ALBANY 2030

The City of Albany Comprehensive Plan

Appendix D. Climate Action Plan

ALBANY 2030
your city. your future.

Adopted by Resolution of the City of Albany Common Council on April 2, 2012.

1.0 Current Climate Science Summary

Climate change is one of the most significant social, environmental, and economic challenges facing our society today. In Albany, a warmer overall climate can result in many adverse impacts, such as more intense and frequent storms, sea level rise along the tidal Hudson River, and an increase in high heat days and heat waves.[1] Climate change is expected to cause an increase in precipitation during the winter months, with more precipitation falling as heavy downpours rather than light rain or snow.[2] Tropical Storm Irene, which hit the region in September 2011, demonstrated that intense storms can have tremendous impact on Albany economically and socially. In Albany County alone, the storm led to over $17 million in public assistance applications to FEMA as well as $3 million in individual assistance applications.[3] Across New York State, the storm caused over $1 billion worth of damage, destroying over 600 homes, closing over 22 bridges and causing damage to over 150 major highways.[4] In addition to property damage and disruption to businesses, Albany County experienced its first human case of West Nile Virus, which the County Public Health Commissioner attributed to the ideal conditions for mosquito breeding grounds created by the massive flooding and associated standing water created from the storm.[5]

Since the industrial revolution, humans have been altering the earth's climate by releasing large quantities of carbon dioxide and other heat trapping gases, known as greenhouse gases, into the atmosphere.[6] As shown in Figure 1, the earth's atmosphere naturally contains greenhouse gases, which trap heat from the sun and creates a climate that is warm enough to support life. However, as the concentration of greenhouse gases in the atmosphere increases, too much heat becomes trapped, disrupting the natural balance and creating changes in the overall climate.

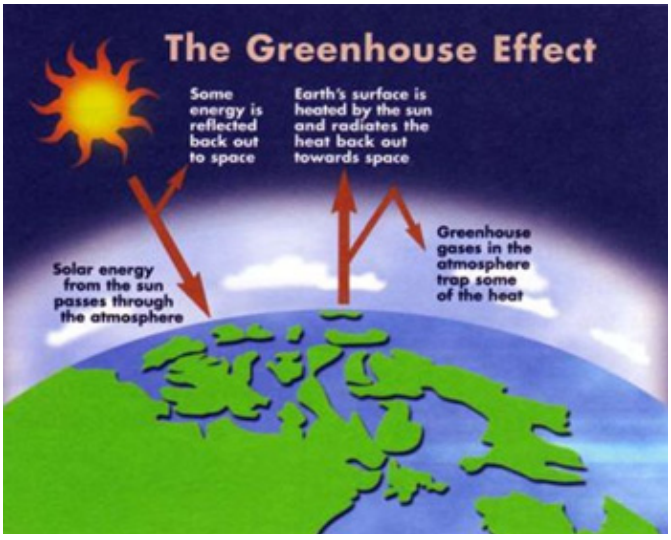


Figure 1: The Greenhouse Gas Effect
Image Credit: http://effectsglobalwarming.org/wp-content/ uploads/2011/04/A-New-Explanation-of-Global-Warming-2.jpg

[1] Responding to Climate Change in New York State, Technical Report, NYSERDA ClimAID Team. 2011
[2] Ibid
[3] Albany County Office of Emergency Management
[4] Central New York YNN, August 2011 http://centralny.ynn.com/content/top_stories/555526/cuomo-says-damage-from-irene-to-hit--1-billion/
[5] Albany County Department of Public Health News Release, September 2011 http://www.albanycounty.com/departments/health/news.asp?id=3109
[6] EPA, Climate Change – Science, http://www.epa.gov/climatechange/science/recentcc.html

New York State has recognized the threat of a changing climate and is already taking action to reduce the State's greenhouse gas emissions and to prepare for unavoidable climate impacts. Through Executive Order 24, New York established a statewide goal of reducing greenhouse gas emissions by 80 percent below 1990 levels by 2050, the level of reduction that scientists agree must occur globally to avoid potentially catastrophic impacts from climate change.[7] Through an extensive stakeholder engagement process, the State has created a Climate Action Plan to help meet this goal. By addressing the causes if and impacts from climate change, Albany is not only helping New York reach its greenhouse gas emissions reduction target, but is also taking steps to increase the City's social, economic, and environmental resiliency.

