Carbon Footprint Report

Village of Howard, Wisconsin

An inventory of greenhouse gas emissions and air pollutants emissions produced by the Howard community as well as government operations.

Written by Jennifer Pollitt, 2009-2010 L.E. O'Connor Fellow
Baseline Year: 2006
Additional Government Operations Data: 2007, 2008
Forecast Year: 2020

Acknowledgements

In June 2009, the Village Board passed Resolution 2009-29 adopting the Wisconsin Office of Energy Independence 25x25 goals. Governor Doyle initiated the 25x25 Plan. Adoption of the resolution signified the Village's commitment to generating 25% of its electricity and 25% of its transportation fuels from renewable sources by 2025.

In August 2009, the Village Board passed Resolution 2009-28, thereby joining ICLEI– Local Governments for Sustainability. Membership to ICLEI provided free access to the Clean Air Climate Protection (CACP) software allowing Village staff to calculate the carbon footprint data presented in this report.

Also in 2009, the Go Green Save Green Taskforce established its first Energy Action Plan. The Energy Action Plan seeks to fulfill the taskforce's goal in reducing emissions by 25% by 2020 using 2006 as a baseline. As more greenhouse gas inventories are calculated, the Energy Action Plan may be amended or progress reports may be published.

The following Village of Howard staff should be recognized for their input and cooperation in determining emission levels for the various sectors:

Bob Bartelt: Assistant Village Administrator- Public Works

Mitchell DeBauche: Village Accountant

Barb Hoppe: Clerk/Typist- Public Works

Dave Wiese: Executive Director of Community Services

Many thanks to the following organizations for their support and cooperative assistance throughout the calculation and analysis of this report:

Agri-Partners Co-Op (Progressive Farmers)

ICLEI-Local Governments for Sustainability

Wisconsin Public Service

Wisconsin Department of Transportation

Veolia Environmental Services

City of Clayton, Missouri

City of Creve Coeur, Missouri

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Abbreviations

CACP: Clean Air Climate Protection- greenhouse gas inventory calculation software

CO_2e: Carbon Dioxide Equivalents (cumulative GHG unit equivalent)

GHG: Greenhouse Gas

ICLEI: International Council for Local Environmental Initiatives

LGOP: Local Government Operations Protocol

CO_2: Carbon Dioxide CH_4: Methane N_2O: Nitrous Oxide SO_x: Sulfur Oxides

CO: Carbon Monoxide NO_x: Mono-Nitrogen Oxides VOC: Volatile Organic Compounds

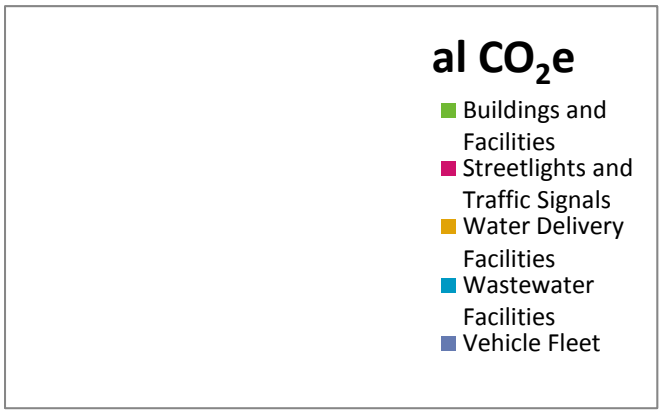
PM10/2.5: two forms of particulates

Executive Summary

GOVERNMENT OPERATIONS

Six major sectors of governmental operations were examined in calculating the carbon footprint: Buildings & Facilities, Streetlights & Traffic Signals, Water Delivery Facilities, Wastewater Facilities, Vehicle Fleet, and Employee Commute. The contribution of each sector to government emissions is shown below.

Three main metrics present the footprint of the Village operations: CO_2e, Energy, and Costs. CO_2e (carbon dioxide equivalents) are presented in tons and basically provide a framework to convert all greenhouse gases into a single, comparable unit as each gas has a different level of impact on the environment. Energy units are presented in MMBtu (Million British thermal units). Costs are determined by what the Village pays for greenhouse gas emitting sources. Fuel costs paid by employees for their commute, for example, are not included in this analysis.



A 2006 inventory was calculated for use as the baseline year for all inventories going forward. 2007 and 2008 inventories were also conducted as data was readily available. The broadly summarized results from the three year inventory are presented below:

Performance Metric	2006	2007	2008	Next Steps:
CO_2e (tons)	3,524	1,040	1,070	-2009 analysis -set future targets -amend action plan
Energy (MMBTU)	25,549	22,573	18,714	
Costs	$669,646	$647,023	$665,049	

Greenhouse gas emissions through ICLEI's CACP software have been completed across the country. While each community has internal and external factors affecting their emissions, the most comparable municipalities' emissions are presented below:

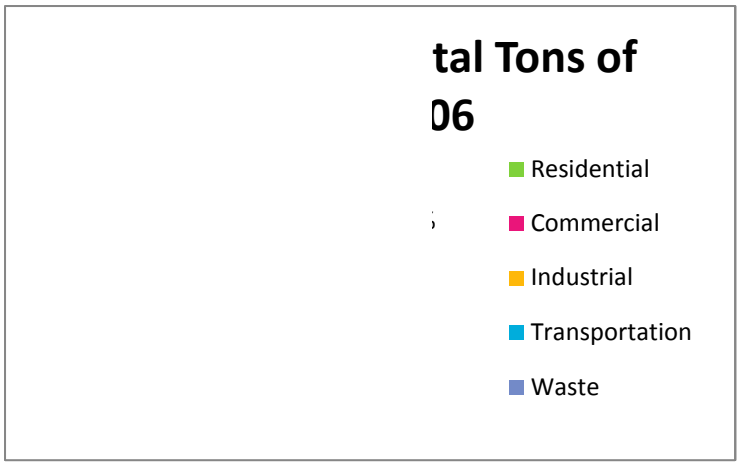
City, State	Population	Baseline Year	CO_2e (tons)	Energy (MMBtu)	Costs	Notes
Creve Coeur, MO	16,759	2005	3,973	34,079	$476,049	-less snowfall
Clayton, MO	16,076	2006	5,465	34,298	$568,369	-no water delivery/wastewater facilities/employee commute

It is important to note that comparisons with other communities do not show the true effect of Howard's emissions. The Village of Howard should focus on decreasing its own emissions at a level it deems appropriate. The Village Go Green Save Green Taskforce will manage these emission levels and inventories to ensure progress is made towards Governor Doyle's 25x25 plan as well as Howard's own Energy Action Plan.

