DEPARTMENT OF COMMUNITY DEVELOPMENT SERVICES

Planning Division

m e m o r a n d u m

TO: The Urbana Plan Commission

FROM: Robert Myers, AICP, Planning Manager

DATE: March 16, 2012

SUBJECT: Study Session presentation on the Sustainability Advisory Commission's draft Climate Action Plan

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The City of Urbana's Sustainability Advisory Commission will at the March 22, 2012 Plan Commission meeting present a draft of a proposed Climate Action Plan, Phase I for discussion.

City staff requests that the Plan Commission review the draft report and provide any comments. One or more members of the Sustainability Advisory Commission will attend the meeting and make a brief presentation.

Attachments: draft Climate Action Plan

cc: Marya Ryan

City of Urbana Climate Action Plan, Phase I

Executive Summary

This document, developed by the City of Urbana Sustainability Advisory Commission (SAC), presents the first of two phases of a climate action plan for the City of Urbana. A second phase with a more comprehensive set of strategies will follow, after a period of public involvement and input. By adopting this document, the City of Urbana

- Establishes its vision for sustainability of natural resources.
- Commits to a set of underlying principles that will frame climate action planning.
- Identifies a 2007 GHG emission baseline inventory of ~548,700 metric tons of CO_2 equivalent (MT CO_2e) and a projected 2020 inventory of ~638,800 MT CO_2e under a "business as usual" scenario. Emissions from the University of Illinois campus are not included in the inventories, since the University has its own climate action plan.
- Commits to a goal of 25% reduction in greenhouse gas (GHG) emissions by 2020, regardless of growth and pending identification of Phase II strategies that will enable the City to reach the goal.
- Agrees to pursue a set of GHG-reduction strategies that can be implemented on a short timeline at modest or no cost. Strategies are designed to be implemented by City government and by the public at large.
- Establishes the Sustainability Advisory Commission's role in review of matters related to GHG reduction.

Phase I will be followed by a period of time during which Phase I strategies are implemented and public input is sought. A Phase II document will then be developed with an additional set of strategies.

At the same time public input is gathered, the SAC will continue to coordinate with other climate planning efforts under way within the county and seek opportunities to shape this plan toward an integrated regional approach.

Phase I strategies focus on

- Renewable energy credits (RECs) for residential electricity and
- Energy efficiency in commercial sector electricity; transportation sector gasoline; and residential sector natural gas.

City of Urbana Climate Action Plan, Phase I

Introduction

This document has been developed by the City of Urbana Sustainability Advisory Commission (SAC). It presents the first of two phases of a climate action plan for the City of Urbana. A second phase with a more comprehensive set of strategies will follow, after a period of public involvement and input.

During Phase I, the City will implement the Phase I strategies; seek public input on the effectiveness of the strategies; and seek public input on the development of Phase II strategies. The anticipated timeframe for implementation of Phase I strategies is one to two years. With regard to Phase I strategies, feedback will be sought from the community at large after the strategies have been implemented. Members of the public will be asked how well or poorly the strategies are working, what their reasons are for participating (or not participating) in those strategies, and what barriers or limitations they have come across with regard to their participation. For Phase II, members of the public will be asked to contribute ideas for new strategies, assessments of whether they will or will not participate and why, and input on what would remove barriers to participation.

After public input has been gathered, a Phase II document will be written, defining additional strategies to take the City the rest of the way to its greenhouse gas (GHG) emission reduction goal.

At the same time public input is gathered, the SAC will continue to coordinate with other climate planning efforts under way within the county and seek opportunities to shape this plan toward an integrated regional approach.

Both phases of the City of Urbana climate action plan include strategies for residents and businesses to adopt; that is, they include but are not intended solely for the operations of municipal government. They do not include the University of Illinois campus, which has its own climate action plan.

City of Urbana Sustainability Vision Statement

The City of Urbana is committed to meeting the needs of today's residents without compromising the ability of future generations to meet their needs. The City of Urbana, therefore, works toward:

1. Supporting a healthy, diverse and equitable economy;

2. Increasing resilience and community security with respect to food, water, energy and other human needs; and

3. Enhancing quality of life through stewardship of natural resources, restoration of ecological integrity, and conservation of open space.

