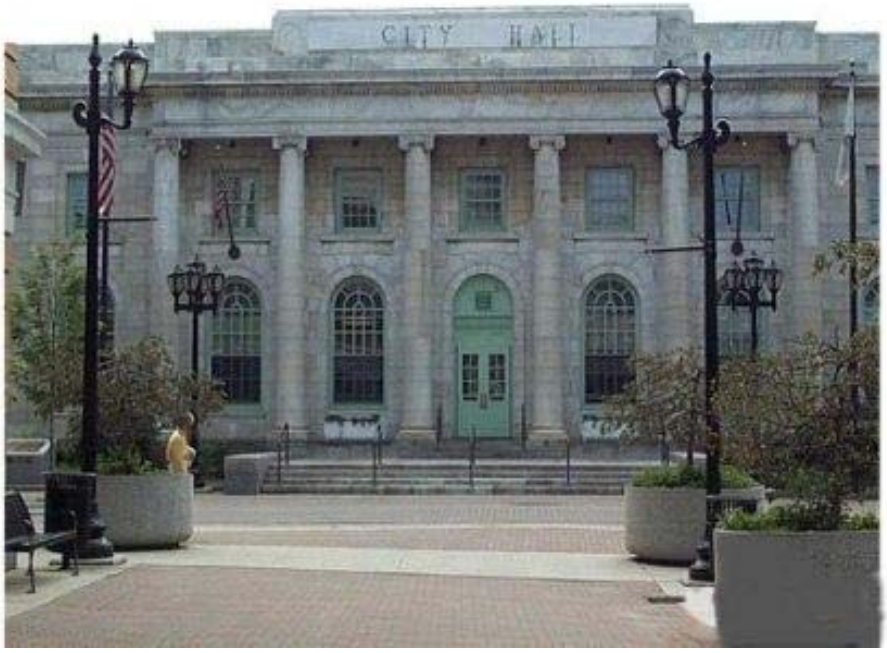
# Greening the Pittsfield Municipal Vehicle Fleet

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**Environmental Planning 302**
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**Problem Identification**

Green technologies have the capability of saving money and reducing the gases that contribute to global climate meltdown. This Paper is intended to move forward and increase the green initiatives already started by the City of Pittsfield. As the scientific debate over global climate meltdown diminishes to a murmur; nations, cities, and individuals are beginning to search for solutions to a global problem. More than %50 of the residents in the Berkshires live in communities that have ratified non binding commitments to lower Carbon Dioxide emissions[1]. It is our intent to provide data and suggestions in a clear and precise paper. Our hope is that the City of Pittsfield will be able to use our report to create change.

Change does not necessarily imply an increase in spending. The consulting firm McKinsey & Company released a report this year claiming that the United States could reduce their green house gas emissions by 28%. Most of the reduction methods would pay for themselves through lower energy costs[2]. Our results generally agree with this study. With little to no extra cost Pittsfield can significantly lower their green house gas Emissions.

This paper focuses on the carbon reduction possibilities for Pittsfield's municipal vehicle fleet. The vehicle fleet is just one contributor to carbon emissions. Carbon emissions come from three different sectors; residential, commercial, and municipal (figure 1). Each sector can be further broken down into heating, electricity, and

[1] John Earle
[2] NYTimes

transportation (figure 2). This paper represents only one section of the solution to global climate meltdown.

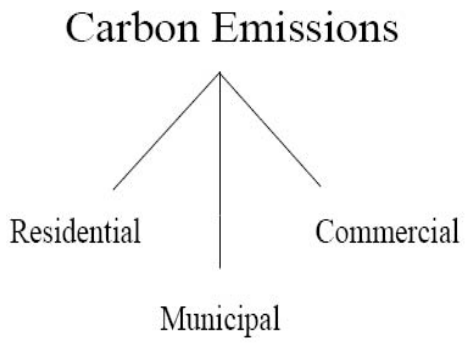



**Figure 1 Three sectors of carbon emissions**

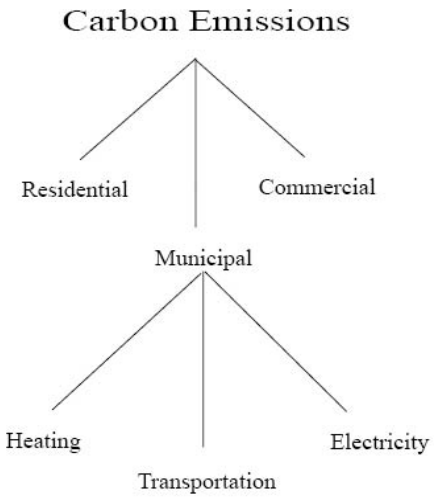



**Figure 2 Three producers of carbon emissions**

Pittsfield was selected for our project because it recently signed onto a variety of climate initiatives. On July 10th 2007 the Pittsfield Charter Township Board of Trustees unanimously agreed to Support the U.S. Conference of Mayors Climate Protection Agreement[3]. This agreement commits the signers to "agree to meet or exceed the Kyoto Protocol targets for reducing global warming pollution through local action."[4].

The goals of the Kyoto Protocol are as follows, "*The Kyoto Protocol is an agreement under which industrialized countries will reduce their collective emissions of greenhouse gas*es *by 5.2% compared to the year 1990[5]"*. Pittsfield has essentially

[3] http://pittsfieldtwp.org/boards/Board_of_Trustees/Minutes/2007%20Minutes/Minutes%20of%207-10-07
[4] http://www.windaction.org/news/6448
[5] http://unfccc.int/kyoto_protocol/background/items/2879.php

pledged to honor a treaty that the United States has rejected. While this step is admirable, the government needs to stand behind their commitment.

The city council ratified the Cities for Climate Protection(CCP) campaign on May 23, 2006. The CCP is the flagship program of the International Council for Local Environmental Initiatives (I.C.L.E.I.). The CCP, "assists cities to adopt policies and implement quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability.[6]". The CCP assists cities by offering them a framework to help implement climate action targets. It is up to the individual cities to decide which goals to aim for and how to achieve them.

The main message of the CCP is to encourage cities to follow their Five Milestones outline. The Five Milestones are the following:

**Milestone 1.** Conduct a baseline emissions inventory and forecast[7]. Based on energy consumption and waste generation, the city calculates greenhouse gas emissions for a base year (e.g., 2000) and for a forecast year (e.g., 2015). The inventory and forecast provide a benchmark against which the city can measure progress.

**Milestone 2.** Adopt an emissions reduction target for the forecast year[8]. The city establishes an emission reduction target for the city. The target both fosters political will and creates a framework to guide the planning and implementation of measures.

[6] http://www.iclei.org/index.php?id=800
[7] http://www.iclei.org/index.php?id=810
[8] http://www.iclei.org/index.php?id=810

**Milestone 3.** Develop a Local Action Plan[9]. Through a multi-stakeholder process, the city develops a Local Action Plan that describes the policies and measures that the local government will take to reduce greenhouse gas emissions and achieve its emissions reduction target. Most plans include a timeline, a description of financing mechanisms, and an assignment of responsibility to departments and staff. In addition to direct greenhouse gas reduction measures, most plans also incorporate public aware-ness and education efforts.

**Milestone 4.** Implement policies and measures[10]. The city implements the policies and measures contained in their Local Action Plan. Typical policies and measures implemented by Participants include energy efficiency improvements to municipal buildings and water treatment facilities, streetlight retrofits, public transit improvements, installation of renewable power applications, and methane recovery from waste management.

**Milestone 5.** Monitor and verify results[11]. Monitoring and verifying progress on the implementation of measures to reduce or avoid greenhouse gas emissions is an ongoing process. Monitoring begins once measures are implemented and continues for the life of the measures, providing important feedback that can be use to improve the measures over time.

[9] http://www.iclei.org/index.php?id=810
[10] http://www.iclei.org/index.php?id=810
[11] http://www.iclei.org/index.php?id=810

Currently various departments of the Pittsfield Municipality are working on different stages of the milestones. To our knowledge no department has completed a baseline calculation of Carbon Emissions for any given year. This is evidence of a lack a quantifiable strategy to reduce emissions. Ideally this paper will show the need for a comprehensive strategy to reduce carbon emissions.

