

# **Mount Lebanon Community Greenhouse Emissions Inventory & Climate Action Plan**

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June 22, 2010



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## **Executive Summary**

### **A Climate for Change**

In 2008 the Municipality recognized the need to reduce local greenhouse gas emissions, improve air quality and enhance community livability and sustainability, and signed on to the US Mayors Climate Protection Agreement. Subsequently the municipality joined the International Council for Local Environmental Initiatives (ICLEI), initiating its participation in ICLEI's Cities for Climate Protection (CCP) campaign. The following year, the state Department of Environmental Protection awarded Mt. Lebanon \$20,000 toward the development of a communitywide greenhouse gas emissions inventory and local climate action plan. The resulting Mt. Lebanon community emissions inventory and climate action plan have developed under a collaborative process involving a core Project Team and a larger Community Climate Team. Thirty-four individuals representing more than 14 separate organizations, including the municipality, the High School, and St. Clair hospital, currently are engaged in this process. The enclosed report is the first iteration of Mt. Lebanon's climate action plan; strategies will continue to be developed and evaluated for this living document of climate action.

### **Starting Point: Baseline Inventory & Emission Forecast**

The first step toward reducing greenhouse gas emissions is to identify baseline levels and sources of emissions and the sectors of the community that are responsible for the bulk of these emissions. The Project Team used ICLEI's standardized methodology and its Clean Air Climate Protection (CACAP) 2009 software to estimate and report all emissions generated from energy- and waste-related activities within the physical boundaries of the municipality in the year 2006. Electricity, natural gas, transportation and waste data were collected from Mt. Lebanon's four energy supply utilities, the Pennsylvania Department of Transportation and the Municipal Department of Public Works. The data was then categorized into four community sectors – residential, commercial and institutional, transportation and waste.

To project the communitywide emissions in the year 2025 with no local climate action, growth factors were developed for each of the greenhouse gas emissions sectors and sources. The growth factors were developed from expected local population growth and local vehicle miles traveled, as well as from projected national averages for per capita electricity and natural gas demand growth or decline relative to each sector. An alternative projection was developed to include emissions reductions based on reduction measures implemented between 2009 and the baseline year 2006, including residential and commercial recycling, municipal composting and municipal street tree planting.

The Community Climate Team then convened to select a reduction target and to develop an initial plan of action towards meeting the target.

## **Inventory & Forecast Results**

Mt. Lebanon's annual communitywide emissions for the year 2006 are estimated at 289,339 metric tons of carbon dioxide-equivalents (MT CO<sub>2</sub>-e). This equates to the annual emissions from 55,000 passenger cars or the carbon sequestered annually by 59,000 acres of pine forest. These emissions result primarily from the direct combustion of fossil fuels or the consumption of electricity produced from fossil burning sources.

In 2006 the residential sector represented nearly half of the communitywide emissions, followed by the commercial sector at 31% and transportation at 21%. Analysis by source revealed that electricity consumption is responsible for 55% of the community's emissions and natural gas for 23%.

The forecast for 2025 indicates a 15.4 percent growth over the 2006 baseline with the largest growth anticipated in the commercial sector electricity demand. If the reported existing reduction measures (those implemented between 2006 and 2009) are continued at their current levels until 2025, a 5.5 percent emissions reduction is considered achievable before implementing any new planned or proposed strategies.

## **Action Plan**

Throughout 2009 and 2010 Community Climate Team members met to set a greenhouse gas reduction target and propose strategies towards meeting the target. The Team chose to target a reduction of 17% below 2006 levels by 2020. This goal mirrors the President of the United States' targets for reducing emissions as put forth in the 2009 Copenhagen Climate Talks.

To develop the first iteration of the Community Climate Action Plan, the Community Climate Team selected ten practical municipally-led strategies that have potential for significant communitywide greenhouse gas emissions reductions. The Project Team further developed and analyzed the strategies. These ten strategies in combination with the reduction measures already established since 2006 have the collective potential to reduce community-wide greenhouse gas emissions by 3.4 percent below the 2006 baseline by 2015.<sup>1</sup>

Additional strategies need to be proposed and implemented in order to meet the 17% reductions target. Interested individuals, businesses, and organizations can join the Community Climate Team by contacting the Mt. Lebanon Environmental Community Action Team (ECAT) at [bob7smith@verizon.net](mailto:bob7smith@verizon.net), or by joining the Community Climate Team Google Group at <http://groups.google.com/group/mt-lebanon-community-climate-team?hl=en>

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<sup>1</sup> A 5.5% reduction of GHGs with existing measures was identified in the community emissions inventory. An additional 6.0% reduction of 2006 levels by 2015 is possible with the 10 planned and proposed strategies outlined in the action plan. Community-wide emissions are expected to rise by 8.1% from 2006 to 2015 if no action is taken. The resulting net reduction over 2006 levels is 3.4% by 2015.

## Summary of Strategies To-Date

The Community Climate Team developed ten strategies to reduce GHG emissions in each sector:

Sector	Name / Description	Year	Annual GHG Reduction	Percent of Community 2006 Baseline Emissions	Annual Community Cost Savings
			MT CO <sub>2</sub> -e	%	2010 \$
RES	1. Increase adoption of Residential Energy Efficiency and Conservation Measures	2015	2914	1.0%	\$460,000
COM	2. Increase adoption of Commercial Energy Efficiency and Conservation Measures	2015	2468	0.9%	\$350,000
MUNI	3. LED Traffic Light and Street Light Retrofit	2015	339	0.1%	\$65,379
MUNI	4. Implement Energy Conservation Measures in Municipal and School District Buildings and Operations	2015	2217	0.7%	\$82,994 +
TRANS	5. Complete Traffic Light Synchronization	2015	384 +	0.1%	\$114,000 +
TRANS	6. Establish "Best Workplaces for Commuters" Program	2015	327	0.1%	\$99,788
TRANS	7. Promote & Facilitate Active Transportation	2015	TBD	TBD	TBD
TRANS	8. Promote Reduced Idling through No Idling Zones	2015	66	0.0%	\$20,625
WASTE	9. Create a Residential Recycling Competition	2015	7341	2.5%	0
WASTE	10. Establish Commercial Recycling Services Purchasing Cooperatives	2015	1400	0.5%	TBD

**Action 1 (Residential Sector): Increase Adoption of Energy Efficient Lighting, HVAC Equipment, Appliances, and Encourage the Implementation of Energy Conservation Measures by the Residential Sector.** This action will encourage residents to replace energy inefficient equipment with energy star rated equipment and to weatherize their homes through implementing a community wide outreach program.

**Action 2 (Commercial Sector): Increase Adoption of Energy Efficient Lighting, HVAC Equipment, Appliances, and Motors by the Commercial Sector.** Through an outreach campaign, this action will encourage the commercial sector to increase the adoption of energy efficient lighting, HVAC equipment, appliances, and motors. The outreach campaign will inform business and commercial property owners of the benefits of energy efficiency and conservation and the generous rebates and incentives offered by Duquesne Light, the Department of Environmental Protection and the federal government, and will promote the benefits of undertaking an energy audit.

**Action 3 (Institutional Sector): LED Retrofits of Municipal Traffic Signals and Street Lights:** Light emitting diode (LED) traffic lights reduce electricity consumption of signals by 60 – 90 % and also reduce maintenance costs through lower replacement frequencies. Mt. Lebanon has already retrofitted half of its municipally owned signals. This action supports plans by the Public Works department to replace the remaining signals. Following on the success of the traffic signal replacement program, this action also encourages the municipality to retrofit all municipally owned street lights with LED lamps.

**Action 4 (Institutional Sector): Implement Energy Conservation Measures in Municipal and School District Buildings and Operations.** This action encourages the community's institutions (including the

Municipal Public Works, Parking Authority and the School District) to aggressively pursue opportunities to meet the plan's greenhouse gas reduction targets at the municipal golf course, recreation center, public library, municipal building, public works facilities, public safety building and parking authority. Specific measures include undertaking building retrofits, implementing purchasing policies, and establishing behavior modification programs.

**Action 5 (Transportation Sector): Traffic Signal Synchronization.** This action encourages the municipality to implement the two traffic signal synchronization projects it is planning along three primary arterial streets, US Route 19 and Cochran & Beverly Roads with intention of reducing congestion and improving revitalization and economic development along those corridors.

**Action 6 (Transportation Sector): Implement *Best Workplaces for Commuters* program.** This action proposes that the Municipality, School District, and Hospital implement the *Best Workplaces for Commuters* program. The program helps employers develop effective commuting programs for their employees, including financial incentives for ride sharing / carpooling, taking public transit, biking or walking to work, and developing telework business schedules. The initial goal is a 10 percent reduction in using single occupancy vehicles to get to work.

**Action 7 (Transportation Sector): Promote and Facilitate Walking and Biking.** This action emphasizes Mt. Lebanon's walking community culture by promoting and facilitating biking and walking within the municipality.

**Action 8 (Transportation Sector): Establish "No Idling Zones."** Through an educational campaign, this action seeks to educate residents about pollution's adverse affect on health and to achieve reductions in car emissions by discouraging idling through establishing no idling zones.

**Action 9: (Waste Sector): Establish a Competitive Residential Waste Reduction and Recycling Goal.** Building on the recently successful introduction of single stream recycling, this action seeks to boost the percentage of waste being recycled in the community through developing a regional recycling competition supported by an educational campaign promoting the benefits of recycling.

**Action 10: (Waste Sector): Establish a Commercial District Recycling & Eco-Purchasing Cooperative.** This action will establish eco- purchasing cooperatives in Mt. Lebanon's business districts to significantly increase commercial recycling. The program could then be expanded to offer cooperative or bulk purchasing of eco-friendly consumable products and services such as recycled paper products and energy audits.

## Acknowledgements

The enclosed report and first iteration of Mt. Lebanon’s evolving plan of climate action is the result of an extensively collaborative process comprised of a core Project Team and a larger Community Climate Team, including citizens, officials, volunteers, and staff.

Special thanks are extended to the Mt. Lebanon Environmental Community Action Team, Commissioners, municipal staff, and Environmental Sustainability Board for their leadership and support. We are especially grateful to the Pennsylvania State Legislature and Department of Environmental Protection for funding this climate inventory and action planning effort and others like it across the Commonwealth through the PA DEP GHG Pilot grant. Special thanks also go to the energy utilities serving Mt. Lebanon (Equitable Gas, Dominion Peoples, Columbia Gas, and Duquesne Light), Waste Management, Pennsylvania Departments of Transportation and Environmental Protection, and the Southwestern Pennsylvania Commission, all of whom provided the data necessary to complete the community-wide greenhouse gas emissions inventory and forecast.

Project Team	Community Climate Team	
<p><b><i>Mt. Lebanon Environmental Community Action Team (ECAT)</i></b></p> <p>Brett Aristegui Tybe Brett Hazel Cope Loretta Hoglund Bob Smith Suzanne Stamatov Katherine Oxenreiter (student) Nina Wroniak (student) Jay Louik (student)</p> <p><b><i>Mt. Lebanon Department of Public Works</i></b></p> <p>Tom Kelley Teri Romani-Corbin</p> <p><b><i>SEEDS</i></b></p> <p>Barton Kirk</p> <p><b><i>Envinity</i></b></p> <p>Kevin Gombotz Frank Higdon</p>	<p>Brett Aristegui Andrew Baram Tybe Brett Bill Burdwood Elaine Cappucci Hazel Cope Randy Francisco Joan Gibson Kevin Gombotz Robert Hedin Loretta Hoglund Kathy Hrabovsky Lauren Hurley Gerald Ingram Tom Kelley Barton Kirk Matt Kluck Jay Louik Mark Magalotti Rachel Martin Stephen McLean Matt Mehalik Ken Mittereder Steve Novicki Katherine Oxenreiter Rob Papke Frank A. Petrich Sharon Pillar Indigo Raphael Teri Romani David Ross Bob Smith Suzanne Stamatov Nina Wroniak</p>	<p>Environmental Sustainability Board Resident Environmental Sustainability Board Giant Eagle School Board ECAT Sierra Club Environmental Sustainability Board Envinity Environmental Sustainability Board ECAT Environmental Sustainability Board Office of State Rep. Matt Smith MLSD Mt. Lebanon Municipality Seeds Commissioner ECAT Trans Associates; Resident Sierra Club Environmental Sustainability Board Sustainable Pittsburgh Resident St. Clair Hospital ECAT Environmental Sustainability Board Penn State Master Gardener Program Penn Future &amp; Citizens Climate Conservation Consultants Inc. Mt. Lebanon Municipality Equitable Gas ECAT ECAT ECAT</p>

## Introduction

Our global atmospheric concentration of greenhouse gases (GHGs) has surpassed and is rapidly exceeding the current recommended maximum of 350 parts per million (ppm) with dire consequences to climate and quality of life locally and globally. Concerns about the rising cost, availability, and impact of energy resources are growing at every level of community and government. The community and municipal government of Mt. Lebanon have taken a leadership role by beginning the process of measuring, reducing, and monitoring emissions.

In early 2008 the Mt. Lebanon Environmental Community Action Team (ECAT), a volunteer group comprised of Mt. Lebanon residents, successfully petitioned the Commission to lead the community by example in energy and climate action and sign the US Mayors Climate Protection Agreement, joining the now 1017 US Mayors and 1105 "Cool Cities" nationwide that have recognized the need to reduce local greenhouse gas emissions, improve air quality, and enhance community livability and sustainability. With funding by Mt. Lebanon residents, most of whom are ECAT members, the Municipality of Mt. Lebanon subsequently joined the International Council for Local Environmental Initiatives (ICLEI) as a full member and initiated its participation in ICLEI's Cities for Climate Protection (CCP) campaign. The Municipality is undertaking its leadership role in climate protection and carrying out the CCP campaign's Five Milestones to reduce community-wide greenhouse gas and air pollution emissions.

