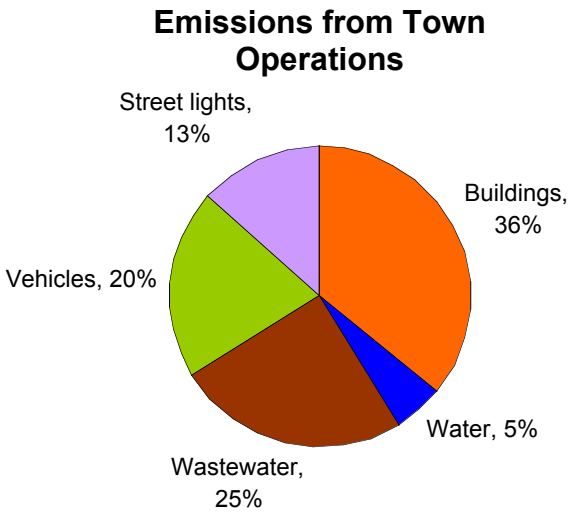
Hanover Carbon Dioxide Emissions from Town Operations

Based on 2005-2006 data provided by the town to the Climate Protection Campaign

Analysis and Summary by Charlie Sullivan for the CPC, January, 2008.

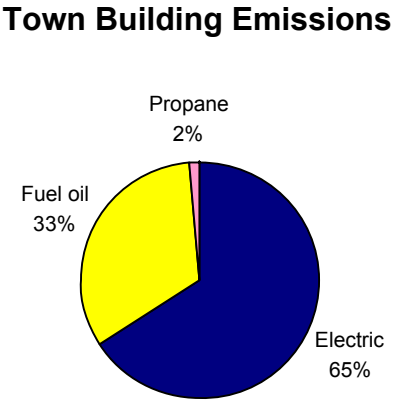
For 2005-2006, Town operations produced approximately 3250 metric tons of carbon dioxide emissions, including emissions from burning fuel for heat and in vehicles, and emissions from power plants supplying electricity for Town operations. This is equivalent to the emissions from burning 370,000 gallons of gasoline, and it about equal to household emissions from 100 to 200 typical New England households.

Town buildings account for the largest share of emissions (36%), followed by the wastewater treatment plant (25%), vehicles (20%), streetlights (13%, including signals and parking areas), and water works (5%).