### Clients Goals

Bruce Collinwood, Commissioner of Public Works and Ernie Fortini, the head of Building Maintenance, helped guide the goals of the project. They requested we take an inventory of the municipal vehicle fleet, make recommendations for change, and create a plan for the future. The information and guidance they offered was essential to the completion of this study.

Nancy Nylen at the Center for Ecological Technology was integral in helping us interpret and organize our data and results. She provided us with lots of background information as well as a sounding board for our ideas.

## Community Profile

### The Berkshires

Pittsfield is nestled into the heart of the Berkshires. The Berkshires are known for their idyllic beauty, and wide array of cultural activities. They are in close proximity to both New York City and Boston. The Berkshires have become the playground for city dwellers that long for the country but do not want to leave the culture of a more urban area. The Berkshires are in a unique position to meet these standards. Pittsfield is home to

a wide variety of music, art, theater, and dance. Lenox is home to Tanglewood, Williamstown has WCMA and the Clark Art Museum. North Adams recently turned from a run down mill town to contemporary art

## Pittsfield

Pittsfield is now using its central location in the Berkshires to try and attract the same clientele. This emphasis on the arts is helping to rejuvenate the image of Pittsfield. They have invested heavily in the arts spending millions to renovate their Colonial theater. The theater is known as one of the acoustical gems of the World.

When General Electric (GE) significantly downsized their operations in Pittsfield, they took with them 12,300 jobs[12]. GE was the main employer in Pittsfield at the time. The loss of jobs sent Pittsfield in an economic downturn. For years Pittsfield was known for its high crime rates, and low employment rates. With a new focus on the arts, Pittsfield is beginning to shed its old image for new more attractive image.

Pittsfield recently won a competition to work with American Institute of Architects. The Architects, working with members from the city came up with a design charrette for the city. Another development which has helped make Pittsfield more livable is a new arts overlay district. This new zoning has helped revitalize Pittsfield's downtown. New developments are popping up everywhere as Pittsfield becomes the urban center for the Berkshires. The mix of nature and culture can be a perfect combination for many second home owners who want to be close to nature but do not want to leave in isolation.

[12] http://www.pittsfield-ma.org/

Another sign of change is the development of designer hotel chains and restaurants. The world-renowned porches in North Adams have hired Architects Burr and McCallum to design their new location in Pittsfield. Also the most recent winner of TV's Top Chef hailed from Pittsfield's well loved Dragon restaurant.

Meanwhile education and safety are still a major problem in Pittsfield. The Mayor has pledged to keep a continued focus on these two sectors, promising better infrastructure for schools as well as more police officers on the street. The mayor also acknowledged that these promises will cost money and that the city cannot expect to keep raising taxes on their citizens and commercial areas. The mayor stressed the need to find alternative sources of revenue.

## The Municipality

The municipality of Pittsfield consists of 110 buildings, 27 departments, and 404 vehicles. There is a mayor and a city council. The current operating budget is 117 million dollars. Education, safety, and reducing costs continue to be major priority of Mayor Roberto.

## Methods

**Survey:**

The intent of our survey was to better understand the driver's specific needs. As green technologies advance, how a vehicle is powered becomes more and more flexible. Alternatives range from hybrid and electric vehicles to alterations in fuel as well as traditional vehicles with improved milege. These various forms do not all operate equally

well. For instance a hybrid pickup truck and a regular pick up do not necessarily have the same amount of power. The survey was used to make sure basic vehicle requirements were met before various energy concerns was considered.

The other purpose of the survey was to identify vehicle purpose. Vehicles are very flexible tools. Certain vehicles are better used for some tasks and not for others. This survey would hopefully illuminate how individual vehicles are being used.

**Interviews:**

We interviewed various members of the municipality. This helped us better understand how the municipality works. We used interviews to find out how vehicles are purchased, repaired, and replaced. We also used interviews to get a sense of the priorities of different departments. Different departments have different concerns. It was important to our study that a wide range of opinions were considered.

**Data Collection:**

We gathered concrete data such as vehicle miles traveled and fuel consumption. This allowed us to show concretely which cars were being used the most frequently. It also helped look at what type of vehicles the municipality owned and the range of replacement possibilities. We were able to see which vehicles had been in the department for a long time and were due for replacement and which vehicles were brand new.

Concrete numbers were also used to look at areas of greatest potential benefit. We wanted to see which department emits the most carbon dioxide. Which department has

the greatest number of vehicles? Which individual vehicles create the most carbon dioxide? As well as just getting a collection of the vehicles in the municipality.

**Comparisons to other cities:**

Another tool we used for this paper was looking at other green fleets around the country. Many cities have already found ways of reducing the carbon emissions from their own fleet. We looked at what other cities had done and then researched the feasibility of the changes if they were to be implemented in Pittsfield.

# Part II

### Procedure for Analysis

Tom Foody of the Highway department provided us with information on the yearly/monthly fuel usage for each of the municipal vehicles. Not all departments have participated in the highway department's data analysis program and not all vehicles within each department are registered for the program. However, the information that has been given to us, allows us to make a good cross-section of municipal vehicle fleet. Thus we thought through extruding out these numbers on a department-by-department basis would give a fairly good estimation of total annual $CO_2$ emissions rates and annual fuel costs for all 404 registered vehicles.

By cross referencing Tom Foody's data with the information from the vehicle speculations sheet provided by Jim Carpenter of the maintenance department, we were able to determine each car's fuel type. From this we were able to calculate monthly and yearly carbon dioxide emissions rates for each department by multiplying the yearly

usage of gallons of gasoline or diesel fuel by a conversion factor of 19.37lbs/gal and 22.23lbs/gal respectively[13]. We also calculated the total amount of money spent on fuel by the municipality. We took the average price of gasoline and diesel fuel for New England in 2006, which was $2.60 and $2.80 respectively and multiplied that by the amount of gasoline used yearly and monthly by each car[14]. Although gas prices have fluctuated quite a bit, these numbers could give a pretty good estimation of the annual fuel costs. In addition one discrepancy remains that the municipality does not pay taxes on diesel fuel, which was not accounted for in our data set. This means that total estimates for annual fuel cost might be a bit high for diesel vehicles. However, conversely the current trend of increasing gas prices would account for some underestimations. As such our calculations for total annual fuel costs must be seen as merely an approximation of the actual budget.

