Franklin Township
Greenhouse Gas Emissions
Inventory
and
Suggested Policy Options

Prepared, reviewed and completed by
Katie-Anne Conway

Research and analysis conducted by
Transportation: Matthew Singer, Lauren Damiano, Matthew Hausman, Kathryn Voishnis
Energy: Erin Maguire, Kyle Bartsch, Kristen Meidt
Waste: Amanda Calabrese, Devon Doles, Jeremy Moskovitz, and Lucia Ruggiero

Township Liaison
Jessica Franzini

Technical Consultant:
Patrick Hossay, PhD
Associate Professor
The Richard Stockton College of New Jersey

The following key identifies units used throughout this report.

Unit	Meaning	Notes
eCO_2	Carbon Dioxide equivalents	Puts calculations of all greenhouse gases into one format
KW	kilowatt	1000 watts
KWh	kilowatt hour	Common billing unit for energy from utility companies
Btu	British thermal unit	Amount of heat required to increase the temperature of a pint of water by 1 degree F
MMBtu	million British thermal units (BTU)	Standard unit of measurement for natural gas
MW	megawatt	1 MW= 1 million watts
thm	Therms	1 thm = 100,000 British thermal units (BTU); used to convert the volume of gas used to its heat equivalent

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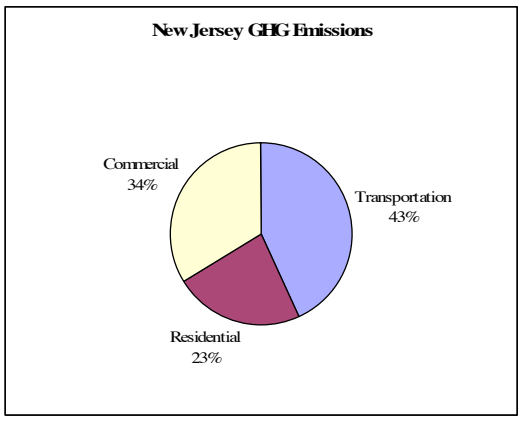
Executive Summary

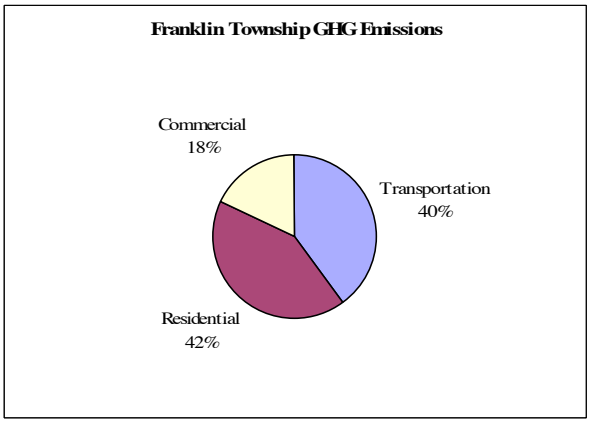
This greenhouse gas emission (GHG) inventory was conducted for Franklin Township, Gloucester County, New Jersey for both municipal operations and the township community overall. Data were either collected for 2011 or adjusted to 2011 values. Insufficient historical data were available to identify trends; however, known state-wide growth rates of key emissions sources were used to project future emissions. Data on residential and municipal energy use, transportation, solid waste, and other sources of greenhouse emissions were gathered and analyzed to calculate an index of current emissions and to help identify promising reduction strategies.

In Franklin Township the overall community energy use and greenhouse gas emissions for 2011 are as follows:

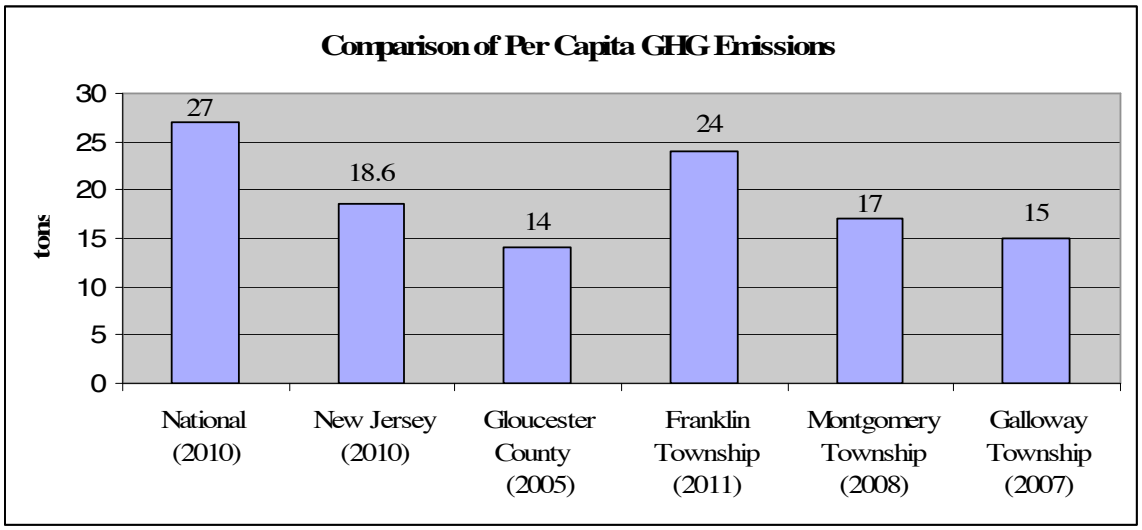
	Energy (MMBtu)	Emissions (tons eCO_2)
Residential Energy	1,014,824	163,781
Commercial Energy	422,032	71,904
Transportation	1,799,638	154,305
Solid Waste		3,869
Total	**3,236,494**	**393,859**

The chart below compares emissions from Franklin Township to emissions from the state of New Jersey overall. Franklin's emissions from transportation are comparable with NJ's, while residential and commercial emissions vary from state averages.





A comparison of Franklin Township's per capita GHG emissions to national, state, and county levels is shown in the graph below, along with a comparison to Montgomery Township (Somerset County, NJ) and Galloway Township (Atlantic County, NJ). Emissions studies were conducted for these two townships by Stockton College students, under the direction of Professor Patrick Hossay who has also overseen this report.



For each township, values were determined from reports of annual electricity usage provided by energy companies. Franklin uses about 1.5 times more electricity annually than Montgomery and Galloway Townships. **The reason for this higher reported usage is not clear**. Franklin's emissions are roughly 10% less than the national average, but they are over 20% higher than the state average.

An assessment of municipal facilities, separate from that for the community as a whole, was also conducted. Greenhouse gas emissions for municipal facilities and operations were as follows:

	Energy (MMBtu)	**Emissions (tons eCO_2)**
Electricity	335,766,794	572

As part of this analysis, community emissions were estimated for the future. For 2020, a thirteen percent increase in residential and commercial energy use and a twenty-one percent increase in transportation related emissions is projected, based on population growth. More can be read about this in "Future Projections."

Creative and proactive policy changes will be needed to ensure that these increases do not occur and that Franklin Township is able to achieve its share of the twenty percent reduction in emissions by 2020, a goal to which the state of New Jersey is committed.

For the community overall, this GHG emissions inventory shows that residential energy use (40%) is the second greatest contributor to greenhouse emissions, exceeded only slightly by transportation (42%). Hence, policies that attempt to reduce such energy usage provide the greatest potential for GHG emission reduction in Franklin Township. Reaching this goal will require community education and incentives for energy efficient buildings, adoption of energy saving features and appliances, and efficient home energy management. Such practices are also likely to save homeowners and business owners money; and thus are likely to enjoy the support of residents and businesses. Other measures are needed to reduce transportation-related emissions in the township in the short term. In the long term, the township needs to adopt policies and practices that will help shape a less transportation-intensive community through smart growth policies, clustered housing, transportation alternatives and mixed-use development.

Introduction

Global warming presents a great threat to our shared future. A significant rise in carbon dioxide and other greenhouse gas emissions has already led to a temperature increase of one degree Fahrenheit over the past century, the greatest temperature increase in more than a millennium. If the emission of these heat-trapping gases continues, the consequences may well be devastating. Among the expected impacts are ocean level rises that will threaten shorelines and wetlands, significant changes in water resources, reduced and otherwise changed food production, reduced biodiversity, and increased stresses on vital ecosystems such as forests, wetlands, and coral reefs. Most disconcerting, if left unchecked, the effects of climate change can in turn intensify the causes of change, inciting a positive feedback loop that could define an inherent momentum toward severe climactic change which is difficult or impossible to address.