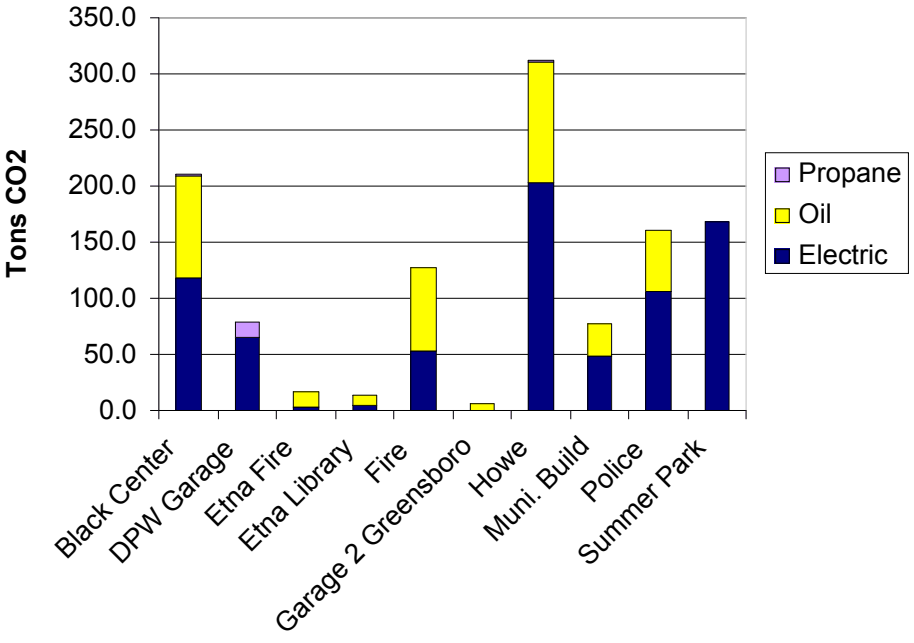


Buildings

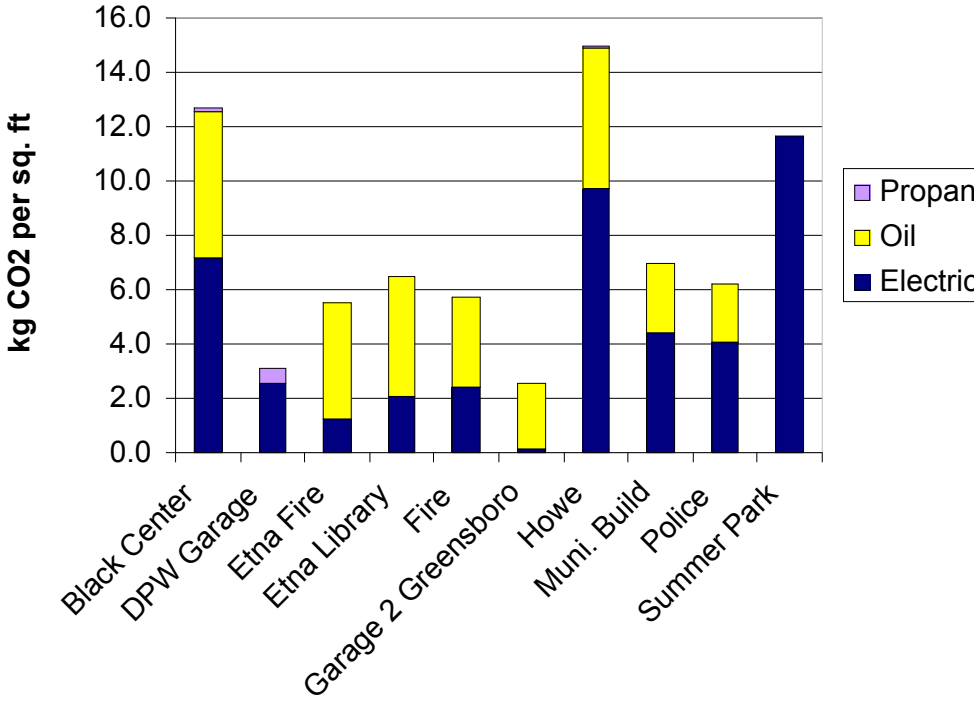
Town buildings account for 36% of total Town CO2 emissions. 35% of this is from fuel oil and propane for heating; 65% is from electricity.



A breakdown by building (right) shows that five buildings dominate, the Howe Library, the Black Center, the Summer Park Residences, and the police and fire buildings on Lyme road.



The buildings can also be evaluated by their emissions per square foot of floor space. The top three are still Howe, Black, and Summer, but the police and fire stations on Lyme Road are, by this measure, on par with three other buildings: the municipal building and the Etna library and firehouse.



Oil and propane are used primarily for heating. Electricity is used for a much broader variety of purposes, including lighting, air conditioning, computers and office equipment, other equipment, and, in Summer Park, for heating. Data on how much is used for which purpose is not available; beginning to collect this data, especially for buildings with high electric usage such as the Howe Library, the Black Center, the downtown municipal building and the Police station, would be valuable.

Regardless of what the breakdown of electricity uses is, it's clear that heating and air conditioning are the largest component, and upgrades to building envelopes and HVAC systems are likely to be one of the largest opportunities for Town savings. Audits of Town buildings are the first step in this process. It is typically easy to find improvements that can provide 20 to 30% savings with short payback times.

Wastewater Treatment and Water Supply

The wastewater treatment plant accounts for 25% of the total CO2 emissions. It comprises 510 tons per year from electricity use and 300 tons from fuel oil use[1]. This is equivalent to burning 92,000 gallons of gasoline. It is unclear how easy it would be to reduce this—the facilities are more specialized than most Town facilities, and designing improvements requires specialized expertise. However, it is a single facility that consumes a large amount of electricity, which could make upgrades of a few key components here easier more cost effective than replacements of a wider variety of equipment in other areas of town operations.