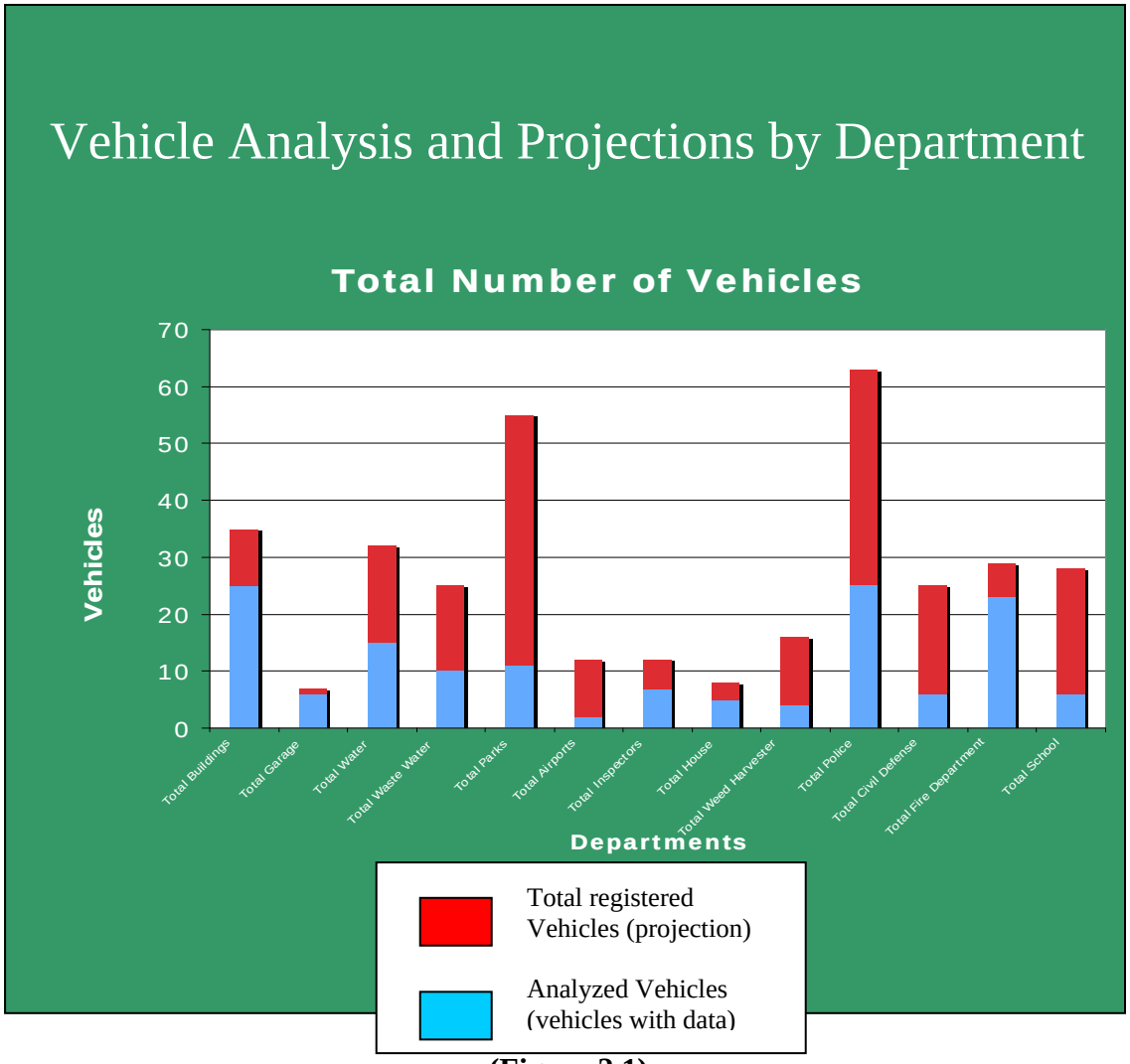
Inventory of Current Fleet

Form the information that we gathered; we concluded that municipality emits about 832.44 metric tons of carbon dioxide yearly from the 145 vehicles that we surveyed. The municipality spends about $82,000 on fuel each year on these 145 vehicles. When we extruded this data out for the rest of the 404 vehicles we estimated that the municipal vehicles emit about 1,137 tons of carbon dioxide a year and spends upwards of $120,000 in fuel every year. We found that some of biggest contributors to

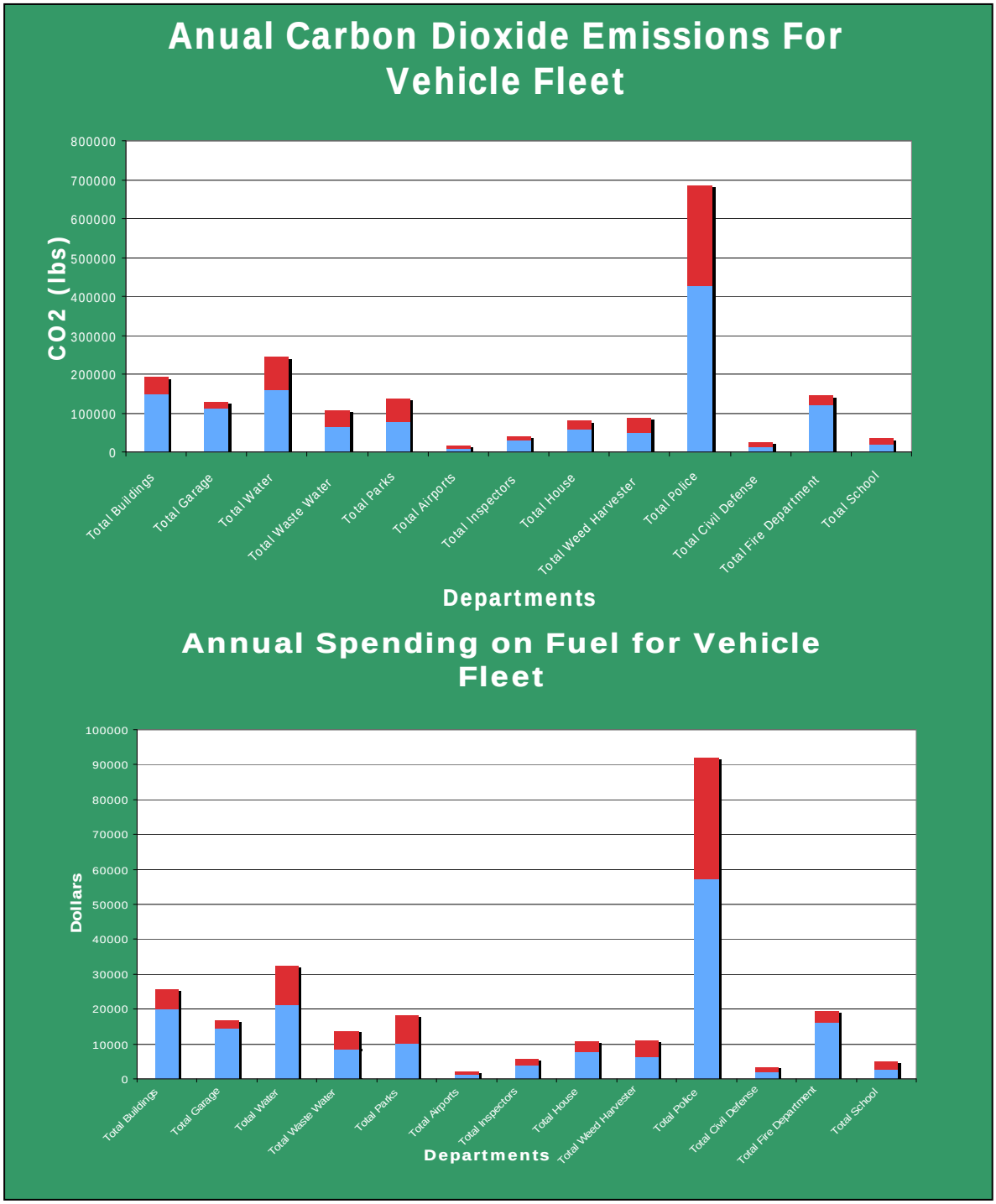
[13] These conversation factors were taken from the EPA website ( "Emissions facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel" U.S. Environmental Protection Agency. http://www.epa.gov/otaq/climate/420f05001.htm#calculating (July 30, 2007) .

[14] Information on gas and diesel prices obtained from the Energy Information Administration. "Gasoline and Diesel Fuel Update". Energy information Administration. http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp (Nov. 26, 2007).

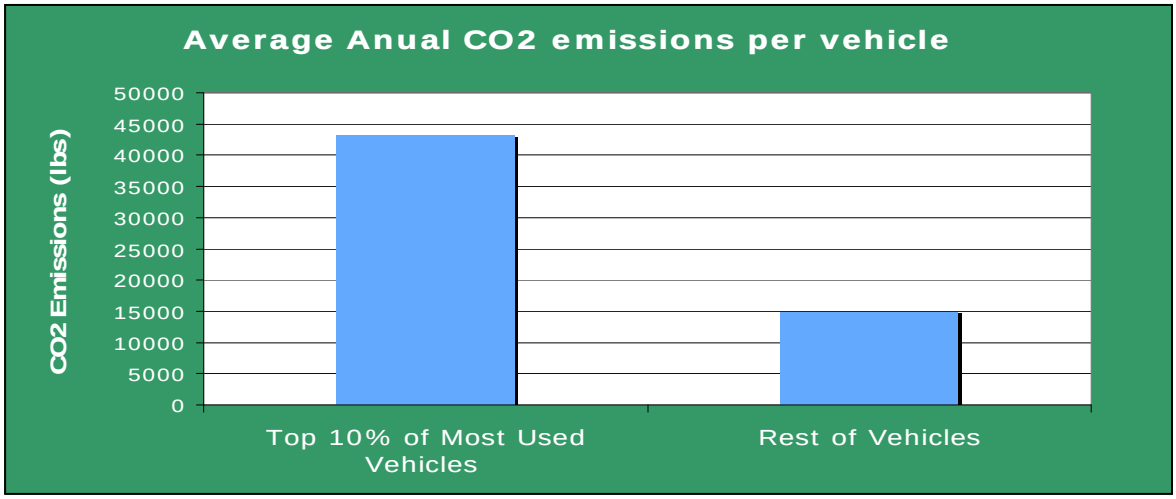
these expenditures are the Highway and Police departments (even with some records from the police department withstanding). Due to a largely diesel based fleet, the highway department emits about 195.62 metric tons of carbon dioxide a year. Even though the police department does not have that many more cars, they tend to drive more miles per year and burns more fuel per year than the highway department, which makes it the most costly department, spending about $57, 299 a year on fuel for the 25 cars that we surveyed. We projected that for the 62 total vehicles in the department about $90,000 is spent on fuel every year which emits about 310 tons of carbon dioxide each year.




