the cost savings resulting from the short-term Energy Coordinator’s efforts in a dedicated fund to finance the Energy Coordinator beyond the short-term initial funding period. This fund can also finance key capital improvements (e.g., purchase of new equipment and building improvements) that will yield additional cost savings. Figure C-6 illustrates this model for funding municipal sustainability work.
Figure C-6: Hypothetical Cost Savings Resulting From Implementation and Monitoring of Energy Goals and Recommendations

Pooling Resources with Mingo County

Another option for funding a permanent Energy Coordinator discussed during the Charrette is combining the scope of work to include both Williamson and Mingo County. Given the limited number of buildings, facilities, and vehicles owned and operated by both the City of Williamson and Mingo County, it might be cost effective for both municipalities to share one Energy Coordinator. Moreover, the City and County may be able to realize economies of scale by pooling their buying power together for energy efficient equipment and building upgrades.

Such cooperation is not unprecedented. The Sustainability Manager for the City of Durham and Durham County is funded in equal parts out of the general fund of both municipalities. By establishing a joint Sustainability Office, the City of Durham and Durham County have realized economies of scale and a greater level of cooperation on sustainability issues.

Foundation Funding and Revolving Loan Fund

During the Charrette, stakeholders identified the following Foundations as potential sources of revenue for the City’s energy conservation and energy efficiency initiatives:

- The Benedum Foundation
- Foundation for the Tri-State Community

The City can use Foundation grants to establish a revolving loan fund that would issue low- or no-interest loans for energy conservation, energy efficiency, or renewable energy improvements. The loans are paid back from cost-savings resulting from the energy improvements. As loans are repaid, the revolving loan fund would issue additional loans thereby providing the upfront capital for even more energy improvements throughout the community. Charrette attendees suggested that the Community Foundation of Williamson or the Williamson Redevelopment Authority could solicit capital for and administer Williamson’s revolving loan fund.
Federal Tax Incentives

Appendix 4 contains a summary of federal tax incentives for energy efficiency and alternative energy. Of particular importance to Williamson is the Section 179D tax deduction of up to $1.80 per square foot available to “designers” who assist Williamson with energy upgrades to new or existing publically owned buildings. Municipalities are not capable of taking advantage of many federal tax incentives. Section 179D allows Williamson to allocate its otherwise wasted tax deduction to the engineer, contractor, architect, environmental consultant, or energy services provider that assists a new or renovated City building save at least 50 percent of the heating, cooling, water heating, and interior lighting energy cost of a building that meets ASHRAE Standard 90.1-2001. Each of the three energy-using systems of a building — the envelope, interior lighting system, and heating and cooling system — is eligible for one third of the incentive ($0.60 per square foot) if it meets its share of the whole-building savings goal. The Section 179D tax deduction applies to buildings or systems placed in service or remodeled between January 1, 2006 and December 31, 2013.

The designer that is going to receive Williamson’s Section 179D tax deduction should first consult a tax professional qualified to handle such transactions (e.g., certified public accountant or tax attorney). According to Internal Revenue Service Notice 2008-40, before a designer can claim the Section 179D deduction with respect to property installed on or in a Williamson-owned building, the designer must obtain all of the following information from the City of Williamson in writing:

1. The name, address, and telephone number of an authorized representative of the owner of the government-owned building;
2. The name, address, and telephone number of an authorized representative of the designer receiving the allocation of the Section 179D deduction;
3. The address of the government-owned building on or in which the property is installed;
4. The cost of the property;
5. The date the property is placed in service;
6. The amount of the Section 179D deduction allocated to the designer;
7. The signatures of the authorized representatives of both the owner of the government-owned building and the designer or the designer’s authorized representative; and,
8. A declaration, applicable to the allocation and any accompanying documents, signed by the authorized representative of the owner of the government-owned building, in the following form:

   “Under penalties of perjury, I declare that I have examined this allocation, including accompanying documents, and to the best of my knowledge and belief, the facts presented in support of this allocation are true, correct, and complete.”

