

Greenhouse Gas Inventory, Village of Wilmette
Prepared November 28, 2011
By the Environmental and Energy Commission

In 2007 the Wilmette Village Board voted to support the U. S. Mayor's Climate Protection Agreement, which provides targets for reducing greenhouse gas emissions in local municipalities¹. The U.S. Mayor's Agreement has been adopted by 1,049 cities nationwide as a means to address the problem of climate change on a broad scale, in the absence of federal guidelines². Chicago, Deerfield, Evanston, and Highland Park are some neighboring cities that also have signed on to the Agreement.

Wilmette's Environmental and Energy Commission (EEC) has prepared an inventory of village-wide greenhouse gas emissions for the years 2008, 2009, and 2010. As the Village continues to implement measures that conserve electricity and natural gas and that encourage increased recycling, an annual emissions inventory will provide objective information about the impact of such measures on overall emissions.

Methods

ComEd and Nicor provided usage data to Michael Braiman, Assistant to the Village Manager, who shared the numbers with the EEC for this inventory. The Illinois Department of Transportation (IDOT) provided annual vehicle miles traveled on roads within Wilmette. Veolia provided data on the tonnage of residential refuse and recycling collection.

The primary sources of greenhouse gas emissions involve the burning of fossil fuels, which release carbon dioxide as well as other greenhouse gases such as methane and nitrous oxide. Methane also is produced from decomposing waste in landfills. The recycling of waste not only reduces the amount of landfill methane released but also tends to use less fuel based on transportation distances to landfills and recycling facilities.

Obtaining accurate measures of the Village's overall electricity use, natural gas use, vehicle miles traveled, waste production, and recycling volume is a fairly simple endeavor that can be easily repeated annually, making these five measures good ones to track over time. Data were provided as kWh (electricity), therms (natural gas), vehicle miles traveled (transportation), or tonnage collected (refuse and recycling). These numbers were converted to carbon-dioxide equivalents using conversion factors obtained from the U.S. Environmental Protection Agency³.

It should be noted that estimating emissions from the transportation sector by using annual vehicle miles traveled (AVMT) within the village is an imperfect measure of Wilmette-based transportation emissions. Many cars travel through the village from other municipalities, and Wilmette's emissions reductions programs can have little impact on these sources. However, it is a reasonable assumption that the majority of vehicles traveling through the village do belong to residents. (Vehicle miles traveled on the sections of I-94 and US-41 that run through Wilmette have been excluded from our analysis.) Other means of estimating transportation-based emissions have their own

imperfect assumptions, and given the ease and repeatability of obtaining AVMT, this seems an appropriate measure of transportation-based emissions within the village.

Thus, the Village of Wilmette’s Greenhouse Gas Emissions Inventory is an imperfect but reasonably accurate and repeatable measure of greenhouse gas emissions. It omits contributions from sources such as heating oil, propane, lawn equipment, and wood burning. It considers electricity and natural gas usage from residential, commercial, and municipal sources, which are the primary sources of emissions for our village. It considers waste production and recycling from residential sources (commercial waste data were proprietary and not available).

Going forward, these data will allow the Village to track the impact of energy conservation and recycling programs both within village properties and throughout the village as a whole. Many signatory cities, including Chicago and Evanston, have set goals for emissions reductions and have developed specific action items for reaching those goals. Should Wilmette decide to do the same, an annual inventory of emissions will allow the Village to conduct the necessary analysis to determine whether goals are being met.

Emissions Inventory Results

Total greenhouse gas emissions in Wilmette have decreased slightly since 2008 (see Fig. 1). This pattern mirrors that of the United States as a whole, where emissions decreased 6% from 2008 to 2009 (the latest year for which figures were available), due largely to decreased economic output⁴. The decrease over the same time period in Wilmette was 3%.

