

**TOMPKINS COUNTY GOVERNMENT GREENHOUSE GAS EMISSIONS,  
1998-2008: A REPORT ON THE LOCAL ACTION PLAN**

**Tompkins County Planning Department  
June 2010**

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## EXECUTIVE SUMMARY

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In 2001, Tompkins County joined the Cities for Climate Protection (CCP) campaign, a project of the International Council on Local Environmental Initiatives (ICLEI). This action recognized the need to address the global warming problem swiftly and effectively at the local level. These efforts to reduce greenhouse gas emissions are also anticipated to save taxpayer dollars, improve local air quality, and increase the quality of life in the community.

Tompkins County has followed ICLEI's approach to addressing climate change that measures achievement through five milestones. The milestones in this process are:

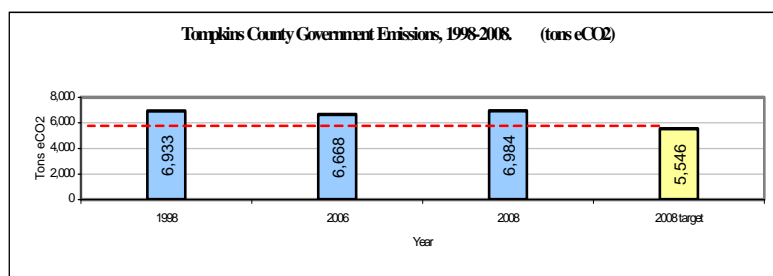
- 1) Conduct a greenhouse gas emissions inventory;
- 2) Establish an emissions reduction target;
- 3) Develop a local climate action plan;
- 4) Implement policies and measures; and
- 5) Monitor progress and report on results.

The first Greenhouse Gas Emissions Inventory for both the Tompkins County government operations and the community as a whole was completed in 2001, tracking data from 1998 as the baseline year. In 2002, after the completion of the first inventory, the County Legislature established a 10-year emissions reduction goal of 20 percent below 1998 emissions levels by 2008. In 2003, the County adopted a Local Climate Action Plan that identified six initiatives for curbing government emissions. The County then developed governmental policies to address these initiatives and began implementation. Two subsequent inventories were completed for the County government for 2006 and 2008, first to monitor progress and then to evaluate the success of the ten-year goal. Essentially, the Tompkins County government has achieved one full cycle of the milestones (1998-2008) and has now completed 4 of the 5 milestones for the next cycle, 2008-2020.

This final report provides findings for the 10-year tracking period as well as presents the 2008 greenhouse gas emissions inventory findings, analyzes the change in emissions for County government from 1998-2008, examines progress toward achieving the emission reduction target, and outlines next steps the County government may consider to further reduce greenhouse gas emissions. The appendices provide information about the methods used for measuring greenhouse gas emissions at the County government level, underlying assumptions, and data updates that have occurred through this process. Please note that this report looks solely at County government emissions. For information on the Tompkins County community emissions over the same timeframe, see the report titled Tompkins County Community Greenhouse Gas Emissions Report, 1998-2008.

### 1998-2008 Greenhouse Gas Emissions Findings

In Summer 2009, the Tompkins County Planning Department completed the 2008 target year inventory to measure County government progress toward its 20 percent greenhouse gas emissions reduction goal (5,546 short tons<sup>1</sup> eCO<sub>2</sub>), which strived for a 2 percent annual



<sup>1</sup> U.S. short tons are the standard "tons" identified throughout the County government greenhouse gas emissions inventories and reporting from 1998-2008.

reduction from 1998. Unfortunately, the Tompkins County government did not reach its goal of reduced emissions.

While a 3.5 percent reduction in total government emissions was achieved in the first 8 years of the tracking period, those savings were erased between 2006 and 2008. Consistently increasing fuel consumption on the part of the County's fleet throughout the 10 years coupled with a leveling off of savings in emissions from the government buildings' sector have caused the reverse in the emissions reduction trend. Overall, emissions have actually increased to 6,984 tons eCO<sub>2</sub> in 2008. Total energy costs for County government were \$1,696,063 in 2008.

The Tompkins County government emitted 6,984 tons eCO<sub>2</sub> in 2008 - 51 tons above 1998 levels and 1,438 tons above the 20 percent reduction target for 2008. County buildings are responsible for the lion's share of energy used by the government though substantial facility improvements in County buildings yielded reductions in emissions from 1998-2008. By 2008, emissions from County buildings were 432 tons less than 1998 levels – an 8 percent reduction – with emissions totaling 4,842 tons eCO<sub>2</sub>.

These reductions reflect successful implementation of building energy efficiency improvements that were called for in the 2003 Local Action Plan and completed in January 2007. Unfortunately, the buildings emission reductions were completely offset by a 456-ton increase in emissions from the County vehicle fleet during this period of time- a 28 percent emissions jump in ten years time.

### **Progress on the Tompkins County Government Local Climate Action Plan**

The 2003 Local Climate Action Plan listed six measures to be taken by the County government to reduce emissions by 1,438 tons eCO<sub>2</sub> to achieve a 20 percent reduction by 2008. Three of these measures were implemented by 2007 and reduced emissions significantly, though slightly less than was originally projected. These include:

- 1) County Library Solar Panel Installation that is reducing emissions by almost 50 tons eCO<sub>2</sub> annually.
- 2)& 3) Phase I and II Building Energy Improvements implemented through a facility performance energy contract are achieving significant reductions of more than 1,100 tons eCO<sub>2</sub> per year.

The three other original measures were recently kicked off, as the County Legislature adopted policies in 2009 to initiate:

- 4) Green Vehicle Fleet to reduce its fleet emissions by 2 percent annually.
- 5) Environmentally Preferred Product Purchasing (EPP) Policy to procure energy efficient and environmentally benign products and services.
- 6) Employee Energy Conservation that will implement best practices in energy efficiency and management in County facilities, including facility monitoring and management of energy.

Two additional measures have been instituted to support progress toward the 20 percent reduction goal. In 2006, the County signed a five-year contract to purchase 5 percent renewable wind power to provide facility electricity to help compensate for an anticipated shortfall in reaching the reduction goal. Wind power is currently offsetting County emissions by about 140 tons eCO<sub>2</sub> annually. The second measure, which was proposed for implementation and has recently been implemented, is the purchase of B20 biodiesel for the County Highway Division fleet. This department has recently begun the conversion to biodiesel, reducing emissions by 134 ton eCO<sub>2</sub> in 2009. In 2010, the division intends to transition all diesel-fueled vehicles to B20, which is anticipated to save about 200 tons eCO<sub>2</sub> annually.

