Appendix A

City of Ypsilanti
Greenhouse Gas Assessment

WARM Training Center
Michigan Suburbs Alliance

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Ypsilanti Greenhouse Gas Assessment

The purpose of this Greenhouse Gas Inventory is to establish a baseline of greenhouse gas emissions for both the governmental and community sectors. This baseline will be used to develop strategies for emissions reduction and measure future changes in greenhouse gas emissions resulting from the implementation of those strategies.

Data Collection Boundaries

The tools and resources developed by ICLEI Local Governments for Sustainability guided determination of sources and quantification methodologies. Since 1990, ICLEI has been assisting cities in their efforts to limit their environmental impacts by providing analytical tools and methods to help local governments and communities measure and reduce their greenhouse gas emissions. [1]

In the absence of any US-based community emissions protocol during the creation of this report, the methods used for the evaluation of community emissions are outlined in the International Local Government Greenhouse Gas (GHG) Emissions Analysis Protocol. The methods used for the evaluation of governmental emissions are outlined in the Local Government Operations Protocol (LGOP), which was developed through a partnership between the California Air Resources Board, California Climate Action Registry, and ICLEI – Local Governments for Sustainability (ICLEI).[2]

The ICLEI Protocol indicates that any community-scale emissions inventory must include all emissions associated with any activity occurring within the geopolitical boundaries pertaining to the jurisdiction of the local government. The rationale for this edict is that local governments have some degree of influence over activities occurring within their jurisdictions, as opposed to activities occurring outside of their jurisdiction. [3] The actual emission sources, as in the case of Scope 2 emissions, may occur outside of the geopolitical boundaries. This is discussed in the Operational Boundaries section below.

The Local Government Operations Protocol indicates that the preferred method quantifies GHG emissions ONLY from sources over which a local government has operational control. A local government has operational control over an operation if the local government has the full authority to introduce and implement operating policies. According to this Protocol, "one or more of the following conditions establishes operational control:

- Wholly owning an operation, facility, or source; or
- Having the full authority to introduce and implement operational and health, safety and environmental policies (including both GHG- and non-GHG- related policies)." [4]

Under this approach, the local government is responsible for all emissions that are emitted in any facility where the government has operational control. However, it is important to note that though a

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[1] "Local Government Operations Protocol." *The Climate Registry*. ARB, CCAR, ICLEI, The Climate Registry, May 2010. Web. 23 May 2012. <http://www.theclimateregistry.org/downloads/2010/05/2010-05-06-LGO-1.1.pdf>.

[2] Ibid.

[3] International Local Government Greenhouse Gas (GHG) Emissions Analysis Protocol, ICLEI, p. 11, http://www.iclei.org/index.php?id=ghgprotocol

[4] "Local Government Operations Protocol." *The Climate Registry*. ARB, CCAR, ICLEI, The Climate Registry, May 2010. Web. 23 May 2012. <http://www.theclimateregistry.org/downloads/2010/05/2010-05-06-LGO-1.1.pdf>.

municipality may have full operational control over a facility, control of capital investments or other major changes may be shared. Under LGOP, however, this does not change the responsible party. [5]

Based on this protocol, GHG analysis has been organized into two categories, community and governmental emissions, as presented above. This separation based on controlling entities will continue in the following assessment and in the emissions reduction recommendations.

Operational Boundaries

Scope

Greenhouse gases are emitted in the course of daily activity, when we drive our cars, turn on lights and even when you exhale. GHG emissions can be either direct or indirect—a toaster indirectly emits, while the power plant that provides the electricity for that toaster directly emits. To separately account for direct and indirect emissions, to improve transparency, and to be usable when crafting any number of climate policies and goals, this Greenhouse Gas Assessment follows the World Resources Institute and World Business Council for Sustainable Development GHG Protocol Corporate Standard in categorizing "direct and indirect emissions into "scopes" as follows:

- Scope 1: All direct GHG emissions (with the exception of direct carbon dioxide (CO2) emissions from biogenic sources).
- Scope 2: Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating or cooling.
- Scope 3: All other indirect emissions not covered in Scope 2, such as emissions resulting from the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity (e.g., employee commuting and business travel), outsourced activities, waste disposal, etc.[6]"

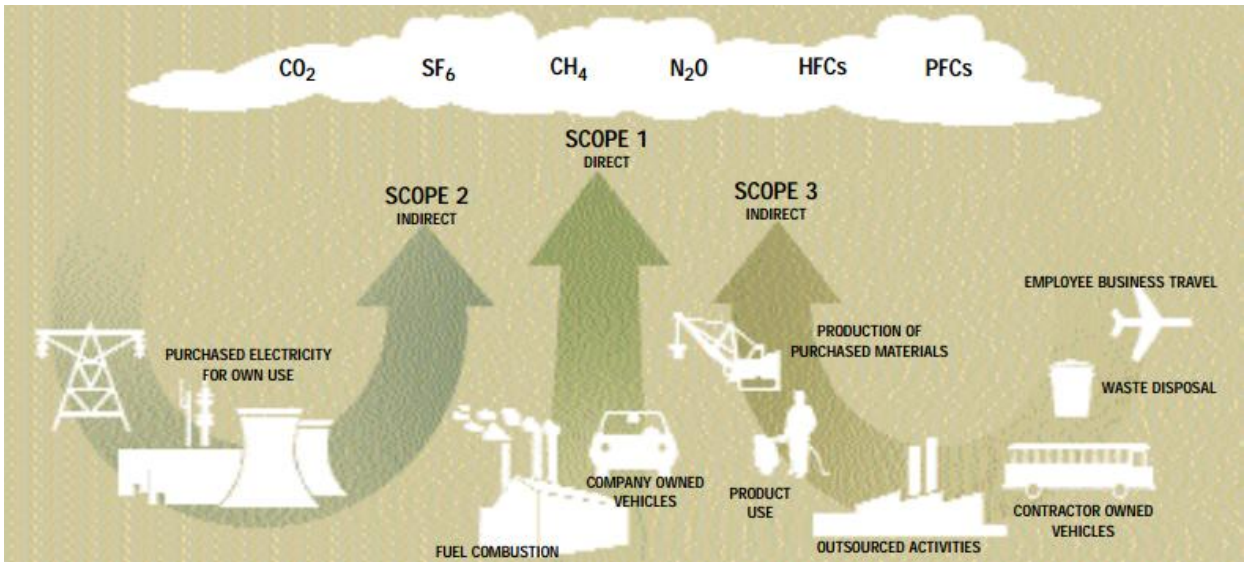

Figure 1 - Overview of Scopes and Emission Sources
Source: WRI/WBCSD GHG Protocol Corporate Standard, Chapter 4 (2004).

[5] Ibid.

[6] *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*. Revised ed. World Business Council for Sustainable Development and World Resources Institute, n.d. 25-32. Web. 23 May 2012. <http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf>.

Appendix A

Community

Community emissions result from a number of different sources. Scope 1 emissions include heating, cooling, and lighting of homes, businesses, and institutions; individual vehicles and mass transit; landfills; and industrial processes. Scope 2 emissions are from electricity generation for electric use in residential, commercial, and industrial facilities throughout the community. Scope 3 emissions are produced by waste generated within but disposed of outside of the community, vehicle emissions from community residents, government waste disposal, and employee commute. Any biogenic emissions from the burning of biomass or biofuels are counted as information items in the greenhouse gas emissions accounting protocols.

Municipal

Municipal emissions are typically a small percentage of the overall community emissions profile. However, because the government has control over the processes, technologies, and procedures that result in municipal emissions, focus on these sources can be a productive source for reductions. Scope 1 emissions from local governments include fossil fuel combustion and fugitive emissions in governmental buildings and facilities as well as fleet and transit vehicles. Scope 2 emissions are from electricity generation for lighting and air conditioning in municipal buildings. Scope 3 emissions result from contracted services, government waste disposal, and employee commute. Any biogenic emissions from the burning of biomass or biofuels are counted as information items in the greenhouse gas emissions accounting protocols.

	Community		**Governments**	
	Emission Category	Example Sources	Emission Category	Example Sources
Scope 1	Stationary Combustion	Heating Buildings with Fossil Fuels	Stationary Combustion	Heating Buildings with Fossil Fuels
	Fugitive Emissions	Escaped Refrigerant Gasses (Buildings, Vehicles), Wastewater Treatment or Landfill Emissions within community	Fugitive Emissions	Escaped Refrigerant Gasses (Buildings, Vehicles), Methane from Government Operated Waste Disposal Facilities
	Process Emissions	Industrial Processes, Manufacturing		
	Mobile Emissions	Vehicle Miles Travelled Within Community	Mobile Emissions	Vehicle Fleet, Transit Fleet
Scope 2	Emissions from Purchased Electricity	Lighting, Appliances, Air Conditioning	Emissions from Purchased Electricity	Lighting, Computers, Air Conditioning
Scope 3	Fugitive Emissions	Community-Generated Waste at Landfills Outside City Limits	Fugitive Emissions	Emissions from Contracted Waste Hauling Service, Government Waste

				Disposed to Date
	Mobile Emissions	Emissions from Vehicles Used by Community Residents	Mobile Emissions	Emissions from Employee Commute, Contracted Services
Information Item	Biogenic Emissions	Wood Heat, Biofuel Use	Biogenic Emissions	Wood Heat, Biofuel Use, Renewables