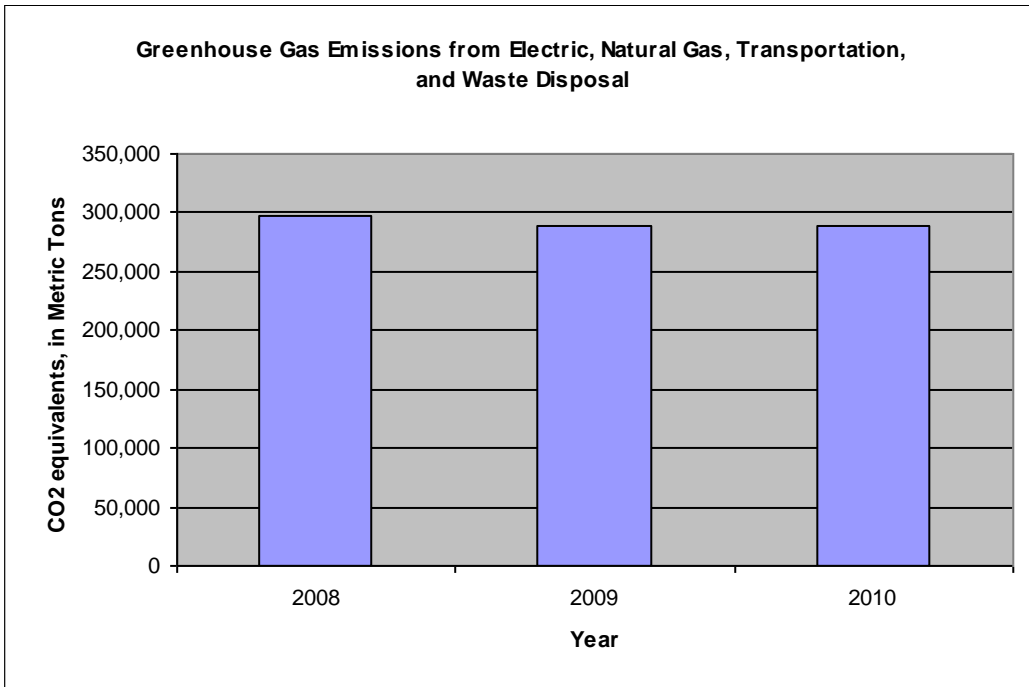


Figure 1. Total greenhouse gas emissions from electric, natural gas, transportation, and residential waste disposal for the Village of Wilmette.

Electricity use accounted for the majority of Wilmette's emissions each year, averaging 51% of emissions (see Fig. 2). Natural gas use accounted for 33% of emissions, while transportation contributed 15%.