1. Conduct a baseline emissions inventory and forecast of GHG emissions,
2. Adopt an emissions reduction target for a forecast year,
3. Develop a Local Action Plan,
4. Implement plan strategies, and
5. Monitor and verify results.

In the spring of 2008, as the municipality was moving forward on its baseline emissions inventory, the Pennsylvania Department of Environmental Protection (PA DEP) launched a GHG Pilot Grant Program to fund local efforts to address community-wide greenhouse gas emissions. Mt. Lebanon ECAT and municipal staff partnered with SEEDS, a sustainability-driven non-profit organization, and Envinity, a PA-based energy services company to develop a grant proposal. The following year the DEP awarded Mt. Lebanon \$20,000 toward the development of a community-wide greenhouse gas emissions inventory and local climate action plan.

The objectives of the PA DEP GHG Pilot Grant Program correspond to the first three milestones of the CCP program. This report represents the completion of the grant program objectives and the first three steps of the Cities for Climate Protection process.

Included in this report are:

- Background on greenhouse gases, climate change, and local climate action (Appendix A);
- Explanations of the inventory analysis and how it was conducted;
- Baseline emissions inventory results for the community of Mt. Lebanon;
- Forecasting future emission levels with and without current reduction efforts;
- Mt. Lebanon’s general strategy for climate action;
- Specific emissions reduction measures for each community sector;
- Synthesis of reduction measures and recommendations for strategic implementation; and
- A listing of additional reduction measure ideas recommended or under consideration by the action planning committees (Appendix C).

The resulting Mt. Lebanon community emissions inventory and climate action plan have developed under a collaborative process involving a core Project Team and a larger Community Climate Team. Thirty-four individuals representing more than 14 separate organizations currently are engaged in this process. The groups involved are:

#### **Project Team**

- ECAT – local citizen and student volunteers
- Mt. Lebanon municipal staff
- Mt. Lebanon Environmental Sustainability Board
- SEEDS – a sustainability-driven non-profit organization, and
- Envinity – a PA-based energy services company.

#### **Community Climate Team**

- Environmental Sustainability Board
- Mt. Lebanon Board of Commissioners
- Mt. Lebanon School Board
- St. Clair Hospital
- Giant Eagle
- Penn Future
- Citizens Climate Corps
- Office of State Representative Matt Smith
- Equitable Gas
- Sustainable Pittsburgh
- Conservation Consultants, Inc.
- Sierra Club
- Trans Associates
- Penn State Master Gardener’s Program

## **Inventory & Forecast**

### **Methodology Summary**

The first step toward reducing GHG emissions is to identify baseline levels and sources of emissions and the sectors of the community that are responsible for these emissions. This information is then used to inform the selection of a reduction target and develop a local plan of action. ICLEI's Cities for Climate Protection campaign assists local governments to track energy and waste related activities in the community, providing software and standardized methodology for estimation and reporting emissions.

**Software:** ICLEI's Clean Air Climate Protection (CACP) software tracks emissions of GHGs (primarily carbon dioxide, methane, and nitrous oxide) and also criteria air pollutants <sup>2</sup>(nitrogen oxides, sulfur oxides, carbon monoxide, volatile organic compounds, and particulate matter) that result from the use of electricity, fuel and waste disposal. It then reports the GHGs in equivalent carbon dioxide emissions<sup>3</sup> (CO<sub>2</sub>-e). It also translates all energy units into British Thermal Units (BTUs).

**Inventory Scope:** The community-wide inventory was calculated using the CACP 2009 software and its default calculations, values and assumptions. The analysis includes all activities<sup>4</sup> occurring within the municipality of Mt. Lebanon and reports both scope 1 (direct) and scope 2 (indirect) emissions.

Scope 1 – direct emissions are as emissions released within the community including fossil fuels burned for heating homes and businesses or vehicles driven within the municipality.

Scope 2 – indirect emissions are those that occur as the result of energy consumed within the community, but the actual emissions are emitted by sources outside the municipality. Impacts resulting from the consumption of purchased electricity, heat, or steam are considered indirect and represent Scope 2.

Inventory activity inputs and total scope 1 and 2 emissions created by community activities have been categorized by the software into four community sectors:

RESIDENTIAL – inputs include total electricity and natural gas consumed by residential households<sup>5</sup>, within the municipality during 2006.

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<sup>2</sup> Criteria air pollutants include the six air pollutants regulated by the US EPA under the National Ambient Air Quality Standards due to their ubiquity and potential harm to human and environmental health.

<sup>3</sup> Because different greenhouse gasses have different atmospheric warming potentials, total emissions are converted to carbon dioxide equivalents (CO<sub>2</sub>-e) to provide a standard unit of measurement.

<sup>4</sup> Emissions or activities may be excluded that are considered *de minimis* – emissions from one or more sources, for one or more gases which, when summed, equal less than 5% of the communities total emissions

COMMERCIAL<sup>6</sup> – inputs include total electricity and natural gas consumed by commercial sector activities. The commercial sector represents management, professional, and service organizations including wholesale, retail, communications, financial, health care, food services, hospitality, and office activities. Also included in this category are educational institutions, houses of worship, and municipal governmental operations.

TRANSPORTATION – inputs include total on-road vehicular and local on-road transit transportation within the municipality during 2006. This includes transportation for residential, commercial, and industrial activities. Emissions are based on estimated total vehicle-miles traveled (VMT) and an estimated distribution of vehicle and fuel types. The local transit service, the Pittsburgh Port Authority provides both on-road and rail service. Only Port Authority bus transportation miles are included in the estimated community-wide VMT.

WASTE – inputs include weight and composition (i.e. percentages of organic and inorganic materials<sup>7</sup>) of solid waste generated within the community during the base year of 2006. Additional inputs include the method of solid waste management (e.g. landfill, incineration, composting, open dumping, etc.), and the percentage of methane capture and flaring or recovery for use.

#### **Data Sources:**

Electricity: All electricity consumption data for residential, commercial, and industrial sectors were provided by Duquesne Light, the municipality's electricity provider.

Natural Gas: Natural gas consumption data were provided by Equitable Gas, Dominion Peoples, and Columbia Gas, the Township's three providers for the residential, commercial and industrial sectors.

Transportation Data: Historical vehicle miles traveled within the municipality were provided by the Pennsylvania Department of Transportation's Bureau of Planning and Research for all road class types except municipally owned local roads, for which no data sources were available.

Waste Data: Quantities of residential solid waste and recycling collected annually within the municipality were available through the Mt. Lebanon Department of Public Works, as were reported quantities of commercial recyclables collected. However, commercial solid waste collection is not

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<sup>5</sup> Households in apartment buildings with individual meters that receive energy utility bills directly from the utility are categorized as Residential, while households in apartment buildings with master energy meters for the entire building are categorized as Commercial based on how the data is reported by the utility companies.

<sup>6</sup> Because there are so few industrial facilities in Mt. Lebanon the industrial sector has been combined with the commercial sector for both the inventory and action plan.

<sup>7</sup> The quantity and type of organic materials deposited in a landfill will affect the quantity of methane generated within the landfill as the waste decomposes over time.

reported to the municipality, county or state, by municipality, therefore commercial solid waste collection was estimated.<sup>8</sup>

**Backcasting:** Several of the utility providers were not able to provide consumption and customer records back to the year 2006. In order to estimate the total community-wide emissions for the year 2006, the data was weather normalized and backcasted to year 2006<sup>9</sup>. The same process of weather normalization served as the starting point for the community emissions forecast.

**Forecasting:** The CACP 2009 software enables communities to project emissions from the baseline year or current year (in this case weather normalized 2009) to any forecast year of interest. Forecasts are based on chosen rates of energy use growth for each fuel type and sector. The energy use growth rates developed for each sector of the Mt. Lebanon community were comprised of two factors: 1) sector growth<sup>10</sup> (e.g. for the residential sector: percent growth in the number of households; for the commercial or industrial sectors: percent growth in the number of establishments) and 2) projected changes per capita energy demand relative to each sector.<sup>11</sup>

**Existing Reduction Measures:** In addition to inventorying, the CACP 2009 software provides tracking of existing and planned reduction measures that can be applied to the baseline and forecasted emissions. Data on existing reduction community measures were provided by the Mt. Lebanon Department of Public Works, including residential and commercial recycling, municipal composting, and municipal street tree planting.

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<sup>8</sup> The CACP software does not allow for the reporting of recycling in the baseline inventory, but does provide an opportunity for reporting recycling in the quantification of greenhouse gas reduction measures. Therefore all materials recycled in 2005 are reported as landfilled in the baseline inventory and the benefit of recycling is subsequently factored when the existing reduction measures are applied.

<sup>9</sup> For electric 2009 monthly data were used to create linear regressions between monthly Heating Degree Days (HDD), monthly Cooling Degree Days (CDD), and monthly electric usage. These monthly regressions were used to backcast electric usage for 2006 based on the HDD and CDD for 2006. For natural gas, monthly data were used to create a linear regression between monthly Heating Degree Days (HDD) and gas usage for both residential and commercial sectors. These monthly regressions were used to backcast gas usage for 2006.

<sup>10</sup> Annual municipal population, household, and commercial business projections from 2010 to 2030 were obtained from the Southwest Pennsylvania Commission's Municipal Profiles and US Census 2008 National Projection, both based on the 2000 Census

<sup>11</sup> Annual projections of national energy use were available from the 2008 release of the US Energy Information Administration's Annual Energy Outlook (AEO). AEO data used for the County projections included national projections of electricity, natural gas, diesel gasoline consumed by the residential, commercial, industrial, and transportation sectors

## Inventory Results

**2006 Community Baseline:** Mt. Lebanon’s annual community-wide emissions for the year 2006 are estimated at 289,339 metric tons of carbon dioxide-equivalents (MT CO<sub>2</sub>-e), which equates to the emissions from 55,000 passenger cars or the carbon sequestered by 59,000 acres of pine forest. These emissions result primarily from the direct combustion of fossil fuels or the consumption of electricity produced from fossil burning sources. The remaining 1% of estimated community-wide emissions is associated with landfill gas – methane released from the decomposition of solid waste generated by the community. As compared to the international average, Mt. Lebanon is responsible for 4.3 times more GHG emissions per person.

**Sources:** Energy consumption is the primary driver of community greenhouse gas emissions, so it is important to consider the different energy sources. Figure 2 illustrates that electricity is the lead contributor of GHG emissions at 55%. However, electricity makes up only 26% of municipal-wide energy use (Figure 3).

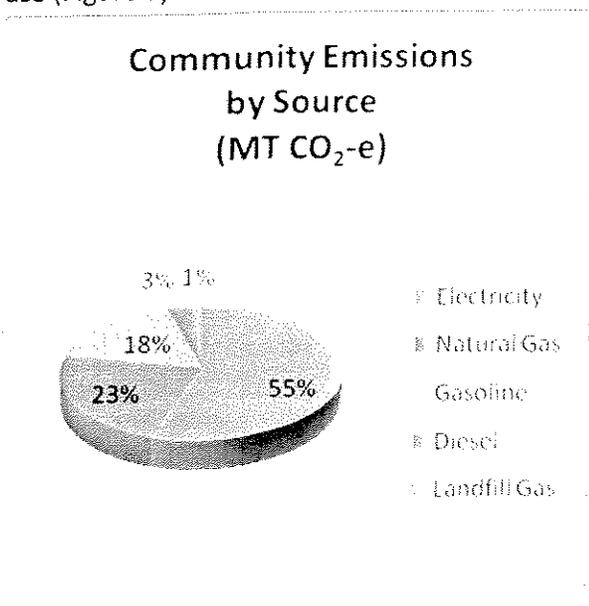


Figure 2: Distribution of GHG Emissions by Source

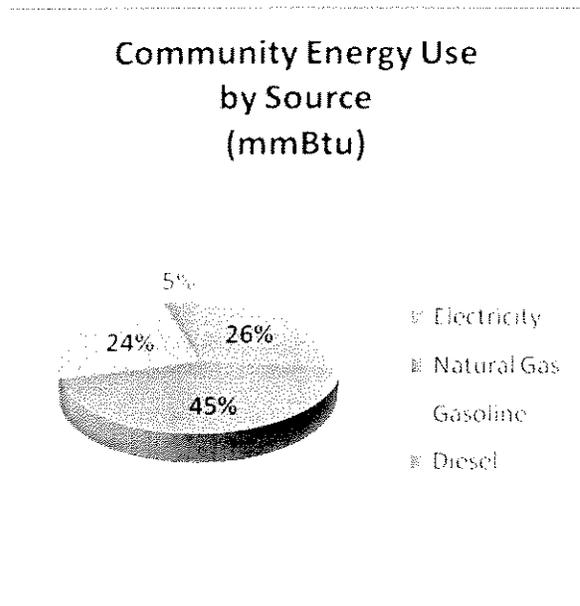


Figure 3: Distribution of Community Energy Demand

This comparison illustrates that emission-per-unit energy consumption is not equivalent for all energy sources. For each unit of electricity consumed, energy is lost in its transmission and distribution, which results in a higher emissions profile than for fuels combusted for transportation or heating.

Table 1 lists the assumed emissions efficiencies of energy sources consumed within Mt. Lebanon by million British thermal units (MMBtu).

**Table 1: Average Emissions Efficiency by Source**

Source	Kilograms CO <sub>2</sub> -e per MMBtu
Electricity <sup>12</sup>	213
Natural Gas	53
Gasoline	78
Diesel	79

**Sectors:** Total emissions and energy use for the entire community within Mt. Lebanon are divided among four community activity sectors.