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36 According to Internal Revenue Service Notice 2008-40, if more than one designer (e.g., engineer, contractor, architect, environmental consultant, or energy services provider) is responsible for creating the technical specifications for installation of energy efficient commercial building property on or in a Williamson-owned building, the owner of the building should either determine which designer is primarily responsible and allocate the full deduction to that designer, or at the owner’s discretion, allocate the deduction among several designers.
According to Internal Revenue Service Notice 2008-40, the owner of the public building is not required to include any amount in income on account of the Section 179D deduction allocated to the designer. The owner of the public building is, however, required to reduce the basis of the energy efficient commercial building property (or partially qualifying commercial building property) by the amount of the Section 179D deduction allocated.

**Combining Incentives and Programs**

Williamson can maximize funds available for energy efficiency and/or renewable energy by combining multiple tax incentives. For example, after a homeowner has maximized efficiency, the homeowner can take advantage of both West Virginia’s residential solar tax credit as well as the state’s net metering law that would allow for the homeowner to sell electricity back to the grid. It should be noted that any net excess electricity generation by a customer during a billing cycle will be carried over to their next bill as a kWh credit at their retail rate.

Many discussions during the Charrette focused on the historic significance of Williamson’s buildings. There is an opportunity for Williamson to attract funds for historic preservation, such as the Historic Preservation Tax Incentives Program administered by the National Park Service, which is a tax credit that applies specifically to preserving income-producing historic properties. If Williamson can successfully assist its commercial building owners receive funds of historic preservation, then energy conservation/efficiency should be included in the project. Another opportunity for Williamson is to invest savings from increased energy efficiency into historic building restoration.

**Looking Forward**

The Williamson Local Energy Action Plan has been developed through considerable input and guidance from Williamson City employees, elected officials, board members, and concerned citizens. The LEAP planning process itself yielded a tremendous amount of information that can help Williamson lower its energy bills and spur economic development. The City should continue this momentum by implementing the Energy Goals contained in this LEAP Report.
Williamson Local Energy Action Plan
Appendix 1 – LEAP Energy Inventory Data
## Government Analysis - Buildings and Facilities Inventory and Forecast

<table>
<thead>
<tr>
<th>Name of Building or Facility and Account #</th>
<th>Electricity or Fuel Source</th>
<th>Total Electricity or Fuel Use/Units</th>
<th>Total Cost/$ (Optional)</th>
<th>Indicator Inputs and Notes (Optional)</th>
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<td>Base Yr. Cost</td>
<td>Target Yr. Projected Cost</td>
</tr>
</tbody>
</table>

*Make as many copies of this table as you’ll need to account for all local government buildings, facilities and operations.

**Shaded columns represent optional inputs.

Notes, Assumptions and Data Sources
### Government Analysis - Buildings and Facilities Inventory and Forecast

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<th>Name of Building or Facility and Account #</th>
<th>Electricity or Fuel Source</th>
<th>Total Electricity or Fuel Use/units</th>
<th>Total Cost/$ (Optional)</th>
<th>Indicator Inputs and Notes (Optional)</th>
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*Make as many copies of this table as you'll need to account for all local government buildings, facilities and operations.

**Shaded columns represent optional inputs.

### Notes, Assumptions and Data Sources

- [Notes and assumptions for specific data collection.]

- [Data sources referenced in the analysis.]
## Government Analysis - Buildings and Facilities Inventory and Forecast

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<th>Name of Building or Facility and Account #</th>
<th>Electricity or Fuel Source</th>
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<td>Emergency Service Bldg</td>
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*Make as many copies of this table as you'll need to account for all local government buildings, facilities and operations.

**Shaded columns represent optional inputs.

### Notes, Assumptions and Data Sources

_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________
Williamson Local Energy
Action Plan
Appendix 2 – Unsigned Copy of Street Lights Contract
This Agreement entered into this 18th day of July, 2001 by and between Appalachian Power Company dba American Electric Power, hereafter call the Company, and City of Williamson or his or its heirs, successors or assigns, hereafter called the Customer.

Witnesseth:

For and in consideration of the mutual covenants and agreements hereinafter contained, the parties hereto agree with each other as follows:

1. The Company agrees to operate and maintain, as hereinafter provided, certain street and highway lighting equipment owned and installed by others the downtown area of the City of Williamson, antique streetlighting system, consisting of the following number of lamps set forth below, and to supply sufficient electric energy to continuously operate the lamps to give the maximum amount of illumination obtainable under commercial conditions from one-half hour after sunset until one-half hour before sunrise, every night and all night, approximately 4,000 hours per annum during the term of years hereinafter set forth.