The effects in New Jersey will be significant. Our state can expect a four degree Fahrenheit temperature increase over the next century, as well as a sea level increase of 27 inches along our coast. These changes will lead to a significant loss of habitat, threats to shoreline property, loss of or changes in drinking water supplies, shifting of forest habitats, more frequent fires, and the destruction of 20 to 70 percent of shorebird habitat. Public expenditures will need to increase considerably to address the threats to property and public health presented by these changes.

Economic consequences will be felt across NJ. Sea level increase will affect tourism, an industry that brings nearly $2.2 billion dollars into NJ each year. In addition, our state can expect to spend hundreds of millions of dollars protecting its coastlines. The US Environmental Protection Agency estimates that the protection of Long Beach Island alone could total between $100-$500 million. The increased frequency and harshness of severe storms are expected to entail considerable economic and human costs.

In Franklin Township, and the Pinelands region more generally, hundreds of species of plants and animals could be at risk. Longer growing seasons may occur as a result of warmer temperatures, but this may also make our crops more susceptible to pests and weeds. Warmer

temperatures will have associated changes in the water cycle, affecting ecosystems, water supply and agriculture. This loss of water will affect the state's blueberry yields, for example. More intense rain events are likely, and although there will be more precipitation overall, it will be uneven and erratic with an increased likelihood of summer droughts.

In summary, a partial list of the impacts of climate change in New Jersey includes:

- Significant loss or deterioration of shoreline and shore communities
- Significant loss in wetlands
- Temperature rise of 4-11^{o}F by 2100
- Increase in precipitation by 10-25%
- Possible increase in severe weather, including heat waves
- Rising temperatures raising concentration of ground level ozone(smog)
- Increased encephalitis, Lyme disease, and possibly malaria
- Decrease in agricultural yield

New Jersey residents contribute significantly to the emissions that cause climate change. Our state's residents constitute only one-tenth of one percent of the world's population but are responsible for a full half of one percent of all greenhouse emissions globally. Hence, residents produce roughly five times the greenhouse gas emissions of the average person on the planet. NJ residents overall, however, do produce somewhat less GHG emissions than the national average. This is largely a result of the less carbon-intensive electricity production in the state. NJ relies more on nuclear powered generation than on coal-fired production. NJ residents constitute three percent of the US population, but they are responsible for only two percent of US greenhouse gas emissions.

It is perhaps for these reasons that local resident and Stockton graduate, Ms. Jessica Franzini along with Franklin Township's Environmental Commission have expressed such strong support for efforts to reduce the township's contribution to climate change. Moreover, the state of New Jersey, in its State Energy Master Plan, has adopted a targeted reduction of carbon dioxide emissions by a full twenty percent by 2020 and eighty percent by 2050. Achieving these targets will require significant efforts among local municipalities. Within Franklin Township's 2004 Master Plan are provisions supporting Smart Growth practices, an encouraging

acknowledgement to the potential of sustainable development. **This GHG inventory serves as the starting point in the effort to decrease Franklin Township's carbon dioxide emissions.** Setting clear and measure able goals for reduction is the next step.

Inventory Methods

This inventory provides an index of climate change emissions from Franklin Township, expressed in a common unit as carbon dioxide equivalent (eCO2). So, while emissions of other greenhouse gases such as methane and nitrous oxides are considered, they are expressed as a function of their heat trapping capacity as eCO2. The results are intended to help the township (1) establish an index for future emissions reduction efforts; (2) evaluate the nature of emissions sources and identify efficient and effective reduction strategies; (3) produce a useful comparison with similar communities in New Jersey and nationally.

This inventory is separated into two distinct parts:
(1) Community Inventory – A municipality-wide assessment of major energy uses and waste production and their resulting greenhouse emissions.
(2) Municipal Operations – An evaluation of energy use and emissions caused by municipal buildings and operations.

This separation is intended to provide clarity and to empower policymakers and township managers to more effectively identify immediate changes in township operations that may result in greater efficiency and reduced greenhouse emissions. In addition, it is hoped this separation may facilitate the identification of broader changes in ordinances, enforcement policies, and practices that can contribute to efforts to reduce overall contributions to climate change. **The Township can therefore set an example of responsible energy use and climate stewardship for residents and businesses while also shaping policies that encourage similar reductions in the community overall.**

This inventory is conducted for the year 2011, thereby providing a baseline of annual climate changing emissions. Data were not available for an analysis of past emissions or historical

trends. However, known state-wide growth rates of emissions and estimates based on survey data were utilized to define projections of future emissions.

It is important to note that this inventory focused on direct emissions assessments that can be used to shape municipal operations and policy and in fact excludes significant secondary and tertiary sources of greenhouse emissions from Franklin Township residents and businesses. So, while this report provides a useful index to measure future changes, it does not represent a complete measure of all emissions resulting from residents and businesses in the Township. For example, this inventory does not measure the emissions resulting from any commercial or retail consumption in the Township or by its residents. The purchase of any product entails a certain carbon 'backpack', the result of the energy and resources used to manufacture the item. In fact, consumer purchases can account for a full third of an individual's contribution to climate change. However, because of the difficulty in measuring (and regulating) these secondary and tertiary emissions, they are not included in this inventory. As an example, while beef production is a major contributor of methane, a potent greenhouse gas, beef consumption in Franklin Township is not included in this report.

Data for this evaluation were collected from multiple sources, including: energy providers, Franklin Township offices, New Jersey state offices, and extensive surveys and assessments conducted by Energy and Design students at The Richard Stockton College of New Jersey in the Spring Semester of 2011. **Data were analyzed by Stockton College students under the guidance of Professor Patrick Hossay and facilitated through the use of specialized software designed and developed by Local Governments for Sustainability (ICLEI).**

Data were entered into ICLEI software to produce tangible measures for Franklin Township's GHG emissions inventory. *ICLEI – Local Goverments for Sustainability* is an international association of local, regional and national governmental organizations that have made a commitment to sustainable development. ICLEI provides technical support, training and information sharing to its members to increase local governments' capacity to meet sustainable goals. The Richard Stockton College of NJ has access to ICLEI software, which was used to generate carbon emission measures (along with emissions of other common pollutants) for this

report. Franklin Township may become a member of ICLEI for access to this software, and other useful tools, moving forward.

Following the inventory is a list of suggested policy options derived from these findings and diagnostic evaluations conducted through community surveys. These suggestions are intended to help identify useful first steps in the definition of the Township's reduction strategies.

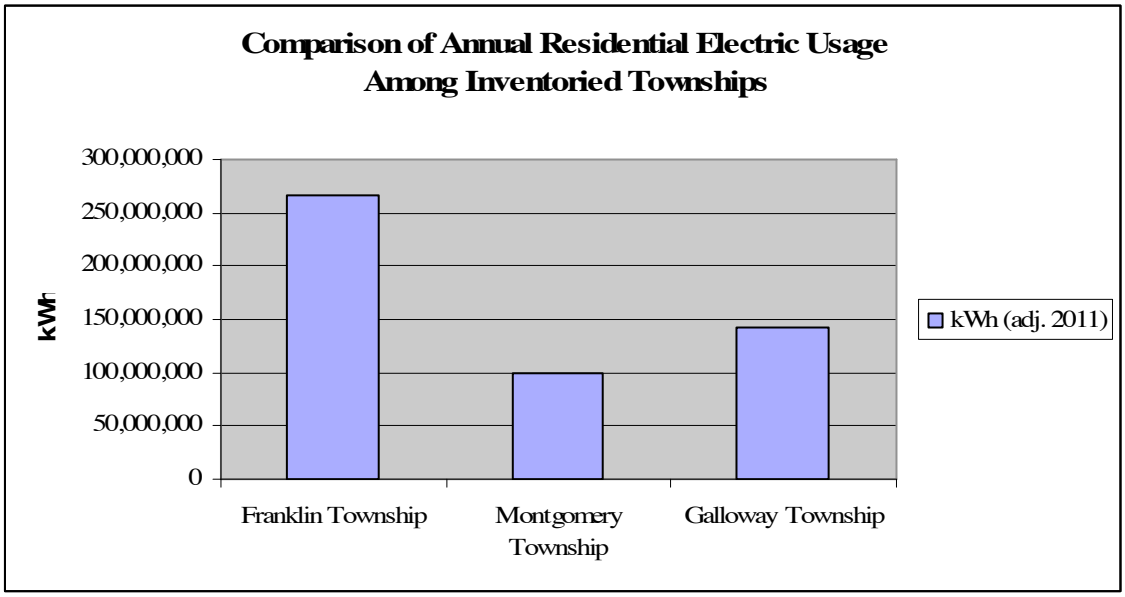
Inventory Results

Residential Emissions

GHG emissions from township homes are principally the result of the use of electricity, natural gas, heating oil, propane, and fuel wood. This energy use in Franklin Township is responsible for the equivalent of 163,781 tons of carbon dioxide (eCO2) annually.