Figure 2: Projected Annual Temperature and Precipitation Change, 2080

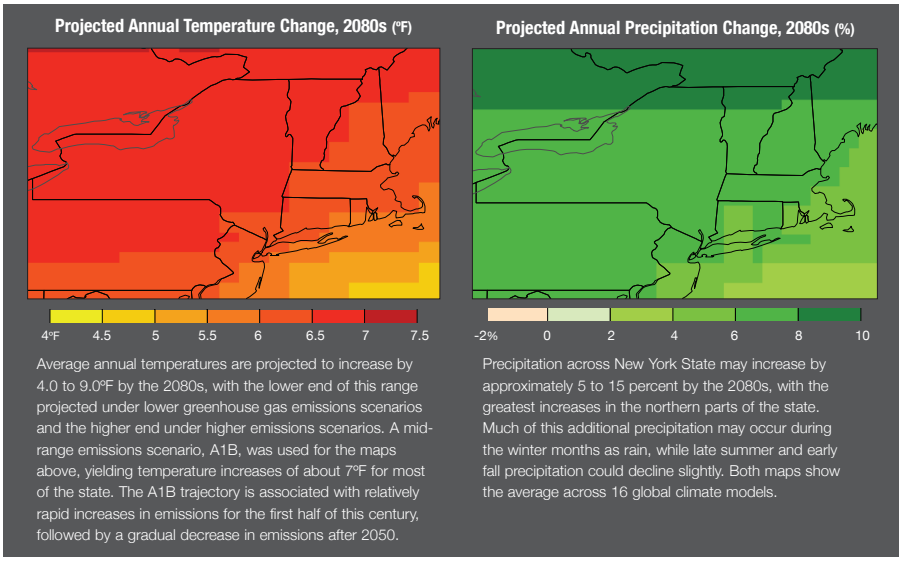


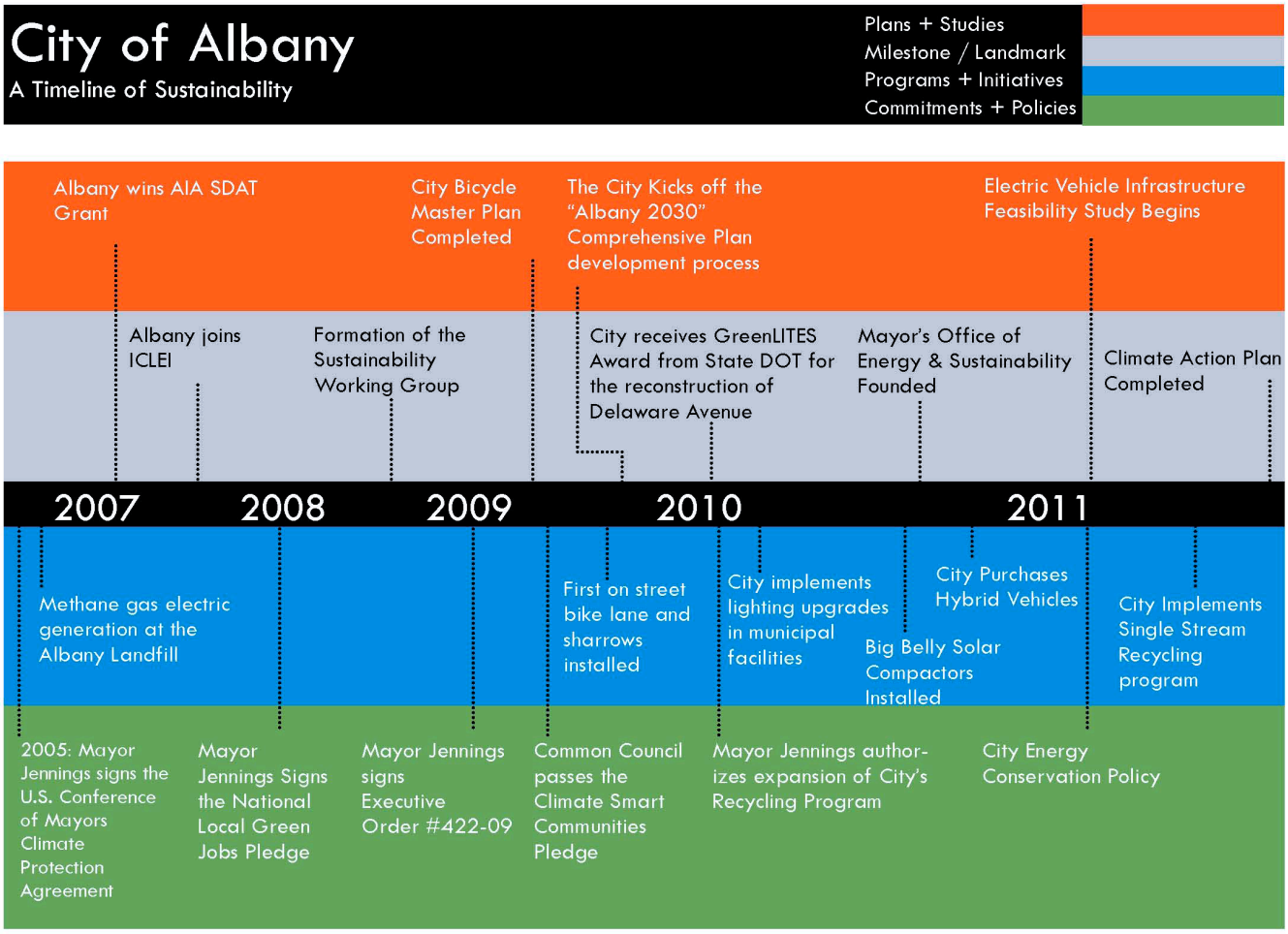
Image Credit: Responding to Climate Change in New York State, Technical Report, NYSERDA ClimAID Team. 2011

OVERVIEW OF CLIMATE ACTION IN ALBANY

The City of Albany has been taking action to address greenhouse gas emissions since 2005 when Mayor Jennings joined an inaugural group of mayors from around the country in signing on to the Mayors' Climate Protection Agreement. Since then more than 1,000 mayors have signed on, committing to reduce the greenhouse gas (GHG) emissions in their communities. The City has moved forward steadily on its efforts to reduce GHG emissions and become a more sustainable community. With the creation of the Mayor's Office of Energy & Sustainability, the City is now better positioned to expedite the implementation of activities to reduce energy use and costs for both the government and the community at large. Since the creation of the Office, the City has completed a comprehensive GHG emissions inventory, installed more than 100 Big Belly solar trash compac-

[7] New York State Climate Change Action Plan, Interim Report November 9, 2010 http://www.nyclimatechange.us/InterimReport.cfm

tors and recycling bins around the City, developed a municipal energy conservation policy, and is working to become an electric vehicle ready community. The development of this climate action plan and its integration with Albany 2030 is another step towards a more sustainable future for the entire Capital Region.