COMMUNITY FOOTPRINT

The greenhouse gas inventory of community emissions is comprised of five categorical sources: Residential, Commercial, Industrial, Transportation and Waste. Emissions from government operations are not included in the community greenhouse gas inventory.

Because costs vary significantly among the residential, commercial, industrial, transportation and waste categories, it is not a reported factor in the greenhouse gas inventory.



Carbon dioxide equivalents (measured in tons) and energy (MMBtu) are the primary reporting measurements for community emissions. CO_2e (carbon dioxide equivalents) provide a framework to convert all greenhouse gases into a single, comparable unit as each gas has a different level of impact on the environment.

A 2006 inventory was calculated for use as the baseline year for all inventories going forward. The broadly summarized results from the three year inventory of community emissions are presented below:

Performance Metric	2006	Next Steps:
CO_2e (tons)	1,507,069	-2009 analysis -set future targets -amend action plan
Energy (MMBTU)	18,007,112	

TOTAL EMISSIONS

Of the 1,510,593 tons of CO_2e emitted from Village of Howard sources, vehicle-related emissions accounted for 53.1%. Government operations made up 0.2% of the Village of Howard's total emissions. The industrial sector was the largest contributor to Village emissions (21.2%) compared with the residential and commercial sectors. The breakdown is as follows:

Emissions Source	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	CO_2e (tons)	Percentage of CO_2e
Residential	174,051	3,716	15,808	174,793	11.6%
Commercial	206,936	2,986	26,752	207,679	13.7%
Industrial	317,843	5,231	10,079	318,760	21.1%
Government	3,504	123	169	3,524	0.2%
Transportation	787,380	86,312	73,415	801,529	53.1%
Waste	0	0	410,263	4,308	0.3%
TOTAL	**1,489,714**	**98,368**	**536,486**	**1,510,593**	**100%**

Background and Methodology

Purpose

Upon signing onto the 25x25 plan and joining ICLEI, the Village of Howard's Go Green Save Green Taskforce decided to calculate the Village's carbon footprint in order to better track and achieve target goals. The Village's Energy Action Plan, available on the Village website[1], would be better enhanced by a Carbon Footprint monitoring mechanism. The main theme in the Village Energy Action Plan is decreasing costs and/or usage by 25% by 2020 using 2006 as a baseline. As inventory years are submitted into the CACP software, the Village will continue to track environmental impact and cost savings to help meet these goals.

As the Local Government Operations Protocol (LGOP) defines, there are five key benefits to performing a Greenhouse Gas inventory at the municipal level. Those are[2]:

1) Risk Management- helps municipalities manage climate risk
2) Addressing Inefficiencies- helps municipalities be redesigned, improved, innovative and more efficient with resources
3) Readiness for a Carbon Constrained Future- helps municipalities "prepare for and respond to the potential impact of new regulations"
4) Recognition as an Environmental Leader- helps promote and publicize "environmental stewardship"
5) Stakeholder Education- helps municipal decision-makers have an understanding of current and future impacts

Greenhouse gas inventory reports provide an educational framework for leaders, citizens, and businesses to learn about their community's impact on the environment. This Carbon Footprint Report adheres to LGOP's GHG Accounting and Reporting Principles to the best of Village staff's availability. The principles are: Relevance, Completeness, Consistency, Transparency, and Accuracy[3].

Tracking Software

Membership to ICLEI- Local Governments for Sustainability gave the Village of Howard free access to the Clean Air Climate Protection (CACP) software. A new version of the CACP software (CACP 2009) was released in April 2009 to harmonize the calculation models offered by various environmental agencies. CACP 2009 incorporates the Local Government Operations Protocol (LGOP) - a reputable standard for local government operations inventories. In adherence with LGOP, three scopes were used to classify data in the analysis:

-Scope 1: Direct emissions produced by Village operations
-Scope 2: Indirect emissions from electricity consumption
-Scope 3: Other indirect emissions such as contracted services and employee commute emissions

[1] www.villageofhoward.com
[2] Local Government Operations Protocol Version 1.0. September 2008. Page 4.
[3] Local Government Operations Protocol Version 1.0. September 2008. Page 9-10.

As of April 2010, an ICLEI-approved protocol has not yet been established for the community inventory. Therefore no scopes were measured in the community inventory.

CACP software allows municipalities to track the carbon footprint of government operations as well as the community as a whole. This report will allow the Village of Howard to achieve Milestone 1: ICLEI's first level of achievement: "conduct a baseline greenhouse gas emissions inventory and forecast for both municipal operations and the community."

Settings

The emissions caused by government operations were measured for the years 2006 through 2008. 2006 was chosen as the base year of analysis due to the availability of accurate records for all stationary sources. Actions by the Go Green Save Green Task Force in 2008 produced energy-efficient results that would blur the true "before" picture. Because employee commute data was not collected in 2006, 2009 data was used as an assumed estimate for these sources. Other mobile sources such as municipal fleet were actual 2006 figures. From 2009 onward, current records will be maintained for future inventory calculations.

The community inventory also analyzed 2006 data as the base year. As of April 2010, no other year has been measured to report progress in community emissions. Transportation emissions were estimated using the CACP Transport Assistant function using 2006 Annual Average Daily Traffic (AADT) data. Energy usage for residential, commercial and industrial sectors was based off an average provided by the community's utility provider for the following categories:

-Residential
-Small Commercial
-Large Commercial/Small Industrial
-Super Large Commercial
-Large Industrial
-Super Large Industrial
-Howard-Suamico School District

The Village, through its performance measurement initiative called VillageTrack, maintains accurate waste and recycling records regarding its garbage collection and was therefore able to utilize 2006 data.

Greenhouse Gases and Air Pollutants

There are six greenhouse gases as regulated under the Kyoto Protocol: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), Mono-Nitrogen Oxides (NO_x), Sulfur Oxides (SO_x), Carbon Monoxide (CO), Volatile Organic Compounds (VOC), and two forms of particulates (PM10 and PM2.5). For example, when any NO_x and VOCs react in sunlight, they produce smog- a common sign of air pollution. The CACP software provides emissions for each of these gases as well as their cumulative total.

The cumulative total is known as carbon dioxide equivalents- a unit that can "allow GHGs to be compared on a common basis (i.e. on the ability of each GHG to trap heat in the atmosphere)"[4]. Carbon Dioxide Equivalents are abbreviated as CO_2e in this report. CACP reports also provide MMBtu (million British thermal units or therms) data- or the number of million units of energy emitted by the input sources.