**(Figure 2.1)**

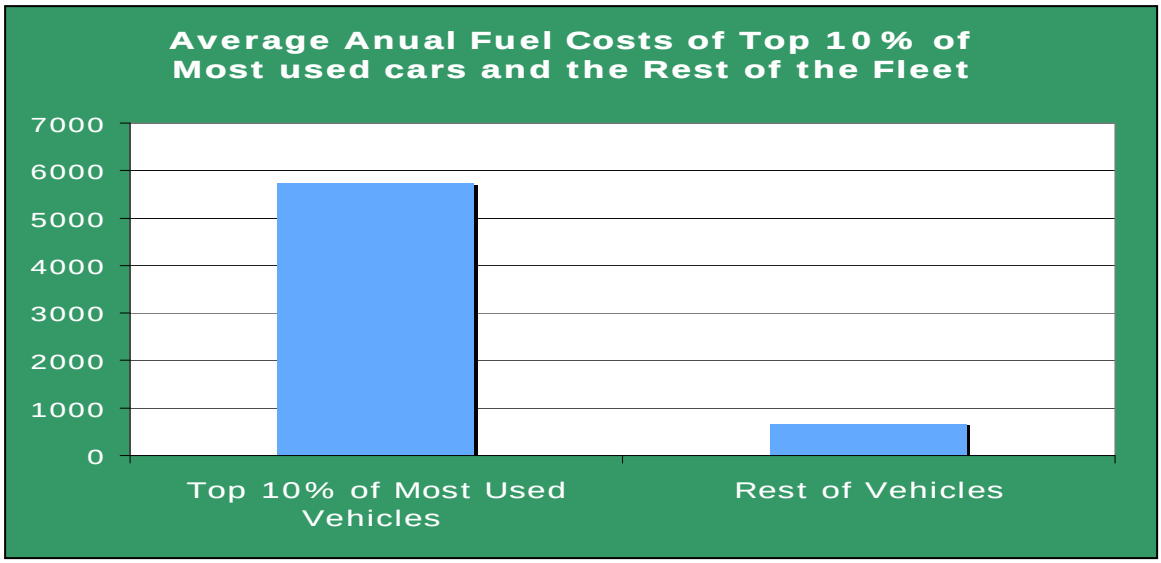

Anual Carbon Dioxide Emissions For Vehicle Fleet
CO2 (lbs)
800000
700000
600000
500000
400000
300000
200000
100000
0
Total Buildings
Total Garage
Total Water
Total Waste Water
Total Parks
Total Airports
Total Inspectors
Total House
Total Weed Harvester
Total Police
Total Civil Defense
Total Fire Department
Total School
Departments
Annual Spending on Fuel for Vehicle Fleet
Dollars
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
Total Buildings
Total Garage
Total Water
Total Waste Water
Total Parks
Total Airports
Total Inspectors
Total House
Total Weed Harvester
Total Police
Total Civil Defense
Total Fire Department
Total School
Departments

We also found that much of the fuel usage was concentrated in the top 10% of the most used vehicles. In fact just fifteen of the 145 vehicles we examined accounted for 50% of the annual fuel expenditures and a little more than a third of total carbon emissions (See Figure 2.2). This shows that several vehicles tend to be used much more frequently than the rest of the vehicles. It should be important to track these cars and trucks to make sure they are running as efficiently as possible and are updated when models with better fuel economy are available. Making sure that these vehicles are taking the most efficient route may reduce extraneous expenditures on fuel. Some of these vehicles are police patrol vehicles and certain measures cannot be taken to jeopardize performance of these vehicles. However 10 of these vehicles were from different departments and one of which is a utility trailer that dates back to 1969[15]. Making sure that these vehicles are monitored with GPS tracking systems so that the highway department knows when they need to be brought in for regular maintenance operations and when a replacement is viable. These strategies are essential in raising efficiency levels and curbing carbon dioxide emissions.




**(Figure 2.2)**

[15] This vehicle is a 1969 Steve Utility Trailer owned by the Airport Department

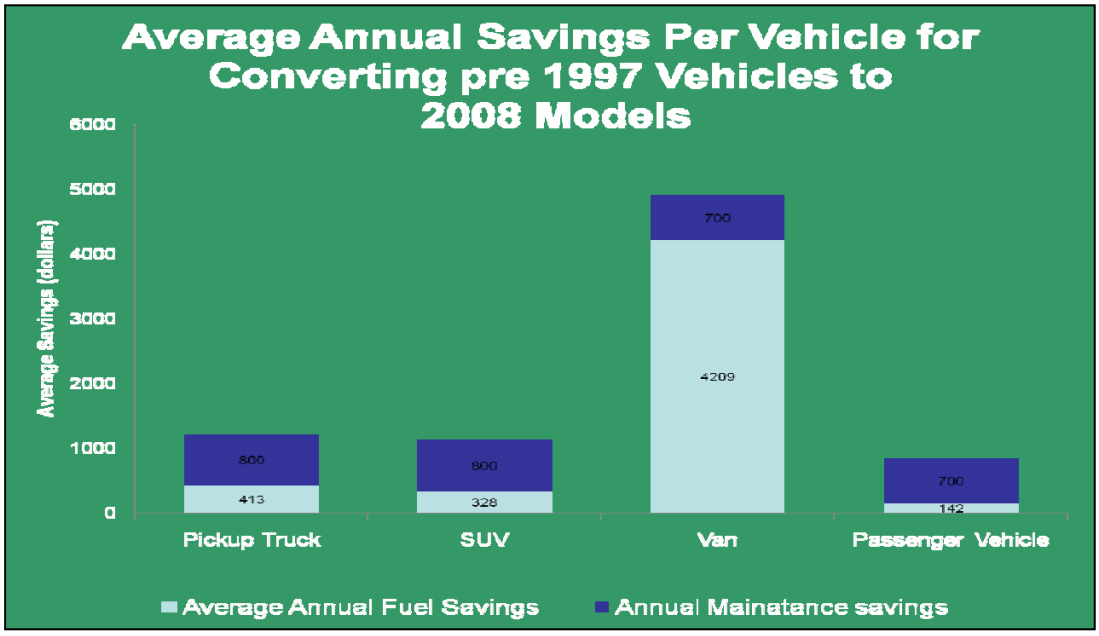



**(Figure 2.3)**

**Analysis of Purchasing and Leasing Plans**

We also wanted to calculate possible savings for different replacement plans and leasing plans. So we focused on the cars that dated from 1997 and before, since these were the vehicles, according to Jim Carpenter, that are much more costly to maintain and will be replaced in the near future. Jim Carpenter estimated that pre-1997 models cost about $1,200 per year to maintenance while, the newer cars only cost about $500 per year for oil changes and minor repairs. In addition the pre-1997 models on average have a lower fuel economy rating and generally get lower miles per gallon ratings as they get older. We also wanted to focus on lightweight trucks and passenger vehicles since heavy-duty dump trucks, compressors, pavers, and tractors tend not to have a wide range of more efficient options and generally do not even have to report fuel economy ratings. We had information on 44 of the total 136 registered lightweight cars and trucks that dated before 1997. The average pre-1997 model pickup in the fleet got 13 MPG, the average Sport Utility Vehicle got 14 MPG, the average van got about 14 MPG and the average