Climate Action Principles

The City of Urbana is committed to the following climate-related principles, which will be incorporated into city planning and implementation activities:

- Promoting energy conservation and efficiency in building construction, operations, and maintenance (including residential); transportation; business and industrial activities; education; municipal and government operations; and in all other areas where energy resources are used
- Reliance on clean, renewable energy resources
- Proactive participation in opportunities to make clean, renewable energy resources available to the public
- Pursuing strategies that are equitable and accessible to all Urbana residents
- Working to attract "green" businesses and industries as a fundamental part of economic development activities
- Assisting existing businesses in efforts to operate with less GHG emission
- Cooperating and collaborating with other governmental entities to promote GHG reduction
- Supporting downtown development, land use planning, parks, amenities, and transportation infrastructure that improve the quality of life in Urbana while reducing its carbon footprint
- Pursuing strategies that are cost effective

GHG Baseline and Projected Inventories

2007 Baseline Inventory

Urbana's inventory of greenhouse gas emissions is based on energy consumption data from the year 2007. Many other U.S. cities use 1990 as their baseline year, as called for in the U.S. Mayors Climate Protection Agreement. Because the City of Urbana does not have reliable data extending back before 2007, the SAC decided to establish 2007 as the baseline year.

Urbana's emissions inventory includes all energy consumed in Urbana for which the city has records; energy consumed on the University of Illinois campus was largely excluded (see section II.A of the Technical Appendix for an explanation). Even though the

electricity used by Urbana residents is produced elsewhere, the emissions associated with it appear in Urbana's inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full ownership of the impacts associated with its energy consumption, regardless of whether the generation occurs within the geographical limits of the community.

Table 1 shows Urbana's GHG baseline inventory for 2007. It also shows a per-capita emissions figure. Figure 1 shows how Urbana's per-capita emissions compare with those of 18 other U.S. cities.

Table 1: GHG Emissions—2007 Baseline Community Inventory for Urbana, Illinois (in Metric Tons CO_2e)[1]

Sector	Quantity[2]
Residential	135,900
Commercial	156,200
Industrial	118,100
Transportation	110,400
Waste	28,100
Total	548,700
Population	33,625[3]
Per capita GHG emissions	16[4]

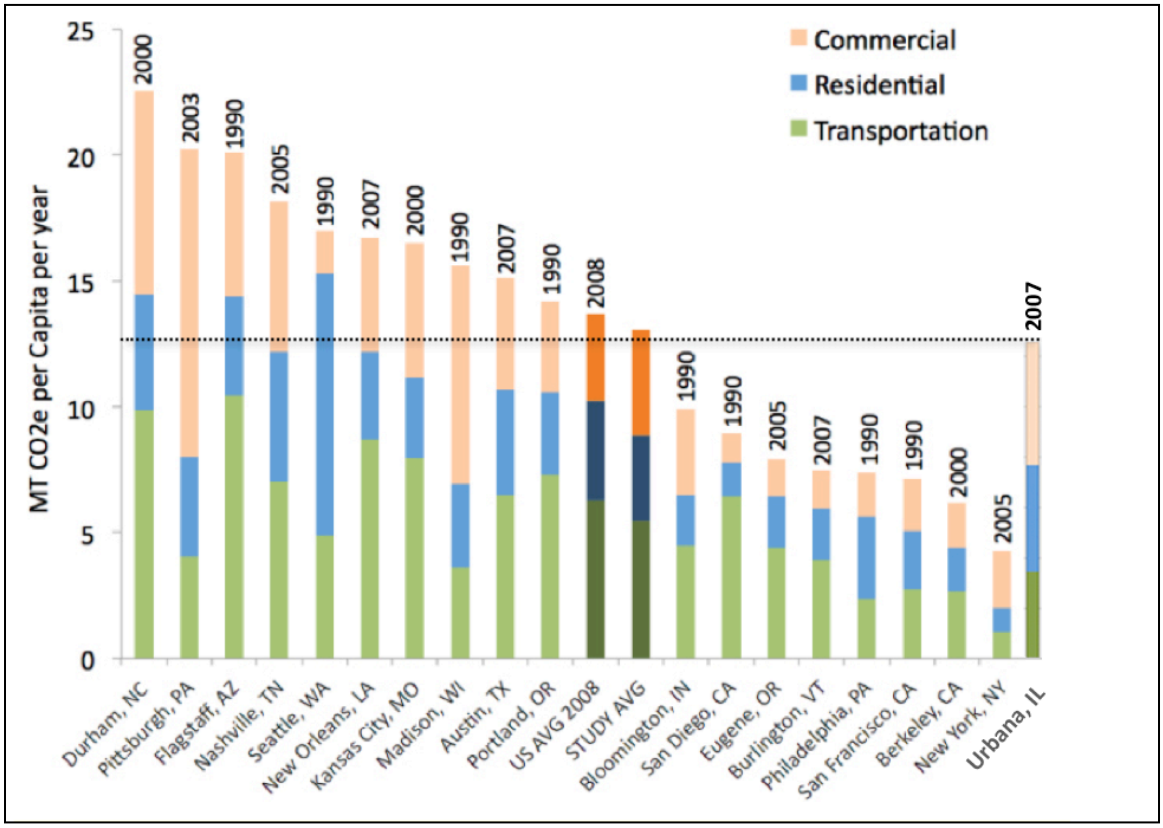
[1] Data includes estimated emissions from all included sources within Urbana. Estimates were calculated using ICLEI's CACP software.