Sectors

GOVERNMENT OPERATIONS

Emissions and costs were reported by sector in the CACP software. Many categories included in the software were not applicable to the Village of Howard including port facilities, airport facilities, transit fleet, electric power, and solid waste facilities. The Village compost center was not included in this analysis as accurate GHG formulas are not yet available, according to LGOP. The sectors utilized in this baseline analysis are:

1. Buildings and Facilities
2. Streetlights and Traffic Signals
3. Water Delivery Services
4. Wastewater Facilities
5. Vehicle Fleet
6. Employee Commute

Most reports and analyses created using inventory data will be reported by sector. Therefore it is necessary to declare the entities included in each major sector[5]:

Buildings and Facilities	Water Delivery Facilities	Wastewater Facilities
Fire Station 2	Brookfield Booster	Lakeview/Woodale Lift Station
Golf Course Club House	Cornell Well #3	Lineville Lift Station
Golf Course Maintenance	Evergreen Booster Pump	Memorial Lift Station
Maywood Garage	Evergreen Well	Omnova
Meadowbrook Park Pavilion	Golf Course Pump House	Sanimax
Public Works Building	Maywood Building	
Sports Complex Concessions	Miltown Rd. Unit B	
Village Hall	Shawano Booster	
	Shawano Booster Pump	
	Sports Complex Well	
	Woodale PRV Station	

It is important to note that the Howard-Suamico School District, Howard Public Library, and other governmental agencies such as the Department of Natural Resources, Brown County, and the State of Wisconsin were not included in the Government Operations analysis as they are not directly operated by the Village of Howard organization.

[4] Local Government Operations Protocol Version 1.0. September 2008. Page 11.
[5] Each facility name is taken from Wisconsin Public Service Account name.

Emissions were reported by sector in the CACP software. The sectors utilized in the baseline analysis are:

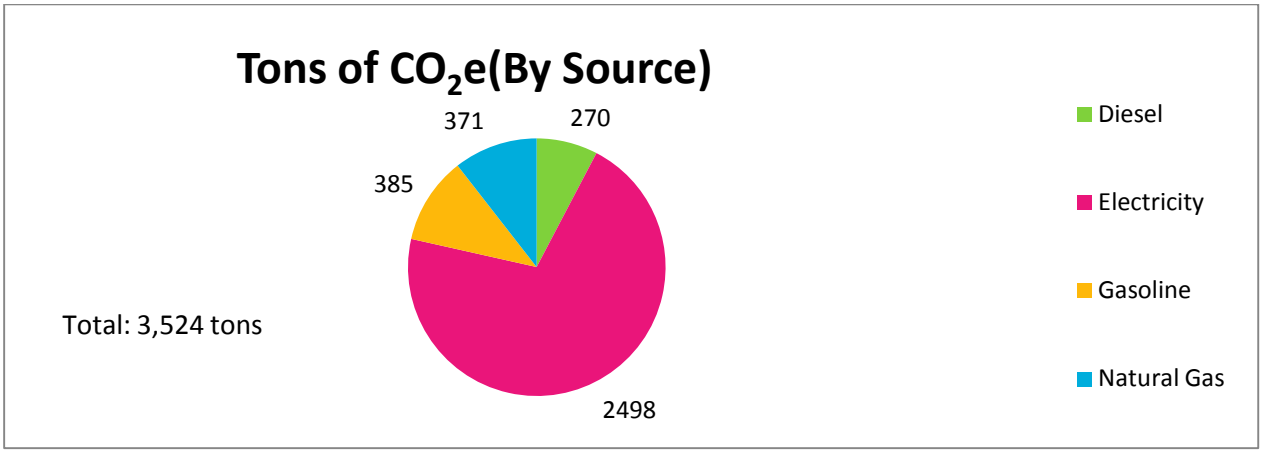
1. Residential
2. Commercial
3. Industrial
4. Transportation
5. Waste

The Howard-Suamico School District was measured in the inventory and was measured separately under the commercial sector. Government agencies with facilities in Howard were included in the commercial sector analysis for any emissions caused by those individual facilities alone. Emissions by the State of Wisconsin were not included in the analysis as no offices or facilities are located within the Village of Howard.

2006 Baseline Government Operations Emissions Inventory

Greenhouse Gas and Air Pollutants Summary

In 2006, 25,549 million units of energy (MMBtu) were consumed by the Village of Howard. The graph below shows that 3,524 tons of carbon dioxide equivalents were emitted from Village of Howard government operations. These emissions cost the Village of Howard $669,646.



Electricity consumption contributed the most to the Government footprint at 71% of carbon dioxide equivalent emissions. In 2006 the Village spent $470, 649 on purchased electricity. Gasoline and natural gas produced 10.9% and 10.5% of carbon dioxide equivalent emissions respectively. The Village of Howard paid $536,347 in utility (electricity and natural gas) costs in 2006. The average household spends $1,900 per year on utilities. Therefore, the Village pays enough in utility costs to subsidize over 282 homes. Transportation fuel costs to the Village totaled at $133,299.

Sector Analyses

Buildings and Facilities

Of all Village buildings, the two primary business centers produce the most emissions: Village Hall and Public Works. All Village buildings emissions are categorized as Scope 2: indirect emissions from purchased electricity. In 2006, Village buildings consumed over 703,000 kWh of electricity. Village building GHG emissions are as follows:

Buildings and Facilities	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	CO_2e (tons)
Fire Station 2	**41**	**1**	**5**	**43**
Golf Club House	**121**	**3**	**9**	**121**
Golf Course Maintenance	**31**	**1**	**3**	**31**
Maywood Garage	**25**	**0**	**4**	**25**
Meadowbrook Park Pavilion	**3**	**0**	**0**	**3**
Public Works	**275**	**5**	**30**	**275**
Sports Complex Concessions	**33**	**1**	**1**	**33**
Village Hall	**364**	**8**	**28**	**366**

Because electricity consumption is Scope 2 and natural gas consumption is Scope 1, total energy usage was separated for all buildings and facilities. Emission and costs should also be analyzed by scope:

Buildings and Facilities		CO_2	N_2O	CH_4	CO_2e	Costs
Scope 1	Natural Gas	353	1	67	354	$62,196
Scope 2	Electricity	541	18	13	544	$56,994

Streetlights and Traffic Signals

This sector accounted for $262,656 of Village electricity costs. 92.5% of the sector costs were due to Village streetlights. Because the streetlights are owned and maintained by Wisconsin Public Service, the Village of Howard only pays for usage.

Water Delivery Facilities

Over 1,800 tons of carbon dioxide equivalents were produced by water delivery services in 2006. Utility costs totaled over $151,000. In 2006, water delivery services contributed the most to the Village's carbon footprint. Over 1,000 carbon dioxide equivalents were emitted from Cornell Well #3. The cost for this well was double the utility costs for the Village Hall. The Evergreen Well also has substantial GHG emissions, totaling three times more than the emissions produced by the Village Green golf course clubhouse. In 2006, the Village of Howard was still responsible for supplying its own water to residents. This resulted in very high energy and consumption costs.