Electricity

The primary provider of electricity to Franklin Township residents is Atlantic City Electric, which reported an annual residential usage of 265,585,463 Kilowatt-hours (kWh) for 2010. These values were adjusted for the year 2011 using a growth rate of 1.75% annually, which results in 270,233,209 kWh for total annual residential usage. The residential electricity use per capita in Franklin Township is 15,790 kWh. The 2010 Census reports a statewide mean of 8,681 kWh. This number may be projected to 2011 using the same 1.75% growth rate annually to produce a current statewide mean of 8,833 kWh. Hence, the mean residential electricity use in Franklin Township is considerably above the state average. A comparison of residential energy use in similar townships with comparable housing types and incomes indicates that residential electricity use in Franklin Township is greater than its expected level. **The reason for this high residential energy usage is not clear.**



Survey Findings for Electricity

Township residents were asked what their estimated average monthly summer and winter electric bills were. From their answers we were able to extrapolate the annual average usage amongst the three different types of residential dwellings.

Dwelling Type	Monthly	Annual	National Annual
Less than 2,000 sq.ft	$153 = 1.16MW	$1,836 = 13.9MW	7.23MW (<2,000 sq.ft)
2,000-2,999 sq.ft.	$252 = 1.64MW	$3,021 = 19.7MW	13.2MW (>2,000 sq.ft)
3,000 + sq.ft.	$322 = 2.45MW	$3,867 = 29.4MW	

Information regarding the number of Franklin Township residences participating in renewable, 'green' energy programs such as the NJ Board of Public Utilities' Clean Energy Program was not available for Franklin Township. The 2010 Census indicates zero generation of solar energy for home heating for the Township. Reports from Township Liaison Jessica Franzini lead us to believe some Franklin residents generate electricity using solar panels, but it must not be reported.

Natural Gas

The 2010 Census indicates 2,356 or 41% of all Franklin Township residences use natural gas as their primary source of heating fuel.

Survey data for natural gas indicates a higher percentage of users with an average of 79% among the three housing types (see "Dwelling Type" above). The fuel provider was not indicated in either data sources. However, it is assumed to be either PSE&G or South Jersey Gas. Therefore an estimated annual amount of energy was calculated through the answers provided by Franklin Township residents which totaled 17,610,289 therms. The therm is used to convert the volume of gas used to its heat equivalent, providing the actual energy use.

Heating Oil

Fuel oil use is supplied through multiple providers and not as easily measured. According to the 2010 Census, 2,057 or 35.6% of Franklin Township residents use oil as their primary source of heating fuel.

Survey data revealed a much lower percent of use, 11.3% overall for heating oil. The estimated annual amount of energy used by township residents surveyed is 16,281,212 therms.

Propane

Gathering data for Franklin Township from propane providers and the 2010 Census was not adequate to determine the amount of users or energy associated with propane use. However, the residential surveys indicated that 2.2% of residents living in 2,000-2,999 ft^2 homes and 4% of residences living in 3,000+ ft^2 homes use propane to some extent as their primary heating fuel.

Fuel Wood

Use of fuel wood was estimated using state and Environmental Protection Agency (EPA) data on fuel wood use and type in New Jersey as well as Census data. Roughly 1.8% of Franklin Township residences utilize fuel wood for some level of home heating. Presuming they utilize this wood at the same rate as New Jersey residents overall, and that they largely utilize the most

commonly available types of fuel wood in the region, we estimate 1,554 cords of fuel wood utilized annually in Franklin Township.

Survey data indicates that 4.6% of residences living in homes that are less than 2,000 ft^2 and 8.7% of residences living in homes that are 2,000-2,999 ft^2 use wood for some level of home heating.

Overall Residential Emissions

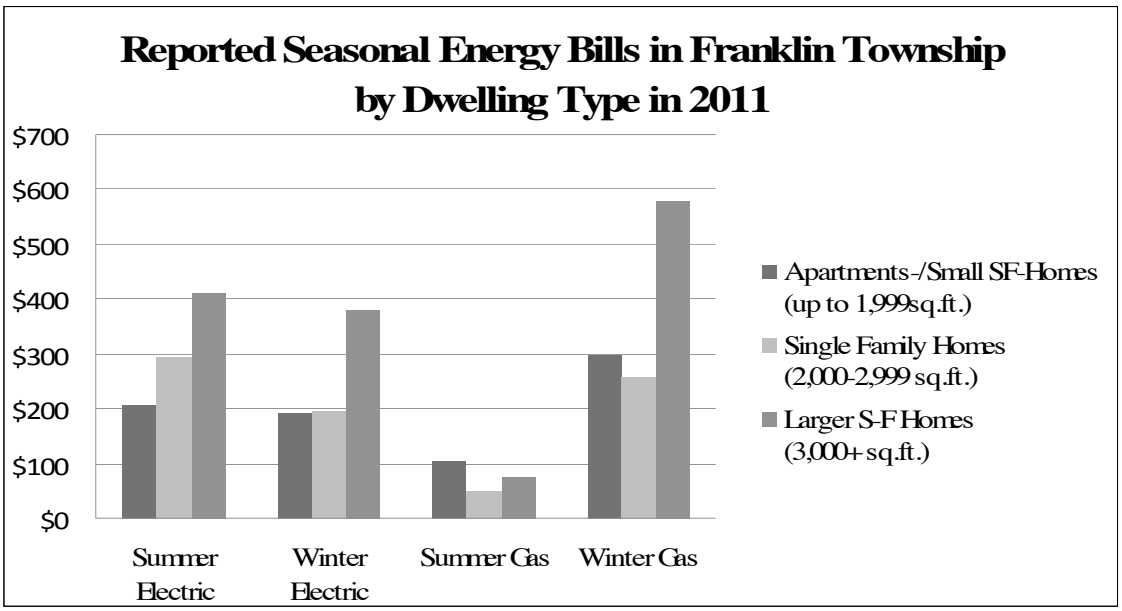
The above data and estimates indicate a total residential energy use in Franklin Township of 906,435 million British thermal units (MMBtu). The resulting greenhouse gas emissions are 154,436 tons eCO2. An additional 9,345 tons of eCO2 emissions were estimated to result from landscaping and lawn care activities (exclusive to lawnmowers) in the township based on the results of the survey.

Using ICLEI software, the values below were generated to demonstrate annual emissions from Franklin Township's residential energy use for some of the most common pollutants.

Pollutant	Symbol	Emissions (lbs)
Nitrogen oxides	NO_X	462,043
Sulfur Oxides	SO_X	1,288,386
Carbon Monoxide	CO	1,025,592
Volatile Organic Compounds	VOC	97,171
Particulate Matter (thoracic fraction)	PM_{10}	115,874

The cost associated with the high rate of residential energy use for the residents of Franklin Township is significant. These costs exceed self-reported numbers collected in similar townships and indicate a **rising pressure on the home budgets of Franklin Townships' working families. It is also clear that large, single family homes are the largest unit consumers of energy.** The following chart compares the reported energy bills of large single-family (s-f) homes, average s-f homes, and small Ss-f homes/apartments throughout the spring. These results

were gathered by Stockton Students through door-to-door and online surveys within Franklin Township during the spring of 2011.



Commercial Emissions

Estimates of energy use were also obtained from Atlantic City Electric for the 2,998 commercial accounts within Franklin Township. The total electricity use for 2010, adjusted for 2011 was 123,655,413 kWh. Estimates for natural gas, fuel oil, propane and clean energy were not available, but were assumed to be small and calculated as zero. The resulting estimated energy consumption results in 71,904 tons eCO_2 greenhouse gas emissions. Using ICLEI software, values were generated to demonstrate annual emissions from Franklin Township's commercial sector for some of the most highly regulated pollutants.