<table>
<thead>
<tr>
<th>NO. OF LAMPS</th>
<th>SIZE IN LUMENS</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>9500</td>
<td>sodium vapor enclosed</td>
</tr>
</tbody>
</table>

The maintenance to be performed by the Company will be limited to normal maintenance requirements and shall include replacing the cleaning of glassware and lamps owned by others, and replacement of ballasts and photo cells as required by normal mortality, but shall not include replacement of other equipment owned by others, such as lighting standards or bases, conduit systems, electrical conductors, luminaries, etc. The Customer agrees to accept the service herein specified during the term hereof and to pay therefor at the rates on file with the Public Service Commission of West Virginia. Current Rate Schedule S.L. (Street Lighting) of P.S.C. W. Va. Tariff No. 11 is attached.

2. The Company agrees that during the term of this Agreement it will furnish, for the Customer, operation and maintenance for such additional lighting units as may be installed and owned by others when requested to do so by written notice from a duly authorized representative of the Customer. Whenever operation and maintenance of such additional lighting units are so ordered and supplied, the number of lamps to be served throughout the remainder of the period covered by this Agreement shall be increased accordingly. The Customer agrees to pay for such additional lamps in accordance with the prices listed above.

3. Bills are due upon receipt and payable at the main or branch offices of the Company within twenty (20) days of the mailing date.

4. All material furnished by the Company shall remain the property of the Company and may be removed at the termination of this Agreement, if the Company so desires.

5. The Company shall keep each and every lamp herein specified in operation during the time provided. Adjustments to the bill for outages which are reported to the company shall be made for all days during which the lamp failed to work, provided that the Company shall be given two regular work days (Monday thru Friday) from the time of notification by the customer or its representative to repair any fixture covered in this agreement and that no adjustment shall be made if the repair is completed within that two day period. Formal notification shall be considered to be in written form only but it is agreed that verbal notification shall be sufficient for precipitating repair measures. The adjustment made by the Company shall be on a daily pro rata basis to reflect the actual number of days which the unit was inoperative.
6. If the Customer shall default in the payment of any bills as herein provided, the Company may at its option, after having given ten (10) days written notice of its intention to do so, discontinue the service herein specified and continue to withhold the supply of electric energy for street lighting until such time as the Customer has made payment for all bills in which it is in arrears. Any such suspension of service by the Company shall not terminate this Agreement unless Company so elects. Otherwise, upon payment by the Customer of the amount it is in arrears, the Agreement shall remain in full force and effect for the period herein specified.

7. The Customer, as a further consideration for the promises and agreements made by the Company, herein set forth, hereby grants to the said Company the privilege of the use of the streets, alleys and public places of said Customer for the purpose of placing its poles and equipment.

8. The Customer agrees that during the life of this Agreement it will provide in its annual budgets and estimates and levy of taxes sufficient funds to pay the Company any amounts due for services rendered under said Agreement.

9. All and singular the terms and conditions of this Agreement shall be binding upon and insure to the benefit of the parties hereto, their respective successors and/or assigns.

10. This Agreement cancels and supersedes all previous Agreements relating to the supply of the service described herein.

11. This Agreement shall extend for a period of ten (10) years from the date thereof and continue with self-renewal provisions for successive periods of one year each until either party shall give at least 60 days’ notice to the other of the intention to discontinue the Agreement at the end of the initial term or any successive yearly period. Rates during the term of this Agreement will change in accordance with revisions in Rate Schedule S.L. as approved by the Public Service Commission of West Virginia.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed in triplicate by their duly authorized officers the day and year first above written.