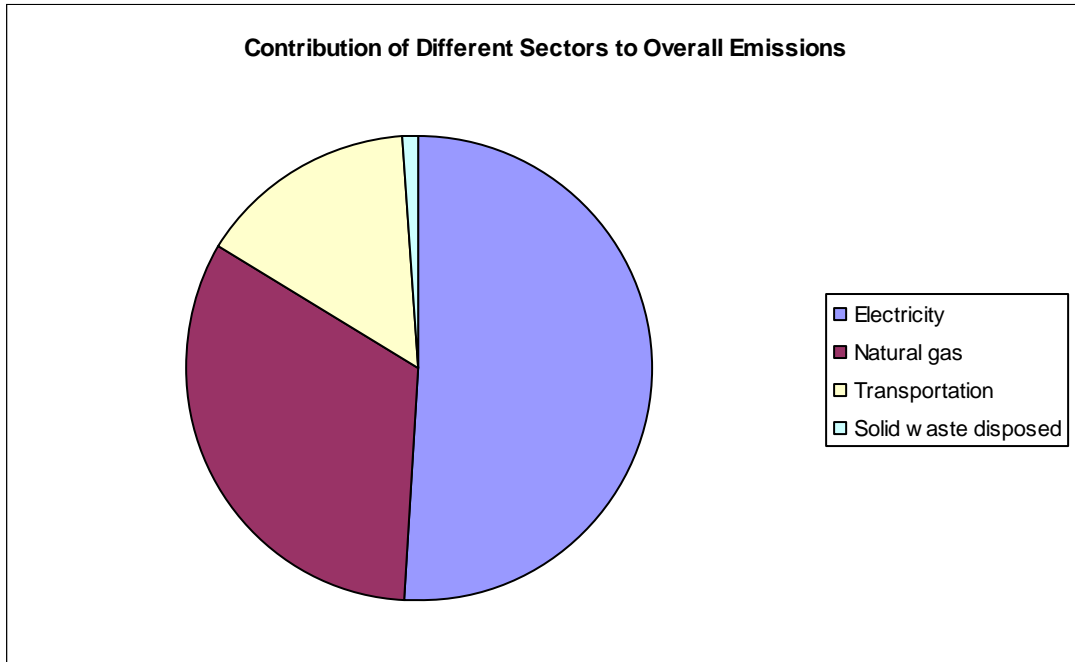


Figure 2. The proportion of total greenhouse gas emissions within the village contributed by the electricity, natural gas, transportation, and waste disposal sectors.

Electricity

Figure 3 shows the use of electricity village-wide for the past three years.⁵ Note that the use of electricity closely matches the number of cooling degree-days each year (see Figure 4)⁶, indicating that a large contribution to our electricity use comes from air conditioning.

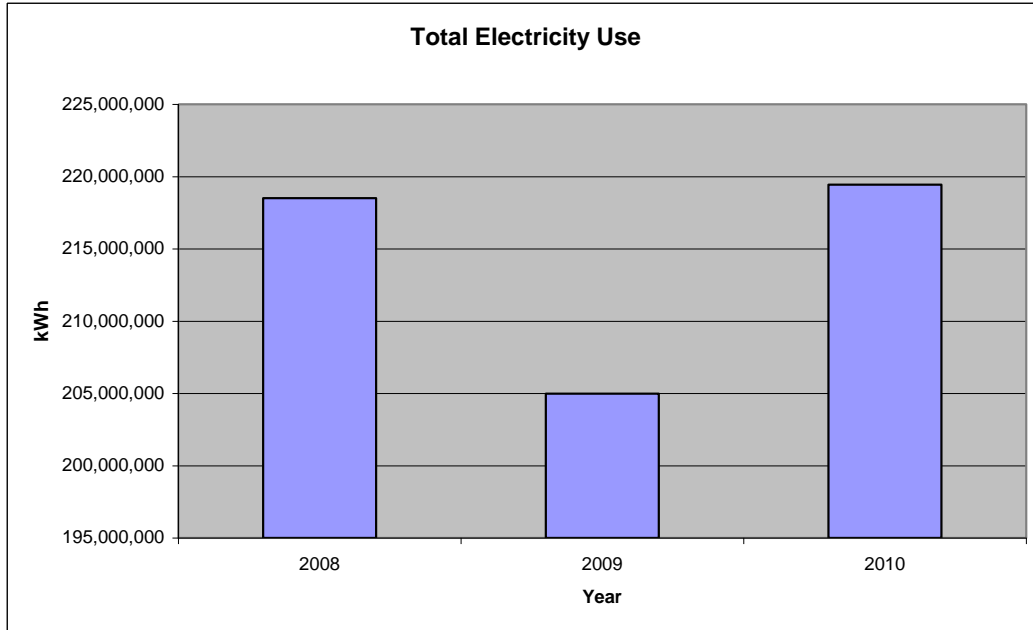


Figure 3. Total electricity usage for the Village of Wilmette.

