Village of LaGrange Park

2009 Community-Wide
Greenhouse Gas Emissions Inventory

Narrative Report

Produced by the Cool Village Commission

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In Collaboration with

ICLEI Local Governments for Sustainability USA

The Village of La Grange Park (VLP) recognizes that greenhouse gas (GHG) emissions from human activity are contributing to climate change and that the Village may contribute to efforts to reduce these emissions, both through its government operations and by inspiring change throughout the community. On January 26, 2010, VLP's Board created the Cool Village Commission (CVC) and directed it to develop a Sustainability Plan. This GHG emissions inventory provides critical data to inform VLP's future policy to reduce emissions.

Presented here are estimates of greenhouse gas emissions resulting from activities in 2009 in VLP's community as a whole and from VLP's government operations. 2009 was the most recent year for which a wide variety of data was available. These data will provide a baseline against which the Village will be able to compare future performance and demonstrate progress in reducing emissions.

Climate Change Background

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. There is much evidence that suggests that human activities are increasing the concentration of greenhouse gases, most notably the burning of fossil fuels for transportation and electricity generation that introduces large amounts of carbon dioxide and other gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, which is in turn expected to affect global climate patterns and cause climate change.

Regardless of one's opinion of climate change research, it makes sense to try to reduce greenhouse gas emissions. Many communities in the United States have taken responsibility for addressing climate change at the local level, and in exploring how to adapt to these changes. Scientists expect changing temperatures to result in more frequent and damaging storms accompanied by flooding and disruption of ecosystems and habitats.

The Cities for Climate Protection Campaign

VLP along with more than 1,000 local governments, including over 600 in the United States, have joined ICLEI's Cities for Climate Protection (CCP) campaign.[1] The CCP campaign provides a framework for local governments to identify and reduce greenhouse gas emissions, organized along five milestones:

1. Conduct an inventory and forecast of local greenhouse gas emissions;
2. Establish a greenhouse gas emissions reduction target;
3. Develop an action plan for achieving the emissions reduction target;
4. Implement the action plan; and,
5. Monitor and report on progress.

[1] ICLEI was formerly known as the International Council for Local Environmental Initiatives, but the name has been changed to ICLEI – Local Governments for Sustainability.

This report represents the completion of the first CCP milestone, and provides a foundation for future work to reduce greenhouse gas emissions in La Grange Park.

Methodology

Greenhouse Gas Emissions Inventory Protocols

The first step towards achieving tangible greenhouse gas emissions reductions requires identifying baseline levels and sources of emissions. As local governments continue to join the climate protection movement, the need for a standardized approach to quantify these emissions is essential. Given this, the CVC with the assistance of staff used the International Local Government GHG Emissions Analysis Protocol (IEAP) to inventory VLP's community emissions and a protocol for Local Government Operations to inventory GHG emissions from VLP's government operations and buildings (which are evaluated as a subsector of the community inventory).

Community Emissions Protocol

The IEAP, developed by ICLEI, provides an easily implementable set of guidelines to assist local governments in quantifying greenhouse gas emissions from both their internal operations and from the whole community within the Village boundaries. ICLEI began development of the IEAP with the inception of its Cities for Climate Protection Campaign in 1993, and recently formalized an official version to establish a common GHG emissions inventory protocol for all local governments worldwide.

Local Government Operations Protocol

In 2008, ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) released a protocol for Local Government Operations to serve as a national appendix to the IEAP.[2] It serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. The purpose of the protocol is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory. The CVC used this protocol to conduct the local government emissions inventory specifically. While the State of Illinois does not currently require local governments to inventory and report their emissions, an emissions inventory is a critical first step for the Village to develop internal emissions reduction strategies and track future progress.

[2] CARB adopted the LGOP in 2008.

Quantifying Greenhouse Gases Emissions

Base Year

A primary aspect of the emissions inventory process is the requirement to select a base year with which to compare current emissions. Due to availability of accurate data, 2009 was selected as the base year.