Figure 2 - Community and government scope inclusions

Overall Emissions

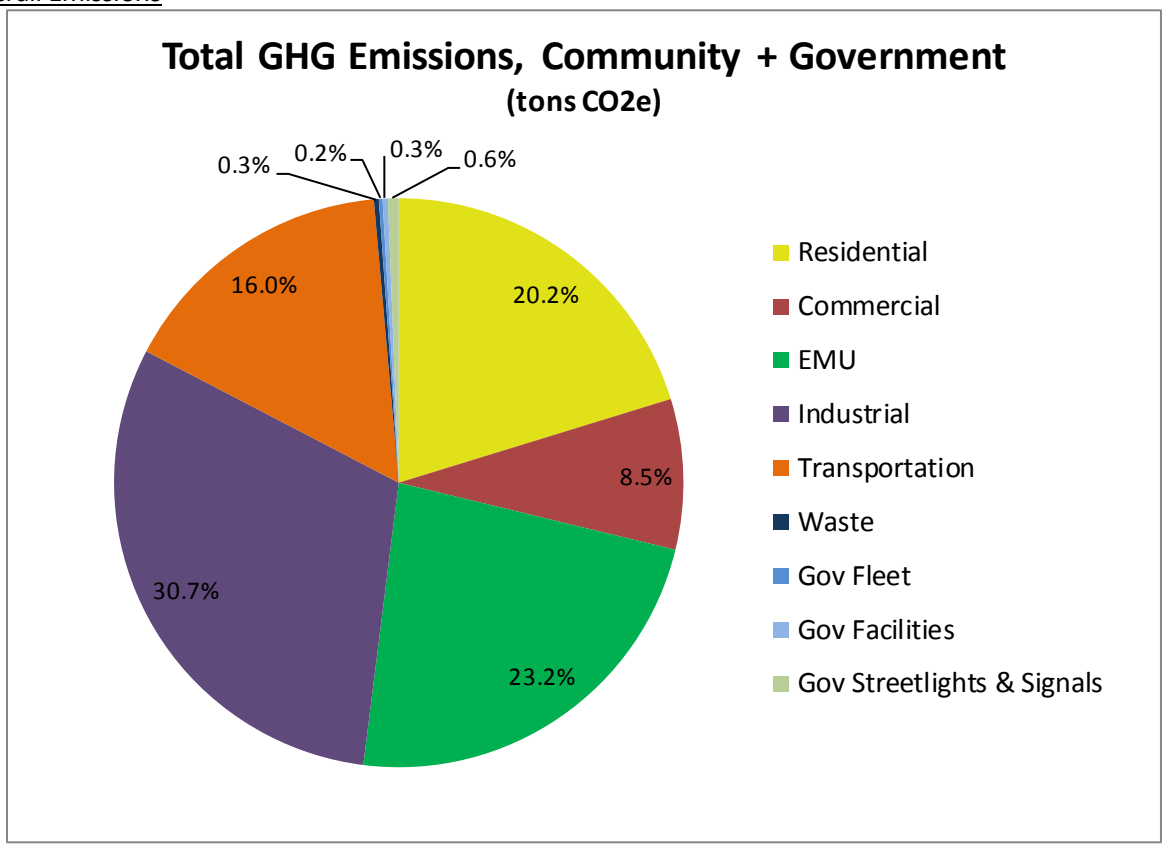

Figure 3 - Total greenhouse gas emissions in Ypsilanti in years 2005 or 2008

The community of Ypsilanti contributed 302,710 metric tons of GHG emissions (CO_2e) into the atmosphere in 2005/2008,[7] equivalent to 15.0 metric tons per capita for the city. On average, US Emissions per capita in 2000 were 24.5 metric tons CO_2 equivalent (CO_2e) for comparison.[8] Ypsilanti city government contributed 3,387 metric tons of emissions, about 1.1% of the total emissions.

[7] Transportation and waste data are from 2005. All other sectors are from 2008.

[8] Baumert, Kevin A., Timothy Herzog, and Jonathan Pershing. *Navigating the Numbers: Greenhouse Gas Data and International Climate Policy*. N.p.: World Resources Institute, 2005. 22. Web. 23 May 2012. <http://pdf.wri.org/navigating_numbers_chapter4.pdf>.

Community Emissions

Emissions from the community at large are significantly greater than those emissions just from governmental operations. In 2008, total emissions from the community of Ypsilanti were 302,710 metric tons metric of CO_2 e.

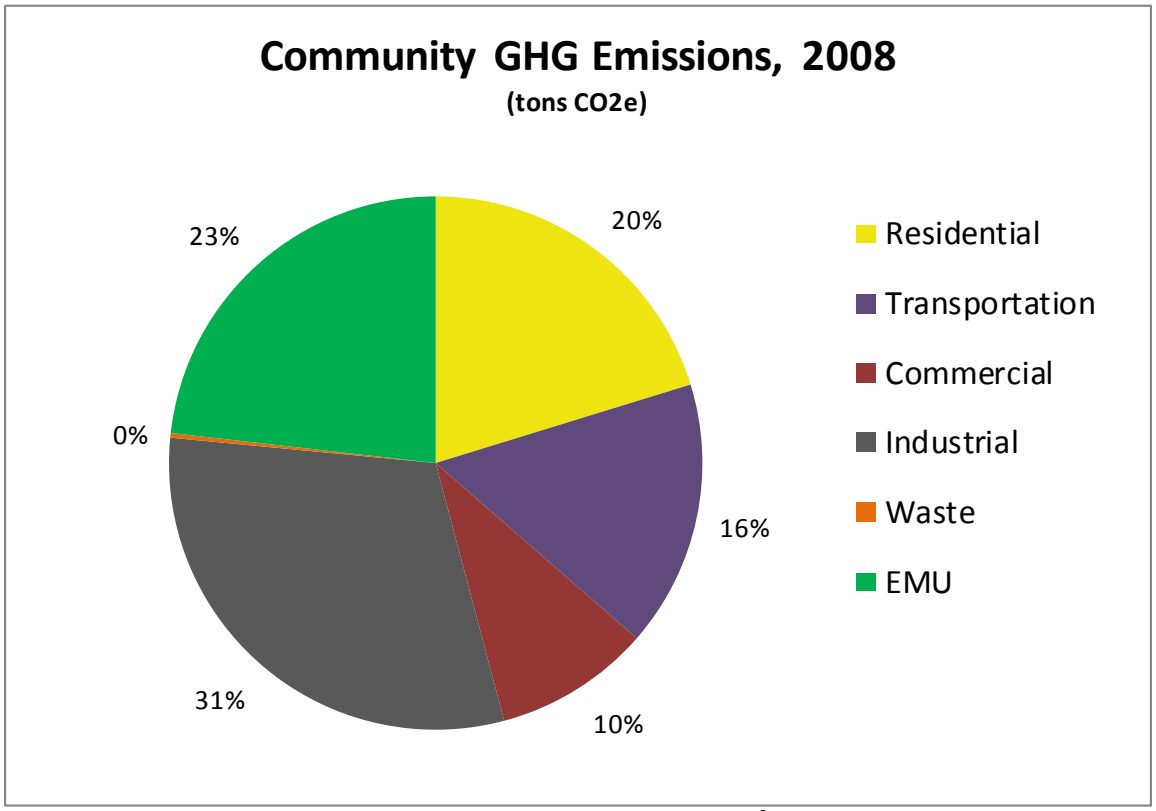

Figure 4 - Percentage of community greenhouse gas emissions by sector[9]

As illustrated, Ypsilanti's commercial sector was the greatest contributor to GHG emissions, with 9.5% of the total emissions plus an additional 23% from Eastern Michigan University (EMU). Industrial followed close behind at 31%. Residential was third, with 20% of the total emissions. Transportation emitted 16% of total emissions. Emissions from community waste, a scope 3 source, made up 0.3% of the overall emissions profile.

The large contributions of the industrial and commercial sectors are attributed to two factors. First, Eastern Michigan University forms a large part of the Ypsilanti community in terms of land use, population, and resulting emissions, producing 70,228 metric tons of CO_2 equivalent emissions in 2008. EMU's emissions were added to the existing commercial emissions. Second, a methodological issue due to unclear data scope could have led to the large contribution of the industrial and commercial sectors to overall community emissions. See the Electricity/Natural Gas methodology section for an in-depth explanation.

[9] See "Community Inventory: Detailed Report" at the end for all data sources.

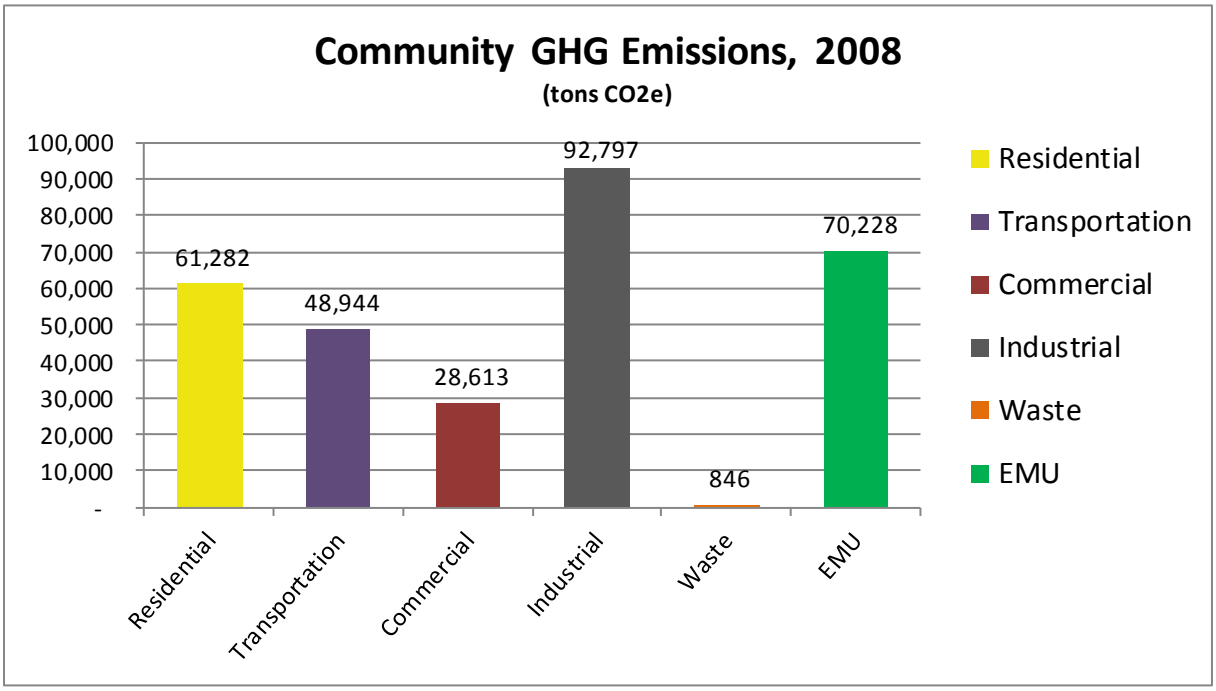

Figure 5 - Raw amount of community greenhouse gas emissions by sector

Emissions by Fuel

In examining community emissions by fuel type, note that 71.6% of total community emissions come from electricity. Gasoline and natural gas are close, with 12.1% and 11.6% respectively. This is followed by diesel (4.0%). Fuel oil (0.2%) and fugitive emissions (0.3%) each make up a small percentage of total emissions.

In comparison to emissions for the state of Michigan as a whole (36%), electricity in Ypsilanti was responsible for about twice as many emissions, by percentage. Emissions from heating fuel use (natural gas, fuel oil, and propane) in Ypsilanti were less than half as much as (12%) the statewide profile (27%). Emissions from transportation (gasoline and diesel) were about even for both, at approximately 24%. Emissions from waste in Ypsilanti were about one tenth of that statewide. Finally, emissions from industrial processes and agriculture were not noted in the case of Ypsilanti, whereas they consisted of 7% and 3%, respectively, for the state.[10]

[10] *Final Michigan Greenhouse Gas Inventory and Reference Case Projections 1990-2025.* Center for Climate Strategies, November 2008. 8.