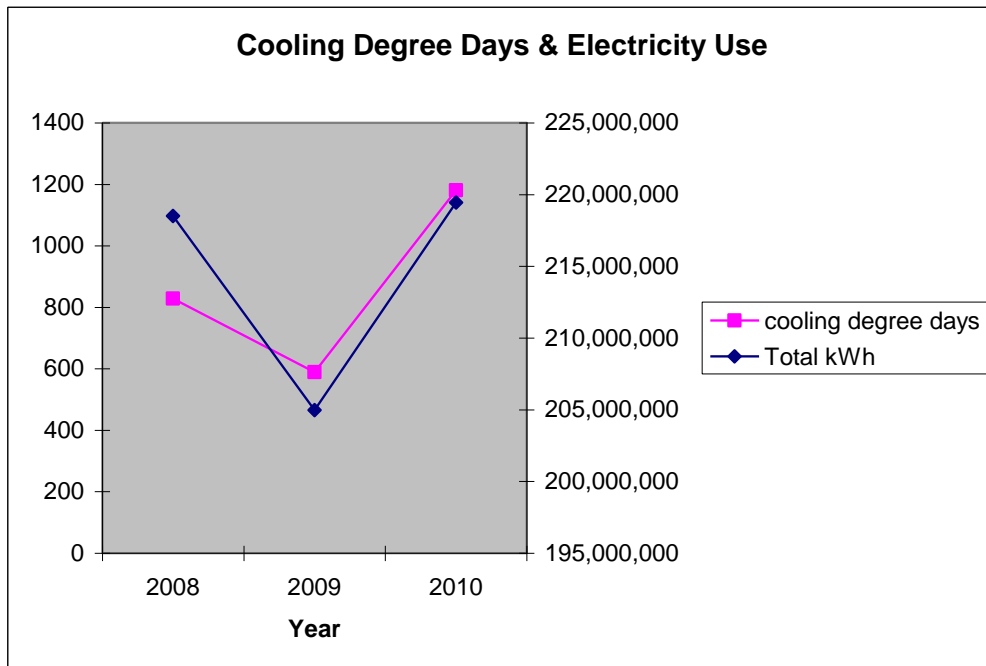


Figure 4. Cooling degree days and electricity usage in Wilmette.

The data from ComEd are broken down by source, including large and small commercial, residential, government, and street lights (see Figure 5). Residential use accounts for the majority of village electricity use, at 58%, follow by small businesses at 36%, for a combined contribution from these two sources of 94%.

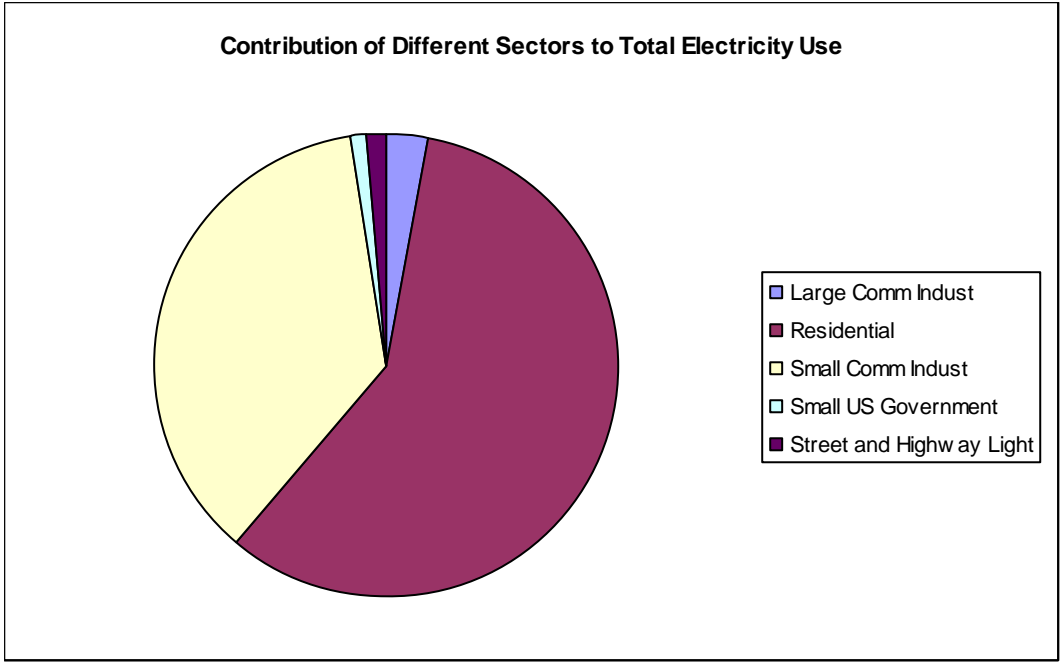


Figure 5. Contribution of different sectors to overall electricity use.