Wastewater Facilities

The Lakeview/Woodale Lift Station is the most expensive and largest carbon dioxide equivalent producer of all Village lift stations. Cumulatively speaking, the Village wastewater facilities emit 17 tons of carbon dioxide equivalents while consuming 77 million units of energy.

Vehicle Fleet

All Village vehicles (both diesel and gasoline) produced 484 tons of carbon dioxide equivalents in 2006. Nearly 22,000 gallons of gasoline and just over 24,000 gallons of diesel were consumed by Howard fleet vehicles. Village vehicles can be broadly categorized as:

1. Police squad cars
2. Fire trucks
3. Engineering, Parks, and Village Hall vehicles
4. Public Works light trucks
5. Public Works heavy-duty vehicles

In 2006, the Village owned and maintained 78 vehicles in its fleet.

Employee Commute

Employee Commute data was unavailable for the year 2006. Therefore, 2009 employee data was used to get a general estimate of the total commute by Howard employees. Data will be collected annually in future inventory years. Employees were grouped into the following general departments:

1. Crossing guards
2. Engineering
3. Forestry
4. Golf Course
5. Parks
6. Public Works
7. Village Hall
8. Water/Sewer

Of these departments, Parks employees had the longest commutes with 49 tons of carbon dioxide equivalents emitted in one year. They are the largest department with 47 employees. Water/Sewer employees had the least emissions but have only four employees. For all village employees, the average distance from work to home was only 6.43 miles. There are very few (only 9 of 113) employees living more than 15 miles from their respective Village facility.

Time Series Analysis of Government Operations Emissions Inventory- 2006 through 2008

2007 and 2008 Summary

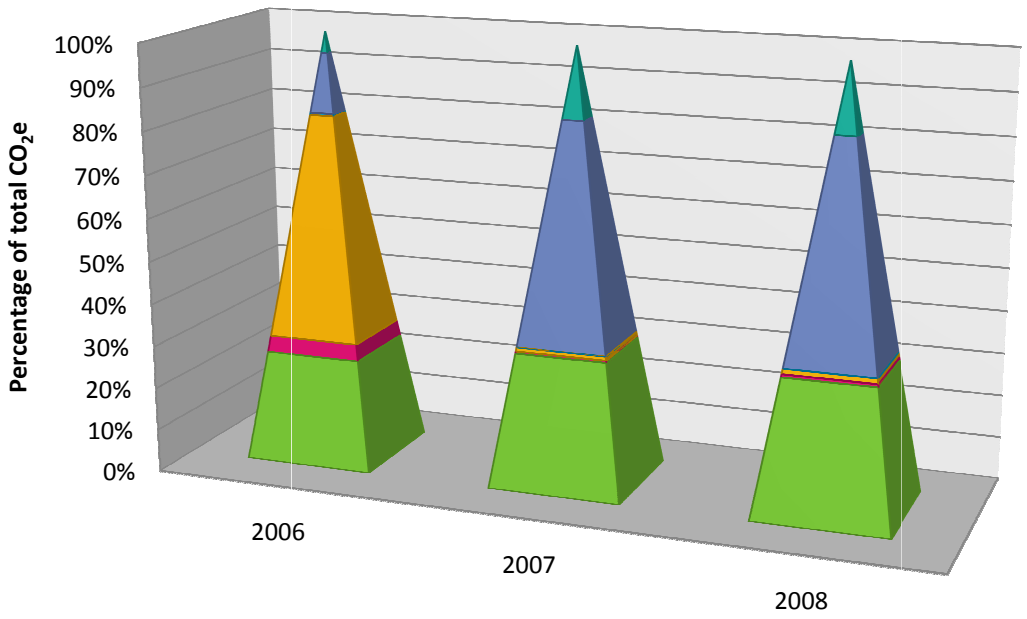
In 2007, the Village emitted 1,040 tons of carbon dioxide equivalents. 22,573 million units of energy were consumed. In 2007, Village utility costs equaled $511,216. $647,023 was spent on greenhouse gas sources.

The Village of Howard emitted 1,070 tons of carbon dioxide equivalents in 2008. To do so, government operations caused the consumption of 18,714 million units of energy. Utility costs to the Village totaled $449,121 in 2008. All GHG sources cost the Village $665,049.

In 2008, the Village of Howard's government operations produced 69% less carbon dioxide equivalents than in 2006. Despite increased vehicle fleet emissions, the decrease of Buildings & Facilities, Streetlights & Traffic Signals, Water Delivery Services, and Wastewater Facilities produced the 2,454 ton reduction in carbon dioxide equivalents. The Village also saw a reduction in utility costs in 2008, spending $87,226 less than in 2006.

Sector Analysis

The distribution of carbon dioxide equivalents emitted by sector varied between 2006 and 2008. The dispersion can be seen in the chart below:



	2006	2007	2008
Employee Commute	4.90%	16.40%	15.80%
Vehicle Fleet	13.70%	51.00%	50.30%
Wastewater Facilities	0.50%	0%	0%
Water Delivery Facilities	51.60%	1%	1.20%
Streetlights and Traffic Signals	3.80%	0.50%	1%
Buildings and Facilities	25.50%	31.10%	32.00%

Vehicle Fleet

The Vehicle Fleet sector caused significantly more carbon equivalent emissions in 2007 and 2008, resulting in more tons of CO_2e in 2008. This is most likely due to the harsh winter that occurred in 2007 and 2008. In 2006, for example, the statewide average snowfall was 36.8 inches[6]. In 2007, it nearly doubled at 64.4 inches. Such a dramatic increase in snowfall creates more usage in snowplows, salt trucks, and other machinery to ensure public safety throughout the Village right-of-ways. The increased vehicle-miles and addition of five vehicles over the 3 year period resulted in the following fuel usage:

	2006	2007	2008
Gasoline- # of gallons used	21,436	22,550	22,143
Diesel- # of gallons used	24, 099	27,583	29,567
Vehicle Fleet- CO_2e emitted	484 tons	530 tons	538 tons
# of Vehicles in Village Fleet	78	81	83
WI Average Snowfall	36.8 inches	64.4 inches	Data not yet available.

Water Delivery Facilities

Cornell Well #3 and the Evergreen Well were the highest kWh users in 2006. These wells were used to supply water to the Village but were frequently over the limit for radium content. After analyzing costs of treating water for radium, the Village decided to purchase their water from Manitowoc Public Utilities. The Village-operated wells were deemed as "back up wells" and therefore use a minimal amount of electricity and are used in emergency situations only. This change in water source had a very significant impact on Village costs and emissions regarding water delivery facilities.