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<sup>12</sup> Electricity emission efficiency is based on the CACP software’s default 2009 emission factors.

Figure 4, detailing emissions produced by each sector, shows that the Residential sector contributed nearly half of the community's 2006 GHG emissions, with the Commercial and Transportation sectors contributing the second half. The Waste sector appears to contribute a comparatively small fraction to the community's total GHG emissions profile, but is significant enough to warrant consideration of strategies to reduce waste emissions further.

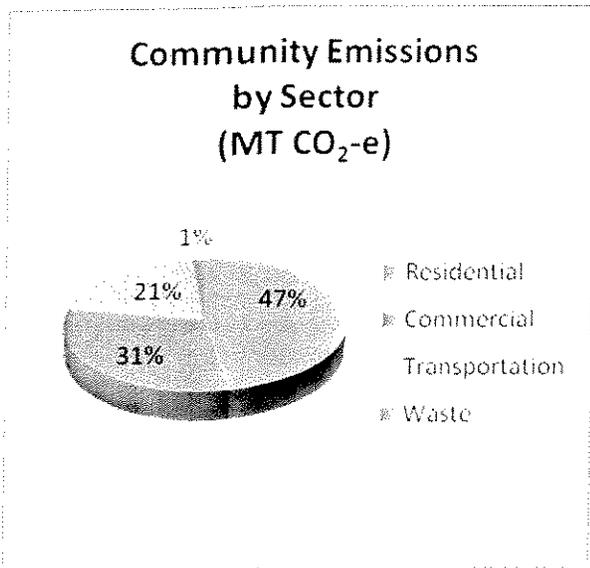


Figure 4: Distribution of GHG Emissions by Sector

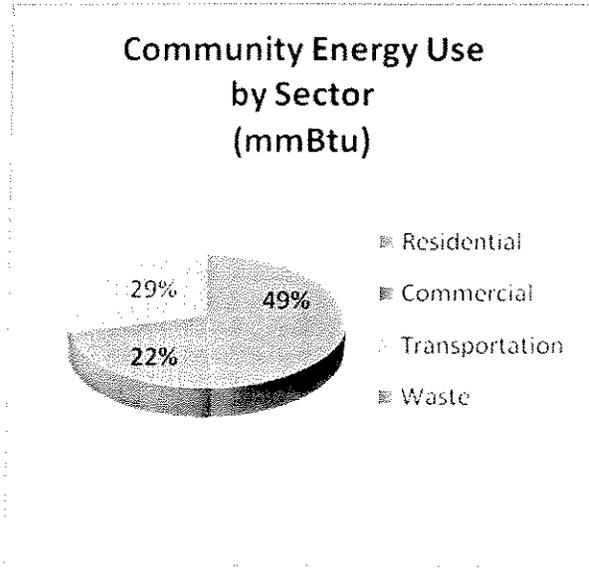


Figure 5: Distribution of Sector Energy Demand

Figure 5 illustrates energy consumption (rather than total emissions as in Figure 4). Here the Residential sector again dominates, but Transportation leads the Commercial Sector in community energy use.

### Forecast Results

#### 2025 Community Forecast:

This forecast of future consumption and emissions considers two scenarios: (1) business as usual and (2) continuation of reduction measures in place as of 2009.

As described in Methodology, forecasts of community-wide emissions were developed from projected population growth and changes in energy demand across sectors and energy types and are based on expected changes in the national per capita energy use for each energy type and sector. Based on these growth trends, if no preventative action is taken by the Mt. Lebanon Community total greenhouse gas emissions are expected to rise progressively, increasing to 333,833 MT CO<sub>2</sub>-e, or 15.4% above the 2006 baseline emissions by 2025.

Figure 6 compares the baseline year (2006) to the current year (2009), forecast year (2025), and forecast year with existing reduction measures. The emissions are also apportioned according to the four community sectors. The Commercial sector is projected to experience the greatest total increase, at 24% of its 2006 emissions by 2025, while the Residential sector is not far behind at 19%. The Transportation sector is expected to decrease slightly by 6%. The Waste sector, which is expected to grow by 15% by 2025, is actually the primary contributor of existing emissions reductions. If the rate of residential and commercial recycling reported in 2009 is continued to 2025, it will result in a 5.5% community-wide emissions reduction.

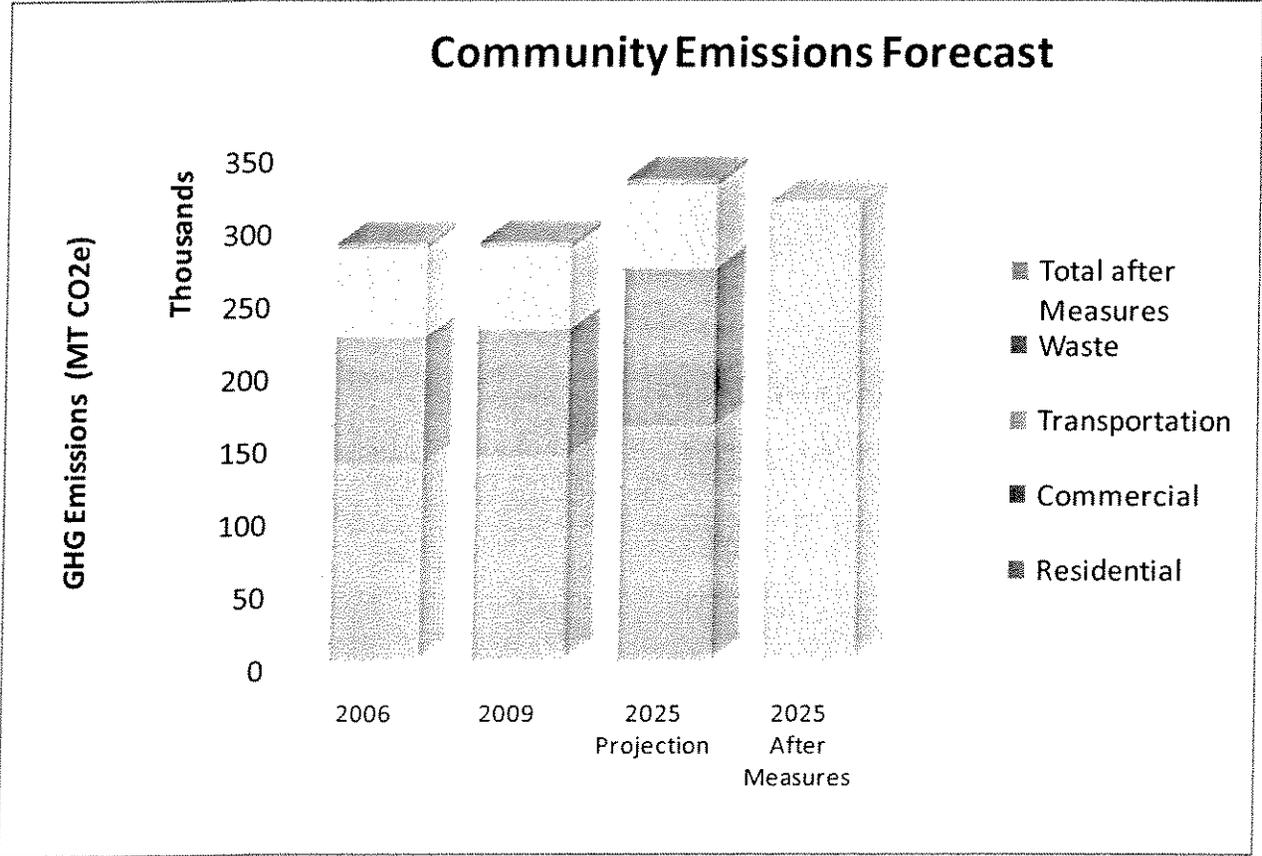


Figure 6: Projected Community GHG Emissions by Sector

## **Emissions Reduction Targets**

The Environmental Community Action Team Climate established a provisional goal of a community wide emissions reduction target of 17% below 2006 levels in 2020. The goal mirrors the President's targets for reducing emissions as put forth in the 2009 Copenhagen Climate Talks.<sup>13</sup>

## **Community Climate Actions**

Strategies to achieve the objectives of the CCP campaign were developed by six Action Planning Committees formed from the Community Climate Team. Each committee is chaired by a Mt. Lebanon resident and the work of the committees has been coordinated by Robert Smith (Overall Chair).

- Residential (Kathy Hrabovsky, Chair)
- Commercial (Loretta Hogle, Chair)
- Institutional (Municipal/Schools) (Brett Aristegui, Tybe Brett, Rob Papke, Co-Chair)
- Active Transportation (Suzanne Stamatov, Chair)
- Waste Reduction (Andrew Baram, Chair)
- Outreach (Bob Smith, Interim Chair)

For inclusion in this first iteration of the Mt. Lebanon Community Climate Action Plan, the Project Team selected ten strategies (2 planned and 8 proposed) for further development and analysis. These actions were chosen primarily to meet the objectives of the PA DEP GHG Pilot Grant, namely to identify practical municipally-led strategies for significant community-wide greenhouse gas emissions reduction. They also were selected based on their political, financial, and logistical feasibility given current municipal resources and partnerships and therefore represent fairly short-term (1-3 years) implementation strategies.

Summaries of the ten strategies as well as initial analysis of the reduction potential, implementation cost, and cost savings are reported below with some suggestions for longer-term strategy development.

Additional strategies recommended by the Project Team and Action Planning Committees are listed in the appendix as strategies under consideration.

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<sup>13</sup> <http://www.whitehouse.gov/the-press-office/president-attend-copenhagen-climate-talks>

## Climate Action Strategies

The ten planned and proposed strategies chosen for the first iteration of the Community Climate Action Plan have the potential to achieve a 6.0% reduction of 2006 levels by 2015, in addition to the 5.5% reduction quantified for recycling, composting, and LED traffic light retrofits currently being implemented. However community-wide emissions are also expected to grow by 8.1% by the year 2015, resulting in a projected net emissions reduction of 3.4% below the 2006 baseline by 2015. Additional strategies will need to be proposed and implemented to reach the Climate Action Plan greenhouse gas reduction goals.

Sector	Name / Description	Year	Annual GHG Reduction	Percent of Community 2006 Baseline Emissions	Annual Community Cost Savings
			MT CO <sub>2</sub> e	%	2010 \$
RES	1. Increase adoption of Residential Energy Efficiency and Conservation Measures	2015	2914	1.0%	\$460,000
COM	2. Increase adoption of Commercial Energy Efficiency and Conservation Measures	2015	2468	0.9%	\$350,000
INST	3. LED Traffic Light and Street Light Retrofit	2015	339	0.1%	\$65,379
INST	4. Implement Energy Conservation Measures in Municipal and School District Buildings and Operations	2015	2217	0.7%	\$82,994 +
TRANS	5. Complete Traffic Light Synchronization	2015	384 +	0.1%	\$114,000 +
TRANS	6. Establish "Best Workplaces for Commuters" Program	2015	327	0.1%	\$99,788
TRANS	7. Promote & Facilitate Active Transportation	2015	TBD	TBD	TBD
TRANS	8. Promote Reduced Idling through No Idling Zones	2015	66	0.0%	\$20,625
WASTE	9. Create a Residential Recycling Competition	2015	7341	2.5%	0
WASTE	10. Establish Commercial Recycling Services Purchasing Cooperatives	2015	1400	0.5%	TBD
<b>Totals</b>			<b>17,427</b>	<b>6.0%</b>	<b>\$1.18 mil</b>

A more detailed description of each climate action strategy, grouped by targeted sector, follows.

## **Residential Sector**

The residential sector represents nearly half of the community-wide emissions, of which almost 60% is attributed to electricity consumption. While this sector has the highest priority in the initial development of strategies, only one residential strategy, representing a low-cost, feasible, municipally-led strategy, with potential for significant community wide reductions, is proposed

### **Action 1 [Proposed]: Increase the adoption of energy efficient lighting, HVAC equipment, appliances, and encourage the implementation of energy conservation measures by the residential sector**

This action, which targets a 3 percent reduction goal among Mt. Lebanon's residential properties, encourages residents to replace energy inefficient equipment and weatherize their homes. Specific actions by residents include replacing incandescent lighting with compact fluorescent bulbs, old inefficient furnaces with high efficiency furnaces, and old hot water heaters and refrigerators with energy star rated models. A proposed outreach campaign will inform residents of the benefits of energy efficiency and encourage them to take advantage of rebates and incentives offered by Duquesne Light under Act 129<sup>14</sup>, the Department of Environmental Protection and the federal government. Specific strategies include:

1. Encouraging local elementary schools to participate in the Duquesne Light's "School Home Energy Pledge."
2. Conducting survey of homeowners to document need, challenges, and opportunities, using Duquesne Light's online energy audit tool.
3. Launching publicity campaign about Duquesne Light's Act 129 rebates, Energy Star tax credits, and other programs (federal tax credits, Keystone HELP financing, PA Home Energy rebates, PA Sunshine Rebates, the emerging federal Home STAR rebate program). Communications channels include the MTL magazine, cable access TV and public events.
4. Organize bulk purchase of audits

#### ***Quantification:***

Market Size: 13,610 housing units, 75% of which are owner occupied.

Market Penetration: To meet Act 129 reduction goal of 3% by 2013, anticipate the need for 20% participation (2700 homes) in the 3 year window with an average of 15% reduction per home.

Assumptions: The average residential dwelling in Mt. Lebanon uses 8,500 kWh electric per year and 72 Mcf natural gas per year. Assume 15% reduction in electricity consumption per participating home and a 5% reduction in gas as co-benefit of synergistic measures.