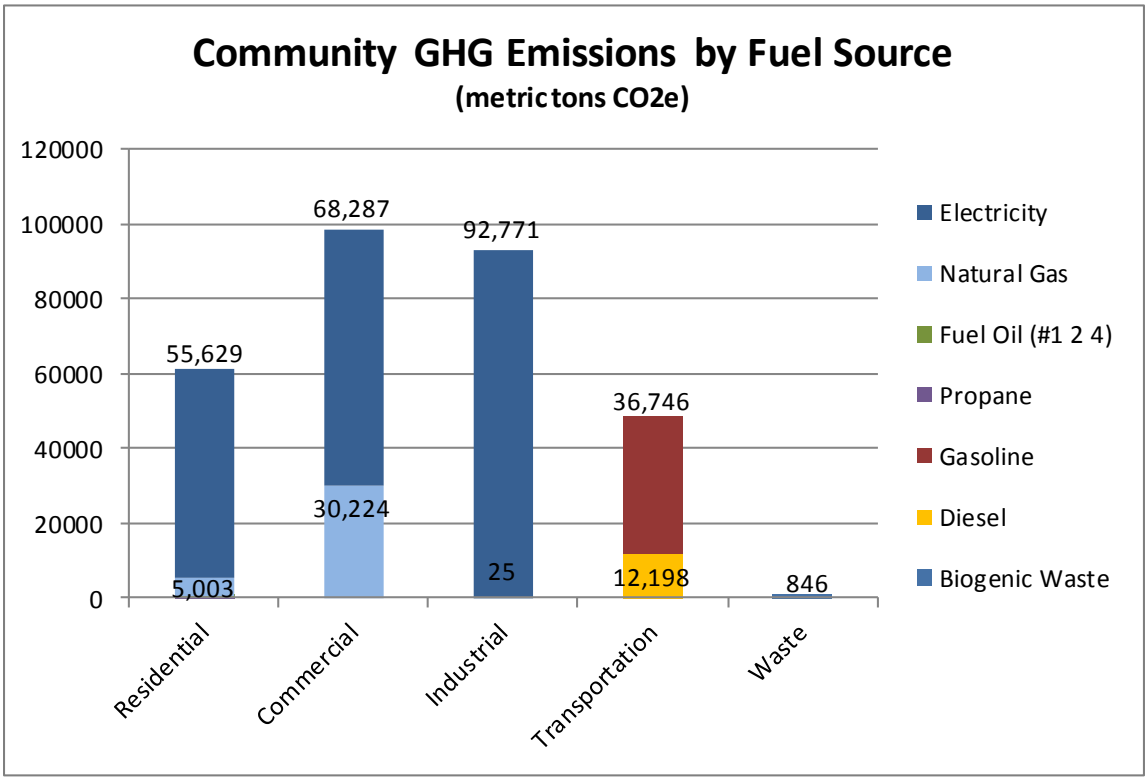

Figure 6 - Ypsilanti community emissions by fuel source in years 2005 or 2008

Emissions by Scope and Sector

Examining emissions by scope is an important component of any GHG assessment (see figure 7), as scopes help prioritize investments to reduce impacts. Scope 1 and 2 emissions are the most directly impacted by local action and thus most inventories only include scope 1 and 2 emissions in their totals. Scope 3 emissions are those emissions either partly or wholly outside of the geographic bounds of the city.

For Ypsilanti, Scope 2 emissions are more than double Scope 1 emissions. Scope 3 emissions are attributed to sources outside of the city and in Ypsilanti's case, include emissions from the miles travelled for all trips beginning or ending with the city (including those miles travelled outside of the city) and the fugitive emissions (largely methane) from garbage produced by city residents and businesses and sent to the Woodland Meadows landfill operated by Waste Management.

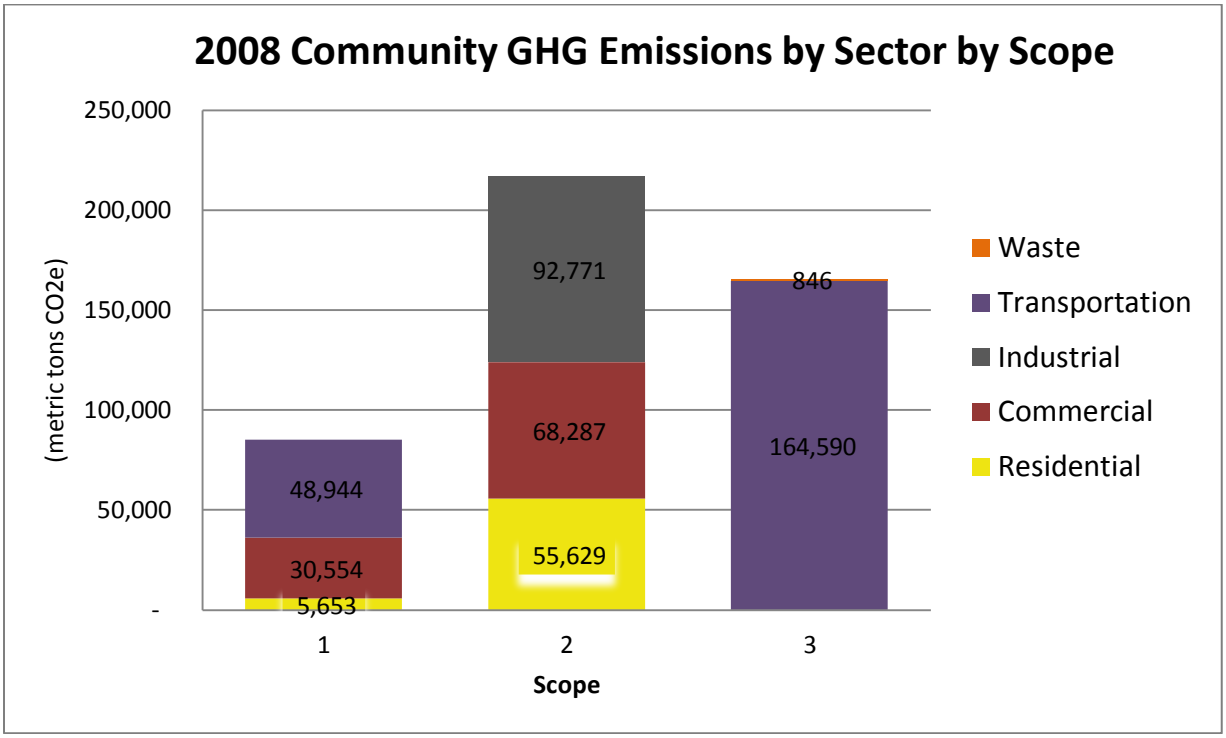

Figure 7 - Total community emissions by scope

Residential

The residential sector in Ypsilanti was responsible for 61,282 metric tons of CO_2e GHG emissions in 2008. Residents of Ypsilanti consumed 941,128 thousand cubic feet (MCF) of gas and 71,106,154 kWh of electricity in 2008 purchased from MichCon/Detroit Edison (DTE). Per household, Ypsilanti residents used about 97.5 MCFs of natural gas and 7,366 kWh of electricity annually.[11] Based on data provided by the Michigan Public Service Commission, the average residential MichCon/DTE customer in Michigan consumed 109.4 MCFs of natural gas and 7,942 kWh of electricity in 2008. [12] Given these figures, consumption in Ypsilanti is below the average for both gas and electric.

In addition, using census estimates and Energy Information Administration (EIA) figures, 2005 fuel oil and liquid petroleum gas (LPG) usage in Ypsilanti is estimated to be 19,110 and 77,616 gallons, respectively. Estimates showed 35 housing units used fuel oil as their primary heat sources and 112 housing units used LPG.

Commercial/Industrial

Commercial customers, emitted 28,613 metric tons of CO_2e, whereas industrial customers emitted 92,797 metric tons through consumption of natural gas and electricity. Eastern Michigan University, the major commercial customer in Ypsilanti, emitted 70,228 metric tons of CO_2e in 2008. Commercial customers consumed 35,354,150 kWh of electricity and 179,518 MCFs of natural gas in 2008 to produce the above-mentioned GHG emissions.

[11] This number assumes 9,653 occupied housing units in Ypsilanti in 2008, according to the US Census Bureau.

[12] "Statistical Data of Total Sales Electric Utilities in Michigan." *MPSC - Electricity*. Michigan Public Service Commission, 31 Dec. 2010. Web. 23 May 2012. <http://www.dleg.state.mi.us/mpsc/electric/download/electricdata.pdf>.

Industrial customers used 118,582,186 kWh of electricity and 4,794 MCFs of natural gas from MichCon/DTE. The low number for industrial natural gas may be because industrial customers bought gas through third party providers, which are numerous and difficult to contact.

Emissions from alternate fuels such as fuel oil and LPG for commercial and industrial sectors were not calculated because there was no reliable method to estimate the usage statistics for these sectors. Unlike the residential sector, no surveys were conducted that would indicate approximate number of businesses using different fuels for heating.

Transportation

Scope 1 emissions from all the vehicle miles travelled (VMT) on *non-freeway* roads within the city of Ypsilanti resulted in 48,944 metric tons of GHG emissions, representing 291,560 vehicle miles travelled each weekday throughout the year. These emissions were calculated based on the Southeast Michigan Council of Governments (SEMCOG) regional transportation model.

Freeway VMT was decided to be outside the scope of this GHG assessment for several reasons. First, the City of Ypsilanti has no jurisdiction over the operation and maintenance of I-94 and thereby cannot affect traffic on the freeway. Second, much of the traffic on the highway is neither coming from, nor bound for the city. Thus, attributing the GHG emissions from the freeway passing through Ypsilanti to the community emissions profile was deemed inappropriate for this study.

Emissions from bus transit in the city of Ypsilanti provided by the Ann Arbor Transportation Authority (AATA) amounted to 426 metric tons, representing approximately 14,262 service hours in the community and 578,229 annual boardings.

Scope 3 emissions from the total VMT for all trips beginning and ending within the city on all road types (including highways) were estimated to be 164,590 metric tons of CO_2e. Because a significant portion of these miles would be driven outside the city boundaries, this estimate is considered a “Scope 3” emission source. However, because these miles are driven by people travelling to or from the city, it is an important source of potential emissions reduction.

Waste

Emissions from solid waste for the residents and businesses of the city of Ypsilanti are considered to be Scope 3 because the waste is disposed of outside of the geographic boundaries of the city. Emissions from the waste landfilled in 2005 contributed 846 metric tons of GHG emissions to the environment.

Waste from the City of Ypsilanti is taken to Waste Management’s Woodland Meadows landfill, where there is a landfill gas capture system. While the quantity of methane expelled to the atmosphere through landfilling depends on the technology used at the specific landfill, we assumed a methane capture efficiency of 75%, a generally accepted efficiency rating for landfills. Different landfills are able to capture greater or lesser amounts of methane for other uses.

Municipal Emissions

Municipal emissions in 2005 totaled 3,387 metric tons of CO_2e. This amounts to only 2.2% of the total community emissions profile. However, this assessment focuses on these emissions because the municipality can have a tangible effect on the activities that cause these emissions.

As illustrated, lighting makes up the majority (54%) of total emissions for the City of Ypsilanti. The category of buildings and facilities comes in second at 27%, with fleets at 19%.