[2] Quantities have been rounded to the nearest hundred, except as noted.

[3] Population figure has not been rounded.

[4] Per-capita figure has been rounded to the nearest whole number.

Figure 1: Per Capita GHG Emissions for 18 US Cities and U.S. Average, Compared with Urbana, Illinois, 2007 (Baseline Year)[1]



[1] Blackhurst et al, 2011. Preparing US community greenhouse gas inventories for climate action plans, Environ. Res. Lett. **6** (July-September 2011) 034003 doi:10.1088/1748-9326/6/3/034003 http://iopscience.iop.org/1748-9326/6/3/034003/fulltext/. Modified to include 2007 data for Urbana, Illinois.

Projected 2020 Inventory

As is explained in the "GHG Reduction Goal" section below, the SAC chose 2020 as the year by which to reach an initial 25% reduction in GHG emissions. In order to track progress toward that goal, the City has projected the expected level of emissions if no action is taken to reduce emissions. The projected figure is significantly higher than the 2007 baseline because as the population of the city grows, so does energy consumption, both in the residential and commercial sectors. Table 2 shows the expected increase in emissions under a "business-as-usual" scenario.

Table 2: GHG Emissions—2020 Projected Community Inventory Compared with 2007 Baseline for Urbana, Illinois (in Metric Tons CO_2e)[1]

Sector	Quantity[2]	
	2020 Projected	2007 Baseline
Residential	153,100	135,900
Commercial	184,300	156,200
Industrial	149,700	118,100
Transportation	118,100	110,400
Waste	33,600	28,100
Total	638,800	548,700
Population	40,900	33,625[3]
Per capita GHG emissions[3]	16	16

[1] Data includes estimated emissions from all included sources within Urbana. Estimates were calculated using ICLEI's CACP software.

[2] Quantities have been rounded to the nearest hundred, except as noted.

[3] Baseline population figure has not been rounded. Figures in both columns exclude 5,600 students living in University of Illinois housing.

[4] Per-capita figures have been rounded to the nearest whole number.

GHG Reduction Goal

2020 Reduction Goal

The City of Urbana is committed to reducing GHG emissions by 25% GHG from the 2007 baseline by 2020, pending a set of Phase II strategies that can be combined with the strategies in this document to enable the City to achieve the goal. The target may be modified

- To a less ambitious one if the SAC is unable to identify strategies that will enable achievement of the goal.
- To a more ambitious one if the Phase I strategies result in greater than expected progress in reducing the community's GHG emissions.

The reasons for adopting the 25% goal are

- Research by the Intergovernmental Panel on Climate Change (IPCC) suggests that emissions must be stabilized at a rate 60% below 1990 levels in order to minimize global warming and avoid the worst risks of uncontrolled climate change.