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<sup>14</sup> Act 129 of 2008, enacted by the Pennsylvania General Assembly on October 15, 2008, requires electric utilities to offer energy efficiency rebates and incentives to produce a 3% decrease in electric use by 2013.

Assume the homeowner invests approximately \$1,700 in energy conservation measures (approximate cost of basic weather stripping, replacing incandescent bulbs with CFLs and replacing old refrigerator with a new energy star rated model.

Reduction:

	YEARLY COST SAVINGS	Yearly electricity savings	Yearly natural gas savings	Co2-e savings	PAYBACK PERIOD
Per housing unit	\$170			1.08	10 YEARS
2700 housing units	\$ 459,000	3,465,000 kWh	7,300 Mcf	2,914	10 YEARS

Administration Cost: TBD

**Partners:**

**ECAT** can organize volunteers for direct outreach to homeowners.

**MTL Magazine and Township staff** can help publicize programs and successes with the MTL Magazine.

**The Environmental Sustainability Board** can liaison with Township staff.

**The Mt. Lebanon Commercial District Office** (potential) could extend the bulk purchasing of energy audits for the business community to residential homeowners through a collective procurement program. Batches of packages audits could be bid to qualified firms who are required to follow a base level of service, such as PA Home Energy guidelines.

**Mt. Lebanon School District** (potential) provides an introduction to the Physics and Ecology of Energy Conservation at the Elementary, Middle and High School levels., and could be encouraged to participate in Duquesne Light’s School Energy Pledge Program, in which families of elementary school children pledge to install energy devices, some of which are provided free to the children by Duquesne Light.

**PA Home Energy** (potential) promotes Home Performance with Energy Star in Pennsylvania through a network of certified auditors and contractors. They have a 3<sup>rd</sup> party quality assurance program for both the audits and the contractor installation. They offer financial incentives of \$200-1000 when the improvements are made. The audit also gives the homeowner access to better lending rates through the Keystone HELP loan.

Key Contact: PA Home Energy [www.pahomeenergy.com](http://www.pahomeenergy.com), Alex Mordas, Building Program Consultant, [amordas@psdconsulting.com](mailto:amordas@psdconsulting.com), (724) 610-0769

**Diagnostic Energy Auditors Association of Western PA** (potential) is an association of certified auditors and energy professionals on Western PA. Most members are certified HERS raters and perform audits through the PA Home Energy program.

**Keystone HELP Loan Program** offers energy efficiency financing for home performance improvements. Loans can be secured or unsecured. \$325 credits available toward cost of certified Energy Audit. An energy audit also lowers interest rate by one point. <http://www.keystonehelp.com/>  
Key Contact: AFC first (Keystone HELP Loan), Jennifer Allen, Program Manager, Keystone HELP & CT Solar Lease, [jallen@afcfirst.com](mailto:jallen@afcfirst.com), (610)433-7486

**Neighborhood or Home Owners' Associations** (potential) could reach out to members. Existing homeowner associations include the Mt. Lebanon Main Line Home Owner's Association.  
<http://www.mtlebanonmainline.org>

## **Commercial Sector**

The commercial sector represents 31% of community emissions and is forecasted to experience the greatest growth in emissions in the next 25 years. Electricity dominates this sector's baseline emissions at 84% and that percentage is expected to grow if unchecked. Like the residential sector, one commercial sector strategy stood out as a low-cost, politically feasible, municipally-led strategy, with potential for significant community wide reductions.

### **Action 2 [Proposed]: Increase adoption of energy efficient lighting, HVAC equipment, appliances, and motors by the commercial sector**

This action, which targets a 3 percent reduction goal among Mt. Lebanon's commercial properties (for-profit and non-profit), encourages the commercial sector to reduce electricity consumption through the adoption of energy efficient lighting, HVAC equipment, appliances, and motors. An outreach campaign will inform business of the benefits of energy efficiency and conservation, promote the benefits of undertaking an energy audit, and inform the sector of the generous rebates and incentives offered by Duquesne Light, the Department of Environmental Protection and the federal government. Additional tactics include surveying commercial organizations, gaining and publicizing individual businesses commitments to efficiency, and coordinating the bulk purchasing of energy audits and conservation services. More specific strategies include:

1. Assemble list of businesses, non-profits, and property owners/managers.
2. Conduct survey to document need, challenges, and opportunities.
3. Engage 5 largest property owners in owner/lessee partnership discussions.
4. Develop capacity with volunteers (student or community) to train businesses on using Portfolio Manager.
5. Develop financing resources for implementation of capital intensive measures.
6. Launch publicity campaign to encourage commercial business and property owners to avail themselves of the rebates and incentives offered by Duquesne Light on Act 129<sup>15</sup> and synergistic programs (tax credits, Energy Star rebates, and Conservation Commitment Program using MTL newsletter and direct email / mail marketing).
7. Use Energy Star Challenge program as a way to get businesses on board, track progress, and recognize achievement.
8. Pool businesses for bulk purchasing of energy audits or services.
9. Facilitate a pilot lessor-lessee shared savings agreement.
10. Track Performance using shared Energy Star portfolio manager accounts.

### **Quantification:**

Market Size: 400 commercial properties.

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<sup>15</sup> Act 129 of 2008, enacted by the Pennsylvania General Assembly on October 15, 2008, requires electric utilities to offer energy efficiency rebates and incentives to produce a 3% decrease in electric use by 2013.

Market Penetration: To meet the Act 129 reduction goal of 3% by 2013, anticipate needing 30% participation (120 businesses) to participate in the 3 year window.

Assumptions:

The average commercial property in Mt. Lebanon uses 260,000 kWh electric and 620 Mcf of natural gas. Assume a 10% reduction in electricity consumption and a 5% reduction in gas as co-benefit of synergistic measures. Also assume each commercial entity invests \$21,000 in energy conservation measures such as a lighting retrofit and weather stripping.

Reduction

	YEARLY COST SAVINGS	Yearly electricity savings	Yearly natural gas savings	Co2-e savings	PAYBACK PERIOD
Per business	\$3,000	26,000 kWh	61MCF	24	7 YEARS
120 businesses	\$360,000	3,120,000 kWh	7,300 Mcf	2,914	7 YEARS

Administration Cost: The estimated first cost and annual cost by the administrator (e.g. municipality) to coordinate the strategy or program is 5% of annual savings or \$18,000 per year for 3 years. This cost includes the value of volunteer time.

Challenges and Opportunities:

Challenge	Opportunity
Act 129 Incentives only lower installed cost by about 10%.	Must leverage financing programs available including the CFA, TRF, and PBEF. Develop Energy Efficiency financing options with local lenders. Promote grant and loan programs.
Many businesses lease their facility but pay their utilities.	Develop a trial lessor-lessee shared savings agreement.
Energy Audit cost barrier too steep for many small businesses.	Pooling together of businesses interested in auditing to generate better pricing for aggregate pool. Organize free system-specific audits (e.g. lighting) from vendors.

**Partners:**

**ECAT** can organize volunteers for direct outreach to businesses.

**MTL Magazine and Municipal staff** can help publicize programs and successes.

**The Environmental Sustainability Board** can liaison with municipal staff.

**The Mt. Lebanon Commercial District Office (potential)** can reach out to the business community, gather data, build relationships, market programs, and publicize achievements, and could also help coordinate bulk purchasing programs for energy audits or services (including lighting retrofits).

Key contact: Eric Milliron, 710 Washington Road, Pittsburgh, PA 15228, Phone: 412-343-3412

**All Facilities Energy Group**, the Conservation Service Provider responsible for working with Small Commercial organizations to deploy Act 129 programs in Duquesne Light's service area. Offers low-cost energy audits to qualifying organizations.

Key Contacts: Jim Bellante [james.bellante@allfacilities.com](mailto:james.bellante@allfacilities.com), Steve Moritz [stephen.moritz@allfacilitiesenergygroup.com](mailto:stephen.moritz@allfacilitiesenergygroup.com)

**The Commonwealth Financing Authority** offers several grant and loan programs for energy efficiency and renewable energy. The Alternative and Clean Energy Program offers 1% interest loans for up to 50% of the cost of energy conservation projects. Non-profit, for-profit, and governmental organizations are eligible. As of March 2010, 16% of the program's \$165 Million was allocated.

Key Contact: Alternative and Clean Energy Program, Ryan Emerson, Site Development Division, Phone: 717-346-8191, [ryemerson@state.pa.us](mailto:ryemerson@state.pa.us)

**The Reinvestment Fund / PA Green Energy Loan Fund (potential)** offers low market rate (3.5% to 6.5%) financing for energy conservation projects that are part of a Guaranteed Energy Savings Agreement (GESA). Loans are also available for projects that save 25% over the system replaced or 25% facility-wide. Because the financed projects must be large (> \$400,000) the Fund would be most appropriate for the largest commercial property owners looking to make improvements to multiple facilities.

Key Contact: Rob Sanders, Managing Director, Energy, 215-574-5850, [Rob.Sanders@trfund.com](mailto:Rob.Sanders@trfund.com)

### **Institutional Sector (Municipal/Schools)**

Both the municipality and the school district have made impressive progress in controlling energy expenditures through implementing energy conservation measures in a large portion of their buildings. However, benchmarking the energy performance of municipal and school district buildings has revealed that opportunities for further reductions in greenhouse gas emissions still exist.

#### **Action 3 [Proposed]: LED Retrofits of Municipal Traffic Signals and Street Lights**

LED traffic lights reduce electricity consumption of signals by 60 - 90% and also reduce maintenance costs through lower replacement frequencies. Mt. Lebanon has already retrofitted half of its municipally owned signals. This action supports plans by the Public Works department to replace the remaining signals, resulting in reduced electricity consumption and associated indirect greenhouse gas emissions. Following on the success of the traffic signal replacement program, this action also encourages the municipality to retrofit all municipally owned street lights (approximately 160) with LED lamps.

#### Process and Timelines

1. Quote received from Republic ITS for traffic signals (Winter 2010)
2. Contract for traffic signal replacement(Spring 2010)
3. Monitor actual energy savings of traffic signals (2011)

#### ***Quantification:***

Market Size: 1500 municipally owned signal lamps; 567 remaining to be retrofitted; 160 municipally owned street lights

Market Penetration: 100% retrofit of municipally-owned traffic signals and street lights

#### Reduction:

Traffic signals: 309 MT CO<sub>2</sub>-e for total retrofit, 114 MT CO<sub>2</sub>-e for remaining lamps;  
Street Lights: 29.5 MT CO<sub>2</sub>-e<sup>16</sup>

User Cost: User capital cost is represented by the administration cost, and user maintenance costs are included in the net maintenance cost savings below.

#### Administration Cost:

Traffic Signals: \$57,737 (Republic ITS price quote for remaining 567 lamps), assumed \$152,743 for entire retrofit.  
Street lights: No quote available

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<sup>16</sup> Savings of 41,120 kWh for street lights based on Demonstration Assessment of Light Emitting Diode (LED) Street Lighting, Phase III Continuation, Pacific Gas and Electric, November 2009

Cost Savings:

Traffic lights: Based on \$17,230 in annual energy and \$5,820 in maintenance savings<sup>17</sup> estimated by Republic ITS for the remaining 567 lamps, total cost savings for all are assumed to be \$60,979. However, maintenance savings may be overestimated for Mt. Lebanon where maintenance is performed by municipal staff.

Street Lights: \$4,400 in annual energy savings, no maintenance saving estimate is available.

Co-benefits: Cost savings, improved quality of life and air quality, reduced risk to signal maintenance personnel and reduced maintenance costs due to reduced bulb replacement frequency.

**Partners:**

**Mt. Lebanon Dept. of Public Works**

Key Contact: Tom Kelley, 710 Washington Road, Pittsburgh, PA 15228, Phone: 412-343-3869

**Republic ITS**

Key Contact: James-Michael Trotta, Phone: 978-262-9010

**PA League of Cities & Municipalities**

**References:**

Grand Traverse County Greenhouse Gas Emissions Analysis Phase 1 – Final Report Part 1 – City of Traverse City Municipal Analysis 2008

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<sup>17</sup> Republic ITS's estimate of energy cost savings is consistent with SEEDS' analysis of traffic light energy use in other municipalities. If the Mt. Lebanon municipal average price for electricity of \$0.107/kWh is assumed the signal efficiency improvement is estimated to be 78%. SEEDS have documented a range of LED retrofit improvement from 44% to 80% with an average of 60%. Maintenance savings may be overestimated for Mt. Lebanon where maintenance is performed by municipal staff.

#### **Action 4 [Proposed]: Implement Energy Conservation Measures in Municipal and School District Buildings and Operations**

This action encourages community's institutions to aggressively pursue opportunities to meet the plan's greenhouse gas reduction targets. Specific energy conservation measures to adopt include building audits, retrofits, and retro-commissioning. The implementation of energy management, conservation programming, and capital improvements will result in increased efficiency of municipal operations, thus directly reducing electric and natural gas consumption.

Public institutions should implement purchasing policies that prioritize minimal energy consumption, such as an Energy Star procurement policy for all qualified building mechanical equipment and appliances, fuel efficiency for fleet vehicles and lifecycle cost analysis. Public institutions should also implement behavior modification programs to reduce the impacts of occupant behavior on energy use.

The municipality also should establish a municipal energy office/officer to pursue these projects and identify further energy conservation projects and climate stewardship goals. The officer would be responsible for setting municipal conservation and cost savings goals, managing implementation, and tracking and reporting progress. The cost of establishing the office would be partially recouped through savings from grants obtained and implemented project/program cost savings. The office would also have community-outreach responsibilities, such as managing the implementation of community-wide strategies adopted as part of the climate action plan. Because the officer position would likely be part-time, this employee could be shared with other organizations, such as other municipalities or institutions within Mt. Lebanon) to develop common energy and climate stewardship activities.