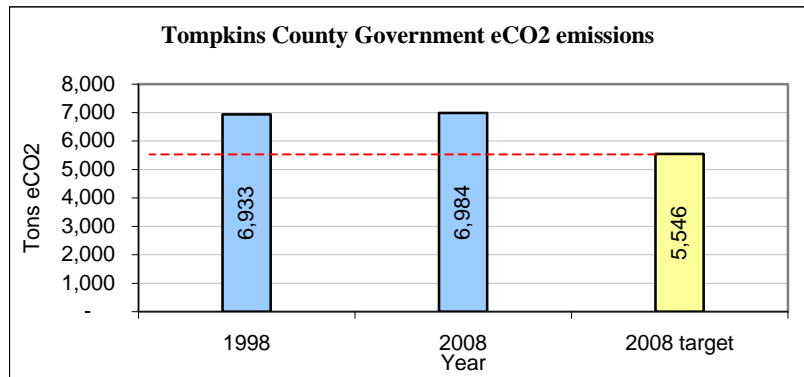
### **Next Steps for County Government Emissions Reductions**

In addition to the six components of the 2003 Local Action Plan (and one additional measure) that the County has initiated or is in the process of initiating, more steps are necessary to achieve real and lasting reductions in greenhouse gas emissions. The 2008 emissions inventory revealed that local emissions levels remain 1,438 tons eCO<sub>2</sub> above 2008 target levels. Therefore, it is important that the County reevaluate its reduction strategy in seeking to achieve its emissions goal.

Implementing both the Energy and Greenhouse Gas Emissions Element (EGGE) of the County Comprehensive Plan and the 2020 Energy Strategy are the best means of achieving emissions reductions at the County government level.

## 2008 EMISSIONS INVENTORY FINDINGS

In Summer 2009, the Tompkins County Planning Department completed a 2008 emissions inventory to measure County government progress toward its 20 percent reduction goal for government operations' emissions. The following section provides the 2008 emissions inventory findings, by energy source and governmental sector and it identifies the associated costs.



### County Government Energy Sources

In 2008, electricity for lighting was the primary source of emissions generated by County government operations, followed by natural gas for heating and gasoline for the fleet.

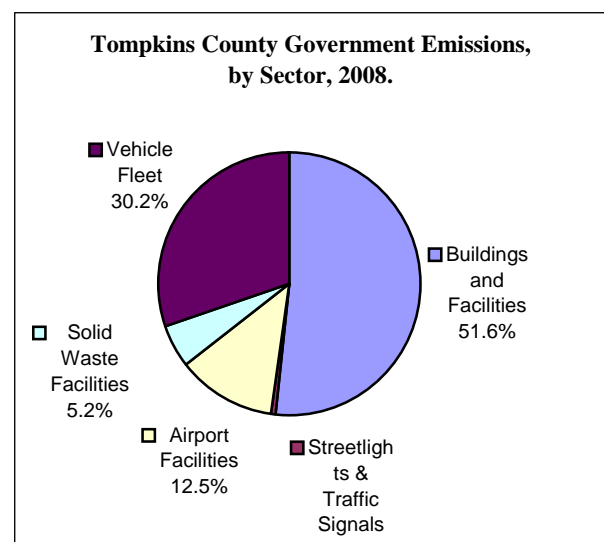
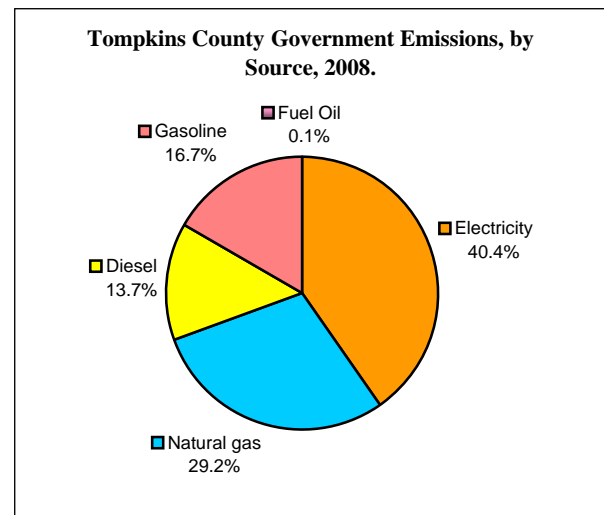
### Buildings and Facilities

The facilities operated by the County in 2008 (including solid waste and airport facilities) used 61,097 MMBtu of energy and produced 4,843 tons eCO<sub>2</sub>. As in the previous two County government emissions inventories, buildings used the greatest proportion of operations' energy and, therefore, contributed the greatest amount of emissions, at 69.3 percent.

### Vehicle Fleet

In 2008, the County vehicle fleet, which consisted of 220 total vehicles, generated 2,108 tons eCO<sub>2</sub> from the consumption of 113,063 gallons of gasoline and 76,692 gallons of diesel. This represented 30.2 percent of all government emissions.

In 2008, the Highway Department generated the most vehicle emissions within the County at 1,043 tons eCO<sub>2</sub>. This was the result of consumption of 18,634 gallons of gasoline and 76,652 gallons of diesel fuel. This high level of fuel usage is due to the large fleet of vehicles operated by this department, most of which are heavy-duty vehicles that are typically more powerful, energy intensive vehicles.



### **Streetlights and Traffic Signals**

A limited number of streetlights and traffic signals fall under the jurisdiction of the County government Public Works Department and are accounted for in the 2008 inventory for the first time. These streetlights/traffic signals used 319 MMBtu of electricity, which resulted in emissions of 34 tons of eCO<sub>2</sub>.

### **Energy Costs**

In 2008, the Tompkins County government spent \$1,696,063 for its total energy costs. Buildings accounted for \$1,325,350, or 78.1 percent of all County government energy costs. Vehicles fuel expenses were \$363,896, or 21.5 percent of the total, and streetlights/traffic signal electricity cost \$6,817 or 0.4 percent of total County government energy costs in 2008.

## 1998-2008: 10-YEAR COUNTY GOVERNMENT EMISSIONS FINDINGS

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Unfortunately, the Tompkins County government did not reach its goal of reduced emissions. Overall, County government emissions have actually increased slightly from 6,933 tons eCO<sub>2</sub> in 1998 to 6,984 tons eCO<sub>2</sub> in 2008, marking a 0.7 percent increase during the 10-year period. Consistently increasing fuel consumption on the part of the County's fleet throughout the 10 years coupled with a leveling off of savings in emissions from the government buildings' sector have caused the reverse in the emissions reduction trend. Therefore, the Tompkins County government emitted 1,438 tons eCO<sub>2</sub> above the 20 percent reduction target for 2008. During this time, the costs for energy used by County government have increased by 42 percent, from \$1.2 million in 1998 to just over \$1.7 million in 2008.

### **Emissions Measurement - An Evolving Process**

A number of improvements have been made to the emissions inventory process between 1998-2008, all of which have impacted both current inventory findings as well as past inventories. Both the original base year inventory and the emissions reduction target have been adjusted (during each of the 2006 and 2008 inventories) to increase accuracy in reporting and to ensure data comparability for analysis purposes.