Appalachian Power Company
BY: ________________________________
Alan Bragg
TITLE: Manager
Account# 028-221-952-0
City of Williamson
BY: ________________________________
Title: ________________________________
Williamson Local Energy Action Plan
Appendix 3 – Williamson City Vehicles
<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Year</th>
<th>Description</th>
<th>VIN</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>Dodge</td>
<td>Intrepid</td>
<td>2004</td>
<td>Police/Security Units</td>
<td>2B3HD46V64H701520</td>
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<tr>
<td>Sutheren</td>
<td>Fire Truck</td>
<td>1990</td>
<td>Fire Department Unit</td>
<td>129A1BB461003745</td>
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<tr>
<td>Ahrens-Fox</td>
<td>Fire Truck-ANTIQUE</td>
<td>1923</td>
<td>Fire Department Unit</td>
<td>1632</td>
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<tr>
<td>Dodge</td>
<td>SW</td>
<td>1987</td>
<td>Light Truck (under 18,500 GVW)</td>
<td>2B5WB31WJHK294604</td>
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<tr>
<td>GMC</td>
<td>Sierra PU</td>
<td>1986</td>
<td>Light Truck (under 18,500 GVW)</td>
<td>1GTGC24MOGF726897</td>
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<tr>
<td>Ford</td>
<td>PU</td>
<td>1986</td>
<td>Light Truck (under 18,500 GVW)</td>
<td>1FTH26H76PA32052</td>
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<tr>
<td>GMC</td>
<td>PU</td>
<td>1980</td>
<td>Light Truck (under 18,500 GVW)</td>
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<tr>
<td>International</td>
<td>Garbage Truck</td>
<td>1996</td>
<td>Bus (under 35 seats)</td>
<td>1HTSAAKXT6H263943</td>
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<tr>
<td>Chevrolet</td>
<td>PU</td>
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<td>Light Truck (under 18,500 GVW)</td>
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<tr>
<td>Ford</td>
<td>Ranger</td>
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<td>Light Truck (under 18,500 GVW)</td>
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<tr>
<td>Ford</td>
<td>Ranger</td>
<td>1996</td>
<td>Light Truck (under 18,500 GVW)</td>
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</tr>
<tr>
<td>Chevrolet</td>
<td>Boom Truck</td>
<td>1990</td>
<td>Heavy Truck (over 18,500 GVW)</td>
<td>1GCC24KXE250012</td>
<td>2</td>
</tr>
<tr>
<td>GMC</td>
<td>Dump Truck</td>
<td>1994</td>
<td>Heavy Truck (over 18,500 GVW)</td>
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<tr>
<td>GMC</td>
<td>Truck</td>
<td>1976</td>
<td>Mobile Equipment Units</td>
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<tr>
<td>Ford</td>
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<tr>
<td>Ford</td>
<td>F-60 DUMP TRK</td>
<td>2003</td>
<td>Heavy Truck (over 18,500 GVW)</td>
<td>3PDFN65H23MB00295</td>
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</tr>
<tr>
<td>UNILOADER</td>
<td>1988</td>
<td>Mobile Equipment Units</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case</td>
<td>BOOM MOWER MODEL 4888</td>
<td>Mobile Equipment Units</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grimme</td>
<td>SCHRIMDT</td>
<td>1992</td>
<td>Mobile Equipment Units</td>
<td>3</td>
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</tr>
<tr>
<td>Wisconsin</td>
<td>Air Compressor</td>
<td>1995</td>
<td>Mobile Equipment Units</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Kohler</td>
<td>Generator</td>
<td>1987</td>
<td>Mobile Equipment Units</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Honda</td>
<td>Trash Pump</td>
<td>1993</td>
<td>Mobile Equipment Units</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>John Deere</td>
<td>Backhoe</td>
<td>2000</td>
<td>Mobile Equipment Units</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Kubota</td>
<td>Tractor</td>
<td>1998</td>
<td>Mobile Equipment Units</td>
<td>3</td>
<td></td>
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<tr>
<td>Kenworth</td>
<td>TRASH PUMP</td>
<td>2008</td>
<td>Heavy Truck (over 18,500 GVW)</td>
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<tr>
<td>Sutheren</td>
<td>Fire Pumper</td>
<td>2005</td>
<td>Fire Department Unit</td>
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<tr>
<td>Ford</td>
<td>PU</td>
<td>1996</td>
<td>Light Truck (under 18,500 GVW)</td>
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<tr>
<td>Chevy</td>
<td>2006</td>
<td>Private Passenger</td>
<td>2G1WS551669426382</td>
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**PART 4. EMPLOYEE EXPOSURES** – Enter current number of Officers & Directors and FULL TIME employees.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
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<tbody>
<tr>
<td>Officers &amp; Directors</td>
<td>14</td>
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<tr>
<td>Law Enforcement</td>
<td>8</td>
</tr>
<tr>
<td>Teacher or Faculty Members</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance or Construction</td>
<td>0</td>
</tr>
<tr>
<td>Dentists</td>
<td>0</td>
</tr>
<tr>
<td>Other Medical Professionals</td>
<td>0</td>
</tr>
<tr>
<td>Unclassified</td>
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**Administrative or Clerical:
<table>
<thead>
<tr>
<th>Number</th>
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<tbody>
<tr>
<td>7</td>
</tr>
</tbody>
</table>