##### Process and Timeline:

1. Determine officer's responsibilities, level of township commitment, and working budget.
2. Solidify partners if the officer is to be shared.
3. Recruit and hire officer.
4. Develop 5 year energy management strategy for Mt. Lebanon.
5. Identify top community-wide Climate Action strategies for Energy Office to support.
6. Implement projects, track performance and progress toward goals (energy, cost savings, and climate impact reduction).
7. Report on and leverage achievements.

Facilities such as the Municipal golf course, recreation center, public library, municipal building, public works facilities, public safety building and parking authority could benefit from energy focused capital improvements.

Facility	Current Energy Star Score	Target Energy Star Score	Percent Energy Reduction	Elec Savings Potential (kWh)	Gas Savings Potential (therm)	Annual Cost Savings
Mt. Lebanon Public Library	n/a	n/a	15%	159,580	0	\$15,958
Mt. Lebanon Golf Course	n/a	n/a	15%	5,370	0	\$537
Mt. Lebanon Municipal Building	30	50	17%	92,120	2652	\$12,394
Mt. Lebanon Public Works	22	50	26%	69,600	11217	\$20,420
Public Safety Building	n/a	n/a	15%	232,530	0	\$23,253.90
Recreation Center	n/a	n/a	15%	55,860	0	\$5,586
<b>Total</b>				<b>663,010</b>	<b>13,868</b>	<b>\$82,944</b>

### ***Quantification***

Market Size: For municipal operations activities, the market is the full scope of municipal energy use.

Reduction: For municipal operations, benchmarking has indicated that energy management could yield 10-15% savings in annual electric and gas usage or 663,010 kWh in electric savings and 13,868 therms in gas savings.

User Cost: For municipal operations, once low-cost operational improvement projects are implemented, there will be additional implementation costs to achieve reduction targets. Costs are estimated at \$400,000 based on a 5 year average project payback. Energy Service Company Guaranteed Energy Savings Agreement leases and grant funding can be used to decrease or eliminate upfront capital costs.

Administration Cost: Allocate \$12,000 per year for Energy Office budget (portion of salary and operating expenses). This is 15% of the projected annual savings from 5-year plan projects and will add only one year to the payback for 5-year plan projects.

Cost Savings: \$80,000 per year at the township after full implementation of 5-year plan projects.

	5 year	6 year	10 year
Projects	\$400,000		
Salary	\$ 60,000		
Savings	\$400,000	\$480,000	\$800,000
Net Savings	(\$60,000)	\$20,000	\$340,000

**Partners:**

**St Clair’s Hospital (potential)** - St. Clair’s has expressed an interest in engaging Act 129 programming and supporting climate stewardship goals. St Clair’s uses over \$1 million per year in utilities and could utilize an experienced energy manager to implement and track their programs. Such programs could include employee commuting incentives, operational improvements, or capital intensive long-term solutions like combined heat and power (CHP).

Key Contact: Steve Novicki, 412.942.2300, [Steve.Novicki@stclair.org](mailto:Steve.Novicki@stclair.org)

**Mt. Lebanon School District (potential)** - The Mt. Lebanon School District has demonstrated a commitment to energy conservation with many successful projects and programs. The School District may be interested in sharing an energy manager/officer to take their efforts through the next stage.

Key Contact: Gerald Ingram, Facilities Director, 412.344.2090, [gingram@mtlsd.net](mailto:gingram@mtlsd.net)

**Peters Township (potential)** - Peters Township, a neighboring municipality currently developing a Strategic Energy Management Plan, has expressed interest in retaining the services of an energy manager during the first few years of plan implementation and could share an energy manager/officer with Mt. Lebanon.

Key Contact: Paul Lauer, Assistant Manager, 610 East McMurray Road, McMurray, PA 15317-3496, (724) 941-4180, [PFLauer@peterstownship.com](mailto:PFLauer@peterstownship.com) ,

**Penn Hills (potential)** - Penn Hills, a Pittsburgh suburban municipality, recently completed an Energy Efficiency Conservation Strategy as part of their DOE EECBG allocation and is currently in the project implementation stage of their first round of energy conservation projects. Penn Hills has many basic energy management opportunities remaining, has expressed interest in retaining the services of an energy manager during the first few years of plan implementation, and could share an energy manager/officer with Mt. Lebanon.

Key Contact: Meg Balsamico, Planner, [MBalsamico@pennhills.org](mailto:MBalsamico@pennhills.org), (412) 798-2129

## Transportation Sector

The transportation sector contributed 21% of the community wide emissions. 94% of the estimated transportation emissions occurred on 15 miles of principal and minor arterial roadways which represent only 16% of the length of streets in the municipality.

### **Action 5 [Planned]: Traffic Signal Synchronization**

Traffic signal synchronization coordinates traffic signal timing along a series of intersections to improve traffic flow and reduce congestion on arterial streets. The reduction in delays at intersections and starting and stopping reduces consumption of gasoline, diesel, and other transportation fuels, GHG emissions, and criteria air pollutants including smog precursors which typically increase while idling.

This action encourages the municipality to implement the two traffic signal synchronization projects it is planning along three primary arterial streets, US 19 and Cochran & Beverly Roads with intention of reducing congestion and improving revitalization and economic development along those corridors.

#### Process and Timeline:

1. Cochran/Beverly Rd. study completed in 2009
2. Cochran/Beverly Rd. CMAQ funding requested and granted
3. Cochran/Beverly Rd. synchronization planned for 2010
4. US 19 study completed in 2010
5. Investigate municipal carbon credit financing for US 19 project modeled after City of Portland

#### ***Quantification:***

Market Size: The Municipality maintains 8.9 miles of principal arterial roadways in Mt. Lebanon. In 2008, principal arterial streets represented 59% of the community wide estimated vehicle miles traveled.

Market Penetration: Other communities, such as Austin, TX have achieved as much as a 10% efficiency improvement from comprehensive traffic signal synchronization.

Reduction: 374 MT CO<sub>2</sub>-e annually (conservative, based on idling time delay for US 19 only)

User Cost: Direct user cost is assumed to be zero.

Administration Cost: Given that the measure was already planned and \$203,500 of local matching funding has been committed for traffic congestion abatement, zero administration cost for GHG reduction is assumed. Potential for actual administrative revenue on future synchronization projects has been demonstrated by the City of Portland Oregon, which monitored intersection CO<sub>2</sub> levels before and after synchronization to receive funding in exchange for tradable carbon credits.<sup>18</sup>

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<sup>18</sup> Carbontrust.org Portland Synchronization Carbon Credits

Cost Savings: Total annual vehicle fuel cost savings is conservatively estimated to be more than \$114,000 based on an assumed fuel cost of \$2.75/gallon and 41,574 gallons of saved as a result of less time delay per vehicle trip. Additional fuel savings and brake wear associated reduced stops and starts as well as traffic accident reductions will add to user cost savings.

Challenges and Opportunities:

Challenge	Opportunity
Indirect emissions increases could result from improved traffic flow, by reducing use of mass transit or other alternative forms of travel to avoid congestion.	Potential to pursue carbon credit financing for US 19 and other future synchronization projects

Co-benefits: The primary co-benefits of improving car emissions which are the precursors to smog and particular risk to children, the elderly, and people suffering from respiratory illnesses are greatly increased during idling.

**Partners:**

**Mt. Lebanon Dept. of Public Works**

Key Contact: Tom Kelley, 710 Washington Road, Pittsburgh, PA 15228, Phone: 412-343-3869

**Southwestern PA Commission** has agreed to assist in funding the Cochran Rd. signal synchronization and funded the US 19 Study.

**Trans Associates** provided study and recommendations for Cochran/Beverly Rd. signal synchronizations.

**Whitman, Requardt and Associates, LLP** provided study and recommendations for US 19 signal synchronizations.

Key Contact: 300 Seven Fields Boulevard, Suite 130, Seven Fields, PA 16046-4356

**Action 6 [Proposed]: Implement *Best Workplaces for Commuters* program at Municipality, School District, and Hospital as a model for other businesses in the community**

This action proposes that the Municipality, School District, and Hospital implement the *Best Workplaces for Commuters* program. The *Best Workplaces for Commuters* program offers resources and guidance on how to develop effective commuting programs for a business' employees, including financial incentives for ride sharing / carpooling, taking public transit, biking or walking to work, and developing telework business schedules. The initial goal is a 10 percent reduction in using single occupancy vehicles to get to work, thus reducing emissions from gasoline and diesel.

Process and Timeline:

1. Assign a Lead Person at each organization
2. Gain Management Support
3. Survey Employees
4. Determine Best Specific Strategies to Implement (primary eligible incentives)
5. Establish a Budget
6. Market and Promote the Programs in the Organization
7. Make Use of External Resources
8. Track and Promote Success and extend to other area employers

***Quantification:***

Market Size: There are currently approximately 150 employees working for the Municipality, 400 employees working for the School District, and approximately 2,600 employees working for the Hospital.

Market Penetration: Assuming each company represents 2000 United States Census data for how people get to work in Mt. Lebanon (69% single occupancy vehicles, 14% public transport, 9% carpool, 8% other); we will target approximately 15 employee commuting changes at the Municipality, 28 employee commuting changes at the School District, and 178 employee commuting changes at the Hospital. The initial goal is to reduce the use of single occupancy vehicles by 10% at each the Municipality, the School District, and the Hospital.

Reduction: Assuming each of these employees drives 15 miles round trip to work, a 10% reduction will save a total of 3,000 miles saved per work day, which equates to approximately 772,000 miles and 302 MT CO<sub>2</sub>-e annually, based on average passenger vehicle fuel efficiency.

User Cost: Estimate the first cost and annual cost per user.

It will cost nothing to the employee to participate in the program. To qualify for the *Best Workplaces for Commuters* program, the company must provide at least \$30 / month for an alternative way to work, i.e. public transportation passes, cash out for not having a parking spot, or reduced parking costs for carpoolers. Thus, it will be a positive cash flow to the employee for choosing a new way to work.

Administration Cost: To qualify for the *Best Workplaces for Commuters* program, the company must provide at least \$30 / month for an alternative way to work, i.e. public transportation passes, cash out

for not having a parking spot, or reduced parking costs for carpoolers. Thus, the initial cost to the employer for the 10% reduction goal will be approximately \$74,000.

Cost Savings: Each company can total the amount it spends on maintaining parking lots, leasing parking spots, and the accrued tax benefits from meeting *National Standard of Excellence* guidelines for offering commuting options.

#### Opportunities

- Increasing the demand of public transport (busses, light rail, etc.) by these companies can help support, maintain, and potentially even grown existing public transit infrastructure services through the municipality.
- Reduce traffic throughout the municipality
- Increase the safety of the employees through public transportation
- Reduce employee stress of commuting and sitting in traffic
- Retain employees through a supportive transportation structure

#### Co-benefits:

- Reduce traffic throughout the municipality
- Improved air quality through decrease in automobile transmissions
- Combine with student Safe Routes to School program to increase carpooling, walkership, and biking to school, leveraging the success.

#### ***Partners:***

**Mt. Lebanon Economic Development Office**

**Bike Pittsburgh**

**St. Clair Hospital (Proposed)**

**Mt. Lebanon School District (Proposed)**

**Commute Info Program of the SPC (Proposed)**

**American League of Bicyclists (Proposed)**

#### ***References:***

[www.bestworkplaces.org](http://www.bestworkplaces.org)

<http://www.commuteinfo.org/>

[http://www.commuteinfo.org/emp\\_how.shtml](http://www.commuteinfo.org/emp_how.shtml) - resources for employers

[http://www.saferoutesinfo.org/getting\\_started/](http://www.saferoutesinfo.org/getting_started/)

**Action 7 [Proposed]: Promote and Facilitate Biking and Walking.**

Consistent with Mt. Lebanon’s walking community image and culture, this action reduces vehicular gasoline and diesel emissions by promoting and facilitating biking and walking within the municipality and regionally. This strategy is directed to commuters in Mt. Lebanon and to downtown, through traffic, students, shoppers, leisure traffic, and recreation.

Steps to implementation this action include developing an outreach campaign to promote current and develop new walking and biking events; leveraging regional partnerships and establishing a coalition of diverse community partners to examine changes that lead towards a safer, more practical, and more utilized biking and walking community.

Process and timeline:

1. Use planned Car Free Friday Event in Mt. Lebanon to create community interest in the Active Transportation Action Planning Committee, the Best Employers for Commuting program, and the Safe Routes to School Program. (May 2010).
2. Publicize Car Free Friday’s success through MTL, extend the Car Free Friday awareness beyond one day in May, and encourage residents to participate in regional Car Free Friday events with Bike Pittsburgh.
3. Formalize a Bike-Pedestrian or Active Transportation committee (possibly as a subcommittee of the Environmental Sustainability Board) that can: guide municipal transportation choices and objectives, serve as focal contact point for regional partners, and Initiate the development of a Safe Routes to School program. (Summer 2010)
4. Use planned Tour of Mt. Lebo event to establish and publicize the safest, quickest, easiest and most scenic routes of Mt. Lebo which can guide future infrastructure planning and creation of biking and walking route maps. (Fall 2010)
5. Leverage regional organization and municipal experiences with best practices regarding low cost active transportation infrastructure including:
  - a. Bike racks
  - b. Bike space leases and other amenities at park and rides
  - c. Share the road signs
  - d. Sharrows (shared lane markings)
  - e. Better coordination with public transit

***Quantification:***

Market Size: According to the Southwestern PA Commissions municipal statistics approximately 11,000 workers in Mt. Lebanon drive alone to work and 1167 are employed within the municipality.