GREENHOUSE GAS EMISSIONS INVENTORY OVERVIEW

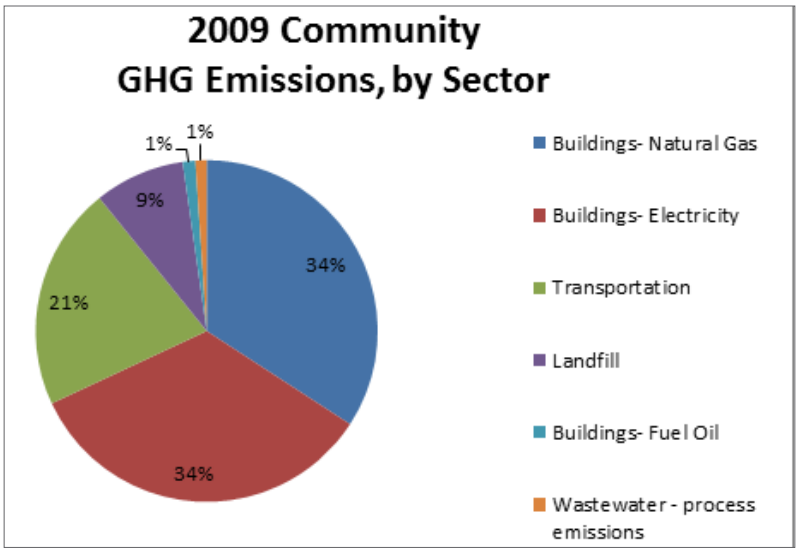
In 2010, the City of Albany completed its first comprehensive assessment of greenhouse gas (GHG) emissions from both government operations and community wide. Following standard GHG protocols, a community wide GHG emissions inventory was conducted for a baseline year of 2009. The community inventory includes all the GHG emissions generated within the boundaries of the City of Albany, such as those generated by energy use in homes, buildings, cars, and other vehicles, the methane emissions from the Rapp Rd. landfill, and process emissions from wastewater treatment. The Community Inventory also includes all of the local government's emissions; where emissions are applicable to both the Community Inventory and Government Inventory, they are reported in each. Details of the government GHG Inventory can be found on the City's website at www.albanysustainability.org/climate.asp. The details of the community GHG inventory are summarized here.

Table 1: City of Albany GHG Emissions Inventory Summary by Sector- 2009 Baseline Year

Sectors	Total GHG Emissions (Metric Tons CO_2e)
Buildings- Natural Gas	445,963
Buildings- Electricity	441,764
Transportation*	276,097
Landfill*	111,514
Buildings- Fuel Oil	15,550
Wastewater - process emissions*	13,797
TOTAL	1,304,685

* Emissions from the Transportation, Landfill, and Wastewater sectors were calculated utilizing a Scope 1 methodology, which incorporates all emissions generated within the boundaries of the City, regardless of who is responsible for them and excludes emissions from sources outside the City's boundaries even if the City is responsible for them.

Figure 3: City of Albany GHG Emissions Inventory Summary by Sector- 2009 Baseline Year



CITY OF ALBANY GREENHOUSE GAS EMISSIONS FORECAST FOR 2030

While it is necessary to have a baseline of community GHG emissions, it is helpful to forecast the City's future GHG emissions for 2030 as well. Using the 2009 baseline GHG emissions as a benchmark for future emissions, this forecast was developed to provide an estimate of GHG emissions given a Business As Usual (BAU) scenario for the year 2030.

The sources of GHG emissions included in this forecast are:

- Consumption of natural gas
- Consumption of fuel oil (used in buildings)
- Electricity purchased from the grid
- Combustion of vehicle fuel
- Methane from decomposition of waste in the landfill
- Process and fugitive emissions from wastewater treatment

The result when totaling emissions from all sectors is an overall 9% increase in emissions for 2030 under a BAU scenario. The BAU scenario incorporates only the anticipated changes in standard population growth, in vehicle fuel efficiency, and the regional energy profile. Additionally, this scenario has incorporated the City's goal of a 65% waste

diversion rate, which would reduce the overall amount of solid waste that ends up in the Rapp Road Landfill by 20%. No other significant policy, program, or technical change that would impact consumption of energy, volume of wastewater treated, or vehicle use is accounted for in any of these sectors. The following table shows the detailed results.

Table 2: City of Albany GHG Emissions Forecast 2030

City of Albany 2030 Emissions Forecast					
Sector	**Emissions Source**	**CY 2009 CO2e (metric tons)**	**Change**	**Data Source**	**Projected CO2e (metric tons) for 2030**
Buildings and Facilities					
	Natural gas consumption	445,963	39% increase in emissions	Annual Energy Outlook 2011	619,889
	Fuel oil consumption	15,550	9% decrease	Annual Energy Outlook 2011	14,151
Wastewater					
	Process and fugitive emissions	13,797	0.11% increase based on population	Capital District Regional Planning Commission (CDRPC) Population Projections	13,812
Transportation					
	Mobile combustion of fuel	276,097	14% decrease in emissions	Annual Energy Outlook 2011	237,443
Landfill					
	Methane emissions from waste decomposition	111,514	meeting 65% diversion rate by 2020	Solid Waste Management Plan	89,211
Buildings and Facilities					
	Purchased electricity	441,764	1% increase in emissions	Annual Energy Outlook 2011	446,182
TOTAL		**1,304,685**	**results in an overall 9% increase in emissions**		**1,420,688**

2.0 Climate Protection Strategies

The City of Albany identified the following actions to address greenhouse gas (GHG) emissions from the community and to prepare for a changing climate. The Albany 2030 Comprehensive Plan includes an underlying theme of sustainability. Therefore, the plan development process, which included rigorous engagement of key stakeholders and the public at large, lent itself to the identification of climate protection strategies. The City reviewed all of the Albany 2030 strategies and highlighted those that directly impact the reduction of GHG emissions or the enhancement the City's resiliency to the projected impacts of climate change. The determination was made based on whether the intent of each strategy, when implemented, would result in a reduction of GHG emissions or the enhancement of the City's resiliency to a changing climate. Once the existing strategies were identified, the City worked with the Community Advisory Committee, consisting of members of the Albany community with diverse expertise in building energy, transportation, wastewater treatment, and natural resources, to identify and make recommendations to address any gaps in the existing strategies. The result of this effort is provided below.