Establishing Boundaries

Setting an organizational boundary for greenhouse gas emissions accounting and reporting is an important step in the inventory process. VLP's community inventory assesses emissions resulting from activities taking place within the VLP's geopolitical boundary. The IEAP defines geopolitical boundary as that "consisting of the physical area or region over which the local government has jurisdictional authority." Although the Village may have limited influence over the level of emissions from some activities, it is important that every effort be made to compile a complete analysis of all activities that result in greenhouse gas emissions.

For data relating to government operations, estimates were made based on activities and facilities that the Village maintains operational control.

Emission Types

Quantifying emissions beyond the three primary GHGs, Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O), can be difficult. Therefore, ICLEI has developed a means for local governments to produce a simplified inventory that includes the three primary GHGs yet is still in accordance with the IEAP methodology. This inventory uses the ICLEI three GHG methodology.

Quantification Methods

Greenhouse gas emissions were quantified using calculation-based methodologies. The basic equation used: *Activity Data x Emission Factor = Emissions*

Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see appendices for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh of electricity). Table 1 demonstrates an example of common emission calculations that use this formula. Please see appendices for details on the emissions factors used in this inventory.

TABLE 1: BASIC EMISSIONS CALCULATIONS

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kWh)	**CO_2 emitted/kWh**	**CO_2 emitted**
Natural Gas Consumption (therms)	**CO_2 emitted/therm**	**CO_2 emitted**
Gasoline/Diesel Consumption (gallons)	**CO_2 emitted /gallon**	**CO_2 emitted**
Vehicle Miles Traveled	**CH_4, N_2O emitted/mile**	**CH_4, N_20 emitted**

CACP 2009 Software

To facilitate community efforts to reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection 2009 (CACP 2009) software package in partnership with the National Association of Clean Air Agencies (NACAA) and the U.S. Environmental Protection Agency (EPA). CACP 2009 determines emissions by combining activity data (energy consumption, waste generation, etc.) with verified emission factors.[2]

Greenhouse gas emissions are aggregated and reported in terms of equivalent carbon dioxide units, or CO_2e. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat, so the CACP software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.

The CACP software has been and continues to be used by over 600 U.S. local governments to reduce their greenhouse gas emissions. However, it is worth noting that, although the software provides governments with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation of reality, rather than an exact value.

Evaluating Emissions

There are several important concepts involved in the analysis of emissions arising from many different sources and chemical/mechanical processes throughout the community. Those not touched on already are explored below.

This inventory examines emissions by Sector. Many local governments find a Sector-based analysis more relevant to policy making and project management, as it assists in formulating Sector-specific reduction measures and climate action plan components.

[2] The emission factors and quantification methods employed by the CACP software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form 1605), and the Local Government Operations Protocol (LGOP).

Community Emissions Inventory Results

Emissions by Sector

The Village of La Grange Park community emitted approximately 133,643 metric tons of CO_2e in the year 2009. (This figure excludes the 330 metric tons of CO_2e for fuel usage of government operations.) As visible in Table 2 below, electricity and natural gas usage within the Residential Sector were the largest sources of community emissions (44.4%). Emissions from the Commercial Sector accounted for 26.3 percent of total community emissions, and emissions from the Transportation Sector accounted for 28.7 percent of the Village's overall emissions. The remaining 0.6 percent of emissions came from waste generated by La Grange Park residents in 2009.

TABLE 2: COMMUNITY EMISSIONS BY SECTOR

Emission	Residential	Commercial / Industrial	Transportation	Waste Generation	TOTAL
CO2e (metric tons)	59,398	35,196.2	38,295	754.1	133,643
% of Total CO2e	44.4	26.3	28.7	0.6	100%
MMBtu					0.00

Residential

As shown in Table 2, VLP's Residential Sector generated an estimated 59,398 metric tons of CO_2e in 2009. This estimate was calculated using 2009 electricity and natural gas consumption data provided by ComEd and Nicor, and only includes consumption through residential buildings. Data on residential equipment usage, such as lawnmowers or on-site electricity generation, is not included in this inventory. GHG emissions associated with residential transportation and residential waste generation are included separately in the Transportation and Waste Sector emissions totals.