Market Penetration: TBD

Reduction: TBD

User Cost: TBD

Administration Cost: TBD

Cost Savings: TBD

Challenges and Opportunities:

Challenge	Opportunity
<ul style="list-style-type: none"><li>• Challenging walking and biking routes in town and to downtown</li><li>• Port Authority T is unavailable to bikes during rush hour</li></ul>	<ul style="list-style-type: none"><li>• Already recognized as a walkable community</li><li>• Bike – pedestrian advocate within Economic Development Office</li><li>• Established relationship with Bike Pittsburgh</li><li>• Well- established City program</li></ul>

Co-benefits: Reduce obesity and improve health

**Partners:**

**Mt. Lebanon Economic Development Office**

Key Contact: Eric Milliron, 710 Washington Road, Pittsburgh, PA 15228, Phone: 412-343-3412

**Bike Pittsburgh**

Key Contact: Lou Fineberg, Project Manager, [lou@bike-pgh.org](mailto:lou@bike-pgh.org)

**Pedestrian Safety Committee** (Proposed)

**School District** (Proposed)

**Parking Authority** (Proposed)

**References:**

<http://www.saferoutesinfo.org/index.cfm>

<http://bike-pgh.org/resources/for-politicians-community-leaders/>

<http://bike-pgh.org/events/car-free-fridays/>

[http://www.city.pittsburgh.pa.us/cp/assets/09\\_pgh\\_bike\\_initiatives.pdf](http://www.city.pittsburgh.pa.us/cp/assets/09_pgh_bike_initiatives.pdf)

[http://www.city.pittsburgh.pa.us/cp/assets/05\\_BikePlan2.pdf](http://www.city.pittsburgh.pa.us/cp/assets/05_BikePlan2.pdf)

### **Action 8 [Proposed]: Establish “No Idling Zones”**

Through an outreach campaign, this action seeks to educate drivers about how car pollution adversely affects health and to achieve reductions in gasoline and diesel emissions by discouraging idling through no idling zones.

#### Process and timeline:

1. Develop educational messages
  - Educate residents about how wasteful idling is and how excessive idling harms car engines.
  - Educate residents about how car pollution affects people’s health. Children are especially vulnerable since their lungs are developing, and they breathe fifty percent more than do adults.
  - Educate people that a car’s engine switches into an idling mode after only ten seconds. It is better at that point to turn off the motor (if appropriate).
  - Re-educate municipal employees about current no-idling policy
  - Ask doctors to provide literature about the dangers of car pollution, post signs. Implement immediately.
2. Place signs that state “No Idling Zone” in areas around Mt. Lebanon where people idle while waiting for children.
  - Place no-idling signs at schools (September 2010).
  - Place no-idling signs around the municipality, including Recreation Center, Tennis Courts, Library, Dixon Fields (December 2010)
  - Ask businesses to place no-idling signs in their store-front windows. (Immediately).
  - Ask gas stations to post signs that Mt. Lebanon is a no-idling community (Immediately).

#### **Quantification:**

Market Size: Mt. Lebanon has 13,600 households and average idling in the US is reported as 5 minutes or more.

Market Penetration: Assume 10% of households reduce car idling by 2 minutes daily.

Reduction: Assume 33g of CO<sub>2</sub> per minute.  $13,600 \times .1 \times 365 \text{ days/yr} \times 2 \text{ minute/day} \times 33\text{g CO}_2/\text{minute} = 66 \text{ MT CO}_2 \text{ per year.}$

User Cost: Assumed to be zero.

Administration Cost: TBD

Cost Savings: Save gasoline and maintenance costs (idling causes engine wear). Assuming 8.8 kg CO<sub>2</sub>-e / gallon of gasoline savings per year per household would be \$15 or \$20,625 community wide.

Co-benefits: Improved air quality leading to better health.

***Partners:***

**Mt. Lebanon Business District Office**

**School District:** work with superintendent. He has already agreed to post signs.

**Local Religious Congregations:** Work with local churches and temples especially those that have pre-schools and religious schools.

**Local sports organizations:** approach groups like the Mt. Lebanon Hornets and ask them to post no-idling on their websites and venues.

**Girls Scouts & Boy Scouts:** ask troops to distribute pledge cards that ask people not to idle

**Insurance Agents:** Have agents explained that leaving an idling car, unattended could raise rates.

***References:***

Environmental Defense Fund's study on the impact of idling in NYC, Air Watch Northwest's website, State of Connecticut, EPA, DEP website.

## **Waste Sector (Recycling & Waste Reduction)**

Residential solid waste currently comprises less than 1% of Mt. Lebanon's contribution of GHG, yet significant reduction potential remains through recycling and waste reduction and displacement of virgin materials. Solid waste reduction and recycling can result in a net reduction of GHG emissions by primarily three mechanisms: 1) diverting organic waste (paper, food, plant material, wood, textiles, etc.) from landfills where the decomposing waste has the potential to release methane gas to the atmosphere 2) displacing demand for energy and GHG-intensive virgin materials (trees, metals, petroleum, etc.) with less energy and GHG-intensive recycled materials, and 3) reducing the actual consumption of materials and their associated embodied carbon footprint. When landfills, like those serving Mt. Lebanon, capture landfill gas for energy use or even just flaring, the second and third mechanisms far outweigh the impact of the first.

### **Action 9 [Proposed]: Establish a Competitive Residential Waste Reduction and Recycling Goal**

Following the successful introduction of single stream recycling, this action seeks to increase the percentage of waste being recycled in the community through a regional recycling competition supported by an educational campaign promoting the benefits of recycling. Using existing municipal resources, volunteer oversight, and partnership with Waste Management, Mt. Lebanon can realize dramatic GHG emission reductions with little to no municipal or community financial cost.

#### Process and Timeline:

1. Using Waste Management's existing municipal recycling monitoring and reporting program to establish a recycling competition among the South Hills townships (SHACOG)
2. Establish recycling baselines for each municipality.
3. Develop an educational campaign targeting both students and residents about the benefits of recycling through WM and publicity through MTL magazine.
4. Launch a competition coordinated by the municipality and Waste Reduction Committee.
  - a. Part 1. SHACOG recycling competition – collect municipal waste diversion rates and publicize through quarterly reports from WM and MTL magazine
  - b. Part 2. "The Biggest Loser" Family Competition – track the weekly progress of a few different families across the municipality in their attempt to achieve zero waste and publicize through MTL and/or television, radio, newspaper, web. Focus on families with school children and encourage students and families to chart their own progress against the competitors.
5. Environmental Sustainability Board and Public Works provide awards based on
  - a. Highest %age of waste diversion
  - b. Greatest increase in waste diversion from baseline
  - c. Highest ghg reduction value from baseline
6. Use program success to prepare students and schools for the statewide "GreenSylvania" school recycling competition in 2011.

#### **Quantification:**

Market Size: In 2006 there were 10,738 households in Mt. Lebanon contributing more than 16,600 tons of solid waste and 900 tons of recycled material, a recycling rate of 5.6%. In 2009, with the introduction of single stream recycling, the recycling rate doubled to 12% with over 1,800 tons of material recycled.

Market Penetration: The current number of households participating in curbside recycling is not available at this time. City-wide diversion rates of up to 70% percent have been achieved by US communities. The US EPA reports the national average diversion rate is 33%.

Reduction: The ghg reduction potential of solid waste recycling varies by material. Based on the US EPA Waste Assessment and Reduction and Model (WARM) and the residential solid waste composition typical of suburban communities in Southwestern PA, the estimated reduction potential of diverting 50% one ton of Mt. Lebanon's commercial solid waste is 1.34 MT CO<sub>2</sub>-e. Establishing and meeting a short term goal of reaching the national average recycling rate would result in 7341 MT CO<sub>2</sub>-e.

User Cost: There are no direct costs of increased recycling to residents.

Administration Cost: Municipal administrative costs for this program would be associated with establishing the reporting process with Waste Management, directing program communications through MTL magazine and assisting the Environmental Sustainability Board in administering awards, estimated as 60 hrs in 2010. Publicizing the competitions through MTL magazine would be considered inclusive to the costs of producing the magazine.

Cost Savings: No direct savings are expected for the residents. Waste Management or a future contracted waste management service will likely receive increased revenue with an increase in recycled materials as the value of recycled material continues to increase relative to the cost of collection and land filling.

#### Challenges and Opportunities:

##### Opportunities

- WM has existing educational materials
- WM profits from increased recycling
- MTL can publicize at no additional cost
- Community Climate Team can oversee competition
- WM can be tasked with monitoring and reporting

##### Co-benefits:

- Direct local co-benefits are limited but, regional, and global benefits
- Commonly reported job benefits of recycling versus land filling is 5 to 1
- Decreased demand for virgin timber, metal and fossil resources

**Partners:**

**Recycling & Waste Reduction Action Planning Committee** may assist Public Works in the monitoring and scoring the progress and determining award winners.

Key Contact: Andrew Baram

**Waste Management** provides monitoring and reporting of municipal recycling rates.

**Mt. Lebanon Public Schools** (proposed) organizes student recycling communications and ensures continuity of recycling messages from "School to Home."

**Environmental Sustainability Board** provides a platform for competition partnership, coordination and oversight.

**MTL Magazine** and Township staff can help publicize programs and successes with the MTL Magazine.

**References:**

<http://www.epa.gov/osw/conservation/tools/localgov/index.htm>

<http://www.ilsr.org/recycling/recyclingmeansbusiness.html>

<http://www.zerowastepgh.org/index.html>

<http://www.grn.org/zerowaste/community/index.html>

**Action 10 [Proposed]: Establish a Commercial District Recycling & Eco Purchasing Cooperative**

This action, addressed to the Mt. Lebanon business districts (Beverly Road, Washington Road, Cochran Road and the Galleria) will significantly increase commercial recycling by establishing eco-purchasing cooperatives in Mt. Lebanon's business districts to bring down hauling costs. The purchasing cooperatives could be expanded to offer cooperative or bulk purchasing of eco-friendly consumable products and services such as recycled paper products and energy audits, consequently reducing the energy consumed in operations and the GHG intensity of materials purchased by commercial businesses. This action could be initiated immediately as a pilot cooperative to purchase lower cost recycling services for the Beverly Road Business District, which would initially be administered between the municipal business district manager and the Beverly Road Business Association (BRBA). This strategy seeks to reduce commercial building natural gas and electricity consumption, and solid waste.

Process and Timeline:

1. Develop a pilot recycling service purchasing cooperative (Spring/Summer 2010)
  - a. Solicit interest from Beverly Rd. Business Association and survey existing waste and or recycling service providers and fees.
  - b. Request price quotes from recycling service providers including Waste Management and Allied Waste based on individual and bulk purchasing agreements.
  - c. Present proposed cost savings and request signatures from BRBA business.
  - d. Negotiate final price with recycling provider.
  - e. Monitor pilot successes and challenges and report financial, energy, and greenhouse gas emissions savings to other businesses and community.
2. Develop funding for expansion and coordination of program (Winter/Spring 2011)
  - a. Survey interest throughout other business districts
  - b. Develop funding proposal based on pilot success and additional interest
3. Expand cooperative to other business districts (Spring Summer 2011)
  - a. Repeat process for remaining business districts
  - b. Renegotiate prices and contracting with service providers
  - c. Request to integrate savings reporting into commercial recycling bills
4. Utilize process successes and challenges and coordination funding to facilitate discussion for Business Improvement District formation and long-term funding of cooperative purchasing model (Winter 2012).

**Quantification:**

Market Size: For the pilot, there are 60 businesses currently operating in the Beverly Rd. Business District. For future expansion there are 565 businesses listed in the Mt. Lebanon Business Directory.

Market Penetration: For the pilot, 80% participation is expected for the recycling cooperative.

Reduction: The GHG reduction potential of solid waste recycling varies by material. Based on the US EPA Waste Assessment and Reduction and Model (WARM) and the commercial solid waste composition

typical of suburban communities in Southwestern PA, the estimated reduction potential of diverting 50% one ton of Mt. Lebanon's commercial solid waste is 1.49 MT CO<sub>2</sub>-e. 80% of the Beverly Rd. Business District represents approximately 10% of Mt. Lebanon's commercial businesses. The commercial waste generated in 2009 is estimated at more than 23,000 tons. The total ghg reduction potential of the pilot is therefore estimated at over 1400 MT CO<sub>2</sub>-e.

User Cost: [Pending response from Waste Management or other]

Administration Cost: The administrative cost for the Business District Manager to coordinate the pilot is estimated as 50 hrs in 2010.

Cost Savings: [Pending response from Waste Management or other]

Challenges and Opportunities:

Challenge	Opportunity
No enforceable ordinance for commercial recycling	Recycling is a legal requirement for businesses within the municipality
Unwillingness to pay for the service	Existing interest in recycling
Content to wait until it is offered free	Existing communication network within business districts and history of cooperative action
Conservative priorities	Municipal staff in place to facilitate process and assist in further development
	This pilot lays groundwork for the development of business improvement districts which could create financing options for green practices and energy efficiency and services offered by or through the municipality

Co-benefits:

Direct local co-benefits are limited but, regional, and global benefits  
 Commonly reported job benefits of recycling versus land filling is 5 to 1  
 Decreased demand for virgin timber, metal, and fossil resources

**Partners:**

**Mt. Lebanon Commercial Districts Office** facilitates price negotiation, identifying interested business, coordinating with the district associations, and monitoring the success of the pilot.