This portion of the Climate Action Plan is divided into two parts. The first section includes those strategies focused on the reduction of GHG emissions from the Albany community – these are climate mitigation strategies. The second section includes those strategies focused on enhancing the resiliency of the Albany community to the anticipated impacts of climate change, as detailed above – these are climate adaptation strategies. The strategies from Albany 2030 are listed by their Albany 2030 identifier. Additional strategies, recommended by the Community Advisory Committee (CAC), that do not appear in Albany 2030, are listed by the identifier CAC and then the number.

CLIMATE MITIGATION STRATEGIES

The climate mitigation strategies are organized by GHG emissions inventory sectors, buildings, transportation, solid waste (landfill) and wastewater/water. Additionally, there are strategies listed that address the urban forest and its potential as a carbon dioxide sink.

Buildings (Residential, Commercial, Industrial)

GHG Emissions	903,226 metric tons of CO2e (69% of emissions)
Target	Reduce emissions 10%

Electricity, natural gas, and fuel oil consumption in buildings was responsible for 903,226

metric tons of CO_2e in 2009, which is equivalent to the annual greenhouse gas emissions from 177,103 passenger vehicles. In an urban center, like Albany, it is common that the building sector dominates the emissions profile. For Albany, the fact that there are a significant number of state government buildings, hospitals, universities, and other institutions, impacts those emissions even further. Based on data provided by National Grid, 67% of building electricity demand is consumed by the city's largest institutions and industries, while 18% is attributed to city residences. The results highlight the importance of addressing community energy efficiency and renewable energy opportunities in Albany. The City will need to work in collaboration with institutional and commercial partners to design, resource, and implement sustainability programs to address energy needs.

Figure 4: City of Albany Electricity-related GHG Emissions by Building Sector- 2009 Baseline Year

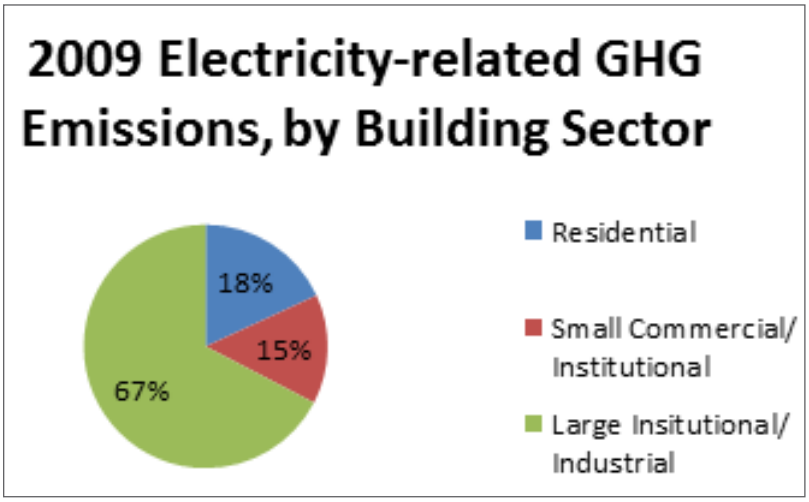


Table 3: Buildings Climate Mitigation Strategies

Building Strategies		
Strategies	**Descriptions**	**GHG Benefits/Metrics**
EN-4 Incentivize energy-efficiency and renewable energy technologies in construction and rehabilitation projects.	Incentivize energy-efficiency and renewable energy technologies in construction and rehabilitation projects. Incentive options could include: • Promoting existing energy efficiency programs through NYSERDA and the utilities • Informing residents of tax rebates on energy efficient appliances • Updating building codes to incorporate green building standards	**Benefits:** Increasing energy efficiency within buildings will reduce heating and electricity use, costs, and associated GHG emissions. Installing renewable energy systems will further assist with the reductions in fossil fuel use and GHG emissions. **Metrics:** Electricity and natural gas usage data; participation rates in utility and NYSERDA programs
CAC-1 Develop a Green Business & Institution Program	The City of Albany has a large number of commercial and institutional facilities that contribute significantly to the GHG emissions in the City. A Green Business Program will focus on assisting businesses within the City to reduce their overall energy use and GHG emissions from their facilities and operations.	**Benefits:** Increasing energy efficiency within buildings will reduce heating and electricity use, costs, and associated GHG emissions. Engaging a broad audience at the office also helps them learn to take these actions at home as well. **Metrics:** Number of businesses actively engaged in the program; electricity and natural gas usage in the commercial, industrial, institutional sectors
CAC-2 Develop a Residential Energy Efficiency Program	Various residential energy efficiency programs already exist for the Capital Region. The City of Albany could develop its own program that pulls all of these opportunities together to make it easy for residents to leverage all of the funding and technical resource opportunities. The City can also conduct a study to determine the feasibility of implementing a PACE (Property Assessed Clean Energy) financing program, which would allow residents to finance energy efficiency and clean energy projects through their property assessments. These types of mortgage liens are currently being argued in federal court, pending results the City can consider pursuing.	**Benefits:** Increasing energy efficiency in homes will reduce heating and electricity use, costs, and associated GHG emissions. Installing renewable energy systems will further assist with the reductions in fossil fuel use and GHG emissions. **Metrics:** Electricity and natural gas usage data; participation rates in utility and NYSERDA programs

Transportation

GHG Emissions Baseline: 276,097 metric tons of CO2e (21% of emissions)
Target: Reduce VMT 20% by 2030

Transportation is the second largest emitter of greenhouse gases in Albany accounting for 21% of the total community inventory. The Transportation sector generated 276,097 metric tons of CO_2e from 621,062,681 vehicle miles traveled. This includes emissions from gasoline and diesel of all private, commercial, and public on-road cars, vans, buses, trucks, and heavy-duty vehicles. Per standard GHG accounting protocols, vehicle miles traveled were only calculated for trips within the geographical boundary of the City of Albany. The City has a great opportunity to reduce its emissions through planning for and around public transit and alternative modes of transportation.