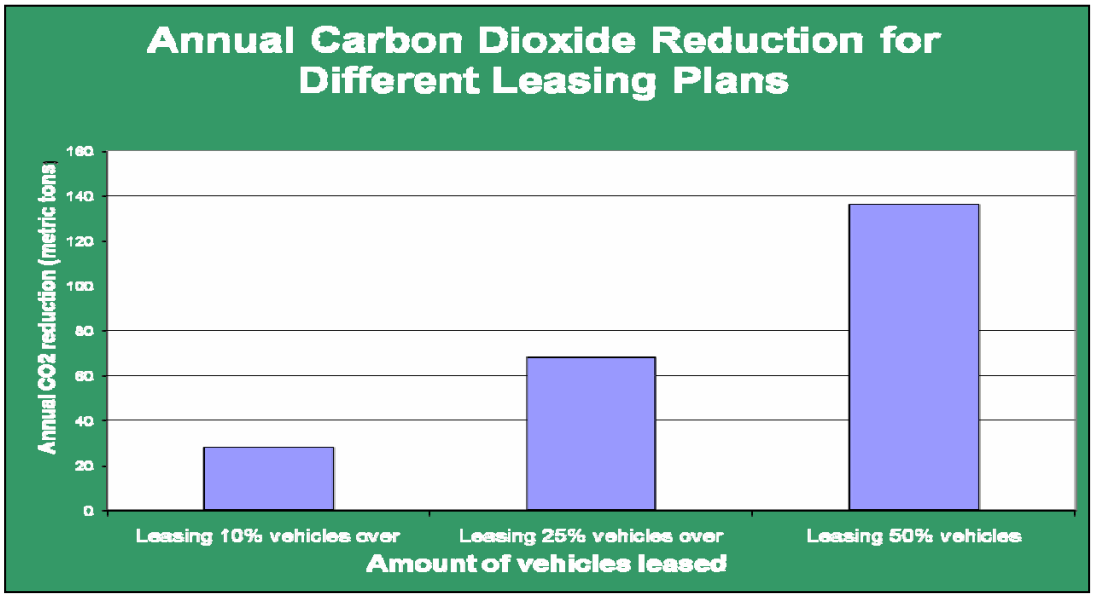
passenger vehicles got about 17 MPG. Comparable 2008 models of pickup truck, like the Ford Ranger gets 22 MPG. The 2008 four-wheel drive Ford Escape hybrid gets 28 MPG, the 2008 GMC Savana cargo van gets 18 MPG and the Honda civic hybrid gets about 42 MPG. So converting to 2008 models would show a significant reduction in yearly fuel usage. In addition changing to newer more, fuel efficient models would also cut maintenance costs (see Figure 1.4 below). Each vehicle would save about $1,000 a year in costs and converting vans to 2008 models would result in about $5,000 in savings.




**(Figure 2.4)**

In addition, converting 10% of these vehicles to 2008 models would reduce yearly CO2 emissions by 28 metric tons (the equivalent of taking 4 cars off the road), replacing 25% of these models to 2008 cars would reduce yearly emissions by 68 metric tons (the equivalent of taking 9 cars off the road) and replacing 50% of these pre-1997 vehicles would result in a reduction of about 136 metric tons of CO2 ( the equivalent of taking 19

cars off the road).

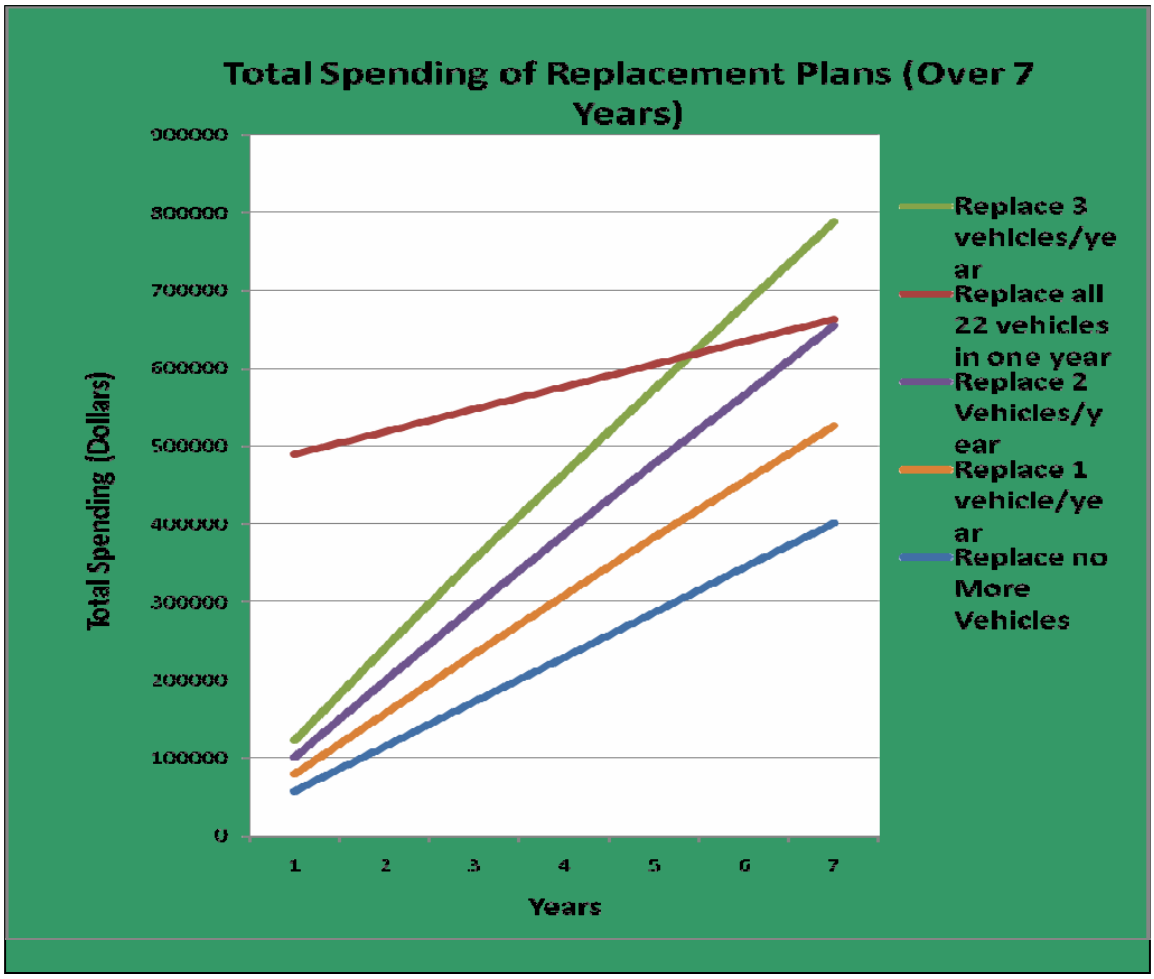



**(Figure 2.5)**

However, initial costs would be very high if the municipality were to purchase new 2008 models for all 136 of their pre-1997 trucks and passenger cars. In fact purchasing new cars and replacing 10%, 25%, 50% of their pre-1997 vehicles would result in initial costs of $294,000, $714,000, and $1,428,000 respectively. So we looked at different purchasing options and leasing options that would help the municipality set long term goals for future replacement policies. Many of these vehicles will probably have to be replaced in the near future due to mechanical failures. Depending on the average rate of replacement of these vehicles certain purchasing plans and leasing plans would save the municipality more money. We looked at each plan in relation to the percentage of vehicles that would need to be replaced over the next 7 years. For example if 10% of the vehicles were to need replacement over the next 7 years that would be a 10% replacement rate, if 25% of the vehicles were to be replaced over the next 7 years that would be a 25% replacement rate, etc. What this allowed us to do was analyze each

plan in relation to the Pittsfield's current operational system which uses them until they are no longer are operable. Of course depending on the vehicle and its use, certain vehicles might last longer than others and it is hard to tell exactly how long each vehicle will be operational. What this analysis intends to do is get an understanding of optimal purchasing strategies in relation to hypothetical replacement rates. Pittsfield would choose the plan that best suits their replacement rate of pre-1997 vehicles. Talking to Jim Carpenter of the garage and Tom Foody of the highway department, the municipality could get a general idea of replacement trends.