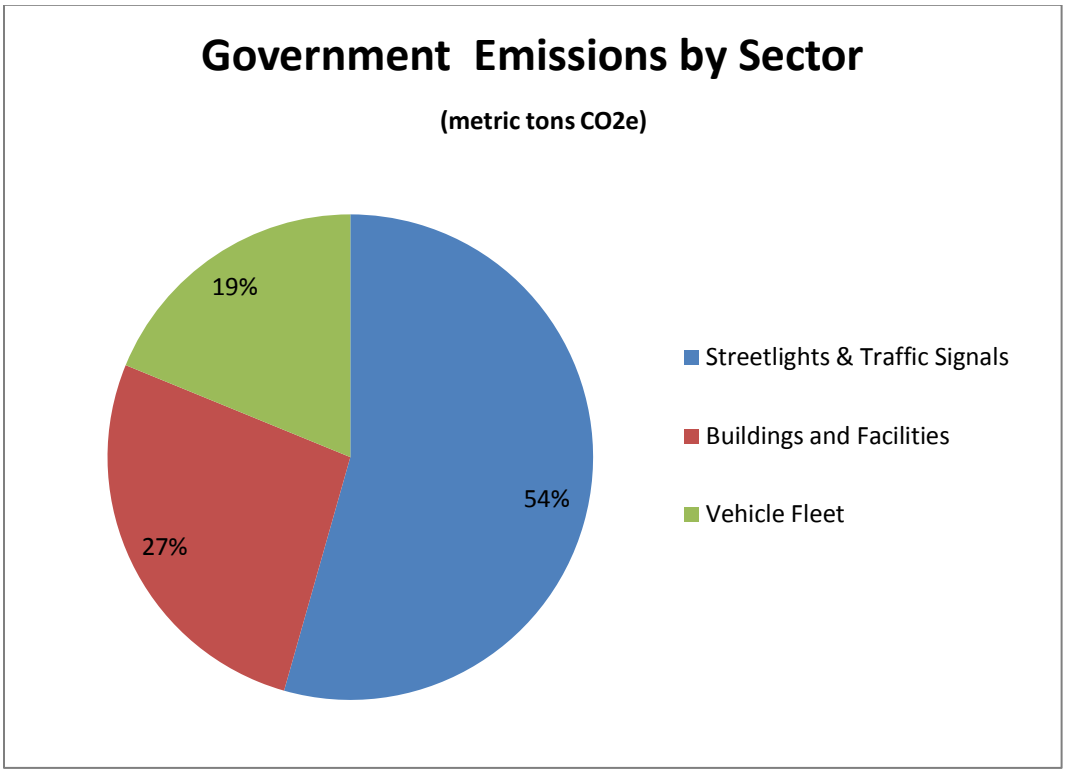

Figure 8 - Ypsilanti government emissions by sector in year 2005

Emissions by Fuel

Emissions from electricity generation (Scope 2) make up the vast majority of municipal emissions, at 69%. The final 31% of municipal emissions is made up of gasoline (13%), natural gas(12%), and diesel (6%).

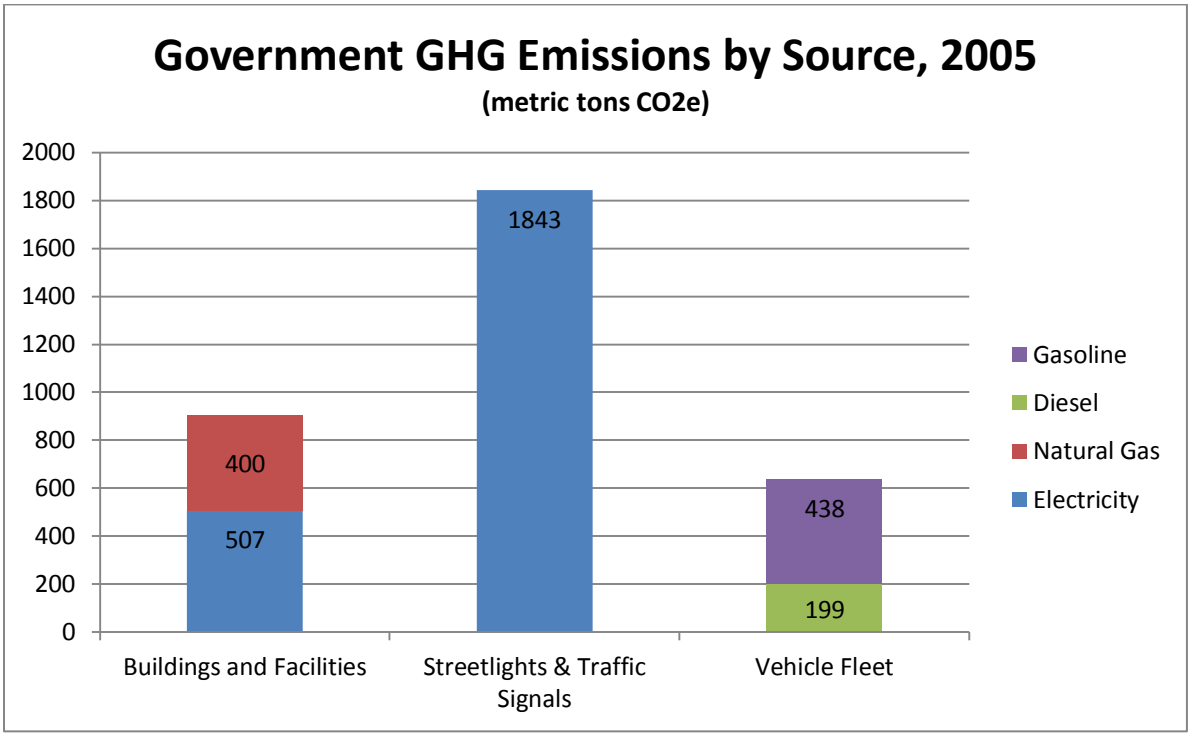

Figure 9 - Government GHG Emissions by Fuel and Sector

Emissions by Scope and Sector

When considering municipal emissions, it is important to consider emissions by scope. Scopes delineate the degree of control that a local government has over the source. See the Scope section of the introduction for more on this topic. The majority of emissions from local government operations come from Scope 2, or electricity generation. Scope 1, or direct emissions from heating fuels and other on-site uses, constitutes a lesser component of the total emissions. The Scope 3 emissions come from estimation of employee commute.

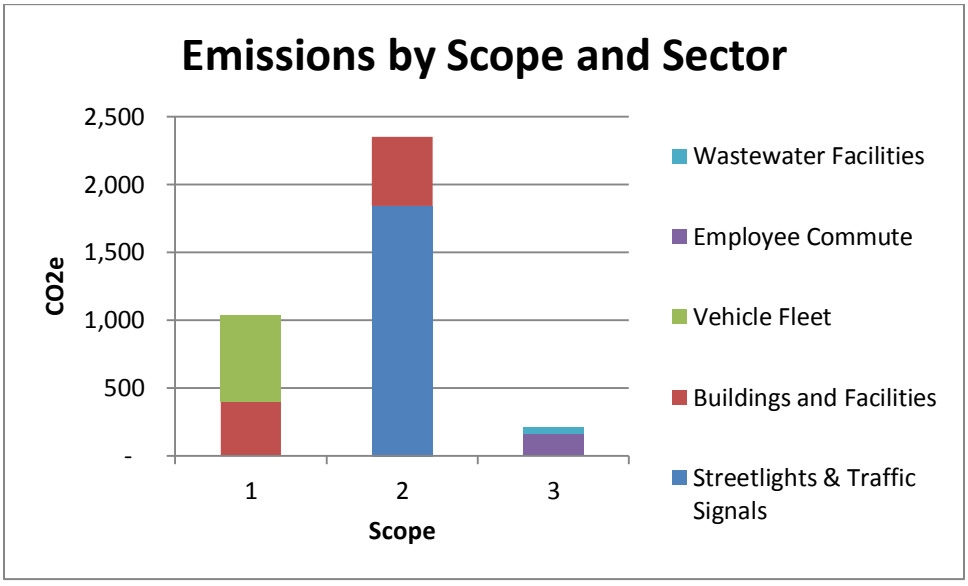

Figure 10 - Government emissions by scope and sector in year 2005

Buildings and Facilities

Emissions from facilities account for approximately 27% of the total municipal emissions in 2005. Buildings and facilities were responsible for 907 metric tons of GHG emissions in 2005.

Municipal Building or Facility	% of Sector Emissions from Electricity	% of Sector Emissions from Natural Gas	CO2e Emissions from Electricity	CO2e Emissions from Natural Gas	Total CO2e Emissions
Fire Station	12%	10%	109	94	203
Police Station	14%	7%	128	64	191
City Hall	12%	1%	111	12	123
Public Works Yard	3%	8%	28	72	100
Rutherford Pool	5%	5%	44	44	88
Parkridge Community Center	4%	5%	38	47	85
Ypsilanti Historical Museum	2%	3%	17	29	46
Senior Center	3%	2%	28	16	44

Figure 11 - Total emissions and percentage of emissions from government buildings

The Fire and Police Stations are some of the most intensive energy users, each emitting approximately 200 metric tons CO2e per year. City Hall and the Public Works Yard are the next most intensive, each emitting about 100 metric tons per year. The pool and community center each emit around 90 metric tons and the Historical Museum and Senior Center emit approximately 45 metric tons annually. Further analysis should examine energy intensities for these buildings.

Public Lighting

Emissions from lighting make up 54% of total municipal emissions, an exceptionally high amount as compared to neighboring municipalities. Streetlights make up 68% of lighting emissions. Traffic accounts for 30%. The remaining 2% consists of parks, parking, and miscellaneous lighting.

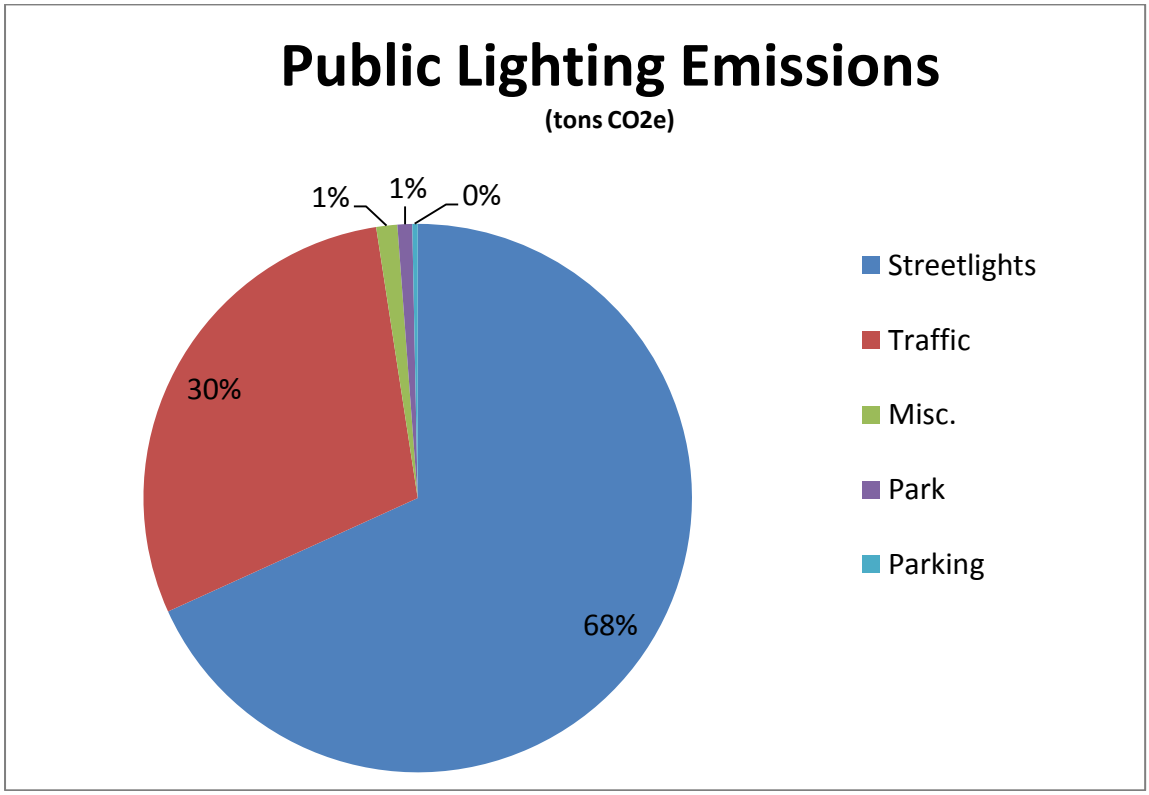

Figure 12 – Emissions by Lighting Type in year 2005

Fleet

Overall GHG emissions from the City of Ypsilanti vehicle fleet were 637 metric tons of CO2e in total. Emissions from police vehicles accounted for the greatest quantity of emissions (219 metric tons), followed by public works (179 metric tons), environmental (124 metric tons), fire (62 metric tons), building (29 metric tons), and general (25 metric tons).