Table 4: Transportation Climate Mitigation Strategies

Transportation Strategies		
Strategies	**Descriptions**	**GHG Benefits/Metrics**
LU-2 Land use transportation connection	Connect land use patterns and the transportation network to maximize transportation efficiency and reduce automobile dependency.	**Benefits:** Increases opportunities to walk, bike, or take transit- thereby reducing VMT **Metrics:** VMT
UD-3 Create multi-modal design guidelines	Use urban design standards and guidelines as a way to support alternative modes of transportation (pedestrian, bicycle, transit and alternative fuel vehicles).	**Benefits:** Increases opportunities to walk, bike, or take transit- thereby reducing SOVs and VMT **Metrics:** VMT, Transit Use, purchases of alternative fuel vehicles
CHR-2 Promote walkable neighborhoods and complete streets	Promote walkable neighborhoods and complete streets to encourage walking and cycling.	**Benefits:** Increases opportunities to walk, bike, or take transit- thereby reducing VMT **Metrics:** VMT

Transportation Strategies Continued		
MM-1 Develop and Implement a Complete Streets Policy	Maintain and enhance the existing street network to encourage the safe and efficient mobility of all persons, regardless of age or ability, whether walking, biking, riding transit, or driving. Complete streets policies seek to make streets safer and more functional, convenient, and enjoyable for travelers using all modes. In January 2011, Complete Streets legislation was reintroduced into the New York State Senate, which passed Complete Streets legislation in 2010.	**Benefits:** Increases opportunities to walk, bike, or take transit- thereby reducing VMT **Metrics:** Bike and bus ridership
MM-2 Coordinate transportation investments to support preferred land uses	Integrate planning for transportation and land use by coordinating transportation planning decisions, policies and strategies to be supportive of the land use vision (e.g., transit-oriented development).	**Benefits:** Creating more livable spaces within walking distance to transit, reduces VMT **Metrics:** VMT
PED-2 Expand Greenways	Continue to improve and expand the current and planned greenways in the City by connecting with local and regional pedestrian and bicycle infrastructure.	**Benefits:** Improvements to the greenways will increase use of bicycles throughout the region, increasing the ability of employees to commute via bike, which reduces VMT **Metrics:** VMT, number of bikes on the trails during rush hour
BIC-1 Promote and Implement the Bicycle Master Plan	The Bicycle Master Plan provides a vision of Albany as a “bikeable” city and a plan to implement the vision.	**Benefits:** A bikeable City accommodates bicyclists more readily increasing the likelihood of commuting by bike, reducing SOVs and VMT **Metrics:** Bike Ridership, VMT
TR-1 Establish an intermodal transit center	Establish an Intermodal Transit Center (regional / local bus service) with connections to the Rensselaer Amtrak Station and Albany International Airport.	**Benefits:** An intermodal center with easy connections to the train station and airport will allow for visitors and business travelers to avoid renting vehicles, reducing VMT **Metrics:** VMT

Transportation Strategies Continued		
TR-2 Promote Transportation Demand Management to improve transit choices	Employ transportation demand management techniques to encourage the use of transit, including the use of incentives.	**Benefits:** Incentivizing transit and alternative modes of transportation will reduce the number of SOVs on the road and associated VMT **Metrics:** VMT, transit use numbers
VEH-3 Promote Transportation Demand Management to reduce vehicle miles travelled	Transportation demand management includes a variety of opportunities to reduce automobile use and vehicle miles traveled. Programs can include the encouraging of bicycling, carpooling, transit use, or telecommuting.	**Benefits:** Incentivizing transit and alternative modes of transportation will reduce the number of SOVs on the road and associated VMT **Metrics:** VMT, transit use numbers
VEH-4 Promote hybrid/electric, alternative- fueled, and efficient vehicles	The inclusion of fuel efficient, hybrid and alternative-fueled vehicles are a desired part of a sustainable transportation network in Albany. Municipal and Public car share should also be explored.	**Benefits:** Alternative fueled vehicles, reduce gasoline and diesel consumption and dependency on foreign oil **Metrics:** Number of alternative fueled vehicles, reductions in gasoline purchases
AQ-1 Provide multi-modal transportation choices to reduce automobile use, vehicle miles traveled, and emissions	Provide multi-modal transportation choices to reduce automobile use, vehicle miles traveled, and emissions.	**Benefits:** Increases opportunities to walk, bike, or take transit- thereby reducing SOVs and VMT **Metrics:** VMT, Transit Use
NS-2 Increase transit connectivity between and among city neighborhoods and employment centers	Increase transit connectivity between and among city neighborhoods and employment centers.	**Benefits:** Increases opportunities to walk, bike, or take transit- thereby reducing SOVs and VMT **Metrics:** VMT, Transit Use
EN-3 Promote multi-modal transportation choices to reduce vehicle miles travelled	Promote multi-modal transportation choices to reduce vehicle miles travelled.	**Benefits:** Increases opportunities to walk, bike, or take transit- thereby reducing SOVs and VMT **Metrics:** VMT, Transit Use

Solid Waste

GHG Emissions Baseline	111,514 metric tons of CO2e (9% of emissions)
2030 Target	Divert 65% of Solid Waste from the Landfill

Methane emissions from the Rapp Rd landfill account for 111,514 metric tons, or 9% of the total community GHG baseline inventory for 2009. Emissions are associated with waste collected and processed by the City from all over the Capital District. In future inventory years, as a policy tool, the City will also attempt to extract and report emissions from municipal solid waste generated only by Albany City residents. This will enable the City to better track the impact of waste reduction measures.