**Firemen:
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<thead>
<tr>
<th>Number</th>
</tr>
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<tbody>
<tr>
<td>8</td>
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**Drivers:
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<tr>
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</tr>
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<tbody>
<tr>
<td>41</td>
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</tbody>
</table>

**Physicians:
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<thead>
<tr>
<th>Number</th>
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<tbody>
<tr>
<td>0</td>
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</tbody>
</table>

**Nurses:
<table>
<thead>
<tr>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

**All Other Professionals:
<table>
<thead>
<tr>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

**Professional Social Workers:
<table>
<thead>
<tr>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>
THESE VEHICLES TO BE ADDED:

2005 Dodge Durango VIN# 1D4HB48N7S5F568306 Police Utility Vehicle
2011 Ford Truck VIN# 1FDU5HT8BEB10534 Heavy truck
1973 Sutphen Pumper Truck VIN# HS91B
1983 Sutphen Tower Truck VIN# 1S9A3KHE5D100192
2004 Hughes Equipment Trailer VIN# 4PRUS14204T000196
On December 17, 2010, President Obama signed the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010. This law extends, but alters, the tax credits for energy efficiency available in 2011. This latest update to the Energy Policy Act of 2005 incentivizes American homeowners and business by providing:

- Tax credits for homeowners for energy efficiency improvements to existing homes
- Tax credits for builders of highly efficient new homes
- Rebates for energy efficient appliances

The American Recovery and Reinvestment Act of 2009 (ARRA) continues to provide incentives for:

- Tax credits for residential and commercial photovoltaics, solar water heating systems, geothermal heat pumps, and other renewable technologies
- Tax deductions for owners or designers of highly efficient commercial buildings

Residential Energy Efficiency

Existing Homes

For homeowners wishing to make their primary residence more energy efficient, the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 will provide some incentives. Qualified improvements receive a federal tax credit of 10% of the cost, excluding labor, with a lifetime maximum of $500. Therefore, homeowners who have claimed $500 or more in any previous year are ineligible. The improvements must be in place prior to December 31, 2011. The following improvements are eligible for the tax credit:

- Insulation material which meets 2009 IECC and amendments
- Exterior windows that meet ENERGY STAR criteria (subject to $200 cap, through lifetime of credit 2006-2011)
- Exterior doors and skylights that meet ENERGY STAR criteria
- Metal roofing having pigmented coatings specifically design to reduce heat gain and meets ENERGY STAR

The following products have individual limits:

- Advanced main air circulating fan (subject to $50 cap)
- Natural gas, propane, or oil furnace or hot water boiler with an annual fuel utilization efficiency of 95 or greater (subject to $150 cap)

New Homes & Existing Homes

For new and existing homes, there is no limit on the size of the tax credit for many renewable systems including geothermal heat pumps, solar water heaters, solar photovoltaics, small wind energy, fuel cells and microturbine systems. Qualified products receive a federal tax credit equal to 30% of their cost. These systems must be placed in service between Jan 1, 2009 and Dec 31, 2016. Some examples of qualified products are:

- Solar water heating systems property certified by the Solar Rating and Certification Corporation (SRCC) which provide at least 50% of the system demand
- Photovoltaic systems which provide electric power for the residence
- Wind energy systems which provide 100 kW or less electric power to the residence
- Geothermal heat pumps which satisfy the ENERGY STAR criteria
- Fuel cells with a capacity ≥ 0.5 kW and efficiency ≥ 30% ($500 per 0.5 kW)
- Microturbines with a maximum capacity of 2,000 kW and a minimum efficiency of 26%