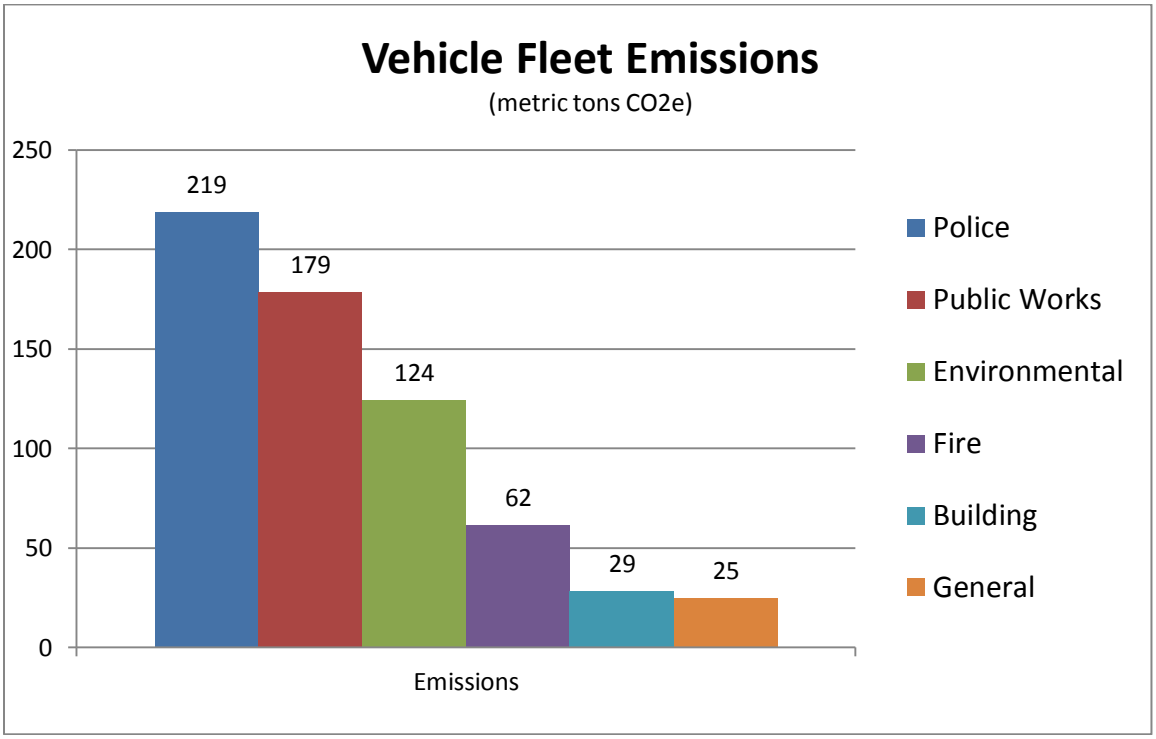

Figure 13 - Graph of government vehicle fleet emissions separated by department in year 2005

Waste

This assessment did not obtain any data specific to the waste generated within municipal operations within the City of Ypsilanti. Regardless, any emissions from waste disposed of outside the city are considered to be Scope 3. However, numerous actions can be taken to reduce the quantity of municipal waste headed for the landfill.

Wastewater

Wastewater produced within the City of Ypsilanti is treated by the Ypsilanti Community Utility Authority (YCUA), a quasigovernmental authority managed by a board with representatives from all the member communities. The City of Ypsilanti does not have control over the operations of the YCUA, and neither is the wastewater treatment plant located within the geographic bounds of the City. Therefore, any emissions from the wastewater treatment plant should be considered scope 3 emissions for the City of Ypsilanti.

The YCUA wastewater treatment plant emitted 48.5 metric tons of CO2e emissions in 2005, composed entirely of nitrous oxide in the process of treating wastewater from the City of Ypsilanti.

Employee Commute

Emissions from current employee commuting patterns are estimated to equal 163 metric tons of CO2e.

Mode	%
Carpooling	41%
Vanpooling	24%
Public Transportation	21%
Bicycling	31%
Walking	21%

88 out of 95 employees drive 389,323 vehicle miles yearly. Therefore, only 7 employees arrive to work by modes other than individual vehicle. However, 31% of employees lived within 5 miles of their job location. Additionally, many respondents were interested in other modes of travel, as noted in Figure 14.

Figure 14 - Government employee interested in commute mode

Appendix A

Methodology

This section outlines the methods used to generate the Ypsilanti GHG emissions estimates. As data availability varied for each of these sectors, slightly different methods were used depending on the detail and accuracy of the data procured. Each section begins with a table that summarizes the data sources, years and assumptions made throughout the emissions calculations.

Community

Community Data Sources and Assumptions				
	Data	**Year**	**Data Source**	**Assumptions**
Residential	Electricity	2008	DTE	Prorated based on Occupied Households
	Natural Gas	2008	DTE	Prorated based on Occupied Households
	Fuel Oil	2005	Census/EIA	Based on Surveys
	LPG	2005	Census/EIA	Based on Surveys
Commercial/ Industrial	Electricity	2008	DTE; EMU	Prorated based on Occupied Households; EMU energy not included in DTE commercial
	Natural Gas	2008	DTE; EMU	Prorated based on Occupied Households; EMU energy not included in DTE commercial
	Fuel Oil	2008	EMU	Added to Other Estimates
	LPG		N/A	Not Available
Transportation	Vehicle Miles Travelled	2005	SEMCOG (VMT) ICLEI (emissions factors)	Based on Regional Travel Model Only non-highway VMT within the jurisdiction included
	Transit		AATA	Service Hours billed to Ypsilanti
Waste	Tons Landfilled	2008	City	Accounts for All Waste in City; 75% Methane Capture; Organic Waste Corresponds with EPA Averages
	Tons Recycled	2008	City	
	Tons Composted	2008	City	

Figure 15 - Ypsilanti data sources, years and assumptions

Electricity/Natural Gas

For the community inventory, a number of methods were used to compile the needed data. One main source was the utility providers. Meetings were set up with both DTE and Consumers, with the help of Chuck Hersey at SEMCOG, to explain the data request. After working through various channels, the utilities provided data sets that contained the total annual consumption of electricity and natural gas within the residential, commercial and industrial sectors for 2008, 2009 and 2010. 2008 figures were used for this analysis, because they were closest to the desired base year, 2005. However, the city of Ypsilanti lies in two different zip codes: 48197 and 48198. Preliminary analysis on the utility data

corresponding to Ypsilanti revealed that the per-household usage was several orders of magnitude higher than the usage in other communities. Out of curiosity, this statistic was computed with the total number of households in the City of Ypsilanti, Ypsilanti Charter Township, and Superior Township (all the units of government in zip codes 48197 and 48198). This made the per-household usage comparable to that for other communities. DTE Energy did not respond to repeated requests for a description of the "envelope" from which this data was drawn. Therefore, the electricity and gas data provided by DTE Energy for residential, commercial and industrial sectors was prorated based on the Census number of occupied households in the City of Ypsilanti, divided by the total number of occupied households in the City and the two surrounding townships.

Eastern Michigan University provided electricity, natural gas and fuel oil figures for 2008. EMU purchased electricity from DTE Energy and natural gas through a third party, delivered by DTE Energy. However, because of unanswered questions regarding energy data from DTE Energy, energy figures from DTE Energy for commercial users and energy figures from EMU were added together. Realistically, some of the commercial energy use reported by DTE Energy could likely be from EMU. However, because of lack of communication on the part of DTE, we were never able to clarify these questions. Therefore, likely the commercial energy use estimation for Ypsilanti is an overestimate.

Emissions factors for electricity were DTE-specific emissions factors for 2007 from EPA E-Grid.[13]

Other Fuels

Other fuels such as fuel oil and LPG are not accounted for within the estimate given by the utilities. Therefore, for the residential sector, the US Census was used to find the number of households using different kinds of heating fuels. This data is based on a survey of household energy use and, based on the number of occupied housing units, computes what the likely number of units using a specific fuel might be. Survey estimates of the average quantity of fuel used per household were derived from estimates published by the Energy Information Agency. In that report, the table US8, Average Consumption by Fuels Used, 2005, Physical Units per Household estimates average fuel usage by census region and division. Figures were computed, then, by using the Census to find the number of households using a fuel type and multiplying by the average consumption/household in the East North Central division of the Midwest Census region. Usage of wood as a heating fuel was not estimated because of its biogenic nature.

Commercial and industrial fuel oil and LPG consumption was not estimated because of the decentralized nature of suppliers. The Census does not estimate information on heating fuel usage for commercial or industrial buildings, thereby making it difficult, if not impossible, to attain an estimate. The assessor's office in Ypsilanti indicated that their records did not denote heating fuel used. Eastern Michigan University did provide fuel oil figures.

The Michigan Air Emissions Reporting System (MAERS) database, compiled by the Michigan Department of Environmental Quality, collects emissions estimates from large industrial operations. Two industrial operators in the City of Ypsilanti had entries in the MAERS database for 2005: Eastern Michigan University and Automotive Components Holdings (ACH). However, these entries were largely restricted to natural gas and electricity. Natural gas emissions were included in the information provided by the DTE Energy. Emissions from fuel oil were included for EMU. Subsequently, EMU provided energy figures

[13] *eGrid*. US EPA, 10 May 2012. Web. 23 May 2012. < http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>.

from 2008 with fuel oil included. Additional air pollutant emissions were noted, namely volatile organic compounds and toluene. However, for the purpose of the GHG inventory, these emissions were considered outside of the scope.

Transportation

Community transportation data was developed using the regional transportation model of the Southeast Michigan Council of Governments (SEMCOG). SEMCOG estimates include total weekday VMT, highway and non-highway, within the jurisdictional boundaries of the city of Ypsilanti. It is important to note that SEMCOG's model only takes into account major roads, thereby undercounting VMT on neighborhood streets.

Scope 1

SEMCOG also provided the regional distribution of weekday VMT by vehicle type. Using the default vehicular emissions factors embedded in the Clean Air and Climate Protection (CACP) 2009 tool developed by ICLEI, the VMT assumptions per vehicle type were modified to reflect the distribution statistics provided by SEMCOG. Finally, we entered the total weekday VMT[14] only for non-highway VMT for each community, reflecting the distribution provided by SEMCOG. We did not include the highway VMT because many of those trips likely did not have the city of Ypsilanti as an origin or a destination. However, a portion of the highway VMT likely did have the city as a destination. For that reason, our estimate of emissions from Ypsilanti's transportation network is likely a conservative underestimate.