Key Contact: Eric Milliron, 710 Washington Road, Pittsburgh, PA 15228, Phone: 412-343-3412

**Mt. Lebanon Dept. of Public Works** based on experience with residential recycling assists in negotiating level of service and pricing with area commercial recycling providers.

Key Contact: Tom Kelley, 710 Washington Road, Pittsburgh, PA 15228, Phone: 412-343-3869

**Recycling & Waste Reduction Action Planning Committee** may assist making the case to business owners to participate in the pilot or other business district purchasing cooperatives.

### **Recycling Service Providers**

#### ***References:***

[http://epa.gov/globalwarming/climatechange/wycd/waste/calculators/Warm\\_Form.html](http://epa.gov/globalwarming/climatechange/wycd/waste/calculators/Warm_Form.html)



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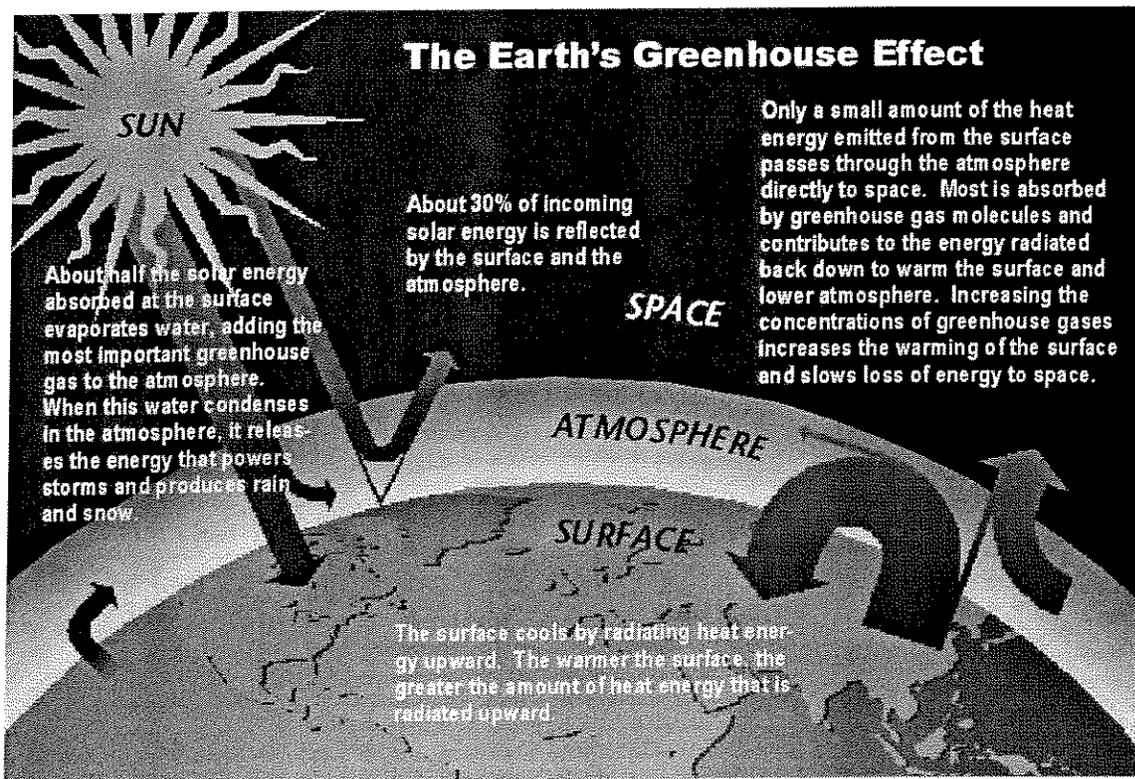


## Climate and the Greenhouse Effect

The gases that trap heat in the Earth's atmosphere are sometimes referred to as greenhouse gases (GHG). When sunlight enters the Earth's atmosphere, some of this solar radiation is immediately reflected and leaves the planet without turning into heat. Some of it is absorbed by the ground, which then re-emits thermal radiation, heat. To maintain a consistent range of temperatures, incoming solar radiation coming in must be balanced by the loss of heat escaping to space.

Greenhouse gases – including Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), and Nitrous Oxide (N<sub>2</sub>O) – create the atmospheric blanket that prevents large fluctuations between night and day temperatures. For example, the moon, which has no GHGs, fluctuates from night-time temperatures of 300°F below zero to over 200°F during the day. GHG traps the heat absorbed by the earth, slowing its escape into space.

Figure 1: The Greenhouse Effect<sup>19</sup>



This greenhouse effect is a natural occurrence. It happens on Earth and is in effect on every planet that has an atmosphere, including Venus. However, on Venus, the high concentration of GHGs in its atmosphere means that its surface temperature is a consistently sweltering >800°F.

<sup>19</sup>Source: US Global Change Research Information Office

We cannot survive without our atmosphere and the greenhouse gases it contains, but the concentration of these gases in our atmosphere is triggering change in Earth's climate.

## **Greenhouse Gas Levels and Trends**

From the time humans first appeared on the planet to the beginning of the Industrial Revolution, the atmospheric concentration of CO<sub>2</sub> remained consistently well under 300 parts per million (ppm). Beginning in the 18<sup>th</sup> century, humans started burning coal and gas, taking carbon that was stored under the earth for millions of years and releasing it into the atmosphere in a matter of decades.

Our current atmospheric concentration of CO<sub>2</sub> is now over 380 ppm and rising. This rise has been correlated with global warming<sup>20</sup>, which may lead to glacial melting, increased drought, increased storm intensities, rising sea levels, and the spread of insect-borne diseases like Lyme and malaria. Because it takes time for our climate to adapt, we are not yet experiencing the full effect of our current level of CO<sub>2</sub>, which continues to increase unabated<sup>21</sup>.

International scientific and political communities recognize that we are facing alterations in weather patterns, ocean behavior, and biological processes. As James Hansen of National Aeronautics and Space Administration (NASA) wrote recently, "If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO<sub>2</sub> will need to be reduced from its current 387 ppm to at most 350 ppm."<sup>22</sup>

Previous efforts to set GHG reduction goals, such as the Kyoto Protocol, were based on stabilizing atmospheric CO<sub>2</sub> to 550 ppm, 200 ppm more than the updated target. The current scientific consensus is that our climate and way of life is at much greater risk within a shorter timeframe than previously thought.

## **Climate Change: Global & Local Effects**

Globally, increases in GHG's and subsequently mean global temperatures are expected to affect water availability, ecosystem health, food production, coastal security, and human health. Figure 2 charts the Intergovernmental Panel on Climate Change's expectations for the occurrence and severity of effects with increasing temperature above the temperatures of the late 20<sup>th</sup> century.

Locally, by the end of this century climate change is expected to shift Western Pennsylvania's climate to mimic summers typical of Northern Kentucky under a low emissions scenario, or Northern Alabama

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<sup>20</sup> US Global Change Research Program, *Our Changing Planet: US Climate Change Science Program for Fiscal Year 2009*

<sup>21</sup> Hansen, James, et al. [Target Atmospheric CO<sub>2</sub>: Where Should Humanity Aim?](#) Submitted April 7, 2008.

<sup>22</sup> Hansen, James, et al.

under a high emissions scenario as depicted in Figure 3. This general shift would likely affect the region in some of the following ways:

- ❑ More severe weather and greater susceptibility to flooding
- ❑ Reduced air quality and water quality
- ❑ Higher rates of infectious diseases and heat-related illnesses and deaths
- ❑ Increased spread of mosquito and tick-borne diseases such as Lyme disease
- ❑ Increased spread of invasive plant and insect species
- ❑ Higher prices and shortages of basic goods, such as food and energy.

Global Mean Average Temperature Relative to 1980-1999 (°C)

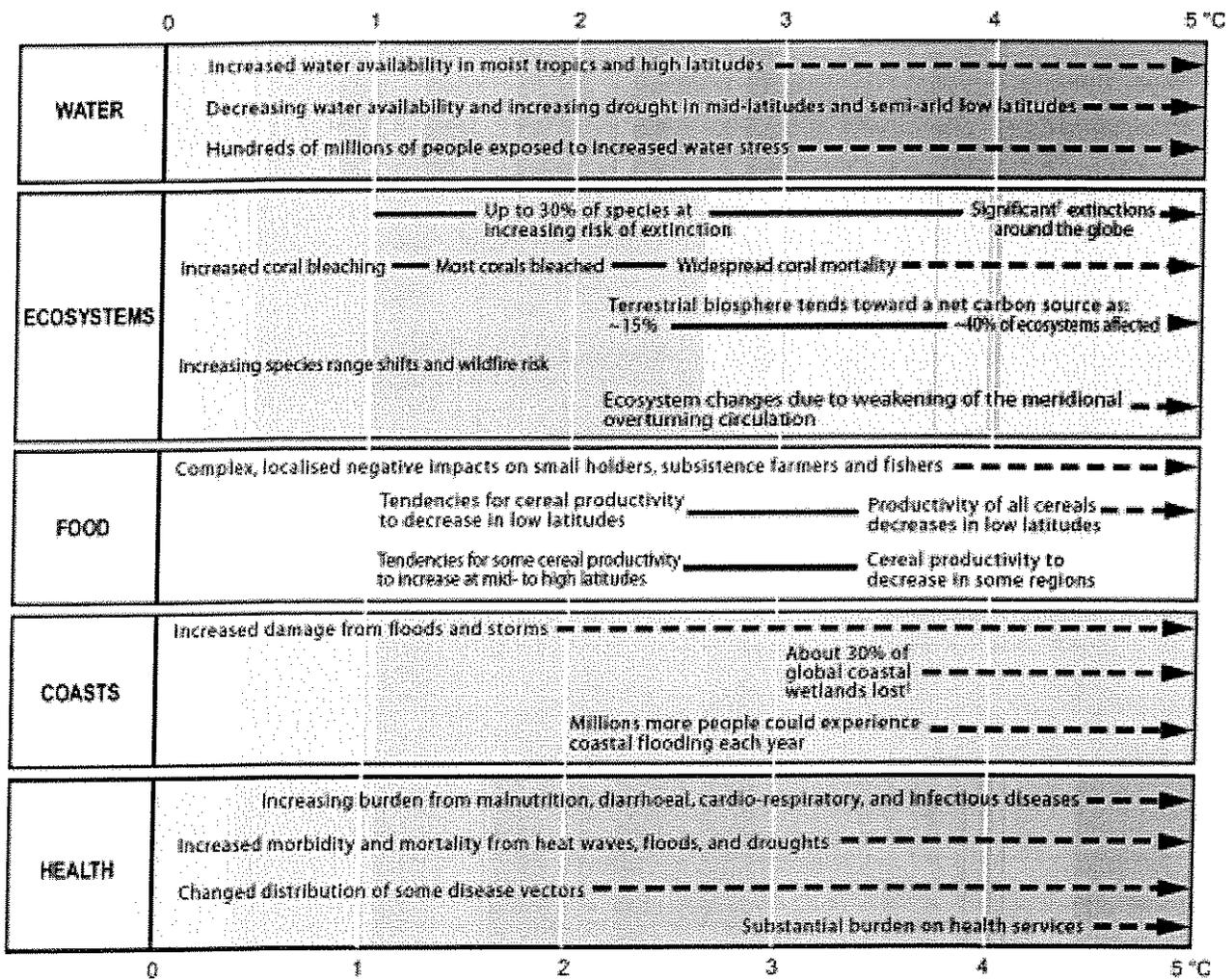


Figure 2: Expected effects with rising temperature (Adapted from: IPCC AR4 Synthesis Report<sup>23</sup>)

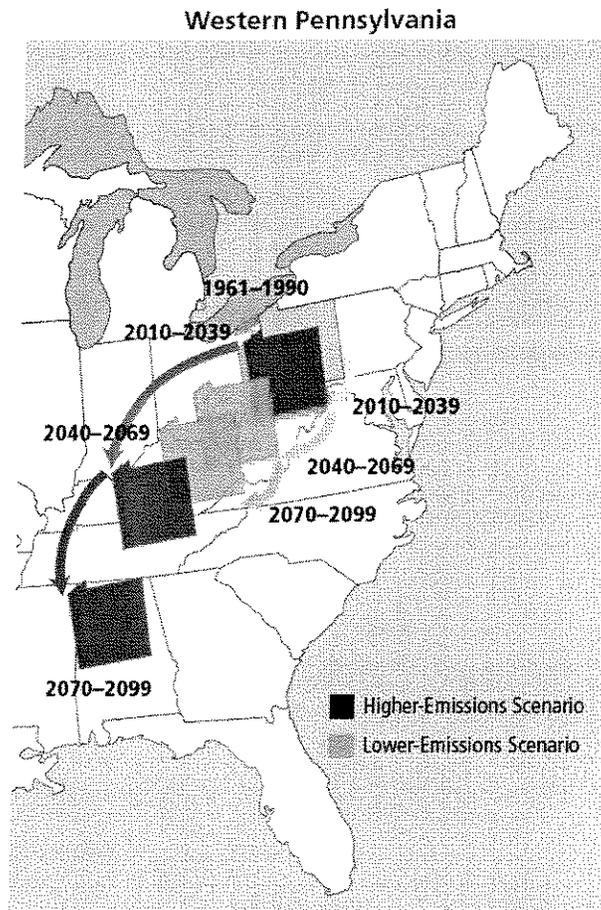


Figure 3: Expected shift in Western Pennsylvania summer climate (Source: Union of Concerned Scientists, 2008)

Of particular concern to the Greater Pittsburgh Region is the rise in summer urban temperatures. It is projected that the number of days above 90°F in the Pittsburgh region could double by mid-century to more than 50 days each summer. By the end of the century 25 days or more of 100°F or greater days are possible. With the increase temperatures comes an increase in health risks particularly for children, the elderly, and poor.