Pollutant	Symbol	Emissions (lbs)
Nitrogen oxides	NO_X	188,621
Sulfur Oxides	SO_X	598,389
Carbon Monoxide	CO	82,335

Volatile Organic Compounds	VOC	9,011
Particulate Matter (thoracic fraction)	PM_{10}	53,100

Transportation

Data from the New Jersey Department of Transportation were combined with data collected by the transportation research team to identify and calculate the amount of carbon released in the township as expressed in total vehicle miles traveled (VMT).

Residential Transportation

The total mileage of the three categories of roads contained within the township - major arteries, feeder, and residential roads - were measured. A major artery was classified as a main highway; examples include Delsea Drive and Harding Highway. A feeder was classified as a road that "feeds" to a major artery; examples include Williamstown Road and Tuckahoe Road. A residential road was classified as a roadway that does not lead directly to any major arteries but may lead into a feeder or another residential road; examples include Sunnyhill Avenue and New York Avenue. In total, the 56.4 square miles of Franklin Township has **177.6** miles of road.

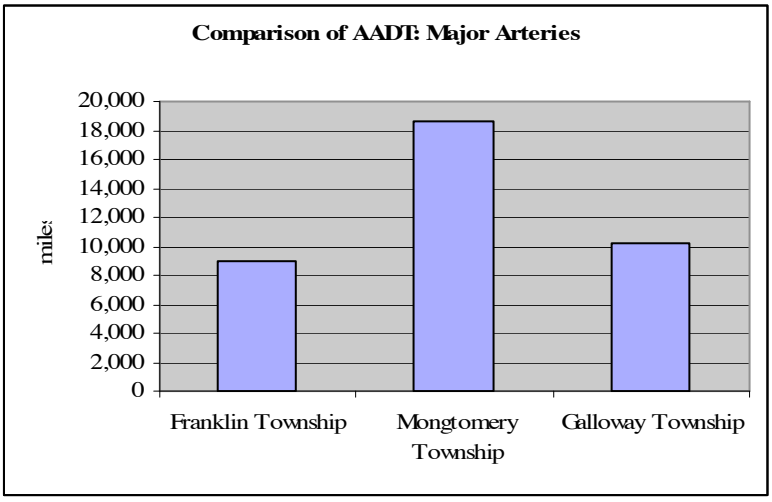
Road Type	**Miles**
Major Arteries	16.8
Feeder Roads	83.3
Residential Roads	77.5

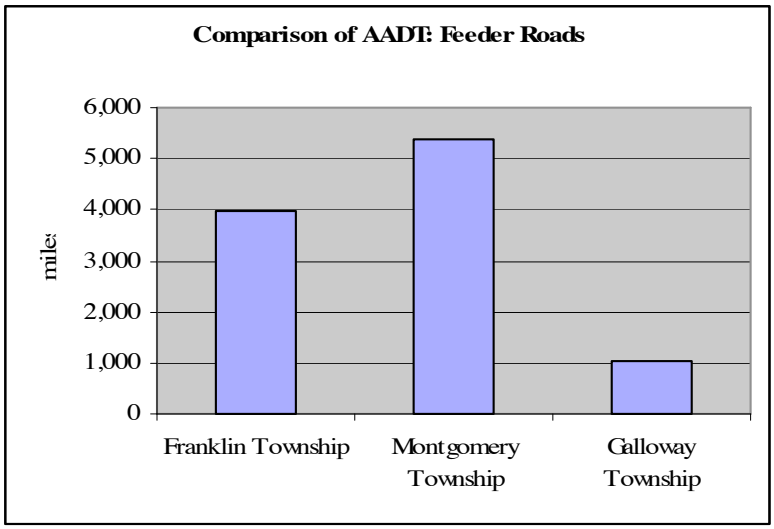
Average annual daily traffic counts (AADTs) were obtained to represent the average number of vehicles driving on each category of road on any given day of the year. Data were taken from the Department of Transportation (DOT) of New Jersey data banks available online. DOT data from 2009 to 2010 were used. The locations of the AADTs were plotted on the Franklin Township map used by Stockton students to determine what data were already gathered and where additional data might be needed.

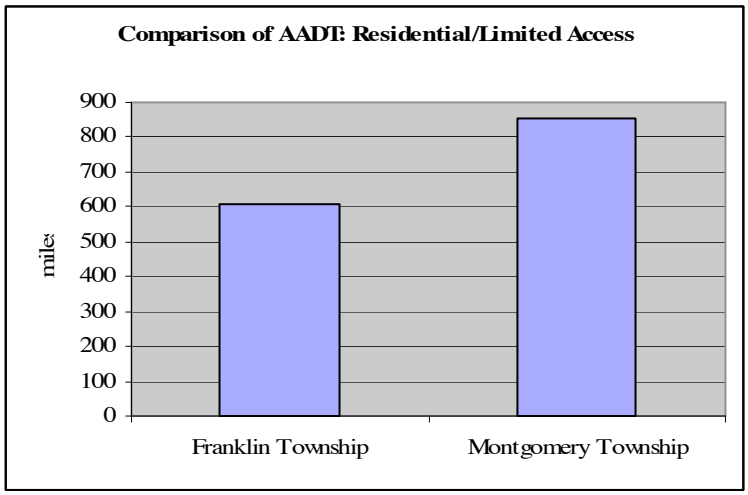
Two traffic counters were setup specifically for this carbon inventory by Stockton students. New Jersey's DOT's AADTs only record counts for forty-eight hours, but Stockton students determined it would be more useful on to calculate traffic on chosen roads for a duration of two weeks. Traffic counters were placed in areas where DOT data were lacking. One traffic counter was laid on Williamstown Road, a feeder road, located between Coles Mill and Fries Mill Road. The other was laid on Sunnyhill Avenue, which is a residential road. The resulting AADT, including data from the DOT and data gathered by Stockton students (which was all entered into ICLEI), is listed below:

Road Type	**AADT (miles)**
Major Arteries	8,983
Feeder Roads	3,966
Residential Roads	606

The three graphs below compare Franklin Township's AADT on major arteries, feeder roads, and limited access/residential roads to Montgomery Township (Somerset County) and/or Galloway Township (Altantic County). Franklin Township has less traffic on all road types than Montgomery Township; meanwhile, they have significantly more traffic on feeder roads than Galloway Township.







Because traffic in Franklin Township was observed to decrease somewhat in volume on weekends, a multiplier of 340 (rather than 365) was used to convert transportation data annual figures. The result is a total annual vehicle miles traveled (VMT) for Franklin Township of 182.8 million.

This annual VMT for Franklin Township is considerably higher than for comparable townships. This is likely the result of a higher than average traffic volume and vehicle use due to dispersed residences, few commercial centers, more widely-dispersed community services, the high proportion of residents who work outside the Township, and the Township's proximity to population centers such as Camden County and Philadelphia.

The emissions resulting from transportation in Franklin Township are significant, as determined using ICLEI software. A total of 147,762 eCO2 are emitted as a result of normal transportation. In addition, normal vehicle use results in the following annual emission of criteria air pollutants:

Pollutant	Symbol	Emissions (lbs)
Nitrogen oxides	NO_X	601,273
Sulfur Oxides	SO_X	38,846
Carbon Monoxide	CO	7,121,863
Volatile Organic Compounds	VOC	90,946

While Stockton students completed profiles of moving traffic in Franklin Township, the number of passengers in each vehicle (including the driver) was also tallied. These counts were classified by the number of passengers in the vehicle.

# People in Vehicle	Total #	Total %
1	1703	72.5
2	588	25.0
3	46	2.0
4	11	0.5
Total	**2348**	**100.0**

The National average vehicle occupancy is 1.3 people. Using the counts above, Franklin Township's average vehicle occupancy is 1.28 people, which can be rounded to 1.3.