Community	Freeway		Non-Freeway		Total
	Miles of Roadway	VMT	Miles of Roadway	VMT	
Ypsilanti	3.6	183,630	47.4	291,560	475,190

Figure 16 - 2005 Average Weekday Vehicle Miles of Travel (VMT) by Road Type

	Vehicle Mile Travelled		%	
	Gas	Diesel	Gas	Diesel
Passenger Cars & Motorcycles	158,435	768	54.3%	0.3%
Light Trucks	102,413	4,109	35.1%	1.4%
Heavy Duty Trucks	-	25,818	0.0%	8.9%
SUBTOTAL	260,849	30,695	89.5%	10.5%
TOTAL		291,560		100.0%

Figure 17 - 2005 Average Weekday VMT from Non-Highway Travel in Ypsilanti

Public transit data from 2008 was procured through the Ann Arbor Transportation Authority (AATA). AATA performed 14,262 hours of service in the City of Ypsilanti. The AATA annual report was used to calculate a ratio of revenue miles per hour of service for the entire AATA system as a whole. At a reported fuel efficiency of 4.08 miles/ gallon, AATA buses used 41,718 gallons of diesel fuel and 7366

[14] Annually, "weekday VMT" adds up to 262 days.

gallons of B100 biodiesel in 2008 while providing service within the City of Ypsilanti. Standard fuel emissions factors were used to calculate the total emissions from the fuel consumed. The biodiesel component of the fuel mix had an effective 0 emissions factor due to its biogenic character.

Scope 3
SEMCOG also used their regional transportation model to derive total VMT for all trips beginning or ending (on all road types) within the city of Ypsilanti. Note that this VMT includes miles travelled outside of the city boundaries, en route from or to a location within the city. The same methodology cited above was used to convert the total VMT into CO2 emissions. The emissions from this VMT is classified as scope 3, as the city of Ypsilanti cannot necessarily influence the driving habits of its residents, especially when they are outside the geographic boundary of the city. However, as a community metric, this statistic is important because the residents of the city of Ypsilanti can change their modes of travel.

Community	Passenger Vehicle Miles Travelled			Truck Miles Travelled			Total VMT
	Start From	End In	Start & End In	Start From	End In	Start & End In	
Ypsilanti	45,720	46,440	12,540	3,440	3,460	480	112,080

Figure 18 - 2005 Average Weekday VMT for Trips Beginning and/or Ending in Community

Waste
Waste generated by city residents and businesses but disposed outside of the city boundaries is considered a Scope 3 emissions source. The landfill emissions are generated outside the geographic boundaries of the city and citizens have no input in how the landfill is operated. Waste Management operates the Woodland Meadows landfill where municipal solid waste from the city of Ypsilanti is taken. The City of Ypsilanti provided waste generation data on quantities of waste landfilled, recycled, and composted. Recycling and composting do not count towards overall GHG emissions and thus count as zero. However, to compute the emissions from landfills, default municipal solid waste (MSW) percentages from EPA were used as a proxy.[15] Because only biogenic waste produces methane, the quantity of methane was calculated using the default waste emissions factors within the CACP software.

Data calculations assumed a methane capture efficiency of 75%, a generally accepted assumption for efficiency of LFG collection systems.

Wastewater
Fugitive emissions from wastewater treatment were provided by the Ypsilanti Community Utility Authority (YCUA), which transports and treats wastewater and potable water for Ypsilanti residents. These emissions are considered Scope 3, because although the wastewater is produced inside the boundaries of the City, treatment is performed outside the geographical boundaries of Ypsilanti. Additionally, because the YCUA is not under control of the City of Ypsilanti, these emissions are not within the scope of the government operations.

Emissions for the YCUA Wastewater treatment plan were calculated using the Wastewater Emissions Data Tool from ICLEI. The YCUA treatment plant does not use digesters, lagoons or septic systems, and so the sole source of emissions was fugitive N_20 emissions totaling 0.1565 metric tons. CACP calculated the CO2e emissions at 53 metric tons based on a global warming potential for N_20 of 310.

[15] http://www.epa.gov/epawaste/nonhaz/municipal/pubs/mswchar05.pdf

Municipal

Municipal Data Sources and Assumptions				
	Data	Year	Data Source	Assumptions
Buildings & Facilities	Electricity	2005	City of Ypsilanti	All City Facilities Accounted For
	Natural Gas	2005	City of Ypsilanti	All City Facilities Accounted For
	Fuel Oil		N/A	
	LPG		N/A	
Streetlights & Signals	Electricity	2005	City of Ypsilanti	All City Facilities Accounted For
Fleet	Vehicle Miles Travelled	2008	City of Ypsilanti	Yearly Averages Used Based on 2008-09 Budget
	Gallons Fuel Purchased	2008	Wacker Petroleum	Fuel Purchased Was Consumed Within the Year Fuel Consumption Prorated Based on Vehicle Mileage and Type
Waste	Tons of Waste	Current Estimate	City of Ypsilanti	Approximated Based on Number, Volume of Dumpsters and Frequency of Pick-Up

Figure 19 - Municipal data sources, years used, and assumptions made

Buildings and Facilities

A noble intern, Scott Kalafatis, sifted through paper energy bills at the City, manually recording each of the building's billing amounts into a spreadsheet format for 2005. Using the DTE Energy specific emissions factors, emissions were computed from natural gas (Scope 1) and electricity (Scope 2) used by the buildings and facilities owned and managed by the City of Ypsilanti. Because these accounts were associated with specific addresses and not building names, current and former planning staff assisted the project by providing specific building names for the addresses provided. Calculations assumed that no facilities used fuel oil or LPG.

Streetlights and Signals

Data on streetlights and signals were collected in the same manner as for buildings, by going through boxes of paper bills. Again, DTE specific emissions factors were used to calculate the emissions associated with these facilities.

Fleet

Fleet emissions were calculated using the gallons of fuel consumed, the total vehicle miles travelled and the vehicle types. Numerous assumptions were made to arrive at this data. First, vehicle data and overall mileage were procured from the city's internal 2008-09 budgeting process. Second, total diesel and gasoline were consumed in two specific buckets: DPW and Fire/Police. The total mileage and date purchased for the vehicles were used to calculate an average annual mileage. Using that number and the assumed average fuel economy for these vehicles, fuel use was prorated to determine the amount of fuel used by vehicle. This number was then aggregated to calculate fuel used per vehicle type per department, which was used to calculate both CO2, CH4 and NO2 emissions. The CACP database provided default fuel and mileage emissions factors.

Usage of one fire vehicle was measured in hours, not mileage, and no hours figure was provided. There

was no indicator of usage provided for equipment such as weed trimmers, chainsaws, and lawnmowers. Calculations of emissions assumed that this equipment used 10% of the DPW gasoline and 2% of the DPW diesel fuel purchased. Emissions for the equipment were calculated by using the default emission factors for a passenger vehicle because no standard methodology was available.

Fugitive emissions from vehicle cooling systems are another source of GHG emissions. However, this data could not be procured from the City of Ypsilanti. Contributions from fugitive emissions typically contribute a quite low percentage (~1%) to overall emissions, but this is a gap in the data.

Employee Commute

A survey was used to gather information from employees of the City of Ypsilanti. 29 employees responded to the survey, which asked about commute patterns, mode of travel and other parameters. Their responses were used to estimate the total gallons of fuel consumed by vehicle type. Using given responses, the data was extrapolated up to the total 95 employees of the City of Ypsilanti. Therefore, calculations assume that the responses of those 29 employees are representative of City of Ypsilanti employees as a whole. Other assumptions were that each employee has 10 days of vacation, 10 sick days and 10 holidays each year.

Projections

Community

Projecting GHG emissions into the future helps estimate what emissions for the community and government will look like in 5, 20 and 50 years from now. The projection known as Business as Usual (BAU) is an estimate of what emissions from the city of Ypsilanti will look like in 2050 if no measures are adopted to curb current GHG-emitting actions. If Ypsilanti's population growth rate stabilizes at 0.0013% annually and nothing is done to change current usage trends, emissions will be 302,776 metric tons CO2e by 2025. In 2050, emissions will be up to 302,873 metric tons of CO2e.

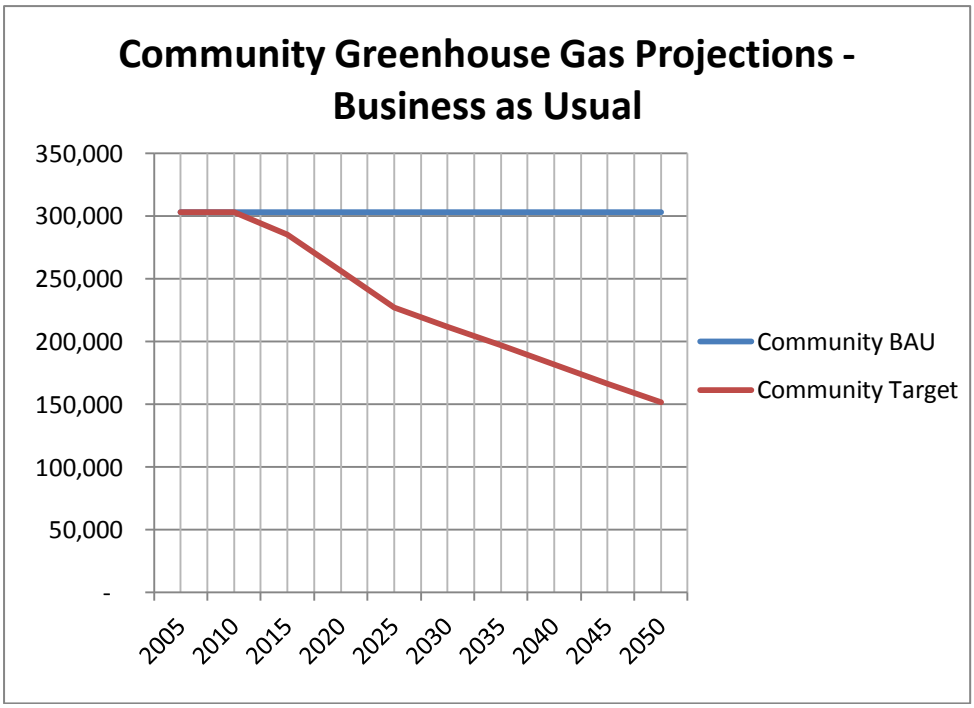

Figure 20 - Community Future Greenhouse Gas Projections: Business as Usual

Government

BAU projections for the City of Ypsilanti indicate that if emissions trends continue, total GHG emissions will fall. The projections show that in 2005, the government emitted 3,387 metric tons of CO_2.

Assumptions were that government employees continue to drop by 1.4% annually until 2025, and losses will slow to 0.0013% annually thereafter. In 2005, municipal operations produced 3,387 metric tons CO_2e. Providing that no actions to curb or increase the rate of change are taken, in 2025 this number will fall to 2,555 metric tons CO2e and by 2050, the government will emit 2,556 metric tons CO2e. This amounts to a decline of about 831 metric tons CO2e over a period of 45 years.