Table 5: Solid Waste Climate Mitigation Strategies

Solid Waste Strategies		
Strategies	**Descriptions**	**GHG Benefits/Metrics**
SWM-1 Maintain and expand waste reduction, reuse and recycling efforts, including recommendations set forth in the SWMP Modification	Both the desire to reduce GHG emissions and the fact that the Rapp Rd. Landfill is running out of space are motivating factors in the City's 65% diversion rate target. There are various ways in which the City can encourage waste reduction and an expansion of reuse and recycling. These could include: • Appointing a Planning Unit Recycling Coordinator as a resource for the region • Enhancing education and enforcement efforts • Establishing a Green Office Challenge that includes a reduction in office waste • Continuing commercial waste inspections for the presence of recyclables • Encouraging backyard composting through educational programs and offering discounts on composters	**Benefits:** A reduction in the amount of waste, particularly organic waste into the landfill will reduce methane emissions and increase the longevity of the landfill. **Metrics:** tons of solid waste entering the landfill; number of composters purchased; percentage of organic waste in the solid waste stream; percent of recyclables in the solid waste stream

Solid Waste Strategies Continued		
SWM-2 Explore alternatives for solid waste reduction and disposal	Both the desire to reduce GHG emissions and the fact that the Rapp Rd. Landfill is running out of space are motivating factors in the City's 65% diversion rate target. There are alternative programs and technologies the City can pursue to encourage waste reduction and an expansion of reuse and recycling. These could include: • Investigate the viability of a pay as you throw program • Create volume based disposal charges to create financial incentives to reduce • Expanding the organics diversion program • Explore additional alternatives that recover energy from the waste (Rapp Rd currently as a methane power generator) • Develop a building and construction material reuse and recycling program • Require an increased percentage of demolition material diversion as part of the permit approval process • Create a green demolition pilot program	**Benefits:** A reduction in the amount of waste, particularly organic waste into the landfill will reduce methane emissions and increase the longevity of the landfill. Utilizing the methane for other energy needs reduces overall GHG emissions. **Metrics:** tons of solid waste entering the landfill; number of composters purchased; percentage of organic waste in the solid waste stream; percent of recyclables in the solid waste stream; percent of methane emissions captured; number of businesses actively engaged in a green demolition pilot program; number of demolition permits exceeding the basic requirement for diversion.

Wastewater/Water

Emissions	13,797 metric tons CO2e (1% of emissions)
2030 Target	10% reduction of CO2e emissions

In 2009, 1,034 million gallons of wastewater from Albany was treated in an aerobic digester process at the Albany County Sewer District. Although aerobic, the treatment process pro¬duces some residual CH4 (methane) and N2O (nitrous oxide) emissions (21 times and 310 times the global warming potential of CO2 respectively). The CO2e process emissions from wastewater treatment are 13,797 metric tons. Electricity consumption by the wastewater treatment facility is accounted for in the buildings portion of the community inventory. Although wastewater process emissions are small, this is still an important area to mitigate. The City and its residents pay by volume of wastewater treated, much of which is stormwater sent via combined storm and sewer system. Working to reduce excess outflow will also save money and reduce pollution to the Hudson River.

Albany's water system is gravity fed so there are no direct emissions associated with moving water through the system.

Table 6: Wastewater/Water Climate Mitigation Strategies

Wastewater/Water Strategies		
Strategies	**Descriptions**	**GHG Benefits/Metrics**
WW-6 Encourage water conservation	Water is a vital resource and conservation of water is always a best management practice. The City can continue to encourage water conservation through actions such as: • Developing standards for new construction and rehabilitation projects to require the use of high-efficiency toilets and low-flow fixtures • Work with New York State to revise building codes to allow the use of greywater recycling systems (i.e., untreated household wastewater from showers, bathroom sinks, washing machines) for irrigation and other non-potable uses.	**Benefits:** Because the City does not require energy to move water, there are no specific GHG mitigation benefits, however, water conservation can also be a climate adaptation strategy and is always a smart, sustainable practice **Metrics:** None

Wastewater/Water Strategies Continued		
WS-3 Encourage water conservation to reduce volume in sewers and to save energy on heating, pumping, and treating water	Currently the City has combined sanitary and storm sewers causing stormwater to be filtered through the South Plant wastewater treatment facility. The more water treated the higher the energy use and process emissions.	**Benefits:** Currently the City has combined sewer overflows (CSOs), which causes storm runoff to be filtered through the South Plant wastewater treatment facility. The more water treated the higher the energy use and process emissions. Any efforts to reduce the volume of water that enters the plant will reduce the energy use and GHG emissions associated with the water treatment process. **Metrics:** Volume of water treated
SW-1 Create a green infrastructure system as an alternative and complement to "grey" (engineered) infrastructure in order to better absorb stormwater runoff and filter pollutants	Green infrastructure is a stormwater management technique that preserves, restores, enhances, or mimics natural hydrology. A green infrastructure system integrates the built environment with soil, water, and plant systems that intercept stormwater, infiltrate a portion of it into the ground, evaporate a portion of it into the air, and in some cases release a portion of it slowly back into the stormwater system, resulting in reduced and cleaner discharge into surface waters.	**Benefits:** Currently the City has combined sewer overflows (CSOs), which causes storm runoff to be filtered through the South Plant wastewater treatment facility. The more water treated the higher the energy use and process emissions. Any efforts to reduce the volume of water that enters the plant will reduce the energy use and GHG emissions associated with the water treatment process. **Metrics:** Percent area of the City covered by green infrastructure projects; Volume of water treated
CAC- 3 Investigate the feasibility of utilizing the City's water system for renewable energy generation	The City's water system is gravity fed. Therefore, it does not require energy to move most of the water through the system. In fact, the speed with which the water naturally flows is actually faster than is needed for the system to function. This presents an opportunity for the City to capture some of that excess energy and utilize it as a power source for other facilities.	**Benefits:** The City's water system has the potential to become a renewable energy source for electricity. This could result in significant savings in electricity costs and GHG emissions. **Metrics:** Electricity generated from the water system