Looking at electricity use by Village government and street lighting (see Figure 6), we see that street lighting accounts for approximately half of all Village government electricity use. These data will allow us to determine the impact on electricity usage of the Village’s recent conversion to high-efficiency street lights.

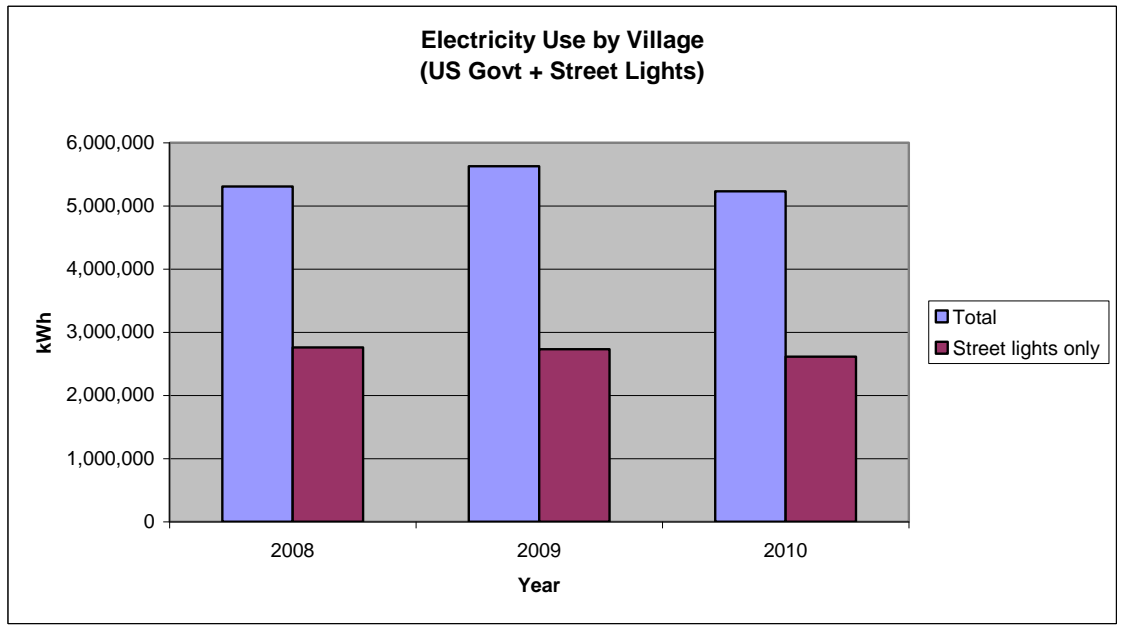


Figure 6. Electricity usage by Village government.

Natural Gas

Figure 7 shows natural gas usage for the past three years⁷. Again, gas usage closely followed heating degree days (see Figure 8)⁶ for the three years, reflecting the fact that our primary use of natural gas is in building heating.