Streetlights and Traffic Signals

The only significant increase in kWh usage by streetlights and signals was Meadowbrook Park. The lights at Meadowbrook Park consumed over 800 kWh in 2006. By 2008 kWh consumption had increased to over 15,000. The increase in consumption is a result of the renovation of the Meadowbrook Park Shelter. This pavilion is rented out very frequently for private parties and events. In 2008, an LED street sign was installed at the Woodman's site. Both Woodman Drive and Dousman Street signs are LED lit. This is the only LED street sign currently in the Village of Howard.

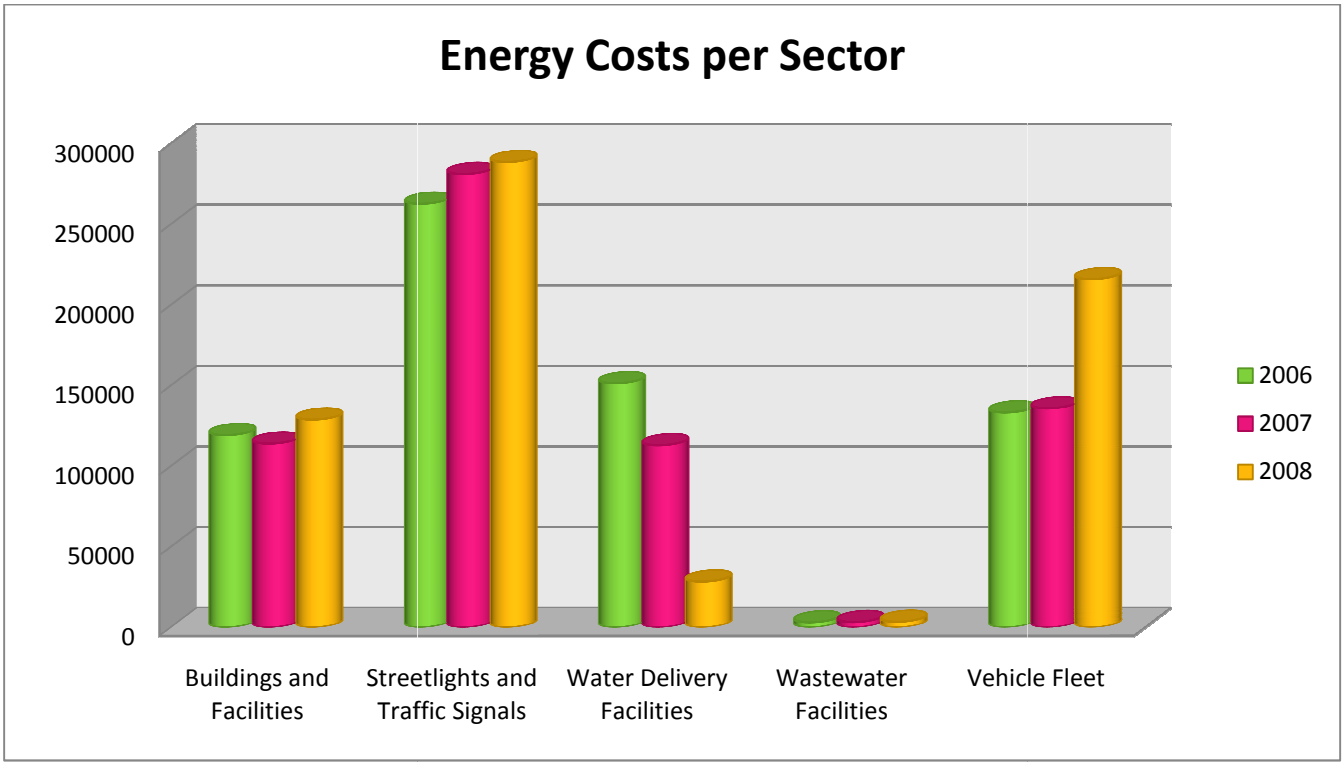
[6] Data from WI State Climatology Office: Statewide Average Snowfall: www.aos.wisc.edu/~sco/clim-history/division/4700-S.html

Refrigerants

"Refrigerants" is the newest sector in the CACP software. Refrigerant leakage is usually minimal but can contain harmful hydro fluorocarbon (HFC) compounds. The Village of Howard uses refrigerants in air conditioners, chillers, and refrigerators. In the Village's HVAC system, the refrigerant R-22 is used. The Village utilized 50 pounds of R-22 in 2007 and 15 pounds in 2008. However, as LGOP states, R-22 (or Freon) is "classified as [an] ozone depleting substance (ODS) and [is] being phased out under the Montreal Protocol…they are not classified as greenhouse gas emissions under the Kyoto Protocol because they are already being phased out… Freon should not be included in your emissions report[7]." For this reason, the use of R-22 was not included in the analysis conducted via the CACP software.

Sector Conclusion

Costs for Buildings & Facilities and Streetlights & Traffic Signals increased from 2006 to 2008. Water Delivery Facilities costs decreased due to the contract with Manitowoc Public Utilities. Wastewater facility costs remained consistent at just over $3,000 throughout the three year period.



Greenhouse Gas Summary

The change from supplying water internally to partnering with Manitowoc has significantly impacted the Village's greenhouse gas emissions. From 2006 to 2008, Streetlights & Traffic Signals, Water Delivery Facilities, and Wastewater Facilities decreased by over 98%. Buildings & Facilities

[7] Local Government Operations Protocol Version 1.0. September 2008. Page 53. (Box 6.4)

decreased 62%, Vehicle Fleet emissions increased about 11% and Employee Commute's emissions decreased by 2%.