Survey Data

Housing Type (sq.ft)	Average Vehicles per Household	Average Annual Miles per Vehicle
Apartments and Small Homes (Up to 1,999)	1.88	13,309
Single, Clustered Homes (2,000-2,999)	2.80	13,059
Large S-F Homes (3,000 +)	2.42	17,196

Multiple counts of moving traffic were taken from two locations in the township: the intersection of Williamstown Road & Delsea Drive and the intersection of Harding Highway & Delsea Drive. As traffic passed, vehicles were tallied by category: midsize/sedan, compact/subcompact, light truck, heavy truck, SUV, minivan, RV, hybrid, and motorcycle. The profiles were completed on both weekdays and weekends in order to obtain a representative sample of Franklin Township's traffic. Three parked vehicle counts were also taken to be included in the calculation of the estimated percentage of different vehicle types driving in the Township. Three residential neighborhoods were selected at random. The parked vehicles in the neighborhoods were tallied using the same vehicle categories as the moving traffic counts. This type of count ensured that the types of vehicles driving on residential roads were represented in the final percentage of different vehicle types, shown in the chart below.

Type of Vehicle	Total #	Total %
Compact/Subcompact	272	9.7
Midsize/Sedan	808	28.8
Light Truck	673	24.0
Heavy Truck	232	8.3
SUV	628	22.4
Minivan	129	4.6
RV (Heavy Truck)	4	0.1
Hybrid (Compact)	10	0.4
Motorcycle	49	1.7
Total	2805	100.0

School Transportation

School buses are also a distinct and significant source of greenhouse emissions. 100 school buses service Franklin Township schools, with a mean route length of 174miles per day. The resulting emissions for 180 school days are 6,281 tons eCO_2. See table on next page.

School Type	# of buses	Mileage/school year	Fuel type
Elementary schools	37 (148mi/day)	985,680 mi/based on 180 school days	33 diesel, 4 gasoline
Regional schools	63 (200mi/day)	2,268,000 mi/ based on 180 school days	All diesel

Residential, Municipal and Commercial Solid Waste Collection Transport

Eight municipal solid waste collection trucks service Franklin Township. These travel twenty five (25) miles four (4) days a week from the township to a waste facility located in Westville, NJ. This facility, Wheelabrator, is a controlled incineration plant that converts the heat from burning the waste into useable electricity.

Transportation alone from Franklin Township to Westville, just for residential waste, totals at least 83,000 miles a year, emitting 160 tons of eCO2. Commercial Waste Management trucks travel 48,700 miles a year, emitting another 90 tons of eCO_2. Municipal waste hauling emits 8 tons. Total waste hauling for the Township releases 258 tons eCO_2 annually.

The resulting greenhouse gas emissions from all transportation-related emissions in Franklin Township total 154,305 tons of eCO2.

Solid Waste

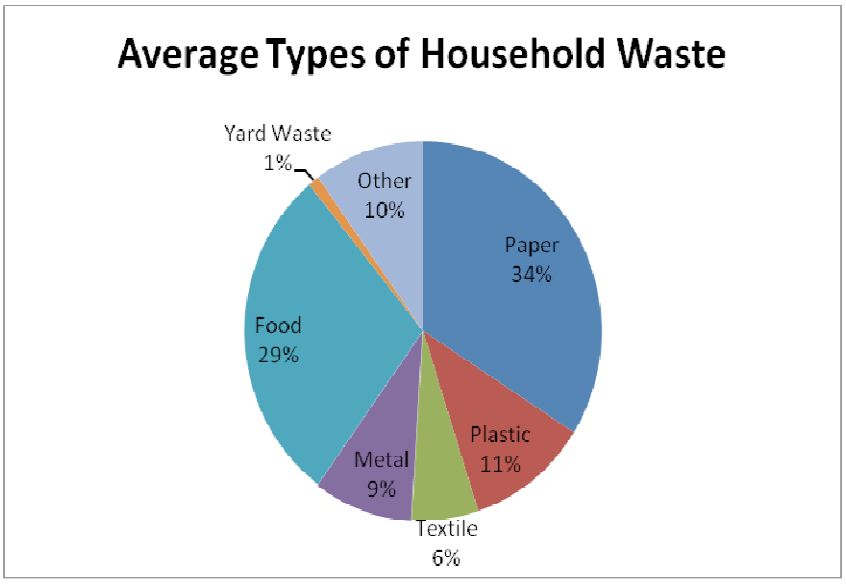
Waste management in any given area has a significant effect on a community's carbon footprint. When waste decomposes, it releases CO_2, methane, and other greenhouse gasses. If waste is burned, fewer greenhouse gases are released; however the proper management of the facility and screening of the trash are essential in this process. Emissions from the garbage trucks that transport the waste also add to the total carbon footprint of the township. Recycling, when

properly managed, is an effective way to help minimize the amount of solid waste an area produces and thus decreases its emissions.

Residential waste is managed in-house by Franklin Township, while commercial waste is managed privately. The reported total from the township for residential waste in 2010 was 7,400 tons, while the total provided by private companies for commercial waste in 2010 was 10,036 tons. **Combined residential and commercial annual waste production is 17,436 tons.**

To determine the total GHG emissions from waste production in Franklin Township, samples of residential and commercial waste were inspected. Stockton students estimated the percentages of paper, food, plastic, textiles, yard waste and miscellaneous items in Franklin Township's waste. Paper, food, yard waste and textiles convert to methane in the landfill, which is a GHG gas. These percentages were then entered into the ICLEI software, along with the Township's annual tons of waste. The result for total GHG emissions from residences in Franklin Township is 1,642 tons eCO2 while commercial produced 2,227 eCO2.

As displayed in the pie chart below, 11% of the waste found in household trash receptacles was recyclable plastic. The plastic found in the garbage was transported to Wheelabrator incinerator. Discussion with the Franklin Township Environmental Commission has revealed that, at this time in 2011, the municipality only offers collection services on two (2) forms of plastic.



Of course, this analysis does not account for the emissions resulting from waste inefficiency or unnecessary consumption. For example, the secondary greenhouse emissions resulting from inadequate recycling of aluminum cans (thus resulting in greater energy use in the production of new cans from raw material rather than recycled stock) are not considered in this analysis.

Sewage

Although waste water treatment is an important factor in waste management, it was not included in this study because all of Franklin Township relies on septic systems. There is no public sewer system. This negates the GHG emissions that would normally be included in an inventory of this kind.

Municipal Operations

Annual energy use and the eCO2 emissions resulting from Franklin Township facilities and normal operations were measured and evaluated for 2010. Monthly electric bills were made available which provided a direct measure of usage.

Municipal Electric Use

Total electricity use for Franklin Township facilities and operations was found to be 983,377 kWh, responsible for emitting 572 tons of eCO2. Electric consumption by category is as follows:

Use	Total (kWh)/ Percent	Emissions (eCO2 tons)
Recreation Complex	74,859 / 7.62%	44
Municipal Building	185,808 / 18.9%	108
Community Center	212,000 / 21.6%	123
Ambulance/First Aid/Fire	15,659 / 1.59%	9
Traffic and Blinking Lights	313,119 / 31.8%	182
Other	135,703 / 13.8%	79
Unknown	46,229 / 4.70%	27

In addition, electricity consumption by township operations and facilities was responsible for the following criteria air pollutants emissions:

Use	NOx	SOx	CO	VOC	PM10 (all in lbs)
Recreation Complex	114	362	50	5	32
Municipal Building	283	899	124	14	80
Community Center	323	1,026	141	15	91
Ambulance/First Aid/Fire	24	76	10	1	7
Traffic and Blinking Lights	478	1,515	208	23	134
Other	207	657	90	10	58
Unknown	71	224	31	3	20

The category 'other' consisted of at least five separate municipal operations; Public Works (Malaga), Public Works (Franklinville), Code Enforcement Building, Franklin Twp Garage, and miscellaneous others. The category 'unknown' comprised facilities/operations that could not be defined but for which there was consistent billing. It is important to note that natural gas totals were not available for facilities/operations and not included in the municipal energy totals.

An accounting for the municipal fleet, all the vehicles associated with municipal and township operations, was not included in this inventory. Departments such as the Parks Division, Health Department, Roads Division and the Police Department were not assessed. The consumption of fuel for these vehicles is potentially significant, given the nature of the spacious layout of the Township.

Future Projections

While historical data was not readily available, projections for future energy use were produced using known state growth rates of major emissions sources. Projections were produced for 2020, the target year for the first phase of state greenhouse gas emissions reductions and for 2030.

Future emissions estimates include normal traffic (not including public services), base residential energy use, and solid waste. These numbers assume no change in current policy, no increase in renewable energy use per capita, and only the continuation of township growth rates established over the past five years.