<sup>23</sup> IPCC Assessment Report 4 – Climate Change 2007: Synthesis Report

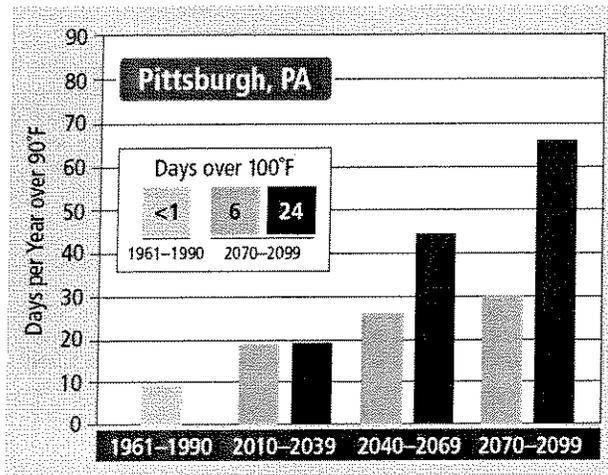


Figure 4: Expected increases in heat indices in Pittsburgh (Source: Union of Concerned Scientists, 2008)

## Greenhouse Gas Sources

With 5% of the world's population, the United States accounts for approximately 25% of the world's human GHG emissions and 30% of the world's waste<sup>24</sup>. Human or anthropogenic sources of GHG emissions include,

- **FOSSIL FUEL COMBUSTION** – Carbon dioxide emitted from the combustion of fossil fuels for heating, transportation, and electricity production represents by far the largest fraction of global GHG emissions;
- **DEFORESTATION & LAND USE CHANGE** – When biologically productive ecosystems are disturbed, carbon dioxide may be released from soils and decrease the ability of ecosystems to uptake and retain carbon.
- **AGRICULTURE** – Methane and nitrous oxide, two potent greenhouse gases, are emitted from livestock, manure, soil, and synthetic fertilizer management.
- **LANDFILLS** – Methane and carbon dioxide are released as organic waste (paper, food, wood, etc.) decomposes in landfills without oxygen;
- **REFRIGERANTS AND INDUSTRIAL CHEMICALS** – Extremely potent greenhouse gases including hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>) are used and emitted in a variety of products and industrial processes.

<sup>24</sup> Halls, Chris, et al. Living Planet Report 2006 (Gland, Switzerland: World Wildlife Fund International 2006)

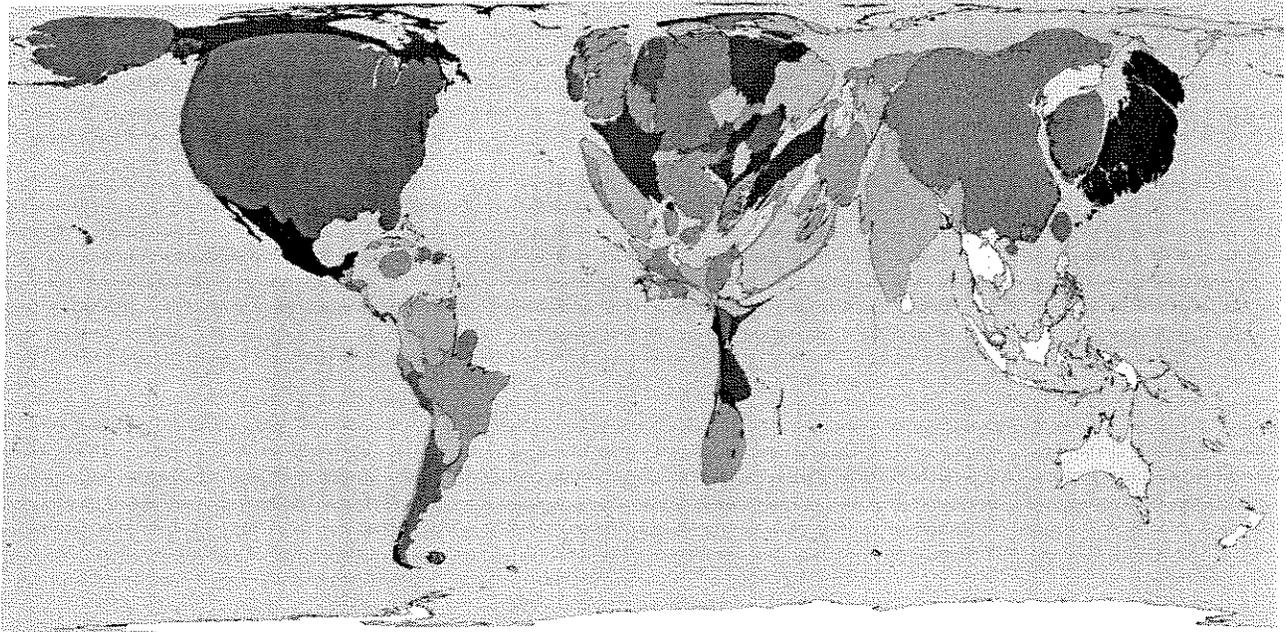


Figure 5: Territory size shows proportion of all GHG emissions from each country<sup>25</sup>

We must collectively face the uncomfortable fact that our current global civilization and actions has become the primary driver of climate change and global warming. If we do not change our present course, the scientific community overwhelmingly agrees that the Earth's response will be a nearly ice-free planet, preceded by a period of chaotic weather and shoreline changes. This decade is perhaps the last chance we have of changing course and avoiding a climactic tipping-point<sup>26</sup>.

### **Greenhouse Gas Reduction Initiatives**

Six states have enacted mandatory GHG reduction laws, and 13 others have set voluntary targets. Many more are focusing on energy-efficiency policies as a cost-effective approach to reducing GHG emissions. The federal government is likely to enact greenhouse gas legislation in the near future. Units of government that enact energy policies now will be a step ahead.

There is no single, 'silver-bullet' solution to the problems associated with climate change, atmospheric greenhouse gas concentrations, or the inefficient use of resources. It takes multiple measures and initiatives, including those at the local level.

### **Reduction Benefits: Economic**

<sup>25</sup> © Copyright 2006 SASI Group (University of Sheffield) and Mark Newman (University of Michigan). Worldmapper, Map #299 <http://www.worldmapper.org/>

<sup>26</sup> Hansen, James, et al.

Maintaining our environmental resources goes hand-in-hand with long-term financial viability and stewardship. Monitoring GHGs in conjunction with finances is one way to quantify progress. Many GHG reduction measures are directly linked to financial savings and economic benefits such as:

- ❑ Reducing energy & resource consumption – From public transportation to electricity use, to waste management, activities that reduce energy and resource consumption have quantifiable financial returns.
- ❑ Streamlining municipal & institutional operations – institutions and institutional departments that work cooperatively, sharing tools and resources, will be more cost effective both from a purchasing perspective and from a productivity perspective.
- ❑ Local Economic Development – For example, a study conducted by the Institute for Local Self Reliance<sup>27</sup> found that for every 15,000 tons of waste:
  - Land filling the waste creates 1 job
  - Composting the waste creates 7 jobs
  - Recycling the waste creates 9 jobs.

### **Reduction Benefits: Health**

Reducing GHG emissions also improves health and wellbeing. Reducing GHGs by decreasing electrical consumption and vehicle miles driven will reduce pollutants that negatively affect human health, like sulfur and nitrogen oxides, mercury, VOCs and particulates. These reduction strategies include land use planning that gets people out of their cars, keeps downtowns dense and diverse, and preserves woodlands, farmlands, and open space. This kind of planning:

- Reduces traffic congestion,
- Reduces air and water pollution,
- Prevents the need for large new infrastructure development, allowing resources to be directed to updating existing infrastructures,
- Minimizes the urban heat island effect,
- Enhances public health.

The bottom line is that many actions taken to reduce GHG emissions will result in the preservation and improvement of Mt. Lebanon's environmental health, economic and social wellbeing. These are the same factors, making our community a desirable destination for families, visitors, and businesses.

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<sup>27</sup> Institute for Local Self Reliance, *Wealth to Waste Homepage* <<http://www.ilsr.org/recycling/>>



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## Transportation

Become a League of American Cyclist's "Bike-friendly Community"

- Covered bike racks at T station, high school, middle schools
- Safe routes to grocery stores
- Safe routes to high school, middle school, recreation center
- Incentive programs to promote biking at high school
- Could Florida Rd. be for bikes? Put bike racks there
- Put bike paths along Cedar Rd.

Convert Mt. Lebanon fleet to hybrid and/or electric cars

- Electric vehicle charging station
- Bikes for police officers

Promote Carpools

- For students who live far from high school, introduce carpool incentives (HOV parking spaces)
- Software for schools to match families for carpooling and the Human Bus

Additional strategies to promote walking in our community

- Safe Routes to School- A Federal Program
- Implement Middle School Safety Study
- Road Diet: Explore ways to make Washington Rd. (between library and Mt. Lebanon Blvd) safer
- Explore ways to make Bower Hill Rd. safer for walkers
- Increase pressure on parents to promote walking (Human School Bus, health)
- Safe routes for older residents, routes to grocery stores, etc.

## Commercial

- Promote Energy Star Lighting Retrofit Program
- Develop goal setting and attainment recognition program for area businesses
- Encourage packaging reduction
- Establish environmental sustainability criteria for commercial renovations

## **Institutional Municipal / Schools**

- Require continuous building energy management: Require tracking the energy consumption of all municipal/school district buildings. May require sub-metering. Require tracking energy use in Portfolio Manager. Require public disclosure.
- Fleet fuel efficiency. Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program to discourage idling.
- Initiate local CNG infrastructure for fleet vehicles: Convert municipal fleet to CNG; receive CNG fueling station; promote CNG fleet conversions for solid waste hauling and other local business fleet vehicles
- Mandate any publicly funded building construction meet High Performance building guidelines: Any publicly funded building (municipal or school district) would need to be LEED certified, Energy Star certified or another high performance building standard.
- Behavior modification program: Turn computers off at night
- Energy Auditing, standards and upgrades: Procure Energy Auditing Services for ALL municipal /school district buildings and structures (including library, parking garages and lots). Develop facility efficiency goals. Require energy upgrades. (Upgrades could be funded through Performance contracts if necessary)
- Land use, zoning: Adopt and enforce land-use policies that reduce sprawl, preserve open space and create compact, walkable urban communities
- Establish a Municipal Energy Office: Establish a Municipal Energy Office(r) to promote and oversee energy efficiency programs and opportunities within municipal operations, business, and residential sectors. Dedicated to ensuring implementation and increased effectiveness of the listed strategies
- Renewable energy: Install renewable energy system on site or purchase portion of energy from renewable sources

## **Recycling & Waste Reduction**

- Report recycling by neighborhood, if possible
- Encourage recycling education through schools and ask students to take what they have learned about recycling at school into their homes.
- Encourage non-profit and volunteer organizations to raise money for them by collecting newspaper and aluminum cans from commercial establishments and residents who are not engaged in a recycling.
- Educate and set community goals for new Mt. Lebanon E-Recycling Program.
- Expand types of items taken and collection site hours & locations. Tactics are similar to those above.
- Establish trash and recycling can placement central to every 4 to 8 residences, so that collecting truck does not have to stop as often. This should improve productivity and enable Mt. Lebanon to bargain for a reduced cost from vendor at contract negotiation.
- Reduce Trash pick-up to every other week from weekly. Residents who follow single stream guidelines have reduced their trash significantly, and usually fill just half a trash can in a week.
- Adopt "Pay as You Throw" system for trash pickup. This provides an economic incentive to reduce one's trash and use single stream recycling program.

## Residential

1. Require a mandatory disclosure of utility information for a minimum of 12 months for all lease turnovers and sales transactions.
2. Implement a residential energy conservation program focused on
  - a. **SIMPLE** - encourage:
    - i. the use of day lighting or the turn-off of light fixtures and electrical devices - this encompasses interior and exterior lighting (landscape lighting, seasonal lighting), etc.
    - ii. the reduction of “vampire” loads from small appliances by turning them completely off when not in use - this includes TV’s, play-station type devices, microwaves, coffee machines, computers, printers, etc.
    - iii. the use of natural ventilation by not using air conditioning systems in the summer months
    - iv. the turn-down of thermostats during the winter months
    - v. the caulking and/or weather stripping of windows and doors, and openings in the building envelope (particularly at attic and basement, and easy to reach locations such as plumbing penetrations, ductwork penetrations, light fixture penetrations, etc.)
  - b. **MODERATE** – encourage:
    - i. the switch from incandescent lamps to compact fluorescent lamps
    - ii. the installation of power strips that permit the easy reduction of vampire loads
    - iii. the purchase of Energy Star appliances (or better) for Kitchen, Laundry and small appliances, and for mechanical equipment such as boilers, furnaces, air conditioners, hot water heaters, etc.
    - iv. the installation of programmable thermostats to control mechanical equipment
    - v. Home Energy Ratings as part of the PA Home Energy or Energy Star program
    - vi. the installation of air-sealing and thermal insulation installed in direct contact with each other, referred to as a “thermal boundary” at the exterior perimeter of a residence as part of the Home Energy Rating
  - c. **ADVANCED** – encourage:
    - i. the switch from incandescent lamps to LED lamps
    - ii. the installation “green” switches that permit the easy reduction of vampire loads
    - iii. the use of “zoning” of mechanical equipment if new equipment is being installed and if the size of a residence warrants “zoning”
    - iv. the use of Heat Recovery or Energy Recovery systems when fresh air is introduced into the residence
    - v. the installation of geo-thermal heat pump heating/cooling systems where new systems, and new construction and/or renovation is included