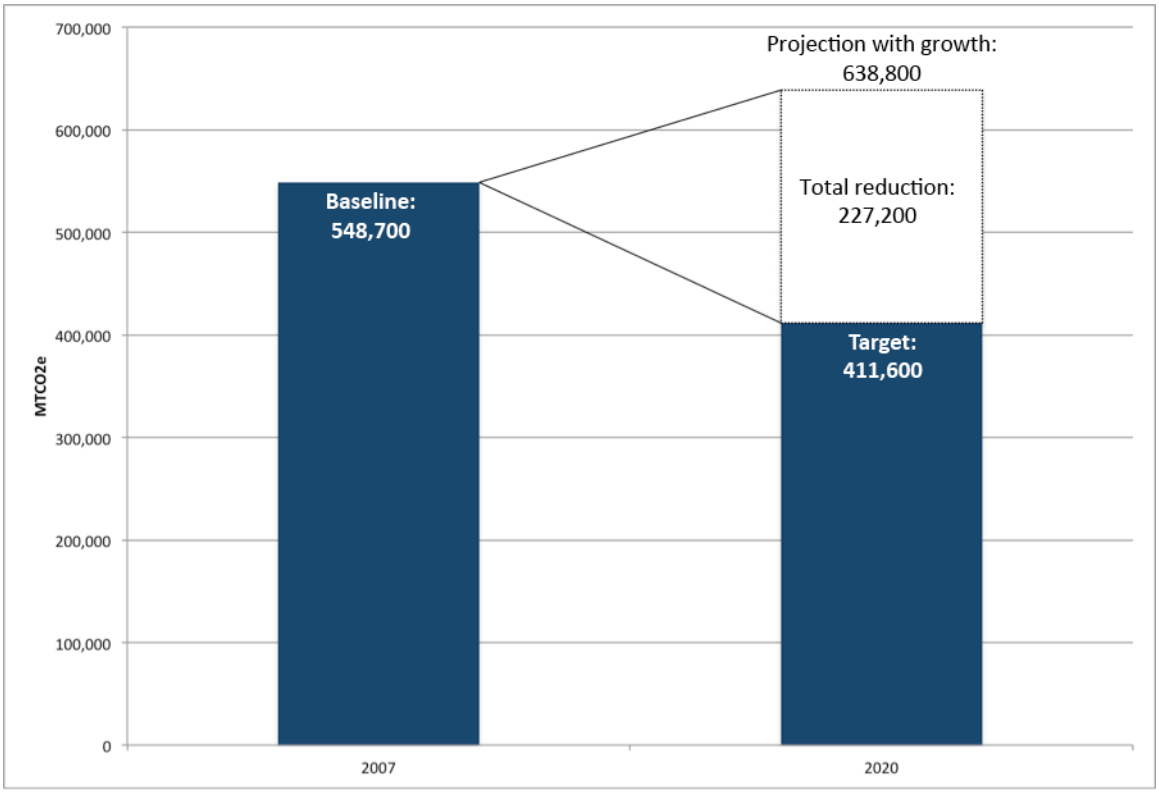
  As explained in the "2007 Baseline Inventory" section above, the City of Urbana does not have reliable data for 1990. The 2007 emissions baseline is very likely to be greater than a 1990 baseline. Therefore, it is prudent to set a longer-term reduction goal of greater than 60%. In order to substantially achieve the needed reductions indicated by IPCC research, the SAC has adopted a long-term goal of reducing communitywide emissions by 80% by the year 2050. The SAC identified a 25% reduction by 2020 as a minimum milestone the City needs to reach if it is to achieve an 80% reduction by 2050.

- The 25% target is both aggressive and achievable, based on estimates of the impact of current and planned programs as well as likely future opportunities to reduce emissions.

- The target is in line with that set by the State of Illinois (illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=2&RecNum=5715v). It is also in line with targets set by other states and countries and in legislation introduced in the US Congress (see www.c2es.org/what_s_being_done/targets).

Urbana's reduction target is an absolute 25% percent below 2007 emissions levels by the year 2020, regardless of population and business growth. The targeted level of emissions is approximately 411,600 metric tons of carbon dioxide equivalent (MT CO_2e). If the City experiences no growth between now and 2020, a drop of about 137,200 MT CO_2e would be needed to reach the City's reduction goal. However, as shown in Figure 2, when projected growth is factored in, the likely reduction will have to be 227,200 MT CO_2e.

Figure 2: GHG Emissions Reduction Goal: 25% below 2007 by 2020[1]



[1] Figures are rounded to the nearest hundred and shown in MT CO_2e.

Initial GHG Reduction Strategies

Table 3 lists by relative rank the source categories of GHG emissions in Urbana. The initial climate action plan recommends strategies to address the following sources: 1) electricity, commercial sector; 2) electricity, residential sector; 3) gasoline, transportation sector, and 4) natural gas, residential sector. Together, these sources account for 65% of emissions in Urbana. Electricity, industrial sector, is also important, but given the difficulty of addressing emissions from the industrial sector, the SAC recommends that a task force be formed to develop strategies to reduce industrial-sector emissions. Those strategies will be considered for Phase II of the climate action plan.