Incorporating past trends and future projections, the chart below shows potential increase in transportation emissions in Franklin Township over time.

	Normal Transportation		**Residential Energy Use**		**Waste**
	MMBtu	eCO_2	MMBtu	eCO_2	eCO_2
2011	1,726,913	178,122	1,014,824	163,781	3,869
2020	1,957,096	214,963	1,150,092	185,612	4,385
Increase	13%	21%	13%	13%	13%
2030	2,249,011	267,222	1,321,636	213,297	5,039
Increase	15%	24%	15%	25%	15%

Note: The figured above account for estimated change in carbon intensity as energy use increases. Because we get ~50% of our energy from nuclear sources, which are carbon neutral, the increase in carbon emissions is not linear.

Suggested Measures

Residential Energy Use

The second largest source of greenhouse gas emissions from Franklin Township is residential energy use. The following policy options may help reduce the use of electricity, natural gas, propane and fuel oil in Franklin Township homes.

1. *Energy Education and Awareness Campaign*: In conducting our surveys, we found most residents to be interested in reducing their energy use and extremely receptive to constructive

suggestions toward this end. A Township education effort, through local publications, presentations to community organizations, and participation and displays at community events may help provide the energy education which is needed and for which many residents have expressed an interest. The importance of energy conservation and its connection with cost savings and home comfort could be emphasized in these efforts. Community education events and demonstrations of home weatherizing, energy efficient appliances, and proper home energy management could also find a receptive audience among township residents. A typical American home can reduce energy bills by fifteen percent (15%) with basic weatherization. Proper energy management and upgrades can reduce energy bills by a full third.

2. *Local Promotion of State and Federal Clean Energy Opportunities*: The Township could do a great deal to make residents more aware of the incentives for clean energy and the support for energy audits. For example, the New Jersey Board of Public Utilities and New Jersey's Clean Energy Program offers certain state residents access to certified home improvement contractors that deliver energy efficiency improvements to their home. State and federal incentives for alternative energy use, such as residential photovoltaic, can also be promoted through municipal efforts. Similarly, federal tax incentives for Energy Star appliances can be promoted to residents. Commercial establishments should also be encouraged to consider energy improvements.

The installation of a visible alternative energy system, most probably a photovoltaic array at the main township complex, could help **promote alternative energy to residents while reducing the GHG emissions from Township operations.** The development of an Alternative Energy ordinance that would regulate the location of wind structures and large solar arrays in the township could also include incentives and standards that would encourage appropriate residential and commercial placements.

3. *Promotion of Clean Power Choice*: It is unknown how many of residents participate in purchasing clean energy for their domestic use. The Clean Power Choice program allows users to support renewable power sources throughout the state. The Township could use public recognition programs and creative incentives to promote this program among township residents.

Each household that participates in the program can reduce Franklin Township's greenhouse emissions by over 10,000 lbs. per year.

4. *Landscaping Emission Reduction*: The overall greenhouse emissions from off-road gas powered equipment in Franklin Township are estimated to be 9,345 tons annually. This figure can be significantly reduced through local incentives and education toward the promotion of low maintenance landscaping and native plantings. Such practices would have an even larger impact on criteria air pollution emissions. The California Air Resource Board has found that a lawnmower can produce nearly 100 times the smog producing emissions of a new car, and ten times the carbon monoxide. We have found that mowing the typical lawn in a low-density residential area of Franklin Township emits as much criteria air pollutants as driving the typical vehicle in the township 300 miles.

Transportation

In Franklin Township, the majority of all residential vehicles traveled in are large SUVs, light trucks, and full-size cars. The modal number of passengers per car, observed during our traffic profiling, was one. The township's vehicle occupancy factor is comparable to the national norm, but Franklin Township residents carpool less than the state average. The result is the relatively high carbon emission and criteria air pollutants from transportation within the township. At this time, reduction of GHG emissions from Franklin Township's residential transportation seems to present the greatest challenge because residents often travel out of the community shopping, recreation, and work. With 40% of the township's overall GHG emissions coming from transportation, however, this is certainly not a category to ignore. Several options are recommended to help reduce the GHG intensity of transportation in Franklin Township:

1. Adopt Carpooling Incentives: The Township could facilitate and reward carpooling among its employees. An on-line ride sharing /car-pooling board for Franklin Township employees could make carpooling easier. A cash incentive or reward for employees who carpool at least one day a week could also help. Subsequently, the municipality may also offer recognition and incentives

to Franklin Township businesses that adopt similar policies or facilitate telecommuting when feasible.

The potential for reduction is clear. The average Franklin Township resident commutes just under twenty miles one way to work, twelve to the grocery store, and drives up to 20,000 miles each year. There is a clear potential to decrease these numbers.

2. *Fuel Efficient Municipal Fleet*: It is unlikely that the Township will be successful in shaping cultural preferences toward smaller cars among all residents. However, the municipality can choose fuel-efficient vehicles and optimal vehicle sizing for its own vehicle use. Optimal vehicle sizing in the fleet would ensure that the smallest vehicle necessary for the task is purchased and utilized. By determining the need of the vehicle and purchasing the most fuel-efficient vehicle that meets that need, Franklin Township can reduce its climate impact and save money. The township can also invest in hybrid vehicles or vehicles that use bio-fuels, much like the Atlantic County Utilities Authority (ACUA) has done successfully.

3. *Enhance Township Alternative Transportation Infrastructure*: The municipality could benefit from prioritizing bikeable and walkable pathways connecting residential and commercial centers to help reduce traffic-related greenhouse gas emissions. Safe pathways and sidewalks could increase biking and walking along those corridors considerably.

Biking is often viewed only as a recreational pastime, particularly in dispersed, semi-rural regions such as Franklin Township. However, as the township continues to develop and define commercial and residential centers, enhanced bike and pedestrian connectivity can help achieve emissions reductions and the promotion of healthy lifestyles. Our surveys indicate that up to two-thirds of residents would be likely to walk or ride a bike to shopping or other services on a regular basis if a safe path were available, and that concern for personal safety is one of the leading reasons residents choose not to bike or walk when making local trips.

4. *Enhance Community Transit*: Polices and practices that encourage the use of mass transit will reduce the township's climate impact. Research indicates that one bus can take twenty cars off

the road and produce one-tenth the climate changing emissions. Ensuring attractive, safe, and convenient transit stops and efficient transit routes is vital to this effort. Safe and sheltered stops for local buses help promote a favorable image of public transit and make each trip more pleasant. An ongoing evaluation of transit needs and transportation patterns of the community could help ensure that the community's changing transit needs are met in the most efficient way possible.

Our surveys indicate a 50/50 split in interest in convenient public transportation. Those residents who did not favor public transportation commented that it is not a possibility for Franklin Township. Stockton students found that public transportation routes are based on projected ridership, which is often connected to population density. There is currently only one route of public transportation in Franklin Township (located along Delsea Drive). This may explain why residents feel convenient public transportation is not an option for Franklin Township.

We project that public transportation options will not reduce emissions immediately, but instead that these reductions would most likely occur over time. Some Franklin Township residents expressed a bias against public transportation, saying it was inconvenient, costly, or unsafe. It would take some effort on the part of the Township to shift public opinion. It will potentially be the least costly option in the short term to develop community shuttles for targeted residents and focused routes.

5. *Encourage a 'Safe Routes to School' Program*: Several counties in New Jersey participate in the Safe Routes to School program in an effort to encourage more students to walk and bike to school. Cutting down on the number of parents who must drive their children short distances to school on a daily basis promises a healthier alternative for our children and the environment. Extra crossing guards can help ensure safety. Sidewalks, trails and bike paths are essential to providing safe routes to school. At this time, it is not safe for children to walk or bike to any of Franklin Township's schools. There is great potential to change this.

6. *Pursue Smart Development*: In the broader sense, Franklin Township must begin to evaluate its growth strategies and plans in order to reduce the energy and transportation intensity of new

construction. Smart growth techniques that prioritize clustering and mixed use development can help encourage energy efficiency and make continued growth compatible with existing transportation infrastructure and the township's emissions reduction commitments.