- Electric heat pump water heater with an energy factor of at least 2.0 (subject to $300 cap)
- Electric heat pump which achieves the highest efficiency tier established by the Consortium for Energy Efficiency (subject to $300 cap)
- Central air conditioner which achieves the highest efficiency tier established by the Consortium for Energy Efficiency (subject to $300 cap)
- Natural gas, propane, or oil water heater which has either an energy factor of at least 0.82 or a thermal efficiency of at least 90 percent (subject to $300 cap)
- Biomass stoves that use "plant-derived fuel available on a renewable or recurring basis, including agricultural crops and trees, wood and wood waste and residues (including wood pellets), plants (including aquatic plants), grasses, residues, and fibers” (subject to $500 cap)
Energy Efficient Home Credit

Home Builders


- Site-built homes may receive up to $2000 if they reduce heating and cooling energy consumption by 50% relative to the 2004 Supplement to the 2003 International Energy Conservation Code standard and the minimum efficiency standards established by the Department of Energy. The building envelope component improvements must account for at least one-fifth of the reduction in energy consumption.
- Manufactured homes may receive $2000 if their consumption is cut by 50% relative to the same stipulations provided for the site-built home as well as follow the Federal Manufactured Home Construction and Safety Standards.
- Manufactured homes may also receive $1000 for a 30% decrease relative to 2004 Supplement to the 2003 International Energy Conservation Code. Building envelope improvements must account for at least one-third of the reduction in energy consumption, and the house must meet ENERGY STAR® Labeled Home requirements.

In all instances, the builder must complete a certification process provided by the Internal Revenue Service (IRS). More information is provided on www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US41F&re=1&ee=1.

Commercial Buildings

Owners or tenants (or designers, in the case of publicly owned buildings) of new or existing commercial buildings may qualify for a tax deduction of up to $1.80 per square foot. The buildings must be constructed or reconstructed to save at least 50% of the heating, cooling, water heating, and interior lighting energy cost of a building that meets ASHRAE Standard 90.1-2001.

Each of the three energy-using systems of the building — the envelope, interior lighting system, and heating and cooling system — is eligible for one third of the incentive ($0.60 per square foot) if it meets its share of the whole-building savings goal.

Software that meets the Internal Revenue Service's requirements for accuracy and consistency will determine the projected energy savings. Third party inspectors review the plans and verify building parameters to determine compliance. The incentives apply to buildings or systems placed in service or remodeled between January 1, 2006 and December 31, 2013

For more information, visit the Commercial Building Tax Deduction Coalition website: www.efficientbuildings.org.

Renewables for Businesses

The business investment tax credit varies from 10% to 30% depending upon their type of system installed. This tax credit is available to businesses that purchase solar water heaters, solar photovoltaics, small wind energy, geothermal heat pumps, fuel cells and microturbine systems placed into service between Jan 1, 2009 and Dec 31, 2016. This business investment tax credit has no maximum cap. ARRA allows a business to receive a federal grant for renewable energy property but this offer may not be combined with the investment tax credit.

Combined Incentives

In many cases, multiple tax incentives may be claimed. In the case of a new home for example, the builder may claim credit for the high efficiency home and the homeowner may claim tax credits for solar hot water, photovoltaic, and fuel cell systems. Other financial incentives, such as local utility rebates, further reduce the cost of building or owning a solar and energy efficient home. For example, in Georgia, Georgia Power offers financial incentives to builders of ENERGY STAR® qualified new homes. To learn more about state incentives for renewable energy, visit: www.dsireusa.org.

Resources

- Database of State Incentives for Renewables & Efficiency
  www.dsireusa.org
- Florida Solar Energy Center
  www.fsec.ucf.edu
- Residential Energy Services Network (RESNET)
  www.natresnet.org
- Southeast Energy Efficiency Alliance
  www.seea.us
- Tax Incentives Assistance Project (TIAP)
  www.energytaxincentives.org
- Internal Revenue Service (IRS)
  www.irs.gov
- The American Recovery and Reinvestment Act of 2009 (ARRA)
  www.recovery.gov

Footnotes

1 Tax deductions are subtracted from income before total tax liability is computed. Tax credits are subtracted directly from the total tax liability. A credit is three or more times more advantageous to the taxpayer than a deduction. For example a tax credit of $500 for someone in the 28% tax bracket is equivalent to a tax deduction of $1,786.

2 The building envelope separates conditioned space from unconditioned (or outside) and consists of an air barrier and insulation that must be continuous and touching. Another way is to think of the building envelope as the balloon that keeps the living space separate from outside.