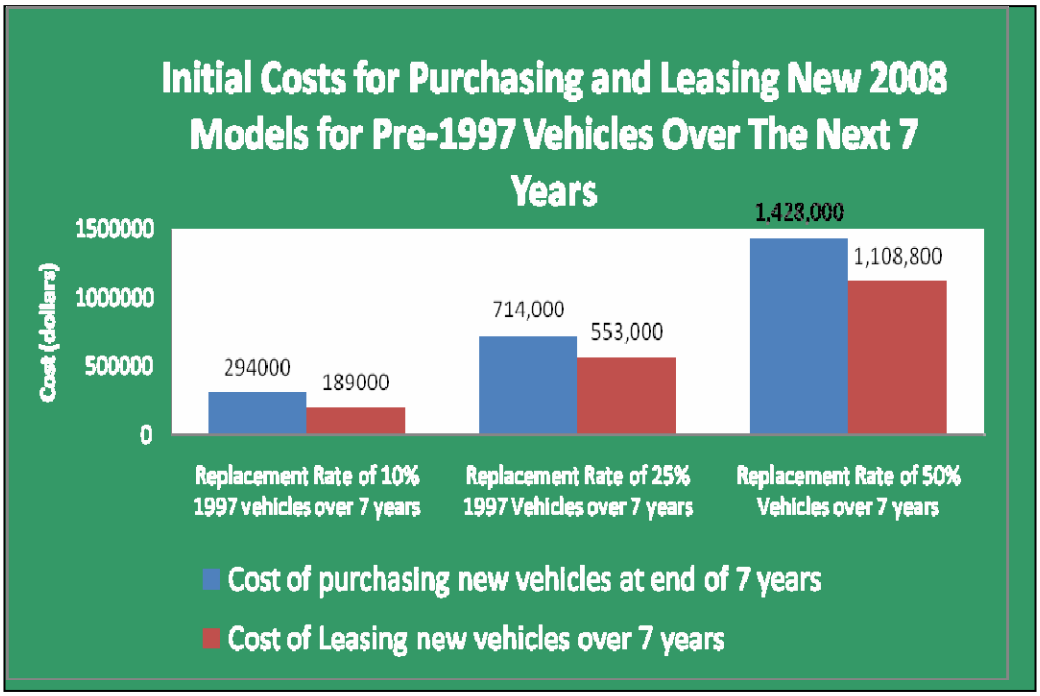
Simply purchasing new cars in place of the pre-1997 models does not seem feasible as a means of saving money. If Pittsfield buys new 2008 models for all the 22 vehicles pre-1997 light-trucks and cars this year, these initial costs would only be made up after 7 years in fuel and maintenance costs, assuming that 2 vehicles need to be replaced each year anyway (See Figure 2.6). However, if the municipality has a 30% replacement rate or lower for these pre-1997 models, than it seems more cost effective to drive these vehicles into the ground, and purchase new cars when needed. That is to say that fuel and maintenance costs alone will not offset the initial costs of buying cars up-front.



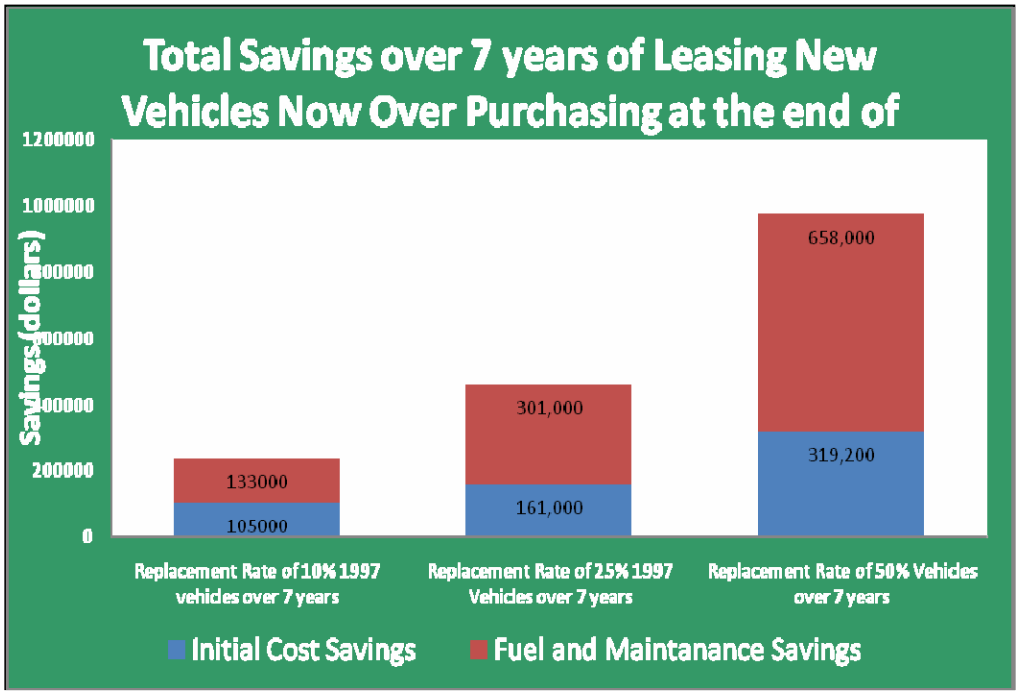

**(Figure 2.6)**

If over the next 7 years if 14 of these pre 1997 vehicles need to be replaced (10% replacement rate), a leasing plan would seem to be the most cost-effective way of updating these vehicles. In fact the initial cost of purchasing new vehicles would be around $294,000 while leasing these vehicles over 7 years with a plan that costs $2,400 a year per vehicle, would cost only $189,000. If the municipality were to switch to a leasing plan for these 14 vehicles now rather than replacing them at the end of 7 years, the savings would amount to about $133,000 in fuel and maintenance costs (See Figure 2.7). If 34 of these pre 1997 vehicles will need to be replaced over the next seven years (about 25% replacement rate), it seems leasing these new vehicles up front with a 3 year

leasing plan would save even more money. In this case a leasing plan would save the municipality about $161,000 in initial costs since leasing these new 2008 vehicles (a total cost of about $553,000 over 7 years) would be significantly less than purchasing new ones (which would cost about $714,000) (See Figure 2.7). In addition if the city turned to a leasing plan this year maintenance and fuel costs would be reduced over the next 7 years by about $301,000. Thus the total savings for leasing these new 2008 vehicles would amount to about $462,000 over 7 years (See Figure 2.8). In addition, the leasing option gives the municipality the flexibility to trade in for newer models as fuel efficiency standards improve, resulting in even more savings on fuel costs. If the municipality will need to replace 68 of these old pre 1997 vehicles, leasing at least some portion of new 2008 vehicles now save the municipality even more money. If the municipality signed on to a similar leasing plan this year for these 68 vehicles rather than purchasing new ones when they breakdown, the municipality would save approximately $319,000 in up-front costs, and another $658,000 in fuel and maintenance costs over these 7 years (See Figure 2.8). This would save the municipality almost 1 million dollars over the next 7 years if they would need to replace 50% of their pre-1997 vehicles over the next 7 years.




**(Figure 2.7)**




**(Figure 2.8)**

In this instance leasing helps reduce the initial costs of replacing large number of vehicles while also cutting down on maintenance costs and fuel costs. In addition to

saving money these leasing plans will reduce carbon emissions by the fleet (See Figure 2.5). However it will be important to find a suitable leasing plan and there is a great range of yearly payments. If the municipality can find a plan that has annual cost of $2,400/per vehicle it makes sense to switch to that plan for pre-1997 vehicles. However, if the leasing plan is around $4,500 and city thinks that it can retain 90% of its pre-1997 vehicles over the next 7 years, than it will not be more cost effective to switch to this plan. However, even a mid-range $4,500/ year plan for 34 of the pre 1997 vehicles would save the municipality $50,000 over the next 7 years and reduce carbon emissions by 68 tons a year. So it seems that most leasing plans would be the most cost effective and environmentally responsible action for the municipality. Even though in some cases it leasing might cost more, it is important option to consider for the future so that fleet remain flexible and up-to-date on technological advancements.