In 2008, Village operations emissions were reduced by 70% since the baseline year. Emissions in 2008 were 3% more than the year prior (2007). A more appropriate conclusion can be derived from the change in emissions from 2007 to 2008:

Sector	Percentage Change (2007 to 2008)
Buildings and Facilities	+6%
Streetlights and Traffic Signals	+33%
Water Delivery Facilities	+30%
Wastewater Facilities	0%
Vehicle Fleet	+2%
Employee Commute	-1%
Total	***+3%***

Air Pollutant Analysis

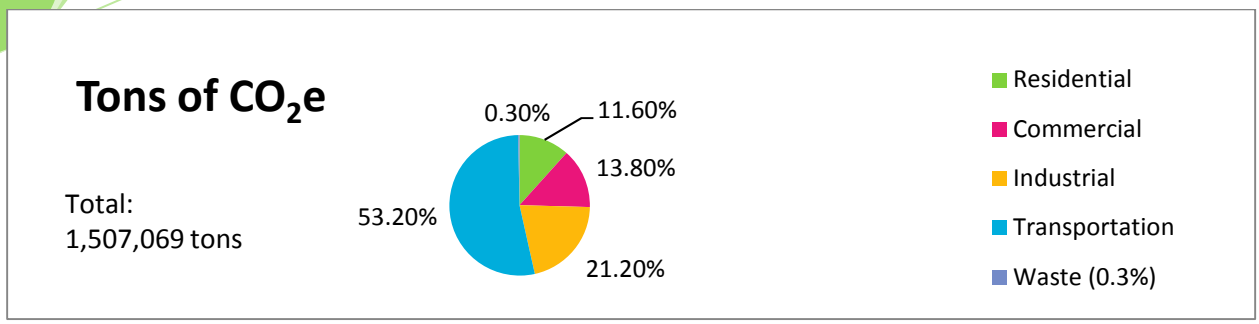
From 2006 to 2008, all air pollutant emissions have decreased. There was no PM25 output as refrigerant usage was not included in this analysis. Again, removing the 2006 outlier data can give a more accurate approach in the Village's recent performance.

Air Pollutant	% change from 2006-2008	% change from 2007-2008
NO_x	-50%	+5%
SO_x	-99%	+3%
CO	-5%	-2%
VOC	-6%	-2%
PM10	-81%	+6%

2006 Baseline Community Emissions Inventory

Greenhouse Gas and Air Pollutants Summary

In 2006, 18,007,112 million units of energy (MMBtu) were consumed within the boundaries of the Village of Howard. 1,507,069 tons of carbon dioxide equivalents (CO_2e) were emitted. Transportation contributed the most to the Community footprint at 53.2% of carbon dioxide equivalent emissions. While waste was rather insignificant in carbon dioxide equivalent emissions, it produced the most methane emissions- over 7 times the other sectors.



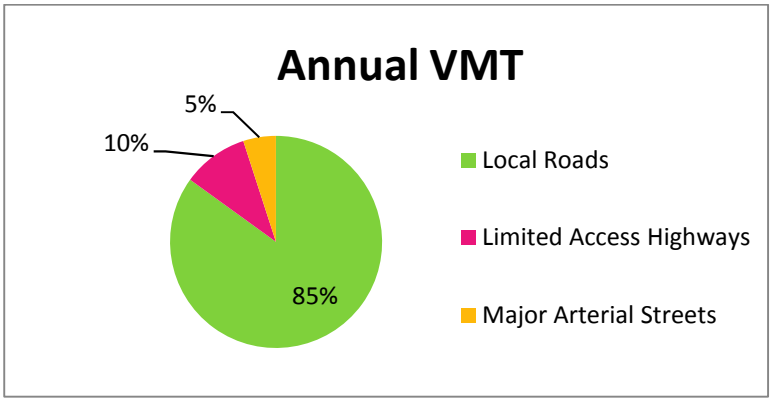
Sector Analyses

Residential, Commercial, Industrial

The US Census Bureau reported the Village of Howard's 2008 population at 16,753 with 5,350 housing units in Village limits in 2000. Because 2006 data is unavailable, the 2000 data was used for the purposes of the Village's baseline inventory. 2009 data was used as an assumed average of businesses, both industrial and commercial, in 2006. Of all businesses in Howard, 202 were measured as small, 27 large and 1 super large commercial firms. There were 128 small industrial, 21 large industrial and 1 super large industrial firms. Collectively, the residential, commercial and industrial sectors contributed to 46.6% of the community's total emissions. All three sectors consumed 7,980,460 units of energy (MMBtu).

Transportation

Because Vehicle Miles Travelled (VMT) data for the Village of Howard was unavailable, Average Annual Daily Traffic (AADT) counts were utilized to calculate the VMT. There are three road types used in the conversion formula: Collectors/Local Roads, Limited Access Highways and Major Arterial Streets. Limited Access Highways include STH 29, US 41 and I 43. Major arterial streets are Shawano Avenue, Velp Avenue, Lineville Road and Cardinal Lane/Packerland Drive. 2006 AADT numbers were multiplied by miles of that road type along with a conversion factor of 330 (accounting for varying traffic periods).



The CACP software suggested default measurements for fuel type in relation to annual VMT. Therefore, VMT was reported as 93% unleaded fuel usage and 7% diesel fuel usage.

Waste

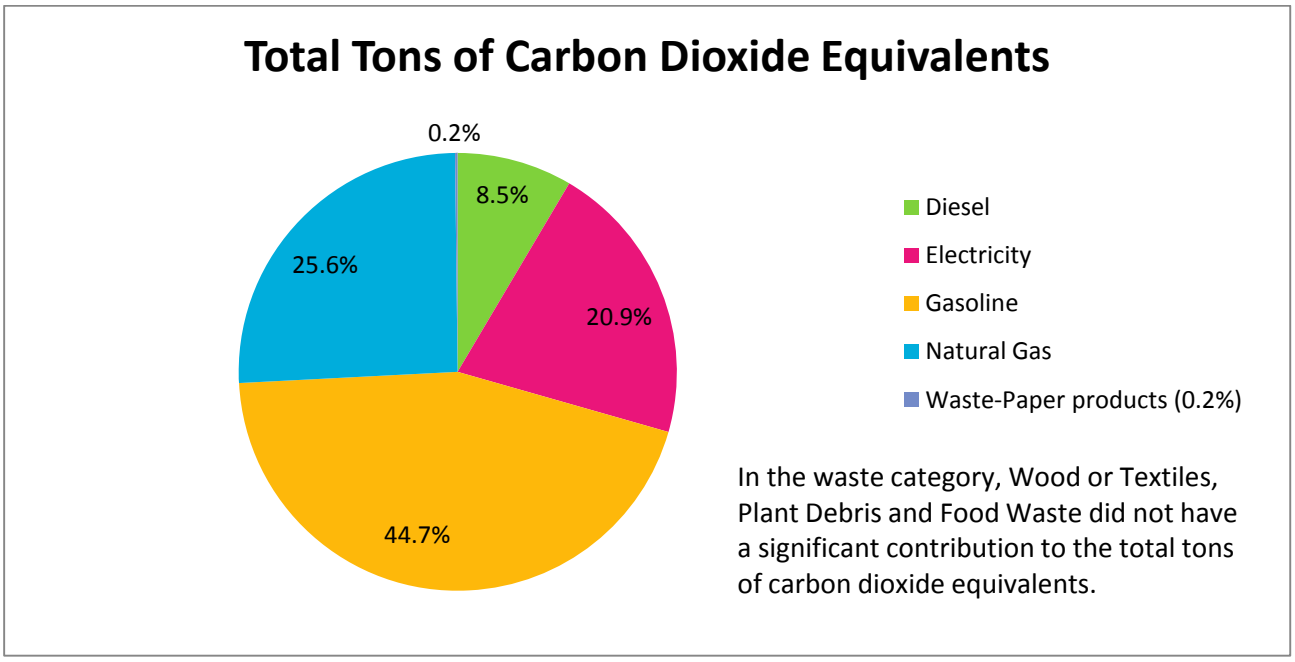
In 2006, 4,054 tons of waste were taken to the Brown County Landfill from Howard homes and businesses. The default waste type numbers were used to break down the waste into the following subcategories:

Waste Type	% of Total Waste (Default)	Howard Waste (total= 4,054 tons)
Paper Products	38%	1,540.5 tons
Food Waste	13%	527.0 tons
Plant Debris	10%	405.4 tons
Wood, Furniture, Textiles	4%	162.2 tons
All Other Waste	35%	1418.9 tons
TOTAL	100%	4,054 tons of waste sent to the landfill

The community's recycling efforts were not included in this analysis as they are not sent to the landfill and therefore do not contribute to methane emissions.

Source Analysis

Of the 1.5 million tons of carbon dioxide equivalent emitted by the community, gasoline contributed 44.7% and diesel produced 8.5%. Natural gas was the second highest supplier of emissions at 386,094 tons (25.6%). Although electricity accounted for 20.9% of the tons of carbon dioxide equivalents emitted, it consumed the lowest amount of energy at 1,391,250 MMBtu. Gasoline caused the most amount of energy consumption totaling at 8,436,299 MMBtu.



Total Emissions Analysis

Community + Government Operations: In Perspective

As ICLEI describes it, if one were to put a "bubble" over the Village of Howard (in 2006), the total carbon dioxide equivalents captured within that "bubble" would be over 1.5 million tons.

Emissions Source	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	CO_2e (tons)	Percentage of CO_2e
Residential	174,051	3,716	15,808	174,793	11.6%
Commercial	206,936	2,986	26,752	207,679	13.7%
Industrial	317,843	5,231	10,079	318,760	21.1%
Government	3,504	123	169	3,524	0.2%
Transportation	787,380	86,312	73,415	801,529	53.1%
Waste	0	0	431,711	4,308	0.3%
TOTAL	**1,489,714**	**98,368**	**557,934**	**1,510,593**	**100%**

To better understand what a ton of greenhouse gas looks like, a 9th grade physics class in Cohasset, Massachusetts[8] built a metric ton of CO_2e measuring 27 feet high by 27 feet long by 27 feet deep.

Imagine 1.5 million cubes like the one pictured floating over the Village of Howard inside that "bubble".

The US Census Bureau reports that in 2000 there were 5,350 households in the Village of Howard. Just taking into account the emissions produced by the Residential sector, **each household contributed 32.7 tons** of carbon dioxide equivalents to the Village of Howard "bubble" in 2006. Again, this is just home energy usage and does not include emissions from vehicles and transportation within the Village.

According to the US Census Bureau, in 2000 there were 9,775 Howard residents over the age of 18. Assuming all of those residents 18 and over had access to a vehicle and drove the same amount, **each driver would have contributed 82 tons** of carbon dioxide equivalents to the Village "bubble" in 2006.

To reiterate, these totals are for ONE YEAR. The Village of Howard's Go Green Save Green Taskforce and Village staff recognize this impact and are working to reduce the impact of both the government operations and the community as a whole on the environment.

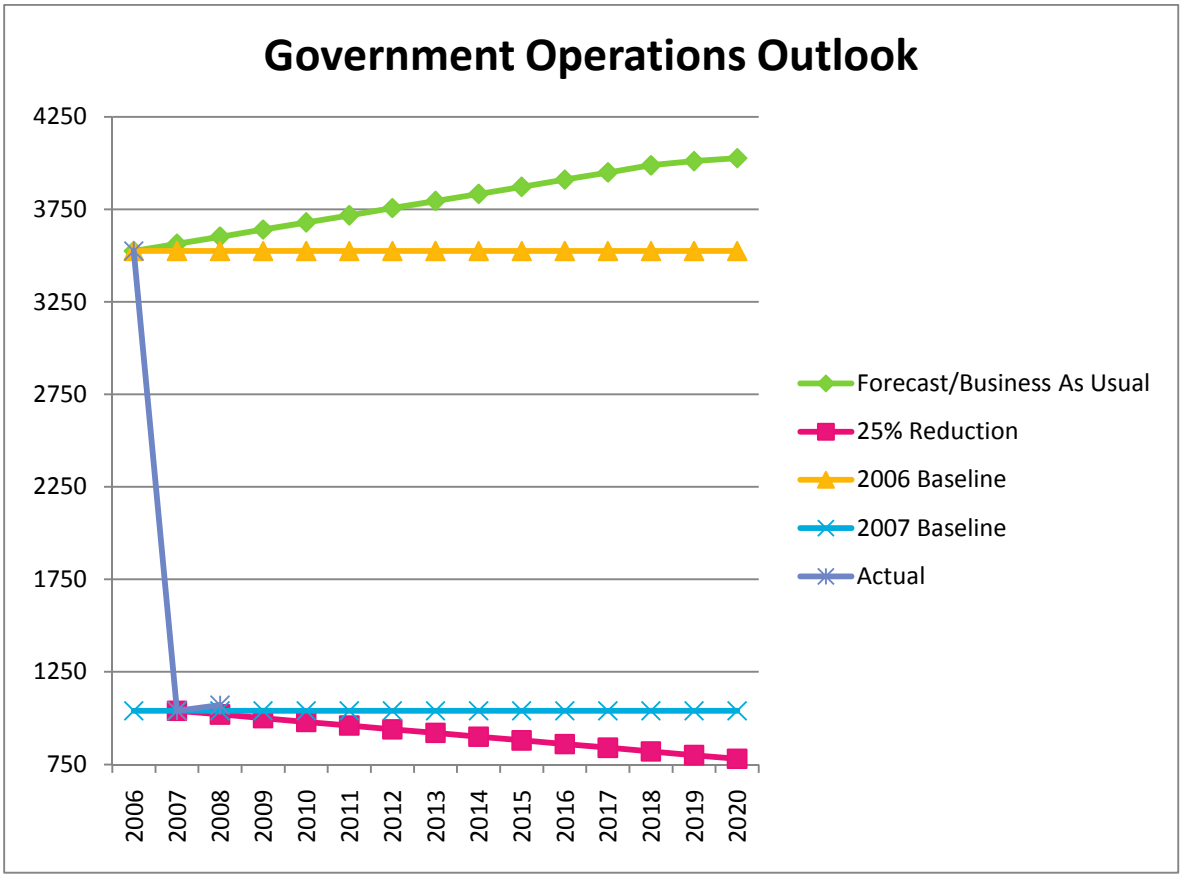
[8]Photo from: http://www.energyrace.com/commentary/what_does_a_ton_of_co2_look_like/