Specific changes include updates to the Tompkins County portfolio of buildings and fleet, EPA Global Warming Potential (GWP) coefficient updates (as they are released by EPA) that are input into the ICLEI tool to calculate emissions for individual greenhouse gasses, methodological changes to inventory approach as determined by ICLEI protocols, and improved data collection.

Regarding changes in the County portfolio, the new library and Emergency Response facility have been added to the County inventory while Biggs A was removed during this 10-year reporting period. At the same time, the County fleet has been augmented by one new highway maintenance crew that includes support vehicles and additional Sheriff's highway patrol units - both increasing County fleet size.

The EPA periodically releases improved estimates for global warming potential (GWP) associated with each greenhouse gas. These are entered into the ICLEI CACP emissions tool to calculate emissions, by energy source. Therefore, whenever inventories are completed, older figures from previous inventories must be updated to reflect new GWP, in order to accurately report local emissions. GWP have changed twice since the first 1998 inventory was completed.

ICLEI's methodology for categorizing waste has been radically altered since Tompkins County completed its first emissions inventory for 1998. Waste produced by government facilities and sent to landfill was originally assigned a negative GWP (based on the assumption of sequestration). County government produced waste is no longer counted in the government inventory at all. Waste now only reflects energy used in solid waste management operations.

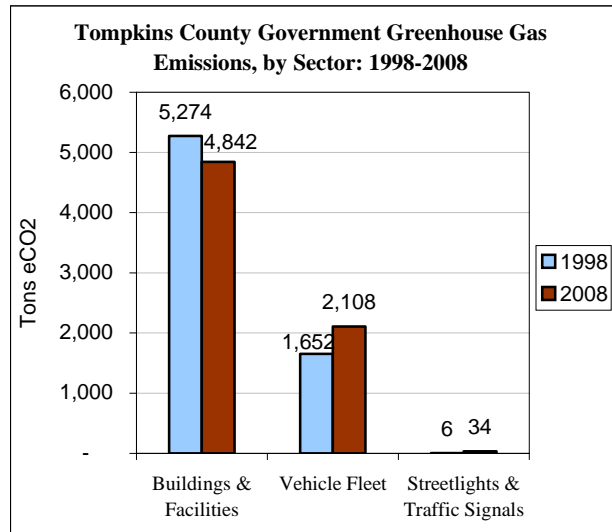
Data collection and reporting has been drastically improved between 1998-2008. Full accounting of total governmental facilities and vehicles and the energy consumption associated with each has involved a learning curve, as much of the data needed for an emissions inventory was not previously tracked. In addition, data has become much more centrally managed since 1998 and the act of reporting has become more consistent. This is clearly evident in the collection of fleet data that was undercounted in early reporting and also was incredibly inconsistent across departments with regard to fuel usage tracking.

Individually, each of these changes to the inventory process has resulted in an increase in reported County government emissions. Together, they have had a significant impact on the overall performance of the County with regard to achieving emissions reductions and have essentially erased any progress achieved.

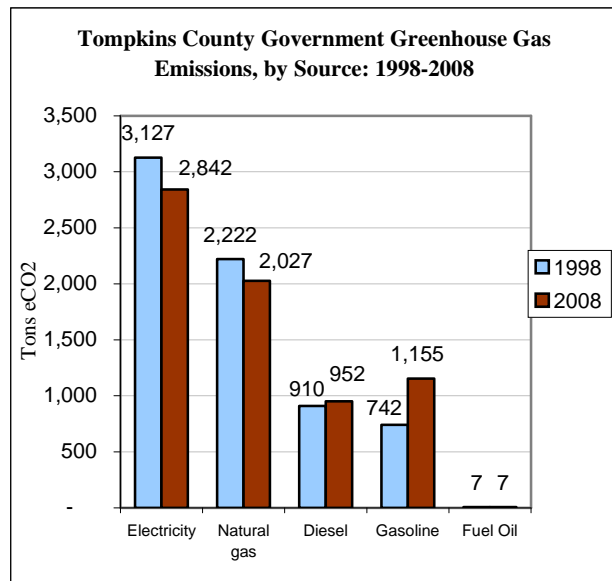


The County government’s portfolio includes buildings, vehicles and a very limited number streetlights and traffic signals that use energy and create emissions. County buildings are responsible for the lion’s share of energy used by the government and the associated emissions. Buildings are followed by the County fleet, with emissions that are less than half that of buildings. From 1998-2008, substantial facility improvements in County buildings yielded reductions in emissions. By 2008, emissions from County buildings were 432 tons less than 1998 levels – an 8 percent reduction – with emissions totaling 4,842 tons eCO<sub>2</sub>.

These reductions reflect successful implementation of building energy efficiency improvements that were called for in the 2003 Local Action Plan and completed in January 2007. However, the buildings emission reductions were completely offset by a 456-ton increase in emissions from the County vehicle fleet - a 28 percent emissions jump in ten years time - attributable to the increase in the reported number of vehicles. However, review of the three inventories reveals that this fleet expansion is likely exaggerated due to initial undercounting of the Highway and Sheriff’s Department fleets in 1998.



Considering emissions by energy source, emissions from both electricity and natural gas used for the entire building portfolio’s lighting and heating have decreased by 9 percent each, from 1998-2008. Meanwhile, gasoline emissions from the County fleet have increased by 55 percent since 1998, while diesel emissions have increased only slightly. This clearly indicates a need for implementing the County’s new green fleet policy and to closely evaluate County vehicle use and efficiency. It should be noted that figures differ slightly between emissions reported by sector and by source, as the waste calculation formula used in the 1998 inventory was modified in the emissions accounting software by 2008. Whereas, in 1998 waste taken to landfill was counted as sequestration (-75 tons eCO<sub>2</sub>), by 2008 only solid waste facility energy use was accounted for and County government diverted waste was dropped entirely.