[1] There may additionally be methane emissions from the plant which would contribute strongly to climate change

Water supply accounts for only 5% of total emissions, but again, the small number of pieces of equipment means that there may be opportunities for cost-effective upgrades.

Another opportunity is to educate residents that unnecessary water and sewer use incurs energy costs as well as financial costs.

Significant facilities changes between 2005-2006 when this data was collect and present operations may have changed the emissions profile for water and wastewater.

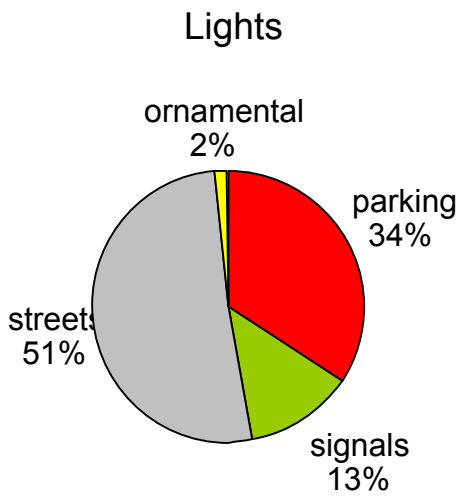
Vehicles

Town vehicles and equipment emitted 278 tons from burning gasoline (31,500 gallons) and 385 tons from burning diesel fuel (38,600 gallons), which make up 20% of town emissions. Opportunities here include:

- Consideration of high-efficiency options such as hybrid or electric vehicles each time vehicles are replaced. Police vehicles may be the best opportunity here because police vehicles are driven many miles per year and also spend a lot of time idling, and because hybrid cars and SUVs are readily available.
- Using smaller vehicles where possible. This could include simply downsizing maintenance vehicles where possible, and/or having a wider range of vehicles available, so that workers can choose the appropriate vehicle for the task (e.g. a small electric car rather than a pickup truck when it's not necessary to hauling equipment along).
- Decreasing or eliminating idling.

Street Lights

This category makes up 13% of Town emissions.



Street lights are the largest contributor to this category, at 51%. Lighting of parking areas, including the 7 Lebanon St. garage is also a large component, at 34%. Signals are only 34%, but are an attractive opportunity for savings because LEDs can replace conventional signal lights with vastly improved efficiency and long life for reduced maintenance cost and hassle and the investment is paid back quickly. The opportunities in street lighting are more complex because the lights are owned by the utility rather than the town, and the efficiency improvements, while significant, are not as large as with signals. However, reducing unnecessary street and parking lighting, or reducing their hours of operation, are simple and clearly cost effective opportunities. Ornamental lighting is only a small contributor, but LED lights are also an attractive option here for reduced maintenance as well as energy, and for symbolic reasons.

Recommendations

Buildings are the leading source of Town emissions. The CPC recommends proceeding with building energy audits as planned. These will identify the most cost effective opportunities for improvements. We recommend budgeting at least $100,000 for 2008-2009 to make some of the most cost-effective improvements identified by the audits, which can be expected to have short payback times.

Additional possible building improvements can be considered for future years, depending on the results of the audits and the success of the improvements made in 2008-2009. At this point there may be a need to more carefully weigh options and make policy decisions about what size investment to make and how long a payback time to accept.

In other areas we recommend continuing to examine options for improvements, or continuing with improvement programs that have already been started (such as upgrading traffic signals with LEDs). Whenever equipment and vehicles are replaced, or facilities are upgraded, there is an opportunity to opt for higher efficiency at moderate cost; these opportunities should not be missed. Areas that should be studied further include:

- Electricity and fuel oil use in wastewater treatment.
- Vehicles and diesel or gas-powered equipment
- Lighting of parking lots and the Lebanon St. parking structure; and street lights.

Beyond emissions from Town operations, we will be making other recommendations for polices that can help residents and business reduce their emissions in the Town.