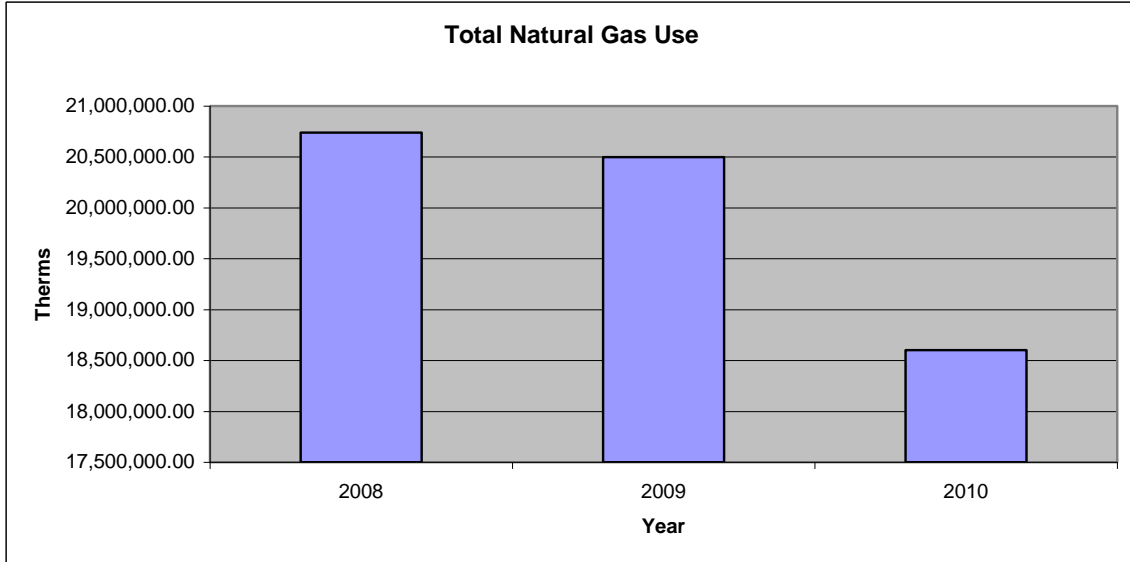


Figure 7. Total natural gas usage by the Village of Wilmette.

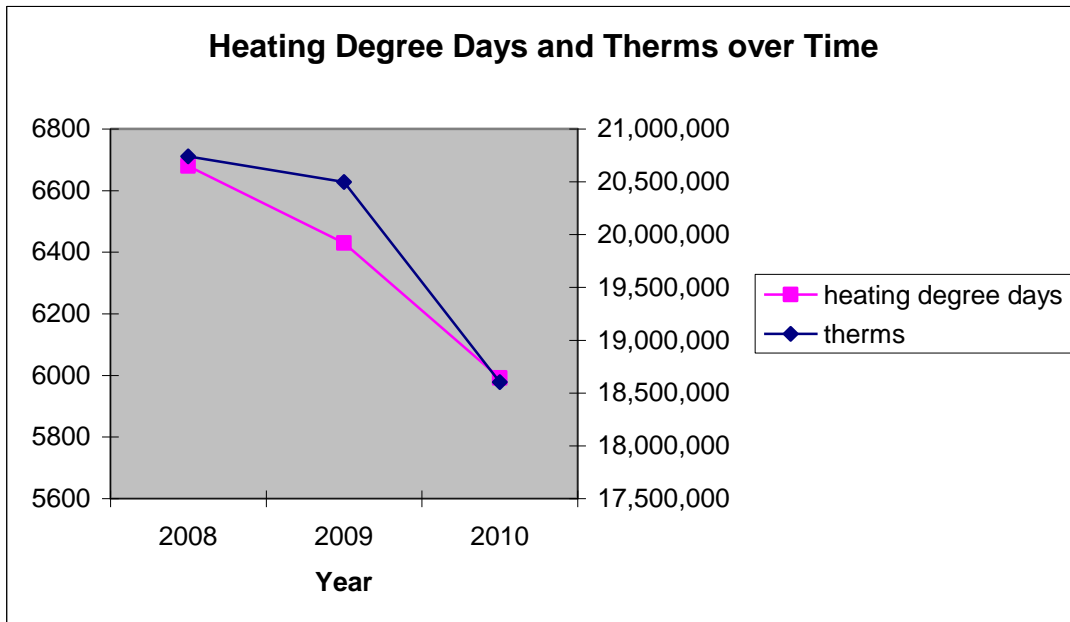


Figure 8. Heating degree days and natural gas usage for the Village of Wilmette.

The data from Nicor are broken down into residential, commercial, industrial, and “other.” Residential use accounts for the majority of village natural gas use, at 80%, follow by commercial at 20%. Industrial and “other” contributed a negligible amount.