**Data Collection and Analysis for the Future**

Much of this information we have gathered is incomplete, and some departments have not reported all of their vehicle information. Part of the challenge is making sure that Pittsfield participates in more cross-departmental communication so that the municipality can make appropriate decisions for the city as a whole. It will be helpful if all their information can be compiled in one place so that they will know when certain vehicles need to be taken in for maintenance or need to be replaced.

Tom Foody of the highway department is now trying to implement a data collection program for each vehicle's annual mileage and fuel usage. Taking this data and doing similar analysis that we can done above, will help the municipality make sure that

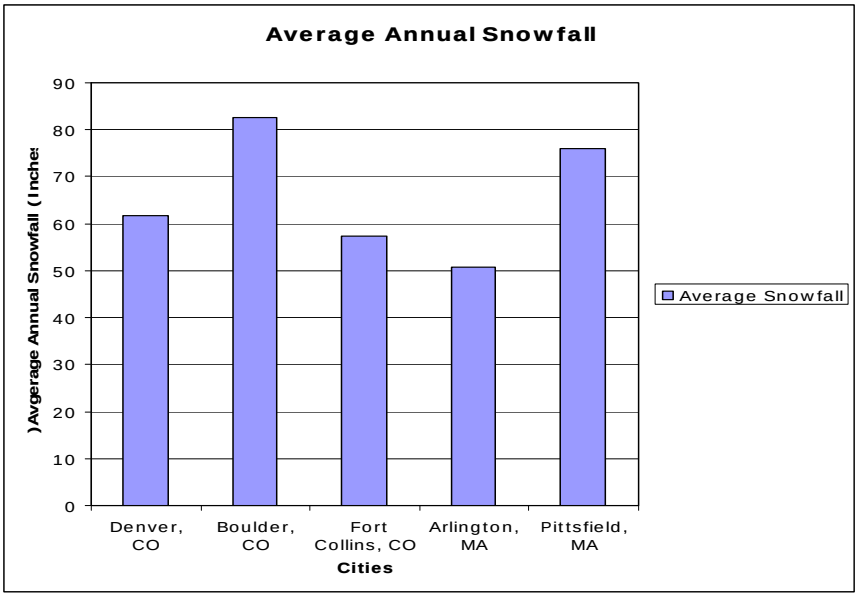
they are making the right purchasing decisions and running the most efficient fleet possible. It is vital that all the departments participate in this data collection program so that the municipality can more readily approach cross-departmental leasing plans and purchasing plans. Keeping updated data like this will also help to cut maintenance costs and fuel cost by scheduling more proactive maintenance operations, rather than waiting until a problem arises. Collecting this kind of data and analyzing it is an important step towards helping the municipality's fleet cut costs and reduce carbon emissions.

**Green Fleets around the Globe:**

Throughout our project we sought to find the most practical and effective carbon reduction strategies that would not only be beneficial to the environment but to the municipality of Pittsfield as well. Reducing your carbon footprint does not necessarily entail making drastic and uncomfortable sacrifices; in fact often time's carbon reduction goes hand in hand with fiscal savings; however, in order to do this it is important to tailor specific carbon reduction solutions that make sense given the city.

In order to recommend the most sensible solutions to the city of Pittsfield, we investigated steps other cities have taken to 'green' their fleets. This allowed us to not only see which steps have been the most effective, but also which steps would work in a city like Pittsfield. As a result, we made sure to look at cities that were similar to Pittsfield, whether in size or climate.

The climate is very influential in determining effective solutions, for, as you can see below in *Graph 1*, Pittsfield receives approximately 80 inches of snow annually, so every strategy proposed must be functional in all types of weather.




**Graph #1:** *As this graph illustrates while Pittsfield has an annual snowfall of approximately 76 inches, Boulder Colorado has a higher snowfall of about 83 inches and is still finding ways to green their fleet. Green fleets can be effective in any climate.*

Cities around the world having been taking climate protection into their own hands, believing local action to be the most realistic way to reduce local carbon emissions. While setting a local emissions target and implementing a reduction strategy can prove to be a daunting task, what we noted from our research is that many cities have been following the International Council for Local Environmental Initiatives, or ICLEI's 3-step guide towards greening your fleet.

ICLEI is an organization designed to educate and empower local governments to take action on climate change and they create quick and easy guidelines that help cities like Pittsfield get the ball rolling. With ICLEI's help cities such as Boulder, Colorado and San Francisco, California have created some of the most environmentally friendly fleets in the world.

**ICLEI's Green Fleet Initiative[16]:**

1) Perform an in depth inventory of fleet vehicles focusing on:
    a. The number of vehicles classified by year, make, model, engine size, VIN number, drive train type (2-wheel or 4-wheel drive) and rated vehicle weight.
    b. Miles per gallon per vehicle
    c. Type of fuels used
    d. Average cost per gallon of fuel
    e. Average fuel cost per mile
    f. Annual miles driven per vehicle
    g. Total fuel consumption per vehicle
    h. Vehicle function
    i. Estimated emissions per mile
    j. Carbon dioxide calculations based on gallons of fuel consumed

2) Use this information to set realistic goals for the fleet regarding a reduction of fuel use, and carbon dioxide emissions.
3) Employing cost effective measures (examples below) to ensure that the goals set in step two are reached. These actions, if implemented wisely, should not adversely effect the day-to-day operations of the municipality and may in fact result in significant savings.
    a. Downsize vehicles
    b. Optimize vehicle use
    c. Maximize efficiency
    d. Consider Alternative Fuels
    e. Use alternative transit: Bike, Walk
    f. Incorporate efficiency into bid specifications

Many cities have benefited simply by following these three steps, but many other cities have been taking action on their own.

In addition to ICLEI we found a number of other helpful sources that gave us ideas for ways to reduce the carbon emissions of the Pittsfield municipal fleet. One thing that we noted from our research is that a lot of municipalities are looking into alternative modes of transportation that produce no carbon emissions at all. Over 400 police fleets across the country have implemented the use of segways, essentially electric scooters; many departments also employ bike patrol cops. Cities everywhere are realizing their

[16] This information was taken from www.iclei.org

impact on the environment and are looking into reducing their emissions in any way possible.

**Recommendations:**

From our research we came up with a number of recommendations to reduce carbon emissions that we think would be both feasible and beneficial. We split up our recommendations into two categories: those that directly reduce carbon emissions, and those that indirectly reduce carbon emissions. None of our recommendations are mutually exclusive; therefore, more than one strategy can be employed.

**Direct Carbon Reduction Recommendations:**

Our first recommendation was simply, to **purchase fuel-efficient vehicles** when it makes sense. A better car for the environment does not always necessitate a hybrid, but that does not mean that an SUV is always the right answer either. There are many alternative vehicles available that can perform the same function as your old car but more efficiently. On that note, it is important to raise awareness about the availability and benefit of these vehicles so that when it comes time to replace an old gas guzzling vehicle, just as you would look into the engine type or horsepower of the new vehicle you also take into consideration its fuel efficiency.

While many people may think finding fuel efficient vehicles is a complicated feat, the truth of the matter is there are numerous websites online that provide an in depth survey of the car including its fuel efficiency and carbon footprint, one such website is a product of the Environmental Protection Agency (EPA), **www.fueleconomy.gov**. These

websites make it really easy to see which car will best suit your needs. While, these sources are just one click away, many people are completely unaware of their service. By raising awareness of the ease of this process, more and more people will be willing to consider the environmental impact of their new car and will look into whether or not there was a way to reduce this impact without sacrificing the function of the vehicle.

Our second recommendation to the city of Pittsfield is to **reduce the vehicle miles traveled** by their fleet. While it only requires a small change or update, route optimization if diligently scheduled could make a big difference, not only with a reduction of carbon emissions but with economic savings as well. Route optimization for solid waste trucks in Toronto, Ontario is saving 140,000 gallons of fuel and reducing carbon emissions by 1,500 tons a year[17]. While Pittsfield is a smaller city than Toronto, there is still a great potential for savings.