URBAN FOREST

The urban forest can play an important role in reducing GHG emissions. Trees absorb CO2 from the air, create shading to reduce energy costs, and absorb stormwater that can overflow into the sewer system. Enhancing the urban forest in Albany is a GHG mitigation strategy that provides significant additional benefits, such as providing habitat for wildlife, improving air quality, and enhancing neighborhoods. For the purposes of the City of Albany's GHG Inventory, trees are not considered sources of GHG emissions, but rather potential sinks, which were not calculated for this inventory.

Table 7: Urban Forest Climate Mitigation Strategies

Urban Forest Strategies		
Strategies	**Descriptions**	**GHG Benefits/Measures**
UF-1 Develop and implement a comprehensive urban forestry program to increase and maintain the health of Albany's urban tree canopy.	The urban forest provides an important service to the City through the absorption of CO2 and heat. A comprehensive urban forestry program will ensure that Albany is maximizing these benefits for the greater good.	**Benefits:** Trees naturally absorb CO2 and can also create decreases in energy costs by shading homes and businesses. **Metrics:** Percent of City covered by tree canopy; number of new trees planted; number of trees saved from removal
AQ-2 Enhance the urban forest to absorb CO2 and other pollutants	To ensure the City is maximizing the potential of its urban forest, it should establish a baseline and target for its urban canopy. This can be accomplished by the following steps: • Measuring the existing tree canopy • Determine the current CO2 sink capacity • Assess existing urban forest management practices and programs • Identify opportunities to enhance those programs • Identify core partners • Establish appropriate urban forest goals	**Benefits:** Trees naturally absorb CO2 and can also create decreases in energy costs by shading homes and businesses. **Metrics:** Percent of City covered by tree canopy; number of new trees planted; number of trees saved from removal

CLIMATE ADAPTATION STRATEGIES

As of the date of this Climate Action Plan, the City of Albany was completing a community-wide climate change vulnerability assessment. While many of the climate adaptation strategies identified here will still be relevant following the release of the vulnerability assessment, it is anticipated that additional strategies will be identified for the climate adaptation plan, which is anticipated to be complete in early 2012. From the New York State ClimAID report, however, we know that Albany can anticipate the following climate change impacts:

- Increase in average temperatures
- Increase in the number of days of 90 degrees Fahrenheit
- A rise in the water table for the tidal Hudson River, due to sea level rise
- Increase in precipitation amounts
- Increase in the number and severity of storm events

View of Hudson River Flooding from Broadway in Albany, New York following Tropical Storm Irene. Photo Credit: Laura DeGaetano, Albany County Senior Natural Resource Planner

Table 8: City of Albany Climate Adaptation Strategies

Climate Adaptation Strategies		
Strategies	**Descriptions**	**Climate Impact Addressed**
PS-6 Enhance resiliency against natural events linked to climate change and that threaten the well being of the community.	This strategy is focused on the broader safety of the community during a climate related storm or hazard event. This will be further defined through the Climate Adaptation Plan. Example strategies the City could implement to reduce the threat to its population: • Identify populations most vulnerable to a changing climate and increase resilience in those populations. • Assess emergency response plans in anticipation of climate change impacts and develop a citywide natural disaster response plan to anticipate and quickly respond to extreme weather and other emergency events. • Partner with the New York State Office of Emergency Management (OEM) to increase coordination between the City of Albany Police and Fire and Emergency Services Departments and the state and region	All
NH-1 Limit encroachment into habitat areas through land use controls	Natural habitat areas are vital for the survival of certain species. Natural areas are better able to absorb increases in precipitation and runoff, reducing the potential for flooding, as compared to urban spaces. Additionally, forested habitat areas can provide shade to reduce the local ground temperature. Protection of natural habitats is vital to Albany's resiliency.	Increased temperatures Increased precipitation Increased storm events Rise in Hudson River
NH-3 Restore and maintain high quality natural habitats.	Natural habitat areas are vital for the survival of certain species. Natural areas are better able to absorb increases in precipitation and runoff, reducing the potential for flooding, as compared to urban spaces. Additionally, forested habitat areas can provide shade to reduce the local ground temperature. Protection of natural habitats is vital to Albany's resiliency.	Increased temperatures Increased precipitation Increased storm events Rise in Hudson River

Climate Adaptation Strategies Continued		
TS-1 Limit encroachment on steep slopes through land use controls	Steep slopes can contribute to landslides during extreme rain events and create significant liabilities.	Increased precipitation
OS-3 Support local food production as a means of economic development and local food security	In the event of a climate related disaster, it is possible that transportation routes connecting Albany to the rest of the region could be destroyed, preventing goods to make it to Albany in a timely fashion. Local food options can enhance the City's ability to feed its population following significant storm events.	N/A
FP-2 Modernize the port to accommodate increased demand	As expected, the Port of Albany is located along the Hudson River to the southeast of Albany's downtown core. In this location, the Port is particularly vulnerable to the rising tides of the Hudson River. Coupled with an increase in precipitation, a winter storm event occurring at high tide could severely impact the Port's ability to operate. Through the modernization process, the Port should factor in the potential impacts of sea level rise, storm surge, and an increase in precipitation and ensure that strategies to address these impacts are incorporated into new development plans. One example strategy could be investigating the feasibility of utilizing alternative construction materials for pavement and rail tracks in preparation for climate change.	Rise in Hudson River Increased precipitation Increased storm events
HDC-11 Increase resilience of housing stock to impacts of climate change	The vulnerability assessment that the City has undertaken will reveal more information on those areas most prone to the impacts of climate change. However, there are opportunities now to investigate resiliency strategies such as the formation of mutual insurance pools to spread the risk of climate change.	To Be Determined