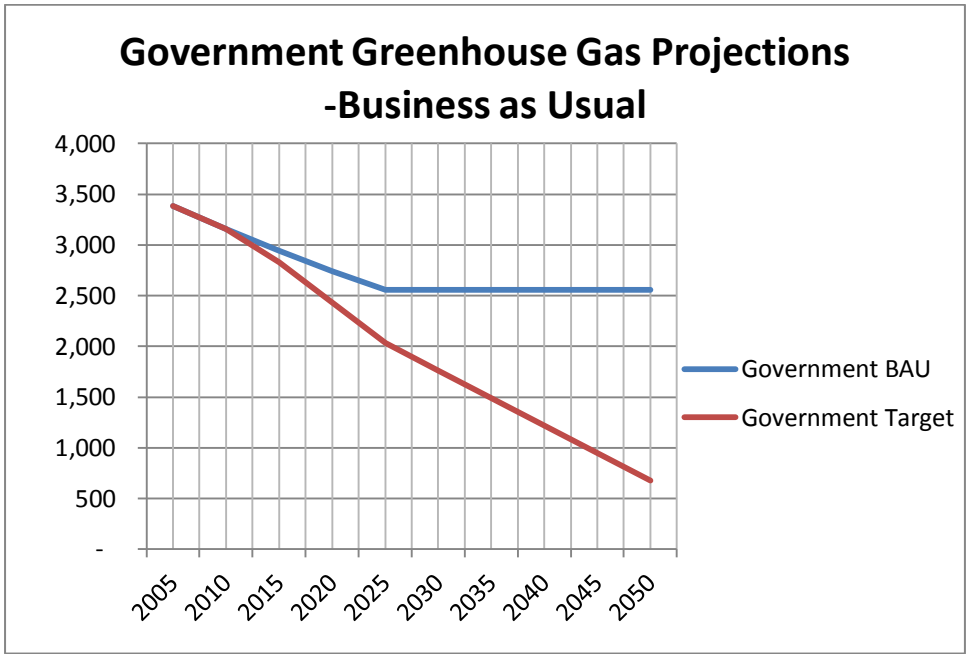

Figure 21 - Government Future Greenhouse Gas Projections: Business as Usual

Methodology

Information about the current population and employment trends in the city was obtained from both SEMCOG and the City of Ypsilanti. Annual population change in the city of Ypsilanti was calculated using SEMCOG's projections along with recommendations from Kurt Metzger, a demographer with Data Driven Detroit. Future projections were made based on the increase in population change relative to the current amount of GHGs emitted within the community.

Based on these estimates, the population of the city of Ypsilanti will stay approximately the same, with a very slight growth rate of 0.0013%. Therefore, community GHG emissions will stabilize at approximately the same level. Other factors, however, such as growth in commercial or industrial sectors, could further affect the community emissions profile.

Information provided by the city government about past and current employee numbers was used to project employee numbers into the year 2050. This provided a percentage change in number of employees that work for the city of Ypsilanti. This percentage and current GHG emissions were used to project future greenhouse gas emissions. Government GHG emissions decline because the City employment declines by -1.4% per year. This leads to overall declining trends in GHG emissions analysis

when looking at BAU. However, we considered that after a time (in 2025), losses would have to slow.

Numerous factors can influence projections of population, size of government and the correlated emissions. Large degrees of uncertainty exist in this field so the data presented here are conservative, but provide a basis upon which to estimate needed emissions reductions.

Appendices

Community Inventory: Detailed Report

Appendix A

Sector Label	Group Name	Scope	Quantity	Units	Source	Fuel	Vehicle Type	WasteTech Name	Waste Product
Residential	Fuel Oil & LPG	1	19110	(US gal)	Fuel and Electricity	Fuel Oil (#1 2 4)			0
Residential	Fuel Oil & LPG	1	77616	(US gal)	Fuel and Electricity	Stationary LPG			0
Residential	DTE	2	71106154	(kWh)	Grid Average	Electricity			
Residential	DTE	1	941128	(therms)	Fuel and Electricity	Natural Gas			
Commercial	DTE	2	35354150	(kWh)	Grid Average	Electricity			
Commercial	DTE	1	179518	(therms)	Fuel and Electricity	Natural Gas			
Commercial	Eastern Michigan University	2	51931600	(kWh)	Grid Average	Electricity			
Commercial	Eastern Michigan University	1	32212	(US gal)	Fuel and Electricity	Fuel Oil (#1 2 4)			
Commercial	Eastern Michigan University	1	550632	(MMBtu)	Fuel and Electricity	Natural Gas			
Industrial	DTE	2	1.19E+08	(kWh)	Grid Average	Electricity			
Industrial	DTE	1	4794	(therms)	Fuel and Electricity	Natural Gas			
Transportation	AATA	1	7362	(US gal)	Transport	Biodiesel (B100)	Heavy Duty Vehicles All MYs		
Transportation	AATA	1	41718	(US gal)	Transport	Diesel	Heavy Duty Vehicles All MYs		
Transportation	SEMCOG Model Data	1	6764313	(vehicle-n	Transport	Diesel	Heavy Duty Vehicles Alt. Metho		
Transportation	SEMCOG Model Data	1	1076485	(vehicle-n	Transport	Diesel	Light Trucks Alt. Method		
Transportation	SEMCOG Model Data	1	201222	(vehicle-n	Transport	Diesel	Passenger Cars Alt. Method		
Transportation	SEMCOG Model Data	1	26832283	(vehicle-n	Transport	Gasoline	Light Trucks Alt. Method		
Transportation	SEMCOG Model Data	1	41510062	(vehicle-n	Transport	Gasoline	Passenger Cars Alt. Method		
Transportation	Trips Beginning and Ending	3	22946835	(vehicle-n	Transport	Diesel	Heavy Duty Vehicles Alt. Metho		
Transportation	Trips Beginning and Ending	3	3651802	(vehicle-n	Transport	Diesel	Light Trucks Alt. Method		
Transportation	Trips Beginning and Ending	3	682614	(vehicle-n	Transport	Diesel	Passenger Cars Alt. Method		
Transportation	Trips Beginning and Ending	3	91024167	(vehicle-n	Transport	Gasoline	Light Trucks Alt. Method		
Transportation	Trips Beginning and Ending	3	1.41E+08	(vehicle-n	Transport	Gasoline	Passenger Cars Alt. Method		
Waste	Landfill _ Woodland Meadows	1	38	(tons)	Waste	Paper Products		Managed	1334.18
Waste	Landfill _ Woodland Meadows	1	13	(tons)	Waste	Food Waste		Managed	456.43
Waste	Landfill _ Woodland Meadows	1	10	(tons)	Waste	Plant Debris		Managed	351.1
Waste	Landfill _ Woodland Meadows	1	4	(tons)	Waste	Wood or Textiles		Managed	140.44
Waste	Landfill _ Woodland Meadows	1	35	(tons)	Waste	All Other Waste		Managed	1228.85
Waste	Recycle	1	100	(tons)	Waste	All Other Waste			805
Waste	Yard Waste	1	100	(tons)	Waste	Plant Debris		Compost	1450

Appendix A

Waste Unit	Energy Output	CO2 Output	N2O Output	CH4 Output	Combined Output	BioCO2 Output	NOx Output	SOx Output	CO Output	VOC Output	PM10 Output	Vehicle Distance	Passenger Distance
	2,637.18	195.05	0.00	0.03	196.24	-	5.28	0.35	1.14	0.42	0.37		
	7,140.67	449.72	0.01	0.08	453.76	-	-	-	-	-	-		
	242,683.11	55,611.95	-	0.81	55,628.88	-	84.37	283.02	8.68	1.03	7.55		
	94,112.80	4,989.86	0.01	0.47	5,002.66	-	7.50	0.29	1.85	0.40	0.22		
	120,662.63	27,650.39	-	0.40	27,658.81	-	41.95	140.72	4.31	0.51	3.75		
	17,951.80	951.80	0.00	0.09	954.25	-	1.37	0.05	0.35	0.08	0.04		
	177,240.95	40,615.58	-	0.59	40,627.95	-	61.62	206.70	6.34	0.75	5.51		
	4,445.26	328.77	0.00	0.05	330.78	-	8.89	0.58	1.92	0.71	0.63		
	550,631.99	29,194.51	0.06	2.75	29,269.39	-	41.96	1.67	10.83	2.31	1.28		
	404,717.35	92,742.84	-	1.34	92,771.08	-	140.71	471.99	14.47	1.72	12.59		
	479.40	25.42	0.00	0.00	25.44	-	0.06	0.03	0.02	0.00	0.00		
	942.34	-	0.00	0.00	0.07	69.57	0.72	0.00	0.21	0.02	0.02	68,180	68,180
	5,760.44	425.94	0.00	0.00	426.24	-	2.82	0.09	1.80	0.23	0.14	302,623	302,623
ɔd	149,804.61	11,076.92	0.03	0.03	11,087.71	-	76.87	3.27	64.69	8.30	2.58	10,886,107	10,886,107
	7,945.14	587.48	0.00	0.00	588.00	-	0.94	0.17	1.10	0.37	0.18	1,732,435	1,732,435
	1,297.84	95.97	0.00	0.00	96.03	-	0.18	0.02	0.27	0.08	0.02	323,835	514,898
	240,960.61	16,926.90	1.16	0.84	17,304.88	-	33.56	2.66	448.70	45.40	0.63	43,182,374	43,182,374
	271,025.29	19,038.87	1.22	1.15	19,441.43	-	56.44	3.11	656.70	65.43	1.41	66,803,969	106,218,311
ɔd	508,187.84	37,576.66	0.11	0.12	37,613.26	-	260.78	11.10	219.46	28.16	8.74	36,929,351	36,929,351
	26,952.59	1,992.94	0.01	0.00	1,994.70	-	3.20	0.58	3.72	1.26	0.60	5,877,006	5,877,006
	4,402.72	325.55	0.00	0.00	325.77	-	0.61	0.07	0.92	0.27	0.05	1,098,561	1,746,712
	817,419.76	57,421.76	3.94	2.86	58,703.99	-	113.83	9.04	1,522.14	154.03	2.13	146,489,197	146,489,197
	919,409.31	64,586.28	4.14	3.91	65,951.88	-	191.45	10.55	2,227.75	221.97	4.79	226,621,626	360,328,386
(tons)	-	-	-	30.81	647.01	-	-	-	-	-	-		
(tons)	-	-	-	5.97	125.29	-	-	-	-	-	-		
(tons)	-	-	-	2.60	54.61	-	-	-	-	-	-		
(tons)	-	-	-	0.92	19.28	-	-	-	-	-	-		
(tons)	-	-	-	-	-	-	-	-	-	-	-		
(tons)	-	-	-	-	-	-	-	-	-	-	-		
(tons)	-	-	-	-	-	-	-	-	-	-	-		