Smart growth initiatives encourage the revitalization or creation of town centers, mixed residential and commercial land use, and the clustering of development toward already-developed areas and away from greenfields. Such policies are in line with Open Space preservation priorities and can help develop healthier, safer, and more livable communities, with a greater sense of community identity and civic engagement. Pursuing smart growth is important for the protection of the global climate, but it's also particularly important for rural townships like Franklin Township that have the potential for inefficient sprawling growth. Smart growth strategies can help ensure Franklin Township's continued economic development while simultaneously reducing the township's greenhouse emissions.

Waste

1. *Enhance Enforcement of Existing Recycling Ordinance*: The conducted survey reflected fair compliance with recycling. An average of 62% of residents living in the three housing types said they recycle, of which an additional 31% said they also do home composting (*see appendix, question 9*). With residents living in 2 bedroom homes (up to 2,000 square feet), only 16% of those surveyed said they do not recycle. Trash inspections demonstrated that compliance with local recycling ordinances is not as high as survey responses indicated, although a true rate of recycling was unable to be determined. Recyclable materials like plastics and cardboard were found often in residential waste. Because compliance appears to be moderate, there may be great potential to reduce emissions through increased enforcement of local recycling requirements.

2. *Recycling Education*: Clarity regarding what can and cannot be recycled is prevalent throughout New Jersey communities. In Franklin Township a list of accepted materials is provided by the township on their website and in the township calendar shared annually with residents. Continued promotion of current policies regarding recycling can be promoted at community events and on the local TV station if this isn't done already.

3. *Green Purchasing*: As stated in the introduction, this study did not evaluate purchasing patterns. However, green purchasing (established preferences for recycled materials, energy efficient appliances, or other green options) or the reduction of purchasing through efficiency and conservation measures can significantly reduce the greenhouse gas emissions resulting from Township operations. (These reductions can be quantified and counted toward the township's reduction commitments even if they are not included in this baseline assessment.) A green purchasing program could also set an example for township businesses and schools.

Carbon Sequestration

Although this inventory did not evaluate the carbon sequestration potential of Franklin Township's forested areas, any change in the quality or size of these areas or flora in the township more generally could be included in future emissions inventories as a positive or negative factor. Hence, a central element in meeting the township's reduction commitments must be the protection and enhancement of open space and forested areas.

1. *Establish a Municipal Tree Planting Program*: Several sorts of programs can encourage the planting of trees in public spaces. Programs might include incentives for the planting of trees by local homeowners or businesses, cooperation with a local nursery that makes low cost or free native trees available to residents, or a public-private partnership that enables local businesses to sponsor tree plantings in the township.

2. *Planting Municipal Lawns in Attractive Natural State and Rain Gardens*: Manicured lawns can be significant contributors to climate change. Inefficient engines on trimmers, leaf blowers, mowers, and the other machinery used to maintain a lawn dramatically increase their carbon footprint. Hour for hour, a lawnmower emits more than ten times the hydrocarbon of a typical car; and an inefficient two-stroke engine on a leaf blower emits three times more per hour than a lawnmower. Frequent watering is energy intensive as well; and the fertilizers and pesticides require a great deal of energy for their production.

Franklin Township can set an example for township homeowners by planting naturalized landscapes and rain gardens at its facilities. Naturalized plantings of shrubs, trees, native grasses and wildflowers can provide a beautiful, unique setting, without the intensive use of fossil fuel. Rain gardens provide a unique yet highly functional landscaping solution to the carbon emitting maintenance of conventional lawns. They require less, if any, watering; and minimal chemical inputs. Rain gardens allow for the increased absorption of rain water runoff from roofs and other impervious surfaces such as parking lots, thus decreasing the potential for flooding.

3. *Establish Municipal Ordinances Protecting of Existing Trees*: Municipal tree ordinances typically specify protection and preservation obligations based on categories of tree and property type. Often, a native tree list or protected tree list can be used to specify obligations for environmentally important species. Any such policy must also address indirect threats to trees such as damage to root systems, compaction of soil, or changes to existing grade that could adversely affect growth. A more general ordinance can protect any tree of a designated size (for example, 32 inches in circumference at the base of the trunk). However, no such ordinance is useful if it is not actively and vigilantly enforced. Such an ordinance may be coupled with incentives for planting of native species and naturalized landscapes.

4. *Develop A Community Forestry Management Plan*: A township tree inventory should gather information on the diversity, health, location, and numbers of species in the urban forest. A good inventory is a necessary starting point to any conservation or forest expansion plan. Forested areas can be evaluated and ranked, based on biodiversity and carbon storage capacity, to help set conservation priorities. An inventory can also help identify problems, like a prevalent pest or common hazard. It can help prioritize conservation efforts; and in the long run, it can save money by helping to make municipal conservation efforts and street crews more efficient and effective. The Franklin Township Environmental Commission is in the process of getting a 5-year Community Forestry Management Plan approved by the township and the state of NJ. A township tree inventory is one goal of this plan.

5. *Promote and Protect Open Space*: Efforts to protect open space are vital to the long term reduction of greenhouse gas intensity in Franklin Township. These practices may be effectively

coupled with the township's efforts to promote smart development. In the short term, performance standards may be reviewed to ensure they are as effective as they can be. In the longer term, multiple policy options and incentives are available to local municipalities to protect existing open space and encourage the permanent protection of farmlands and forests.

Appendix: Franklin Township Survey

This is a compilation of the 97 completed and usable surveys answered by Franklin Township residents.

1. What is the square footage of your home and/or number of bedrooms? Number of residents?

	2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Average occupancy	1.98	3.27	3.88

2. What is your estimated average monthly summer and winter electric bill($)?

	2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Summer	$246	$295	$411
Winter	$230	$226	$379

3. Do you use **gas** or **oil**? What is your estimated average monthly summer and winter bill($)?

	2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Summer	$105 gas	$52 gas	$77 gas
Winter	$311 gas $238 oil	$208 gas $259 oil	$378 gas $4,000 oil (Only a single household, assuming a one time fill up for entire season)

Percent usage by fuel type	81.8% gas 13.6% oil 4.6% wood	69.6% gas 13% oil 8.7% wood 6.5% electric 2.2% propane	84%gas 8% oil 4% electric 4% propane

4. What is your estimated commute to work (in miles, roundtrip)? To the grocery store?

	2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Work	46.4 miles	36.5 miles	35.6 miles
Grocery Store	13.5 miles	12.7 miles	10 miles

5. Do you ever take public transportation? If so, where to?

2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Yes 8% No 92%	Yes 4.4% No 95.6%	Yes 12.5% No 87.5%

6. Please rate your interest in convenient public transportation (1 being the lowest, 5 being the highest)? 1 2 3 4 5 Please provide detailed comments/suggestions if possible.

2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
2.2	2.6	2.6

7. How many cars are used by your family, and what is their estimated average annual mileage?

	2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Average # cars per household	1.88	2.80	2.4
Average annual mileage per car	13,133 miles /yr/car	13,059 miles /yr/car	17,340 miles /yr/car

8. Would you consider traveling by bike to nearby locations if there were bike lanes and greenways?

2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Yes 60.9%	Yes 62.2%	Yes 57.7%
No 39.1%	No 35.6%	No 38.5%
	Maybe 2.2%	Maybe 3.9%

9. Do you recycle or do home composting?

2 Bedroom; up to 1,999 sq.ft.	**3 Bedroom; 2,000-2,999 sq.ft.**	**4 Bedroom; 3,000+ sq.ft.**
Recycle 64%	Recycle 58.7%	Recycle 65.4%
Both 20%	Both 39.1%	Both 34.6%
Neither 16%	Neither 2.2%	

10. How important is environmental sustainability to you? (1 being the lowest, 5 being the highest) Environmental sustainability refers to conserving our resources for the future. 1 2 3 4 5

2 Bedroom; up to 1,999 sq.ft.	3 Bedroom; 2,000-2,999 sq.ft.	4 Bedroom; 3,000+ sq.ft.
4.12	4.51	4.34

11. Please rate your interest in renewable energy for your home in Franklin Twp., if it were affordable: 1 2 3 4 5

2 Bedroom; up to 1,999 sq.ft.	3 Bedroom; 2,000-2,999 sq.ft.	4 Bedroom; 3,000+ sq.ft.
4.08	4.76	4.36

The most common additional comment to this answer focused around the up-front cost associated with renewable energy, mostly solar.