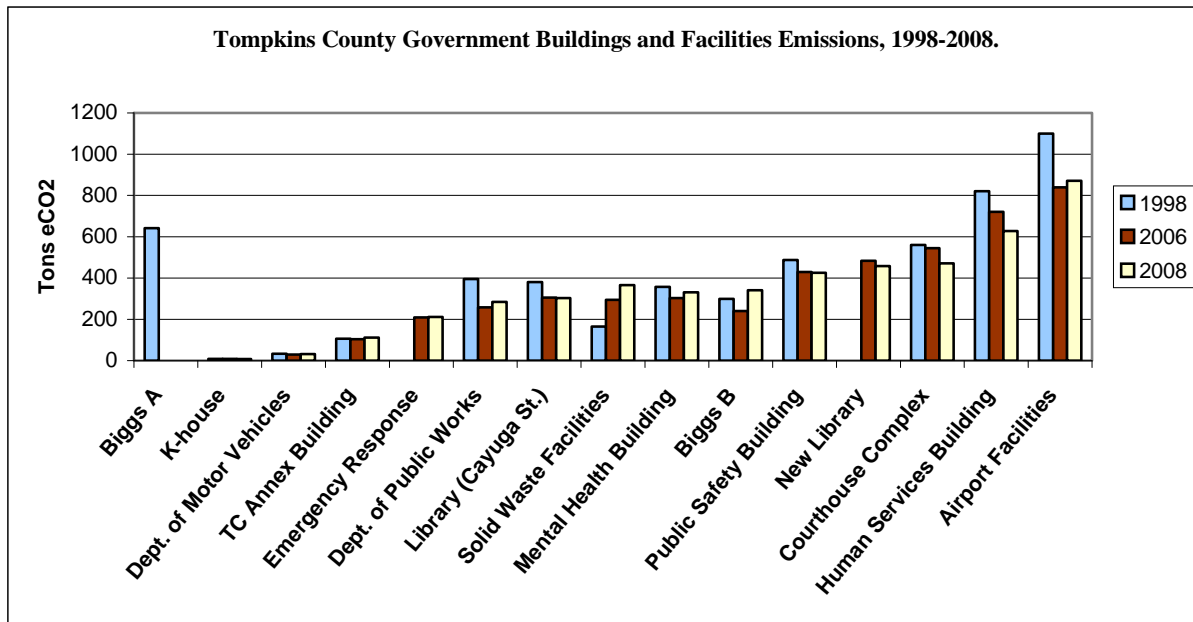


The costs associated with all of the four energy sources used in County operations (electricity, natural gas, diesel, and gasoline) increased between 1998 and 2008. However, while the cost of building energy - for heating and lighting - increased only marginally, gas and diesel costs for the vehicle fleet (accounted for in the inventories) increased more than six-fold during this period, reflecting both spikes in transportation

fuel costs and a substantial increase in fleet size and use. As a note, prior to 2008 the method for tracking fuel consumption was not consistent across all County departments, which may have skewed these figures.

### Buildings and Facilities

Buildings are the largest contributors to the County government’s greenhouse gas emissions . The facilities operated by the County in 2008 used a total of 61,097 MMBtu of energy which produced 4,841 tons of eCO<sub>2</sub>. This represents an 8 percent decrease in building emissions from the 1998 baseline level.



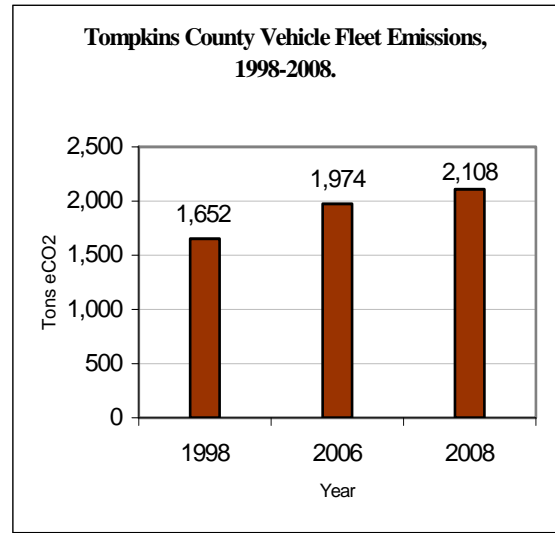
Emissions reductions that are visible across the County’s building portfolio can be directly attributed to energy efficiency improvements implemented in County buildings between 1998 and 2008. There are a few examples, however, where emissions increased, such as the Biggs B building (scheduled for closure in 2010 when the Health Department relocates to the refurbished Brown Road site) and solid waste facilities. In both instances, there has been an upsurge in the amount of energy used at these facilities that correlates to increased emissions. Additionally, two buildings have been added to the County building inventory since 1998: the new County library and the Emergency Response building.

Airport facilities, ranked as the highest emitter in the building sector in 1998, is still the leading contributor to emissions in the County government portfolio in 2008. However, there has been a significant 20 percent decrease in emissions from the baseline levels of 1998. It should be noted, though, that emissions have begun to creep back up at the airport facilities, by about 4 percent from 2006-2008. The four buildings which constitute airport facilities report mixed emissions results over time. The Crash Fire Rescue building has been showing an increase in emissions steadily since 1998. Meanwhile, the new airport terminal emissions dropped by 20 percent between 1998 and 2006, but has then climbed about 3 percent since 2006. The hangars and the outdoor lighting contribute only about 1 percent to airport emissions.

## Vehicle Fleet

Emissions for this sector have increased by 28 percent since 1998, however, it should be noted that this is largely attributable to an increase in reported fleet size from 122 vehicles in 1998 to 220 in 2008. As expected with an increase in fleet size reported, gasoline use has increased by about 50 percent. Meanwhile, diesel which is used primarily in heavy duty vehicles at the Highway Department, has declined in use. Even though total fleet emissions are shown as increasing rapidly over the 10-year period, per vehicle emissions have actually fallen from 13.5 tons eCO<sub>2</sub> per vehicle to 9.6 tons during this same time. This may signify that more efficient vehicles are being purchased for the fleet.

NOTE: As improvements have been made to the County's inventory methods over time, it appears that reported fleet expansion is exaggerated due to initial undercounting of the Highway and Sheriff's Department fleets in 1998. Future initiatives for the County fleet should be based on the 2008 inventory – a complete capture of actual fleet size and composition.



## ACTIONS TAKEN BY COUNTY GOVERNMENT TO REDUCE EMISSIONS

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The 2003 Local Climate Action Plan identified six measures to be taken by the County government to reduce emissions by 1,435 tons eCO<sub>2</sub> to achieve a 20 percent reduction from 1998 levels by 2008. Three of these measures were, in fact, completed by 2007 and had reduced emissions significantly, though slightly less than originally expected. Two additional measures proposed for potential implementation have also been implemented since the Local Action Plan was penned. Substantial building energy efficiency improvements completed in 2007 by Johnson Controls, Inc. (Phase I/Phase II Facilities Energy Improvements), were by far the most significant measures implemented in County government from 1998-2008.

A number of the policies and measures proposed in the Local Climate Action Plan have been accomplished and are achieving savings in energy use, greenhouse gas emissions, and expenditures for the County government. The following outlines how each of the implemented measures has been performing or the current status of the measure if it is still in development.

### Original Measures: Implemented

- Tompkins County Library Solar Panel Installation - This action was completed in 2001 and was originally estimated to save the County 65 tons eCO<sub>2</sub> annually. By 2006, this project was reducing emissions by **48 tons annually**.
- Phase I & II Facilities Energy Improvements - Tompkins County entered into a 15-year energy performance contract with Johnson Controls in 2007 for County facilities (not including solid waste or airport facilities). As part of this contract, building improvements were completed in 2007 that included installation of lighting and occupancy sensors, energy management systems for buildings and some building envelope improvements, boiler replacements, and air handling unit installations/replacements. Initial estimates projected energy reductions from this initiative would yield reductions of 1,204 tons eCO<sub>2</sub> annually. In 2008, actual achieved reductions were **1,106 tons eCO<sub>2</sub>**.