Climate Adaptation Strategies Continued		
SW-1 Create a green infrastructure system as an alternative and complement to "grey" (engineered) infrastructure in order to better absorb stormwater runoff and filter pollutants	Green infrastructure is a stormwater management technique that preserves, restores, enhances, or mimics natural hydrology. A green infrastructure system integrates the built environment with soil, water, and plant systems that intercept stormwater, infiltrate a portion of it into the ground, evaporate a portion of it into the air, and in some cases release a portion of it slowly back into the stormwater system, resulting in reduced and cleaner discharge into surface waters. These types of systems throughout the City will lessen the damage from increased precipitation and avoid possible flooding. Depending on the size of the greenery associated with the green infrastructure system, there is also the possibility to create shade and reduce local temperatures	Increased precipitation Increased storm events Increased temperatures
SW-3 Reduce impermeable surfaces through land development regulations	The less impermeable surface the less runoff and flooding during and after significant precipitation events. Also, a reduction in the amount of asphalt and other impermeable materials also reduces local temperatures.	Increased precipitation Increased storm events Increased temperatures
UD-2 Improve connections between the downtown and the Hudson River waterfront and provide waterfront amenities	This strategy is identified because in order to implement, the projected impacts of climate change should be considered. The Hudson River waterfront is anticipated to be an area that is highly vulnerable to the impacts of a changing climate.	N/A
UF-2 Use zoning and environmental review as a tool to protect the urban forest	The urban forest can play a large role in reducing the urban heat island effect or the local temperatures. Trees provide shade from the sun and absorb precipitation and runoff. Efforts to protect the urban forest should be prioritized.	Increased temperatures Increased precipitation

3.0 Education and Outreach

Education and outreach are fundamental to the success of any program. Throughout the Albany 2030 Comprehensive Plan document, the City has identified many education and outreach opportunities. There are also several ways in which the general population can become more informed on climate change, its impacts, and the opportunities to address and prepare for them. Some of the key strategies focused on outreach programs related to climate protection from Albany 2030 include:

NH-4
Use the Pine Bush Discovery Center and the W. Haywood Burns Environmental Education Center as resources for promoting habitat protection

EN-2
Develop an education program to communicate the City's energy and sustainability goals and accomplishments to residents, businesses, and institutions

FP-5
Work with institutions on climate change planning

4.0 Annual Review

This Climate Action Plan is designed to be a living document, meaning that as opportunities arise and circumstances change the City will revisit the identified strategies to ensure they are appropriate and revise implementation plans or priorities as necessary. At any given point in time, this climate action plan should reflect the most effective ways in which the City of Albany can reduce its overall greenhouse gas emissions and meet its identified targets for 2030. The annual review process will consist of an analysis by the Mayor's Office of Energy & Sustainability to determine if changes are needed and to make recommendations on how to address. If changes are needed, the Mayor will convene the Sustainability Working Group and/or the Community Advisory Committee to review the recommendations from the Mayor's Office of Energy & Sustainability to determine which will be incorporated. The draft of the revised Climate Action Plan will be available for online comment for up to two weeks. Once comments have been reviewed and addressed, as appropriate, the Mayor will approve the updated version and it will be posted on the City's website. This review will be coordinated with the annual review process for the Albany 2030 Plan.

5.0 Glossary of Terms

Alternative Fueled Vehicle: A vehicle that operates on a non-traditional fuel, including natural gas, electricity, propane, biofuels, compressed air, or hybrid power systems.

Bus Rapid Transit (BRT): A bus line that offers quicker and more efficient service along a line, typically through reduced stops and timed traffic lights. CDTA's 905 line is the only line currently in operation in the Capital District.

CDTA: Capital District Transportation Authority, operator of Albany's bus system.

CDTC: Capital District Transportation Committee, the regional Metropolitan Planning Organization (MPO).

Climate Adaptation: Adjustments to climate change (including climate variability and extremes) to moderate potential damage, to take advantage of opportunities, or to cope with the consequences.

Climate Change: Any change in global temperatures and precipitation over time due to natural variability or to human activity.

Climate Mitigation: Any action taken to permanently eliminate or reduce greenhouse gas emissions.

Combined Sewer Overflows (CSOs): Combined sewer overflows (CSO) are discharges of untreated wastewater from a combined sewer system (CSS) at a point prior to the headworks of the Wastewater Treatment Plant (WWTP).

Complete Streets: Streets that are designed to be used by all modes of traffic equally, including vehicles, bicycles, and pedestrians.

Greenhouse Gas (GHG): Atmospheric gases that absorb or re-radiate solar radiation. In excess they have been shown to increase the temperature of the planet. GHGs include carbon dioxide (CO2), methane (CH4), and water vapor (H2O).

Greenhouse Gas Inventory: A comprehensive overview of the GHG emissions by a municipality, population, or organization.

Greywater: Wastewater that is reused for irrigation and other uses. Greywater typically originates from laundry, bathing, and dishwashing and does not use water that has come into contact with human waste (blackwater).

LEED Certification: Leadership in Energy and Environmental Design. A building can receive certification by the U.S. Green Building Council (USGBC) if it is constructed or rehabilitated and meets the USGBC's standards for sustainable design and construction techniques.

Single Stream Recycling: A method of collecting recycling where all recyclables are collected in one container, eliminating the need to separate each type at the source. Separation is done later at a dedicated facility.