A Look Ahead: 2020 Forecast

To complete ICLEI's requirements for Milestone 1 recognition, future emissions must be forecasted. In conjunction with the Village of Howard's Energy Action Plan, emissions have been forecasted to 2020. With the goal of reducing emissions by 25%, the forecasted emissions will give the Village a "Business As Usual" scenario. The Village will continue tracking its emissions and charting them against the forecasted estimates. As of May 2010, no reduction plan has been created for community emissions. However, to achieve Milestone 2 through ICLEI's five milestone process the Village must adopt an emissions reduction target.

GOVERNMENT OPERATIONS

As of April 2009, the Village does not have any definite plans in removing or adding facilities and/or structures affecting governmental emissions. It is common practice to assume a 1% increase in emissions per year for governmental operations. The green line below shows the "business as usual" scenario- plotting that 1% increase. The Go Green Save Green Taskforce seeks to reduce its emissions by 25% by 2020. The change in water source in 2007 resulted in a higher than 25% reduction in that first year. Because of this, the GGSG Taskforce based the 25% reduction strategy on 2007 as a substitute baseline. With 1040 tons emitted in 2007, the 25% reduction goal will bring emissions to just 780 tons in 2020. The Village's 2008 progress is plotted below in purple:



COMMUNITY

As the 2010 census data becomes available, the growth rate for the Village of Howard and the corresponding forecast may be adjusted. The Wisconsin Department of Administration has forecasted the Village of Howard's population to be 17,098 in 2020. With a WI DOA 2009 estimated population of 16,110, the Village should grow 0.56% per year over the next 11 years. For this reason, 0.56% was used as the growth factor for the Village's waste, transportation and residential sectors.

The Village of Howard's Executive Director of Community Development Services estimates 106 acres of industrial zoned property to be developed by 2020. Similarly, 110 acres of commercial land is projected for development by 2020. With approximately 40% of each acre being set aside for road, storm water and other requirements, only 26,136 square feet will be used as the average for facilities contributing to natural gas and electricity consumption.

Based on the above assumptions and estimates, the community will increase its emissions by 103,120.8 tons from 2006 to 2020:

eCO_2	2006	2020	% Change
Residential	174,792.7	189,011.4	8.14%
Commercial	207,679.5	249,535.7	20.15%
Industrial	318,759.6	355,395.6	11.49%
Transportation	801,529.3	811,589.0	1.26%
Waste	4,307.8	4,658.1	8.13%
Total	1,507,068.9	1,610,189.7	6.84%

The "business as usual" scenario indicates a 6.84% increase in emissions in 2020 off the 2006 baseline. At this time, the Village of Howard has no set initiatives to help reduce the community's emissions. The Go Green Save Green Taskforce has adopted several initiatives to help educate the public on green opportunities such as the Green Recognition Program. Community outreach is the Village's main priority in helping reduce community-level emissions.

Post-Baseline Year Improvements and Future Analysis

Go Green Save Green Taskforce

In 2008, the Go Green Save Green (GGSG) Taskforce was created to find initiatives that will have a positive environmental impact and lower Village costs. The Annual Report for the GGSG taskforce is available on the GGSG webpage on the Village website[9]. Projects implemented through GGSG efforts include installing motion-detecting sensors for all lighting and regulating temperature settings for heating and cooling of all Village buildings.

Focus on Energy Collaboration

In March 2009 a Focus on Energy (FOE) Energy Advisor conducted an Energy Audit of all Village-owned buildings. The advisor recommended key temperature settings and other adjustments to the existing HVAC systems. Many of the advisor's suggestions were executed,

[9] www.villageofhoward.com/go-green_save-green.cfm

however some required replacement of equipment. The Village has been putting aside money annually since 2008 for the replacement of various HVAC system units. Implementation of many FOE recommendations produced $24,854.91 in 2009 savings and reduced emissions by 83 tons of carbon dioxide equivalents.

Office of Energy Independence Collaboration

In September 2009, the Village Board approved becoming registered as an Energy Independent (EI) Community with the WI State Office of Energy Independence. The Village signed on to Governor Doyle's 25x25 plan- seeking to transfer 25% of the government's energy usage to renewable sources by 2025. Being an EI Community will provide the Village of Howard access to exclusive grant opportunities for energy efficiency and sustainability. The Village will continue to seek out and apply for grant monies available to help reduce the Village's impact on the environment.

Future Analysis

Village staff will attempt to calculate and report greenhouse gas inventories for government operations every two years (minimum). Community inventories will be calculated every five years (minimum) through the 2020 target year.

Current projects that will be affecting future GHG inventories include:

- In 2009, the Village purchased two police vehicles. One was designated to use only E-85 gasoline while the other uses unleaded fuel. The pilot program will compare cost savings and efficiency.
- In 2009, the Village approved the purchase of three LED streetlights to be installed on Howard Boulevard. These lights will be metered separately to evaluate their energy and cost savings.
- In 2009, recommendations from the Focus on Energy energy audit were implemented reducing government emissions and energy usage.

As 2010 US Census data becomes available, the accuracy of future GHG inventory assumptions should increase.

All greenhouse gas inventories to date will be summarized by these overall performance metrics:

Performance Metric	Govt. Oper. 2006	Govt. Oper. 2007	Govt. Oper. 2008	Community Inventory 2006	Next Steps:
CO_2e (tons)	3,524	1,040	1,070	1,507,069	-2010 govt. oper. analysis -amend action plan -develop emissions reduction strategy
Energy (MMBtu)	25,549	22,573	18,714	18,007,112	
Costs	$669,646	$647,023	$665,049	N/A	

Recommendations for the Go Green Save Green Taskforce

1) The Go Green Save Green Taskforce should focus on fleet and building/facility improvements to improve government operation sustainability.
2) To comply with the 25x25 plan, renewable energy sources should be investigated by the Go Green Save Green Taskforce. The Office of Energy Independence should serve as a main resource in this research.
3) Transportation accounts for over half of the Village of Howard's GHG emissions. Updating the Village bike plan and encouraging carpooling and alternative modes of transportation should be a GGSG initiative.

Respectfully Submitted,

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2009-2010 L.E. O'Connor Fellow
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