Of the original six measures, the three that have been implemented are achieving 1,154 tons eCO<sub>2</sub> reductions annually, as compared to the original estimate of 1,269 tons eCO<sub>2</sub> reduction - a shortfall of 155 tons eCO<sub>2</sub> annually.

### Additional Implemented Measures - Proposed in Local Action Plan

- Purchase of 5 Percent Wind Power for Electricity in County Facilities - Tompkins County entered into a 5-year contract with Community Energy Inc. in 2006 to purchase approximately 390 Mwh power annually, though annual total Mwh vary slightly, depending on total cost. This initiative was projected to reduce emissions by 154 tons eCO<sub>2</sub>. In 2008, the County saved **139 tons eCO<sub>2</sub>** by purchasing 384 Mwh electricity through this contract.
- B20 Biodiesel Transition - The County Highway Department has been researching biodiesel options for the past several years (B5 and B20), in collaboration with the local Alternative Fuels Consortium. In 2009, the County Highway department transitioned 62 percent of its diesel vehicles (which constitute more than 3/4 of the County Highway fleet) to B20 biodiesel, resulting in a 134 ton eCO<sub>2</sub> reduction. The original estimate for emissions reductions associated with this measure were 170 tons eCO<sub>2</sub> annually. In 2010, the department intends to transition all diesel-fueled vehicles to B20. This is anticipated to save about **200 tons eCO<sub>2</sub>** per year.

Of the additional implemented measures, 273 tons eCO<sub>2</sub> are being reduced annually compared to a projected reduction potential of 324 tons eCO<sub>2</sub> annual savings - a shortfall of 51 tons eCO<sub>2</sub> per year.

Currently, emissions reductions from all achieved measures: 1,427 tons eCO<sub>2</sub> annually.

### Original Measures: In Progress

The remaining three measures have not been fully implemented, though they are in progress. These measures include:

- **Green Vehicle Fleet** - In 2009, the Tompkins County Legislature passed a green fleet policy that requires each County department to reduce its fleet emissions by 2 percent annually, to achieve 50 percent reduction in emissions by 2050. To do so, each department with more than 5 vehicles must submit a plan to County administration by the end of each calendar year to green their fleet. County administration has developed a comprehensive countywide vehicle database to facilitate this effort. The County will kick off this initiative in May 2010, by adding three Prius hybrids to the fleet through Legislative funding and a stimulus grant. The Prius introduction alone is projected to reduce fleet emissions by 3.7– 4.7 tons eCO<sub>2</sub> annually. The initial projected reduction for greening the fleet in the Local Action Plan was 23 tons eCO<sub>2</sub> annually. However, the new policy goal for reaching a 2 percent annual emissions reduction increases the estimate to 42 tons eCO<sub>2</sub>.
- **Environmentally Preferred Purchasing (EPP) Policy - Waste Reduction and Resource Management Policy** – This policy was adopted in December 2007 and includes provisions for County departments to seek to maximize environmentally preferable purchasing by procuring products and services that have a reduced negative effect on human health and the environment when compared to competing products and services that fulfill the same purpose. It also establishes a waste reduction program to assess and manage the waste of all County departments, including waste assessments to identify practices and procedures to be implemented for waste reduction, reuse, recycling, composting, and environmentally preferable purchasing based on the unique circumstances of each department. Adoption of the policy has resulted in the County joining with TST-BOCES, the City of Ithaca, Cornell University, Ithaca College, TC3, the Chamber of Commerce, Cayuga Medical Center, and the Tompkins Council of Governments to form the Environmentally Preferred Procurement/Finger Lakes Environmentally Preferred Procurement Consortium. The consortium seeks ways to use its collective purchasing power to purchase environmentally preferred products at the best possible price. The original projected reduction for this initiative was 87 tons eCO<sub>2</sub> annually.
- **Employee Energy Conservation** - This initiative was slated to reduce energy use through educational outreach that would establish a conservation program targeted at County employees. The Tompkins County Legislature adopted the Facilities Management and Workplace Environment Policy in 2009 to implement best practices in energy efficiency and management in County facilities, including facility monitoring and managing energy consumption by ensuring that energy-efficient components are installed and utilized, setting building temperatures as seasonally appropriate, and prohibiting personal appliances in personal workspaces. The key remaining component of this initiative is integrating staff training into regular operations. A subcommittee of the Sustainability Team is developing this component in 2010. The original projected reduction for this measure was 56 eCO<sub>2</sub> tons annually.

### **Lessons Learned**

Great strides have been made at the County government level toward achieving emissions reductions, even though the emissions rose slightly over the tracking period of 1998-2008. Government building improvements have created notable declines in energy use and emissions in the majority of County government facilities. Several policies have been adopted by the County legislature to implement actions ranging from greening the County's fleet to purchasing energy efficient products.

**The primary reason that success has been limited is that it that there has been a time lag between the initial adoption of a governmental emissions reduction goal and the actual implementation of emissions reducing actions.** Specifically, the County government determined it would complete its first greenhouse gas emissions inventory in 2001, using 1998 as a base year. Then in 2002, after the completion of the first inventory, the County Legislature established a 10-year emissions reduction goal of 20 percent below 1998 emissions levels by 2008. In 2003, the County adopted a Local Climate Action Plan that identified six initiatives to implement to curb government emissions. At this point, though the County had already installed solar panels on the County Library and initiated some facility energy improvements, only five years of the 10-year tracking period remained. Meanwhile, policies were still not in place to implement initiatives stated in the Local Action Plan. From 2004-2009, the County completed two subsequent inventories as well as spent time considering the implications of modifying County government business as usual operations methods to meet target emissions goals; developing appropriate policies, vetting them throughout County government, and move them through the legislative process to establish new County regulations that include energy and emissions in decision making; educate County departments; and assigning staff and identifying funding for the various efforts. At the end of this process in 2009, which coincided with the sunset of the original 1998-2008 tracking period for County government emissions, several measures were implemented or were at the beginning stages of implementation, and their impacts on energy consumption and emissions are not yet trackable.

Significant hurdles remain for accomplishing emissions reductions in Tompkins County government operations. Two facilities in the County government's portfolio (Solid Waste and TC Annex) are not achieving emissions reductions. Three other facilities (Mental Health, Biggs B, and the airport) experienced initial emissions reductions then more recently have seen increases again in emissions. These can now be targeted for more pointed review to develop actions necessary to achieve energy and emissions reductions. Likewise, the County's fleet that includes a number of energy-inefficient vehicles continues to consume greater amounts of gasoline (in particular), causing further escalation in emissions.

Throughout the 10-year tracking period, a number of lessons have been learned, specifically about the data and how it is collected and reported. Full accounting of total governmental facilities and vehicles and the energy consumption associated with each has certainly required a learning curve for all involved, as this is new data that, in many cases, was not previously tracked. It has become clear that this process requires intense attention to detail, including collecting a comprehensive inventory, scrupulous data entry, attention to units of measure (an inventory requires notation of several different unit measures depending on fuel types and quantities), and cautious interpretation of the emissions reported, as inventories are presenting macro-level reviews of energy use.