Our third recommendation, which would directly reduce the carbon emissions of the city's municipal fleet, would be the use of **alternative fuels**. A new biodiesel plant is underway in Pittsfield, making this a very attractive option, as an increase in its use would also mean an increase in support for the local economy. Biodiesel is significantly less detrimental to the environment than petroleum diesel, practically cutting carbon dioxide emissions in half. As a result, it has numerous health benefits. Operators have stated that the headaches they would get from operating equipment with 100% diesel have gone away while working with operating equipment using a B20 blend of biodiesel.[18] Biodiesel is a biodegradable, renewable source of energy, capable of running

[17] www.iclei.org
[18] www.ci.keene.nh.us/publicworks/fleet.htm

in existing unmodified diesel engines, from light to heavy duty[19]. This would make it easy to faze both in and out. Keene, New Hampshire converted 68 trucks to biodiesel, reducing their carbon emissions by 417 tons per year. It is important to look into all possible alternatives including biofuels, as any little reduction can help.

Another option we considered was the **adoption of a vehicle-leasing plan**. Cities such as Kittery, Maine and Cambridge, Massachusetts are adamant that leasing plans maximize the efficiency of the fleet by ensuring that regular maintenance is performed on the vehicles, a study done by MIT showed that leasing was a more optimal alternative to purchasing new vehicles for the City of Cambridge. A leasing plan also creates a replacement schedule that is usually around 3-4 years, allowing the fleet to be at the cusp of new fuel efficiency technologies. This is extremely useful for vehicles that do a lot of mileage, for example police patrol vehicles, because as a vehicle gets driven into the ground it loses its fuel efficiency, and often accrues additional maintenance costs. By replacing these cars more often, it is not only beneficial for the police officers who get to drive top of the line vehicles every 4 years but for the environment. Leasing is also beneficial because it creates a pay as you go system; there is no sunk cost.

**Indirect Carbon Reduction Recommendations:**

In addition to our recommendations that would directly reduce carbon emissions, we developed numerous policy recommendations that would help solidify a common environmental goal, around which the municipality could base its actions. While such recommendations do not directly reduce carbon emissions, they are just as important.

[19] Information taken from http://www.biodiesel.com/why_biodiesel.htm

Policy is integral in creating successful green management; which in turn has the power to implement the direct carbon reduction strategies mentioned above.

It is clear that laws and policies are critical in ensuring that an environmental standard is upheld within the municipality. As such, we came up with three policy recommendations we think would be easy to implement and very helpful in increasing environmental awareness.

Our first policy recommendation is in favor of the creation of a **Green Fleet Committee**. A green fleet committee would consist of a member from fleet services, a member from the purchasing department and a member from the equipment board, who would in turn meet once a month to guide and development and implementation of fleet policies. A green fleet committee would ensure that information about fuel-efficient vehicles and equipment is readily available and has been considered by all departments making purchases. The green board would be in charge of over seeing all the purchases made to ensure that a minimum environmental standard is being upheld and the vehicles that are the most fuel-efficient and minimize environmental impact are put out to bid.

While department heads within the municipality are often swamped with responsibilities, the green fleet committee could take on the responsibility of researching grant opportunities that would help fund projects such as the greening of a municipal fleet. There are numerous grant opportunities out there; Boulder, Colorado fleet services received an $80,000 grant from a Federal program to pay for technology to reduce emissions from the larger diesel vehicles in their fleet[20].

[20] Boulder, Colorado received an $80,000 grant from the Federal Congestion Mitigation Air Quality (CMAQ) program, locally administered by the Air Quality Program. Information obtained from the Memorandum Information Packet for the City Council of Boulder, Colorado.

Another forward step in the sector of green law and policy would be the **implementation of a fuel-efficient bylaw**. With the implementation of a fuel-efficient bylaw a minimum environmental standard is incorporated into the vehicle purchasing policy. When it comes time to replace a vehicle, the most fuel-efficient model available that will perform the intended function will replace it. Arlington, Massachusetts passes such a bylaw in 2002.

Nationally, there is a push for an increase in the fuel efficiency standard to up to 35 miles per gallon. This bylaw has been passed by the House of Representatives and is currently under review by the United States Senate. This just goes to show how, across the country, people are becoming increasingly concerned with reducing their carbon footprint.

After analyzing our survey results, we determined that it would be more beneficial for the city to do an even more **in depth inventory of the municipal vehicle fleet**, an inventory similar to that in the first step of the ICLEI Green Fleet initiative. This survey would gather specific information from municipal vehicle operators about their vehicles such as the: engine type, valve gear, displacement cc, maximum horsepower, maximum torque, and transmission. From this information, the city could see how its vehicles were being operated and could create a list of fuel alternative vehicles that still perform the same functions that were recorded in the survey. This is just another recommendation that would help organize the information necessary for forming the backbone of successful green management.

Our fourth and final policy recommendation is an **anti-idling campaign**. According to Massachusetts General Law, idling in excess of five minutes in a violation

punishable by fine. Cities such as Lenox, Massachusetts have created an anti-idling campaign with the goal of not only raising public awareness about the law but raising awareness about the detrimental effects idling has on the environment. A campaign such as this one would introduce cleaner, and healthier driving practices into the lifestyles of the region, a positive step for the future.

**Limitations:**

As we researched and analyzed our findings, we came across numerous limitations that impeded our goal. The first is that in dealing with the municipality there seemed to be little communication with departments. Each department was its own separate entity; while they were productive, it would be beneficial if all departments were aware of what other departments were doing. Increasing inter-departmental communication could ensure that the minimum environmental standard of the municipality is upheld.

A green board, similar to the Williamstown COOL Committee, a group of volunteers dedicated to implementing the town's climate action plan, could solve this problem. A representative from each department responsible for communicating its agendas with the board to make sure everyone was on the same page.

Another limitation we came across was a cultural limitation. The citizens of Pittsfield have not shown much support for the push to become greener. This is probably because environmental movements are usually associated with increased costs and increased burden. Increasing environmental education could notify the public about

simple steps to take to be more environmentally efficient and the potential for economic savings that goes with this lifestyle.

Finally, as always there were strict budgetary constraints. Making big changes costs money; however, throughout our project we took the budget into account and made sure that our recommendations were feasible for the city of Pittsfield. As we stated earlier, being green does not always necessitate giant sacrifices to be made. There are many things you can do to reduce your carbon footprint that don't cost any money at all, and may actually increase your savings. With rising gas prices it is more important than ever to make sure that fleets run as efficiently as possible.

**Conclusion:**

Last year, the mayor of Pittsfield signed the Cities for Climate Protection committing residents, businesses and the government to take action against carbon emissions. By reducing the 1,100 tons of carbon emissions per year of their 404 fleet vehicles, the municipality could lead the community by example showing that reducing carbon emissions is both practical and efficient. There are 43,612 registered vehicles in the city of Pittsfield. We have just calculated how big an impact reducing the carbon emissions of one sector of 404 vehicles had; imagine the potential if all 43,612 vehicle owners were on board.

**Appendix**

# Municipal Vehicle Survey
## To be distributed to all municipal vehicle operators

Please help us provide you with a municipal vehicle that accurately fits your needs by filling out the information below.

1. **Your Municipal Vehicle**
    a. **Year**
    b. **Make**
    c. **Model**
    d. **Valve Gear**
    e. **Engine Size**
    f. **Maximum Horsepower**
    g. **Maximum Torque**
    h. **Transmission**
    i. **VIN Number**
    j. **Drive Train Type (2-wheel or 4-wheel drive)**
    k. **Miles per gallon**
    l. **Annual Miles driven**

2. **Please describe the basic functions of your municipal vehicle below.**

# Leasing Plans For the 136 Pre-1997 Light-Weight Trucks and Cars

| Leasing Recommendations | Cost / Year ($2400-$6000/yr) | Fuel Savings/ Year | Maintenance Savings/ Year | Total annual savings | CO2 Reduction/ year |
|---|---|---|---|---|---|
| Leasing 10% of your cars and light weight trucks for 3 years | $27,000<br>$63,000<br>$90,000 | $ 8,288 | $ 11,200 | $ 19,488 | 28 Metric tons (Taking 4 cars off road) |
| Leasing 25% of your cars and light weight trucks for 3 years | $79,000<br>$138,000<br>$198,000 | $ 20,129 | $ 21,600 | $ 42, 729 | 68 metric tons (Taking 9 cars off the road) |
| Leasing 50% of your cars and light weight trucks | $158,400<br>$277,200<br>$396,000 | $ 40,259 | $ 54,400 | $ 94,659 | 136 Metric tons (Taking 19 cars off the road) |