Table 3 provides information on residential emissions on a per household basis. VLP's households generated 59,398 metric tons of GHG emissions in 2009. Per household emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one's emissions with neighboring cities and against regional and national averages.

TABLE 3: VLP'S 2009 GREENHOUSE GAS EMISSIONS PER HOUSEHOLD

Number of Occupied Housing Units (2000 census)	5,416
Total Residential GHG Emissions (metric tons CO2e)	59,398
Residential GHG Emissions/Household (metric tons CO2e)	10.97

Nearly 47.4 percent of residential GHG emissions were generated from the use of natural gas. Natural gas is typically used in residences as a fuel for heating water and cooking. Approximately 52.6 percent of residential GHG emissions were generated through electricity provided by ComEd and other providers.

Commercial

VLP is primarily a residential community. Accordingly, VLP's businesses generated only 26.3 percent of community-wide GHG emissions in 2009, or 35,196 metric tons of CO_2e. Approximately 67.5 percent of commercial GHGs were generated through electricity, and 32.5 percent were generated through natural gas. [These numbers include government. operations]. VLP's government GHG emissions from natural gas and electricity account for approximately 6.5% of GHG emissions in the Commercial Sector.

Transportation

VLP's Transportation Sector accounted for 38,295 metric tons CO_2e, or 28.7 percent, of the Village's 2009 GHG emissions. The Transportation Sector analysis includes emissions from all vehicle use within VLP boundaries (whether on local roads or State highways passing through VLP).

Approximately 95 percent of VLP's 2009 transportation-related greenhouse gas emissions were generated from vehicle miles traveled (VMT) on state highways located within Village boundaries, while approximately 5 percent was generated from vehicles on local roads.

Emissions from railroads and the air travel of VLP residents were not included in the Transportation Sector analysis.

Waste

The Waste Sector constituted 0.6 percent of total 2009 emissions for the community of VLP. Emissions from the Waste Sector are an estimate of methane generation from the anaerobic decomposition of organic wastes (such as paper, food scraps, plant debris, wood, etc.) that are deposited in a landfill. Specifically, the emissions that are included in the inventory report are an estimate of fugitive emissions (emissions not captured by methane recovery facilities) coming off the landfill in the year 2009.

Per Capita Emissions

Per capita emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one community's emissions with neighboring cities and against regional and national averages. That said, due to differences in emission inventory methods, it can be difficult to get a directly comparable per capita emissions number, and one must be cognizant of this margin of error when comparing figures.

Dividing total VLP community GHG emissions by population yields a result of 9.86 metric tons of CO_2e per capita. It is important to understand that this number is not the same as the carbon footprint of the average individual living in VLP (which would include lifecycle emissions, emissions resulting from air travel, etc.).

TABLE 4: VLP'S 2009 PER CAPITA GREENHOUSE GAS EMISSIONS

Population (2010 census)	**13,551**
Total GHG Emissions (metric tons CO2e)	**133,643**
Residential GHG Emissions/Household (metric tons CO2e)	**9.86**

Community Emissions Forecast

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, VLP conducted an emissions forecast for the years 2012, 2020 and 2040. Under a business-as-usual scenario, VLP's emissions will grow by approximately:

- 1 percent by the year 2012 from 133,643.4 to 135,340.6 metric tons CO_2e
- 2 percent by the year 2020 from 133,643.4 to 136,356.7 metric tons CO_2e
- 6 percent by 2040 from 133,643.4 to 141,675.3 metric tons CO_2e

Residential

For the Residential Sector, a population projection for VLP conducted by the Chicago Metropolitan Agency for Planning (CMAP) estimated that VLP's population was 13,551 in 2009, and will be 13,586 in 2012; 13,614 in 2020; and 13,685 in 2040. Based on these population projections, staff estimated average annual compound growth in energy demand to be 0.086 percent annually from 2009 to 2012; 0.042 percent annually from 2009 to 2020; and 0.032 percent annually from 2009 to 2040.