It is important to understand that emissions inventories depend on an evolving process of calculation. For example, the EPA periodically releases improved estimations for global warming potential (GWP) associated with each greenhouse gas. This means that whenever inventories are completed, older figures from previous inventories must be updated to represent newer research that updates GWP, in order to have comparable figures over time. Likewise, the methodological approach to categorizing waste has morphed since Tompkins County completed its first emissions inventory in 2001. From the government operations sector, waste sent to landfill was originally assigned a negative GWP (based on the assumption of sequestration), this category has been changed to reflect only the energy used in solid waste management operations. Three inventories have now been completed and the final 2008 inventory is considered to be very complete and accurate, though no inventory can capture 100 percent of the potential data that could be considered. Gathering data from all County sources has helped both departments and planners better understand the implications of energy use and emissions with regard to facilities operations and fleet management.

## **NEXT STEPS: REDUCING TOMPKINS COUNTY GOVERNMENT EMISSIONS**

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In addition to the six components of the 2003 Local Action Plan (and the additional biodiesel measure) that the County has already acted upon to reduce greenhouse gas emissions from County operations, more steps are necessary to achieve real and lasting reductions in greenhouse gas emissions. The 2008 emissions inventory revealed that local emissions levels were 1,438 tons eCO<sub>2</sub> above 2008 target levels. Therefore, it is important that the County reevaluate its reduction strategy in seeking to achieve its emissions goal.

Implementing the Energy and Greenhouse Gas Emissions Element (EGGE) of the County Comprehensive Plan and the soon to be released 2020 Energy Strategy as well as funding identified building and facility improvements are the best means of achieving emissions reductions at the County government level.

### **Energy and Greenhouse Gas Emissions (EGGE) Element Policies and Action Items**

The EGGE element amendment was adopted by the Tompkins County Legislature on December 16, 2008. The Tompkins County Comprehensive Plan was adopted by the Legislature in December 2004. This new element explores the broad range of issues related to energy and greenhouse gas emissions and presents specific policies and actions to address them.

While this report tracks the County's first effort to reduce emissions from the Tompkins County government operations, the element establishes community goal of 80 percent greenhouse gas reduction by 2050; the County government is expected to be a leader in achieving this goal.

To achieve this goal, the element lays out eight policies with 17 associated action items, several of which directly relate to County government operations. In addition, the county will incorporate a section in the comprehensive plan to report the change in energy use and greenhouse gas emissions, energy efficiency improvements, and renewable energy installations in the community.

### **2020 Energy Strategy**

In 2010, the County is expected to release a 2020 Energy Strategy to implement specific initiatives that will help the County community achieve the first 20 percent reduction in County greenhouse gas emissions by 2020. County government will also be included in this strategy. As a local leader, the Tompkins County government will be expected to achieve a 20 percent reduction in emissions from 2008 levels.

### **Monitoring Progress**

Future greenhouse gas emissions inventories will be completed to gauge progress toward government operations' emissions reductions, to ensure that County is achieving an average annual 2 percent reduction of greenhouse gas emissions goal through 2050.

## APPENDICES

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### Appendix A—Glossary

#### **CACP Software**

Climate Action Climate Protection (CACP) software is an accounting-based program developed to track and measure greenhouse gas emissions for communities and governments.

#### **Cities for Climate Protection (CCP)**

The Cities for Climate Protection (CCP) Campaign assists cities to adopt policies and implement quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability. Tompkins County is a signatory to the Cities for Climate Protection (CCP) campaign.

#### **eCO<sub>2</sub>**

Equivalent Carbon Dioxide units (eCO<sub>2</sub>) is the factor assigned to each greenhouse gas that reflects its global warming potential (GWP). The GWP is a measure of a compound's ability to trap heat over a given lifetime in the atmosphere, relative to the effects of the same mass of carbon dioxide released over the same time period. Emissions expressed in equivalent terms highlight the contribution of the various gases to overall emissions. Therefore, GWP is a useful statistical weighting tool for comparing the heat trapping potential of various gases.

#### **Greenhouse Gas Emissions Inventory**

A greenhouse gas (GHG) emissions inventory provides an accounting of the amount of greenhouse gases emitted to the atmosphere during a specific period of time (e.g., one year). A greenhouse gas inventory also provides information about the activities that cause emissions (combustion of fossil fuel for heat, electricity, or for transportation as well as waste decomposition and natural and animal emissions) and emission reductions as well as methods used to calculate these figures. This information is then used to track emissions trends, develop strategies and policies, and assess progress.

The Intergovernmental Panel on Climate Change for the United Nations states that six greenhouse gases should be included in an inventory: Carbon Dioxide (CO<sub>2</sub>), Nitrous Oxide (N<sub>2</sub>O), Methane (CH<sub>4</sub>), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). For ease of analysis, all the emissions are converted into an equivalent amount of CO<sub>2</sub> called as eCO<sub>2</sub>. Conducting an inventory is the first step in taking actions to reduce GHG emissions in a community.

Knowing the source of emissions helps in planning and implementing emissions reduction actions effectively. An emissions inventory creates a quantitative foundation for a community to take concrete actions in addressing climate change and sustainability. Tompkins County is using the Clean Air and Climate Protection (CACP) software developed by ICLEI to conduct the inventories.

**ICLEI - Local Governments for Sustainability** is an association of local, regional, national, and international government organizations that have made a commitment to sustainable development. ICLEI provides technical consulting, training, and information services to build capacity, share knowledge, and support local government in the implementation of sustainable development at the local level. Their basic premise is that locally designed initiatives can provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives.



Tompkins County has been a member of ICLEI since 2001 when it signed on to participate in the Cities for Climate Protection (CCP) campaign. In order to initiate and facilitate the process for accomplishing the CCP campaign milestones, ICLEI provided an intern for the Summer of 2001 at no cost to Tompkins County to identify sources of greenhouse gas emissions in the County and develop a baseline inventory for the year 1998. The agreement also required Tompkins County Planning Department to communicate the campaign progress to ICLEI at regular time intervals.

## **APPENDIX B - ICLEI Methodology and First Two Tompkins County Greenhouse Gas Emissions Inventories**

Based on the ICLEI Methodology of completing five milestones to reduce municipal greenhouse gas emissions, the following outlines Milestones 1-4 for the Tompkins County government. These preceded the current 2008 inventory work and final 10-year analysis of the goals (Milestones 4-5) described in the report.