Appendix A

Municipal Inventory Detailed Report

Appendix A

SectorLabel	GroupName	Scope	List1	Indicator1	Indicator2	Quantity	Units	Source	Fuel
Buildings and Facilities	City Hall	2				145,463	(kWh)	Grid Average	Electricity
Buildings and Facilities	City Hall	1				2,342	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Senior Center	2				36,700	(kWh)	Grid Average	Electricity
Buildings and Facilities	Senior Center	1				3,083	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Public Works Yard	2				36,820	(kWh)	Grid Average	Electricity
Buildings and Facilities	Public Works Yard	1				13,525	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Ypsilanti Historical Museum	2				22,471	(kWh)	Grid Average	Electricity
Buildings and Facilities	Ypsilanti Historical Museum	1				5,511	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Carriage House Apartments	2				4,016	(kWh)	Grid Average	Electricity
Buildings and Facilities	Ypsilanti Freighthouse	2				2,422	(kWh)	Grid Average	Electricity
Buildings and Facilities	Police Station	2				167,519	(kWh)	Grid Average	Electricity
Buildings and Facilities	Police Station	1				11,987	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Fire Station	2				142,510	(kWh)	Grid Average	Electricity
Buildings and Facilities	Fire Station	1				17,691	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Parkridge Community Center	2				50,161	(kWh)	Grid Average	Electricity
Buildings and Facilities	Parkridge Community Center	1				8,765	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Rutherford Pool	2				57,440	(kWh)	Grid Average	Electricity
Buildings and Facilities	Rutherford Pool	1				8,253	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Public Works 2?	1				18	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Historical Museum	1				3,079	(therms)	Fuel and Electri	Natural Gas
Buildings and Facilities	Ypsilanti Freighthouse Gas	1				1,038	(therms)	Fuel and Electri	Natural Gas
Streetlights & Traffic Signals	Traffic Signals/Controller	2				710,187	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Streetlights	2				1,649,919	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Frog Island Park - Parking lot lighting	2				4,293	(kWh)	Grid Average	Electricity

Appendix A

VehicleType	Energy Output	CO2 Output	N2O Output	CH4 Output	Combined Output	NOx Output	SOx Output	CO Output	VOC Output	PM10 Output	Vehicle Distance	Passenger Distance
	496.46	110.23	0.00	0.00	110.82	0.24	0.64	0.02	0.00	0.01543		
s	234.20	12.42	0.00	0.00	12.45	0.02	0.00	0.00	0.00	0.00055		
	125.26	27.81	0.00	0.00	27.96	0.06	0.16	0.00	0.00	0.00389		
s	308.33	16.35	0.00	0.00	16.39	0.02	0.00	0.01	0.00	0.00072		
	125.67	27.90	0.00	0.00	28.05	0.06	0.16	0.00	0.00	0.0039		
s	1,352.50	71.71	0.00	0.01	71.89	0.10	0.00	0.03	0.01	0.00315		
	76.69	17.03	0.00	0.00	17.12	0.04	0.10	0.00	0.00	0.00238		
s	551.12	29.22	0.00	0.00	29.30	0.04	0.00	0.01	0.00	0.00128		
	13.71	3.04	0.00	0.00	3.06	0.01	0.02	0.00	0.00	0.00043		
	8.27	1.84	0.00	0.00	1.85	0.00	0.01	0.00	0.00	0.00026		
	571.74	126.94	0.00	0.00	127.63	0.28	0.73	0.02	0.00	0.01777		
s	1,198.69	63.55	0.00	0.01	63.72	0.09	0.00	0.02	0.01	0.00279		
	486.38	107.99	0.00	0.00	108.57	0.24	0.62	0.02	0.00	0.01511		
s	1,769.06	93.80	0.00	0.01	94.04	0.13	0.01	0.03	0.01	0.00412		
	171.20	38.01	0.00	0.00	38.22	0.08	0.22	0.01	0.00	0.00532		
s	876.54	46.47	0.00	0.00	46.59	0.07	0.00	0.02	0.00	0.00204		
	196.04	43.53	0.00	0.00	43.76	0.10	0.25	0.01	0.00	0.00609		
s	825.34	43.76	0.00	0.00	43.87	0.06	0.00	0.02	0.00	0.00192		
s	1.84	0.10	0.00	0.00	0.10	0.00	0.00	0.00	0.00	4.3E-06		
s	307.92	16.33	0.00	0.00	16.37	0.02	0.00	0.01	0.00	0.00072		
s	103.83	5.51	0.00	0.00	5.52	0.01	0.00	0.00	0.00	0.00024		
	2,423.85	538.16	0.01	0.01	541.07	1.20	3.11	0.09	0.01	0.07532		
	5,631.12	1,250.26	0.02	0.01	1,257.03	2.78	7.23	0.20	0.02	0.17497		
	14.65	3.25	0.00	0.00	3.27	0.01	0.02	0.00	0.00	0.00046		

Appendix A

SectorLabel	GroupName	Scope	List1	Indicator1	Indicator2	Quantity	Units	Source	Fuel
Streetlights & Traffic Signals	?? Downtown christmas light outlets? Meter for N. Adams and/or N. Huron parking	2				23,978	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Prospect Park	2				638	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Candy Cane Park	2				7,069	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Riverside Park Bridge Lighting	2				3,964	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Water Street 1	2				4,753	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Water Street 2	2				1,996	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Riverside Park Outlets	2				1,336	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Depot Town Parking Lot	2				3,350	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Depot Town Signal Tower/ Christmas Tree 1	2				4,426	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Depot Town Signal Tower/ Christmas Tree 2	2				1,592	(kWh)	Grid Average	Electricity
Streetlights & Traffic Signals	Water Street 3	2				1,247	(kWh)	Grid Average	Electricity
Wastewater Facilities	Ypsilanti Community Utilities Authority	3		1E+08	1E+08	0	(tonnes N2	Absolute Emissi	Nitrous Oxi
Vehicle Fleet	Heavy Duty-PW	1	Public Works	32550	17	11,245	(US gal)	Transport	Diesel
Vehicle Fleet	Heavy Duty-ES	1	Environment	12490	6	4,315	(US gal)	Transport	Diesel
Vehicle Fleet	Light Truck - BD	1	Building	27348	4	3,194	(US gal)	Transport	Gasoline
Vehicle Fleet	Light Truck- DPW	1	Public Works	59214	14	7,111	(US gal)	Transport	Gasoline
Vehicle Fleet	Light Truck - ES	1	Environment	49627	10	6,242	(US gal)	Transport	Gasoline
Vehicle Fleet	Heavy Duty- Fire	1	Fire	6398	5	2,859	(US gal)	Transport	Diesel
Vehicle Fleet	Light Truck - Fire	1	Fire	5231	2	1,004	(US gal)	Transport	Gasoline
Vehicle Fleet	Passenger- Fire	1	Fire	12929	2	2,617	(US gal)	Transport	Gasoline
Vehicle Fleet	Passenger-Gen	1	General	13714	2	2,776	(US gal)	Transport	Gasoline
Vehicle Fleet	Heavy Duty - Police	1	Police	541	1	242	(US gal)	Transport	Diesel
Vehicle Fleet	Passenger-Police	1	Police	109995	16	24,164	(US gal)	Transport	Gasoline
Vehicle Fleet	Equipment-ES	1	Environmental			819	(US gal)	Transport	Diesel
Vehicle Fleet	Equipment-ES	1	Environmental			1,767	(US gal)	Transport	Gasoline
Employee Commute	All Employees	3		389323	88	7,615	(US gal)	Transport	Gasoline
Employee Commute	All Employees	3		389323	88	10,473	(US gal)	Transport	Gasoline

VehicleType	Energy Output	CO2 Output	N2O Output	CH4 Output	Combined Output	NOx Output	SOx Output	CO Output	VOC Output	PM10 Output	Vehicle Distance	Passenger Distance
	81.84	18.17	0.00	0.00	18.27	0.04	0.11	0.00	0.00	0.00254		
	2.18	0.48	0.00	0.00	0.49	0.00	0.00	0.00	0.00	6.8E-05		
	24.13	5.36	0.00	0.00	5.39	0.01	0.03	0.00	0.00	0.00075		
	13.53	3.00	0.00	0.00	3.02	0.01	0.02	0.00	0.00	0.00042		
	16.22	3.60	0.00	0.00	3.62	0.01	0.02	0.00	0.00	0.0005		
	6.81	1.51	0.00	0.00	1.52	0.00	0.01	0.00	0.00	0.00021		
	4.56	1.01	0.00	0.00	1.02	0.00	0.01	0.00	0.00	0.00014		
	11.43	2.54	0.00	0.00	2.55	0.01	0.01	0.00	0.00	0.00036		
	15.11	3.35	0.00	0.00	3.37	0.01	0.02	0.00	0.00	0.00047		
	5.43	1.21	0.00	0.00	1.21	0.00	0.01	0.00	0.00	0.00017		
	4.26	0.94	0.00	0.00	0.95	0.00	0.01	0.00	0.00	0.00013		
ide	-	-	0.16	-	48.51	-	-	-	-	0		
Heavy Duty Vehicles All MYs	1,552.64	114.81	0.00	0.00	114.89	0.76	0.02	0.48	0.06	0.03774	81,568	81,568
Heavy Duty Vehicles All MYs	595.75	44.05	0.00	0.00	44.08	0.29	0.01	0.19	0.02	0.01448	31,297	31,297
Light Trucks Alt. Method	399.21	28.04	0.00	0.00	28.67	0.06	0.00	0.74	0.08	0.00104	71,542	71,542
Light Trucks Alt. Method	888.78	62.43	0.00	0.00	63.83	0.12	0.01	1.66	0.17	0.00232	159,277	159,277
Light Trucks Alt. Method	780.14	54.80	0.00	0.00	56.03	0.11	0.01	1.45	0.15	0.00203	139,808	139,808
Heavy Duty Vehicles All MYs	394.77	29.19	0.00	0.00	29.21	0.19	0.01	0.12	0.02	0.0096	20,739	20,739
Light Trucks Alt. Method	125.46	8.81	0.00	0.00	9.01	0.02	0.00	0.23	0.02	0.00033	22,484	22,484
Passenger Cars Alt. Method	327.09	22.98	0.00	0.00	23.46	0.07	0.00	0.79	0.08	0.00171	80,623	128,191
Passenger Cars Alt. Method	346.96	24.37	0.00	0.00	24.89	0.07	0.00	0.84	0.08	0.00181	85,521	135,979
Heavy Duty Vehicles All MYs	33.42	2.47	0.00	0.00	2.47	0.02	0.00	0.01	0.00	0.00081	1,755	1,755
Passenger Cars Alt. Method	3,020.17	212.16	0.01	0.01	216.65	0.63	0.03	7.32	0.73	0.01574	744,431	1,183,645
Heavy Duty Vehicles All MYs	113.09	8.36	0.00	0.00	8.37	0.06	0.00	0.04	0.00	0.00275	5,941	5,941
Heavy Duty Vehicles Alt. Met	220.85	15.51	0.00	0.00	15.81	0.03	0.00	0.33	0.03	0.00078	13,817	13,817
Light Trucks Alt. Method	951.77	66.86	0.00	0.00	68.35	0.13	0.01	1.77	0.18	0.00248	170,566	170,566
Passenger Cars Alt. Method	1,308.98	91.95	0.01	0.01	93.90	0.27	0.02	3.17	0.32	0.00682	322,646	513,008