Commercial / Industrial

CMAP projections do not include any growth for VLP's Commercial Sector: the emission growth forecasted is zero. However, the Commercial Sector should be monitored for growth as the Village is continuing to evaluate options to bring growth to this area. Another area to monitor is VLP's government GHG emissions as they are included in the Commercial Sector, except for its fuel usage which equals 330 metric tons.

Transportation

For the Transportation Sector, projected growth in energy demand was obtained from the Chicago Metropolitan Agency for Planning (CMAP). The annual Vehicle Miles Traveled (VMT) are derived from the forecasts CMAP is required to make to meet federal air quality conformity requirements. The 2012 estimate was developed by interpolating using the average change between the forecast years 2016, 2020, and 2040. CMAP projects that the VMT will increase

at the approximate annual rates of 1.5% per year through 2012, 0.6% per year through 2020 and 0.5% per year through 2040. These numbers were used to estimate emissions growth in the Transportation **Sector** for the VLP forecast.

Waste Generation

As with the Residential Sector, population is the primary determinate for growth in emissions pertaining to waste generation. Therefore, the average annual population growth rate for 2009 to 2012 is 0.086 percent, for 2009 to 2020 is 0.042 percent, and for 2009 to 2040 is 0.032 percent, as calculated from CMAP and used to estimate future emissions from waste disposal.

Government Operations Emissions Inventory Results

VLP government operations account for approximately for 1.8%[3] of community-wide GHG emissions. VLP's government operations were responsible for emitting 2461 metric tons of communitywide CO_2e in the base year 2009, with Buildings and Facilities Sector contributing the highest amount and approximately 64 percent of this total. These figures include VLP's government fuel usage of 330 metric tons of CO_2e emissions, as can be seen in the Government Operation's Vehicle Fleet Sector. For a complete VLP government operations inventory analysis, see the attached Government Operations Inventory Report.

Conclusion

This analysis found that the La Grange Park community as a whole was responsible for emitting 133,643.4 metric tons of CO_2e in the base year 2009, with emissions from the Residential Sector contributing the most to this total. The results from the 2012 and 2020 emissions forecasts demonstrate that under a business-as-usual scenario, emissions will grow most significantly in the Transportation Sector, approximately 4% and 6%, respectively. The greatest emission growth is demonstrated in forecast year 2040 in the Transportation Sector, approximately 16%. The emissions growth for the Waste Sector is the same as the Residential Sector. The Residential Sector will have the greatest impact since the Residential Sector produces approximately 44% of total village emissions. These results suggest that energy use in the Residential and Transportation Sectors presents both the greatest challenge and requires the most urgent action in order for VLP to reduce its emissions in the future. Finally, a proactive approach to monitor and evaluate the Commercial Sector should coincide with the proactive steps taken to improve the commercial industry in La Grange Park.

Based on the ICLEI methodology and recommendations, VLP should begin to document emissions reduction measures that have been implemented since 2009 and should quantify the emissions benefits of these measures to demonstrate progress made to date.

[3] This is 0.1% higher than Government Operations Report.

As the Village of La Grange Park Government moves forward with considering emission reduction strategies and works to create a sustainability plan, the Village should identify and quantify the emission reduction benefits of climate and sustainability strategies that could be implemented in the future, including energy efficiency, renewable energy, vehicle fuel efficiency, alternative transportation, vehicle trip reduction, land use and transit planning, waste reduction and other strategies. Through these efforts and others the Village of La Grange Park can achieve additional benefits beyond reducing emissions, including saving money and improving its economic vitality and quality of life.