### **MILESTONE 1: CONDUCT A BASELINE INVENTORY AND FORECAST**

#### **1998: First Inventory**

The Tompkins County government conducted its first greenhouse gas emissions inventory in 2001 – using 1998 data – to trace emissions resulting from the County government operations. Data was collected for all government utilities associated with building and facilities, and fuel consumption was tracked for vehicles to account for all energy sources used. In addition, the costs associated were identified. It should be noted that any government operation that is not directly controlled by County government is not included in this inventory, nor are energy and fuel used by private entities contracted by the County, unless otherwise noted.

To complete the inventory, information was collected from all sectors of the Tompkins County government. In 1998, these sectors consisted of the following:

*Buildings:* Electricity and natural gas consumption data from County-owned buildings and facilities.

*Outdoor lighting:* Electricity use data from the operation of outdoor lighting operated by the County.

*Vehicle Fleet:* Gasoline and diesel for County-owned vehicles such as passenger cars, heavy equipment, and emergency vehicles.

*Waste:* Amount and composition of waste generated at buildings and facilities operated by the County.

#### **Greenhouse gas emissions results for 1998**

The first greenhouse gas emissions inventory for Tompkins County government operations was completed in 2001, using 1998 data. In 1998, activities associated with the operation of the Tompkins County government used 83,634 MMBtus of energy, which resulted in a total of 6,934 tons eCO<sub>2</sub> being released. Buildings contributed the greatest proportion of greenhouse gas emissions, releasing a total of 5,275 tons eCO<sub>2</sub>, or 76.1 percent of the total government emissions. The County's fleet accounted for 1652 tons eCO<sub>2</sub>, while emissions from outdoor lighting associated with buildings and facilities operated by the County accounted for 6.6 tons of eCO<sub>2</sub>, or 0.1 percent of total government emissions.

By energy source, electricity and natural gas from County buildings contributed the most to government emissions at 45.1 percent and 32 percent, respectively, while gasoline and diesel from the vehicle fleet accounted for 10.7 percent and 13.1 percent, respectively.

### **MILESTONE 2: ADOPT AN EMISSIONS REDUCTION TARGET FOR FORECAST YEAR**

On August 7, 2002 The Tompkins County Legislature passed Resolution No. 191, on the recommendation of the Environmental Management Council, stating: *Tompkins County will, by 2008, reduce its emissions of greenhouse gases generated by county operations by 20 percent compared to the base year of 1998.*

The ten-year, 20 percent goal adopted by the County was recommended by ICLEI because the United Nations Intergovernmental Panel on Climate Change determined that emissions need to be cut by at least 20 percent in ten years to achieve stabilization of greenhouse gas emissions. In addition, communities around the world have adopted a 20 percent goal with the idea that this reduction goal is both an achievable and significant target for local government operations.

**MILESTONE 3: DEVELOP A LOCAL CLIMATE ACTION PLAN**

In June 2003, Tompkins County developed a Local Action Plan to meet the 20 percent reduction target established for County government greenhouse gas emissions. The plan identified reduction measures that the county government had implemented since 1998, when the baseline emissions inventory was completed, as well as new and proposed actions that together with the existing programs would reach the greenhouse gas reduction target.

The following table summarizes the actions of the County to reach its goal of reducing emissions to 20 percent below 1998 levels by the year 2008. Estimated savings in greenhouse gas emissions from the County action plan are relatively small – but these actions set an important example within the community. Improving, and communicating about, the efficiency of county-owned buildings and vehicle fleets are strategies that can help begin the climate change conversation.

**Local Action Plan Emissions Reduction Measures**

<u>2003 Plan Component</u>	<u>Estimated Emissions Reduction (tons eCO<sub>2</sub>)</u>
Existing Post-1998 Measures:	
• County Library Solar Panel Installation	65
• Phase I & Phase II Facility Energy Audit Improvements	1,204
Proposed Measures:	
• Green Vehicle Fleet	23
• Environmentally Preferred Purchasing Policy	87
• Energy Conservation	56
<b>TOTAL PROPOSED LOCAL ACTION PLAN SAVINGS</b>	<b>1,435</b>
<b>20 PERCENT REDUCTION GOAL</b>	

**MILESTONE 4: IMPLEMENT POLICIES AND MEASURES**

See Report (pg 7-9) .

**MILESTONE 5: MONITOR AND VERIFY RESULTS**

Tompkins County has completed two inventories post-baseline in order to monitor progress toward the 20 percent reduction goal. One was completed in 2006 and is described below. The most recent inventory was completed in 2008 and is described in the body of this report (pg 4-5).

## **2006: Second Inventory**

In 2007, Tompkins County performed a second inventory by tracking the emissions for the year 2006 to evaluate the progress in the reduction of emission levels, which also presented the status and progress made on the components of the Local Action Plan.

The methodology for the analysis and data collection for the 2006 inventory was the same as that used for the 1998 inventory. The only change, which was rather significant, was that the Federal Environmental Protection Agency updated emissions coefficients for greenhouse gas emissions. The coefficients are multiplying factors that are applied to the energy use number to calculate the GHG emissions. These updates required the findings from 1998 to be modified to reflect new data and to allow for comparison between inventories.

### **Greenhouse gas emissions results for 2006**

In 2006, the emissions generated by Tompkins County Government facilities and operations totaled 6,668 tons eCO<sub>2</sub>, marking a 4 percent drop in emissions from the 1998 baseline level. County buildings produced the greatest portion of government emissions, releasing a total of 5,275 eCO<sub>2</sub>, or 76.1 percent of the total government emissions. Meanwhile, the County's vehicle fleet produced 1,652 eCO<sub>2</sub>, or 23.8 percent of the total. The streetlights and traffic signals under government authority produced only a fraction of the emissions from operations with 6.6 eCO<sub>2</sub>, or 0.1 percent. By energy source, electricity for lighting buildings was the primary type of energy consumed in government operations and represented 41.1 percent of emissions, followed by natural gas for heating at 30.3 percent, while gasoline and diesel from vehicles accounted for 16.6 percent and 13 percent, respectively. Gasoline surpassed diesel for primary use in the vehicle fleet by 2006, representing an increase in passenger vehicles in the fleet.

County building emissions fell substantially between 1998-2006, dropping a total of 432 tons eCO<sub>2</sub>. These reductions reflected the building energy efficiency improvements that were implemented as a direct result of the Local Action Plan. Building efficiency efforts were continued through this inventory period and officially completed in January 2007. While emissions savings were achieved in the buildings sector, these reductions were partially offset by a 321-ton increase in emissions from the County vehicle fleet.

### **Identified gaps and modifications**

In the course of gathering 2006 information for the second County government inventory, it became apparent that data had inadvertently been undercounted in the 1998 baseline. It was determined that changes needed to be made to the original baseline inventory to improve its accuracy as well as its comparability to the 2006 update. Also, it is important to note that the emissions for 1998 have changed from the previous inventory because the coefficients of emission have been updated. Accordingly, the 20 percent reduction target has also been modified. The updates to the 1998 baseline inventory essentially increased the total County government emissions by 84 tons to 6,934 tons eCO<sub>2</sub> for 1998.