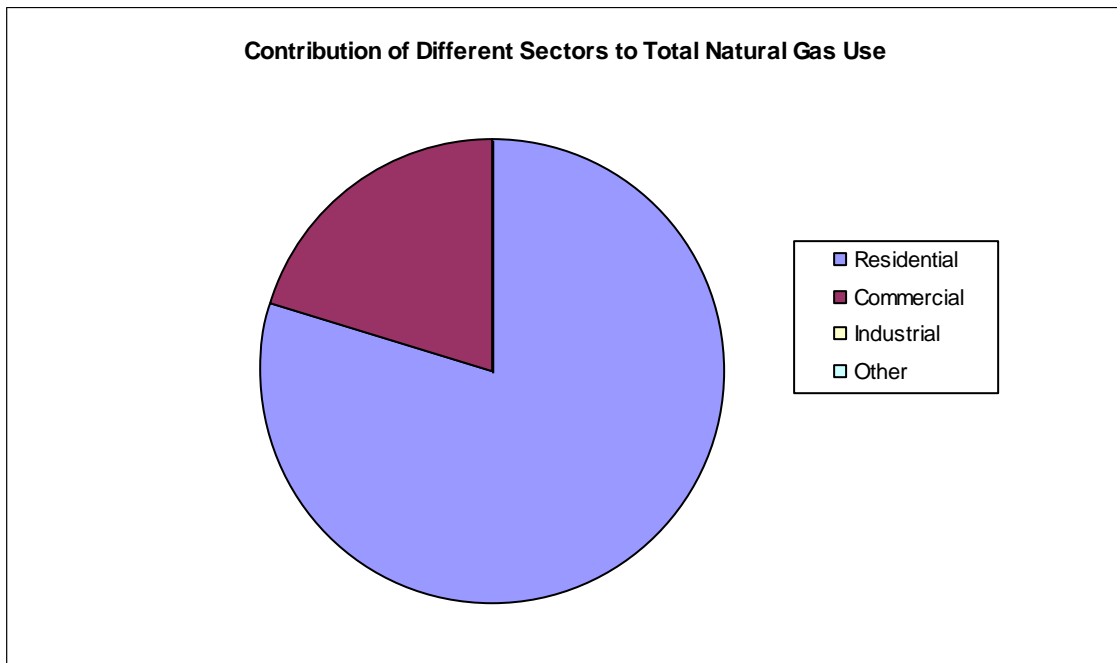


Figure 8. Contribution of different sectors to overall natural gas use.

Transportation

Figure 9 shows the annual vehicle miles traveled (AMVT) on roads within Wilmette for the past three years⁸. The number has changed little from year to year. Miles traveled on State Marked Routes were excluded from the analysis, as a significant proportion of I-94 travelers are likely not based in Wilmette and thus do not truly represent Wilmette-based transportation emissions. (Including miles traveled on State Marked Routes would approximately double the total AVMT for Wilmette).



Figure 9. Annual vehicle miles traveled within Wilmette, excluding miles traveled on State Marked Routes (which includes I-94 and US-41).

Refuse and Recycling

Figure 10 shows the volume of residential refuse and recycling collected by Veolia for the past three years⁹. The percent of total material that was recycled in each year was 32%, 31%, and 33%, respectively. Anecdotal reports suggest that the new, larger recycling totes have increased residential recycling rates. The data for 2011 will tell us the extent to which these reports are true. While commercial collection numbers were proprietary and thus unavailable, Veolia reported that the recycling rate for commercial properties was 10% in both 2009 and 2010.