12. Do you own a lawn mower; if yes is it **gas** or **electric**? Or do you pay for a service?

	2 Bedroom; up to 1,999 sq.ft.	3 Bedroom; 2,000-2,999 sq.ft.	4 Bedroom; 3,000+ sq.ft.
Type of mower	Gas 76% Electric 8% Service 16%	Gas 95.6% Electric 2.2% Service 2.2%	Gas 81.8% Electric 4.6% Service 13.6%
Own more than 1 mower	4%	4.4%	12%

13. What actions/choices have you made or taken to go green? (Open ended question)

< 2,000 sq.ft.

1. Recycling, use CFLs
2. Recycle as much as possible
3. Reusable grocery bags
4. Recycling plastics
5. Hybrid car, recycled denim for insulation in attic and walls, new windows, electric riding mower, buy in bulk/less packaging, grow organic, eat vegan, shop at thrift stores, library rather than buy books, green products for cleaning and body care, reuse containers, donate food, resist upgrades

6. Conserving environmental and financial resources
7. Energy Star appliances, recycling, CFLs
8. Reducing light usage and replacing bulbs
9. None
10. Recycle, compost, conserve water, grow organic
11. CFL bulbs
12. New fertilizer
13. None
14. None
15. Turning AC down in the summer
16. Research
17. None
18. CFLs
19. CFLs, reusable totes
20. CFLs, reusable totes
21. Heating with wood for thirty-two years
22. CFL's, recycling
23. CFLs
24. CFLs
25. CFLs, recycle

2,000-2,999 sq.ft. residences

1) Online bill pay, smart usage
2) n/a
3) n/a
4) recycling, paper instead of plastic, low-wattage bulbs
5) n/a
6) CFL's, low flush toilets, compost, recycling
7) Light bulbs, recycle as many things as possible
8) Replaced HVAC units
9) Recycle at work- cardboard and paper in process
10) CFL bulbs, conserving energy, reusable sandwich wrapper, reusable shopping bags, not as many plastic bottles
11) Recycling, CFL
12) Bulbs, weatherproofing house
13) Heating with wood, CFL
14) No fertilizer/pesticide, conserve
15) 1 hybrid vehicle (Tahoe)
16) Recycle
17) CFL bulbs, veggie garden in backyard
18) Clean wood burner
19) Recycling, use clippings for mulch
20) Build house efficient
21) Recycling, home energy audit and implemented conservation program, preserved 109 acre farm (see appendix G and appendix H)
22) Recycle, mulch
23) Use less lights/water, proper disposal of chemicals, conserve electricity

24) W/D efficient
25) CFL bulbs, keep heat down during day, space heater
26) CFL's, husband has a nursery, instant water heater
27) Recycle/paperless
28) Drink filtered water (drinks tap water)
29) Av. Household
30) CFL's
31) n/a
32) CFL's, gas→electric
33) New electric box (shuts itself off) and water heater
34) Save plastic bags, CFL's
35) n/a
36) no
37) CFL's, totes
38) Light bulbs, recycling (daughter very much go green), totebags
39) CFL
40) CFL's, totes
41) CFL's, totes
42) n/a
43) n/a
44) cut back on heat
45) CFL's, low temp. at night
46) Recycle bags at grocery and reusable bags

3,000 sq.ft+

1. Organic gardens, fertilizer, pesticide, conserve water, light bulbs, recycle
2. CFLs
3. Recycling, conserve water and electricity
4. None
5. Recycle
6. CFLs, less power products
7. CFLs
8. Recycling, composting, drive only when necessary
9. Recycled products when possible, make own mulch, use no phosphate cleaning materials, re use trash bags, less plastics, biodegradables, refrain from burning, interested in solar power
10. Recycle
11. Solar lights
12. No
13. Timers on appliances and lights, energy saving bulbs, increased recycling, reduce irrigation time, programmable thermostat
14. Green cleaning products
15. CFLs, green bags, recycle oil and chemicals
16. Looking into solar
17. Tankless water heater, fiberglass doors
18. None
19. Recycle
20. None
21. Recycle, turn off lights when possible, CFLs

22. CFLs
23. CFLs, gardening, recycling
24. None
25. None
26. None

14. What are your suggestions for making Franklin Township a greener community?
(Open ended question)

<u>< 2,000 sq.ft</u>.

1. Reduce utilities, alternative energy, infrastructure for electric cars
2. Go solar, add more bike paths, closer shopping
3. More efficient garbage pick-up
4. More frequent paint recycling on the town level rather than the county level
5. Educate people on the impact of their choices
6. Zoning and land use policies should encourage farm and forest preservation while concentrating new housing in the villages where services are available.
7. Solar for public buildings if payback is possible
8. None
9. None
10. Not enough done in composting. Clayton, incentive for recycling
11. Bikes and solar
12. Public transportation to be more efficient
13. Littering is a bad problem
14. None
15. New to me
16. Bike lanes
17. None
18. None
19. Lifeguards at the lakes, and clean them up
20. Take the politics out of it, go to solar and wind power
21. Less on school (sports) more on green
22. Construction is a mess
23. Sewage hook-up vs. septic
24. Leaf pick-up
25. None

<u>2,000- 2,999 sq.ft.</u>

1) Move stores and businesses (doctor offices and drug stores) closer
2) n/a
3) n/a
4) n/a
5) Start curb side leaf pick up again (even consolidated pick up)
6) Automatic pick up bins like Williamstown, bigger
7) Doing a good job. Maybe coordinate with other towns for renewable energy options
8) Wind turbines
9) No-Solar at dumps

10) Bike path like Winstown(?). Connect with schools. Require businesses to have solar. Require developers to have walking paths. Connect country woods to figure 8
11) No
12) Solar/ turbine/ geothermal/ energy efficient lighting
13) n/a
14) Strict on recycling
15) Push hybrid vehicles (smaller cars) –more for state of NJ; quality bids
16) n/a
17) Regular recycling pick up (even w/ snow and holidays)
18) Wind turbines, electric cars
19) Solar panels on street lights
20) Solar, being more cost effective with trash and recycling
21) Continue support for recycling and Farmland Preservation programs, sponsor roadside cleanup days, continue to promote conservation design development, The Township already practices these green initiatives and hopefully will continue to support them.
22) Neater because people litter a lot
23) Better recycling program: containers for residents are not currently available. Residents do not have adequate containers for recycling paper and cardboard. Incentives- give residents money/ coupons for weight of recycled content. Glassboro does this now. Incentives are coupons for t-ball and recreational stuff.
24) n/a
25) Same leadership- doesn't always allow for innovation. 60% of our tax dollars should not go to school. Money can be spent on other things
26) Bike lanes, getting more people to recycle
27) Use solar, wind power, or alternative power sources when applicable. Turn off lights at locations such as ball fields at night when not in use
28) n/a
29) Investigate solar more- use at ball fields, M. shale(?) is bad news
30) Never thought about it!
31) n/a (*side note says: Oops- look for survey with answers on back but not front)
32) more public transportation, potholes are a major problem
33) doing a good job
34) Expand recycling (provide bins)
35) Lower taxes
36) NO
37) Lower taxes
38) Close township free mulch service. High taxes!
39) Make recycling more available
40) No
41) Clean up the lake (dam) flooding
42) Composting
43) Leaf pickup
44) High taxes, high insurance
45) Solar/ wind on vacant land; solar on roof's of schools
46) Drive to live

(?) Indicates questionable interpretation of handwriting

3,000+ sq.ft.

1. Solar street lights, civic education about Lawn Doctor
2. None
3. Should recycle more (recycling bank) incentives, leaf pickup should be brought back
4. Take leaves
5. New city council
6. None
7. None
8. Solar street lights, provide waste pickup of batteries and CFLs
9. Solar and other alternatives, provide compost, examine electric or recycled vegetable oil powered vehicles
10. None
11. More access to public transportation
12. None
13. Apply for grant funding for replacements for outdated lighting and other energy devices, encourage recycling and enforcing it
14. Public transportation sidewalks
15. Convenient trash pick-up, solar powered street light
16. Enforce recycling
17. More recycling programs and mulch
18. Recycle more, no bins, get involved like Oceanville, tires on playground grass in asphalt
19. More recycling bins and solar power
20. None
21. Put more emphasis on recycling
22. Rural- large in size, small in population. No public sewer or water, wells rarely tested
23. continue recycling, make solar more available
24. solar light posts
25. Recycle everything, little trash. Solar
26. None