These adjustments to the inventory also required that the emissions reduction goal set by the Local Action Plan and adopted by the Tompkins County Legislature be modified. The 20 percent reduction target was maintained by increasing the goal level of 2008 emissions to 5,546 rather than 5,479 tons eCO<sub>2</sub>.

## **Appendix C - Evolving Inventory Process and Methods**

### **1998 Inventory: Data and Methodology**

#### *Buildings*

The Department of Buildings and Grounds provided electricity and natural gas consumption and expenditure data from 1998 for all County government buildings (except for Solid Waste and Airport facilities which were obtained from these departments separately.) Floor area data for each building accompanied the utility bills provided from Buildings and Grounds in order to calculate emissions/sq ft.

#### *Vehicle Fleet*

A list of all vehicles in the County fleet was provided by the Administration Department from 1998. Vehicles were identified by department, including mileage and fuel costs for the calendar year. The Sheriff's Department and airport vehicles were not included in this database and had to be gathered from the individual departments. This data was input into the software to determine the emissions associated by vehicle, based on light (compact), medium, and heavy-duty categories, as well as by department.

#### *Outdoor Lighting*

Outdoor lighting included energy and maintenance costs for outdoor lighting at the Courthouse Complex and at the airport in 1998, which contributed slightly to government emissions in the form of electrical usage.

#### *Solid Waste*

The waste stream for County personnel was estimated by using the Environmental Protection Agency Office of Solid Waste published statistics regarding the composition of the waste stream compared to the number of staff. The estimate is based on a typical federal office building (1997) where an employee averaged 2.9 pounds of waste per day. To account for recycling, it is assumed that Tompkins County offices recycled at the same rate as households in the county in 1998, approximately 42 percent of all waste. Thus, the total waste generated per employee per day becomes 1.7 pounds. This figure is multiplied by the number of employees, then by the number of working days in a year.

### **2006 Inventory (including modifications to 1998 Inventory): Data and Methodology**

#### *Buildings*

A number of updates were included in the 2006 emissions inventory from the 1998 inventory, for purposes of completeness and accuracy. Two of these changes involve the buildings sector. The only County building that uses heating oil, K-House, was discovered to have been omitted from the original inventory. To improve the comparability of the two inventories, the same amount of heating oil use from 2006 was added to the 1998 K-House fuel use record. The other change involves a shift of one fuel use record. Outdoor lighting electricity use for the Courthouse Complex was removed from the outdoor lighting sector and added to the Courthouse Complex building energy use record.

#### *Vehicle Fleet*

By far, the largest consumer of both diesel and gasoline fuel among County departments is the Highway Division - but this division was very underreported from the original inventory. This data was included in the 2006 inventory.

### *Solid Waste*

Finally, to determine County-specific waste generation, the original inventory used federal office building waste generation data from the EPA with the County's recycling rates applied to estimate County-generated waste. For the 2006 update, however, data was available for the amount of refuse and recycling hauled from County facilities. This information was used to determine emissions from the waste sector. The original baseline estimate was drastically different from these actual County-government numbers, and so the 1998 numbers were replaced by 2006 waste-generation data, assuming that County waste generation occurred at a similar rate from 1998-2006.

## **2008 Inventory: Data and Methodology**

### *Buildings*

The fuel usage and the associated cost of all but two County government facilities was provided by Tompkins County Facilities Division of the Public Works Department.

Contact: Arel Lemaro, Facilities Division

\*In 2008, new ICLEI protocols separated the reporting of airport facilities and solid waste facilities from the general buildings and facilities category, for which data must be gathered separately in any case, as each of these departments functions as an enterprise operation and accounts separately for utility use.

### *Airport Facilities*

The Ithaca-Tompkins Regional Airport provided the monthly usage and associated costs of the electricity for lighting and natural gas for heating the airport facilities, including the airfield lighting and outdoor lighting for the airport. The monthly data was totaled to determine annual figures. NYSEG and Integrity Energy Services provide the electricity, and the natural gas is supplied by NYSEG and HESS Corporation. Contact: Roxanne Noble, Ithaca-Tompkins Regional Airport.

### *Solid Waste Facilities*

The Solid Waste department provided the receipts for the monthly use of electricity and natural gas by the Solid Waste facilities, including the main office, the recycling center, and the Hillview Landfill facility for 2008. The monthly figures were totaled to determine annual energy and emissions figures. NYSEG and Integrity Energy Services provide electricity to these sites, and natural gas is supplied by NYSEG and HESS Corporation. Contact: Barb Eckstrom, Solid Waste

### *Vehicle Fleet*

County administration provided information for the vehicle fleet in the county. This included the vehicle name, the department that operates it, quantity of fuel used, associated cost, and fuel type for each vehicle in the county fleet. The information was first categorized by department, then by fuel type, and then by the category of vehicle (heavy duty, light truck/SUV or passenger cars). The category of vehicle was determined by using the vehicle name and internet verification.

Contact: Norma Jayne, Administration

## Appendix D - ICLEI and CACP software

Torrie Smith Associates Inc. developed the *Cities for Climate Protection Greenhouse Gas Emissions Software* used by members of CCP. The software is a user-friendly, “point-and-click” software tool that makes it easier for local governments to accomplish the ICLEI milestones. Using automated energy conversions and embedded emission coefficients, the software translates data on energy use, transportation patterns, solid waste amounts, and other inputs into greenhouse gas emissions.

The CACP software is also useful as a planning tool to calculate energy, financial, and greenhouse gas savings from both existing and proposed greenhouse gas reducing policies and measures and was used in this inventory. The software is set up to create emissions inventories for both an entire community as well as for government’s internal operations.

All output from the CCP Greenhouse Gas Emissions Software used in this report are in units of *equivalent Carbon Dioxide* (eCO<sub>2</sub>). eCO<sub>2</sub> is a common unit that allows emissions of greenhouse gases of different strengths to be added together and allows each greenhouse gas to be weighted according to its relative contribution to global climate change. For carbon dioxide itself, emissions in tons of CO<sub>2</sub> and tons of eCO<sub>2</sub> are the same. However, for nitrous oxide, an example of a stronger greenhouse gas, one ton of emissions is equal to 310 tons eCO<sub>2</sub>, while one ton of methane emissions is equal to 21 tons of eCO<sub>2</sub>. In essence, converting all emissions to eCO<sub>2</sub> accounts for the varying impact of different gases, thus allowing the user to compare apples and oranges quantitatively.

CACP 2009 is an emissions management software that calculates and tracks emissions and reductions of greenhouse gases (carbon dioxide, methane, nitrous oxide) and criteria air pollutants (NO<sub>x</sub>, SO<sub>x</sub>, carbon monoxide, volatile organic compounds, PM<sub>10</sub>, PM<sub>2.5</sub>) associated with electricity, fuel use, and waste disposal.

The software has undergone several changes over the last eight years, though the fundamental methodology to calculate greenhouse gas emissions remains the same.