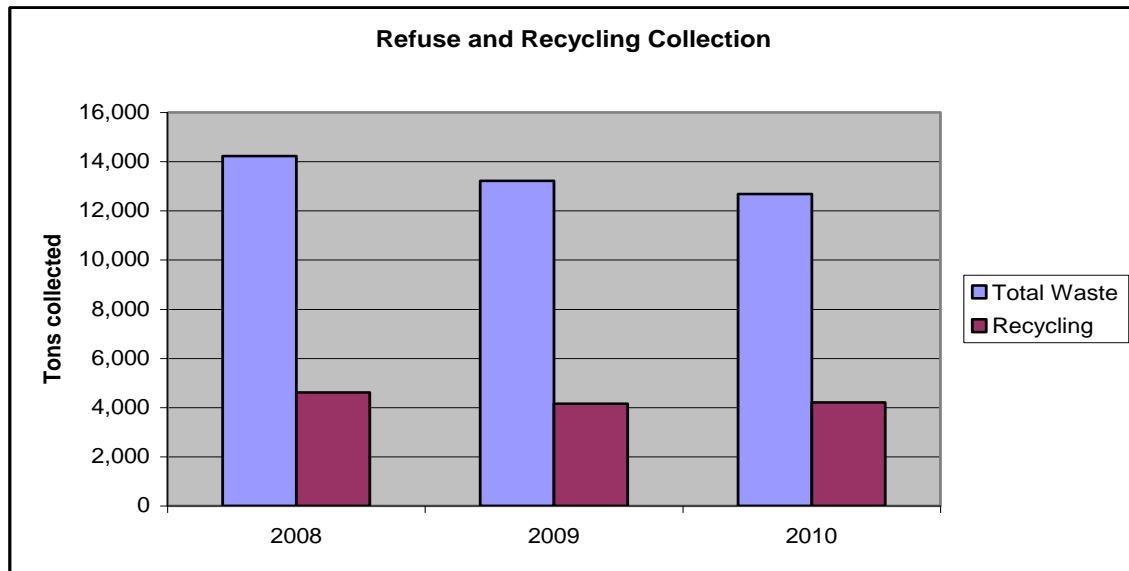


Figure 10. Refuse and recycling collection for residential properties within the Village of Wilmette.

Conclusions

Energy conservation and efficiency measures save money for village residents and government, while also reducing our community's contribution to climate change. The EEC has prepared this greenhouse gas inventory in the hopes that it will aid Village efforts to conserve energy in an informed manner. By knowing which sources account for the greatest contribution to emissions, we can focus efforts where they will have the greatest impact. Having quantitative data allows us to measure the impact of various conservation, efficiency, and education measures village-wide.

For example, since electricity use represents our greatest source of emissions, and since it so closely tracks cooling degree days, it seems likely that air conditioning efficiency and conservation measures for residents and businesses would be a high impact area of focus. Likewise, within the natural gas sector residential use is our greatest contributor and is closely linked to heating degree days. Thus, a focus on winter weatherization of homes would be a high-impact activity. Conversely, waste disposal does not comprise a significant contribution to our community's greenhouse gas emissions. There are of course many other, important reasons to reduce waste and increase recycling, and these data will help the Village assess the impacts of various programs on refuse collection.

Note that the U.S. Mayors Climate Protection Agreement suggests a 7% reduction from 1990 emissions levels by the year 2012. While 1990 figures were not available for Wilmette, we can estimate 1990 emissions using national averages. According to the U.S. Environmental Protection Agency, total greenhouse gas emissions have increased at an average annual rate of 0.4% since 1990 nationwide⁴. If we assume Wilmette's emissions have followed a similar trajectory, we arrive at the goal of 247,828 Metric Tons of CO₂ equivalents, or 14% below current levels. Clearly we will not reach this goal by 2012, but should the Village decide to set a target number, the current inventory will enable us to mark our progress toward our goal.

Sources

- ¹ Under the Agreement, participating cities commit to take following three actions:
- a) Strive in their own communities to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol -- 7% reduction from 1990 levels by 2012;
 - b) Urge their state governments and the federal government to enact policies and programs to meet or beat the Kyoto target; and
 - c) Urge the U.S. Congress to pass bipartisan greenhouse gas reduction legislation.

² <http://www.usmayors.org/climateprotection/list.asp>

³ An online calculator allows one to convert kWh, Therms, and AVMT to CO₂ equivalents: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>.

⁴ <http://www.epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Executive-Summary.pdf>

⁵ Data provided to the Village of Wilmette by ComEd.

⁶ Data obtained from the National Oceanic and Atmospheric Administration (NOAA) websites: <http://www.weather.gov/climate/index> and <http://www.weather.gov/climate/getclimate>

⁷ Data provided to the Village of Wilmette by Nicor.

⁸ Data provided to the Village of Wilmette by the Illinois Department of Transportation.

⁹ Data provided to the Village of Wilmette by Veolia.