Table 3: Sources of Emissions by Rank

Source and sector	MT CO_2e	Percentage
Electricity, Commercial	128,800	23
Electricity, Residential	97,800	18
Gasoline, Transportation	92,600	17
Electricity, Industrial	90,300	16
Natural Gas, Residential	38,100	7
Natural Gas, Industrial	27,800	5
Natural Gas, Commercial	27,400	5
Waste	28,100	5
Diesel, Transportation	17,800	3
Total	548,700	100

The strategies recommended in this section have been identified as the most feasible ones to implement in the short term, based on relative ease and low cost of implementation.

To the extent possible, strategies should leverage existing programs and intergovernmental relationships. In particular, the City of Urbana, City of Champaign, Champaign County Regional Plan Commission, and University of Illinois should pursue opportunities for collaboration on common goals.

The City of Urbana will produce an annual GHG emissions inventory to monitor emissions trends across the city, broken out by the sectors and sources used in the 2007 baseline report.

Strategies to Reduce Emissions from Commercial Sector Electric Usage

Strategies: Energy Efficiency Technical Assistance, Incentives, and Education

Electricity use in the commercial sector accounts for 23% of emissions in Urbana. The most important end uses of energy in this sector include air conditioning, lighting, and ventilation. A focus on energy efficiency should yield at least 25% reduction for this source, or 6% overall emissions reduction for the City.

Technical assistance is already available from organizations like the Smart Energy Design and Assistance Center (SEDAC) and the Illinois Sustainable Technology Center (ISTC), both of the University of Illinois at Urbana-Champaign, as well as “trade allies” of the Ameren Act on Energy program. Incentives are already available through the Ameren Act on Energy program and various other programs. A list of such programs is regularly updated at www.dsireusa.org.

Lack of awareness commonly limits the impact of technical assistance and incentive programs. Increase the local impact of existing resources through

- Education and outreach that spreads awareness of currently available resources and opportunities
- Identification of additional funding that leverages existing resources and extends their collective impact

Strategies to Reduce Emissions from Residential Sector Electric Usage

Strategy: Renewable Energy Certificates (RECs)

The use of RECs can result in a major beneficial impact because of the potential to mitigate up to 18% of Urbana's emissions. If all Urbana residential electric power were tied to RECs on an ongoing basis, this strategy alone would bring the City near to the 2020 emissions reductions goal. Adopting a municipal aggregation program is a feasible method for implementing this strategy, provided that the contract(s) are with providers of clean renewables. Regardless of the method of implementation, purchase of clean renewables would have to be maintained over a long-term horizon and not just for a brief few years.

Strategies to Reduce Emissions from Transportation Sector Gasoline Usage

Strategies: Education and Infrastructure

The City should pursue the following strategies to reduce gasoline usage in the transportation sector:

- Continue infrastructure improvements for biking and walking
- Provide and/or promote education on safe bicycling
- Providing energy efficient transportation infrastructure, including roundabouts, other yield-controlled intersections, speed control, and traffic calming
- Provide and/or promote education on energy efficient driving techniques
- Pursue local government actions recommended in the State of Illinois's Electric Vehicle Advisory Council final report

Strategies to Reduce Emissions from Residential Sector Natural Gas Usage

Strategies: Weatherization and Insulation

Space heating is the most significant end use of natural gas in the residential sector. Weatherization and insulation are cost effective techniques for reducing natural gas use in this sector. Urbana will soon expend all funds from the US DOE Energy Efficiency Conservation Block Grant, which have been used in part to leverage existing incentives from the Ameren Act on Energy program. In order to continue to drive down natural gas usage in the residential sector, the SAC recommends a primary strategy of seeking additional funding to continue this program.

In addition, the City should launch a campaign to encourage residents to use programmable thermostats with appropriate settings and implement simple weatherization techniques, as these are cost-effective strategies for both the City and for individual residents.

Task Force Formation for High-Impact Sectors

Development of Phase II of the City's climate action plan will entail engagement with the public at large. Because of their high impact, two sectors deserve special attention: Rental properties and the industrial sector. SAC recommends that task forces be formed to develop strategies for GHG reduction in relation to these two sectors.

Special Considerations Related to Rental Properties

Rental properties are not defined as a category or sector in the GHG emissions inventory. Even so, there are special considerations related to GHG emissions strategies for rental properties, regardless of whether they fall into the residential or commercial sector.

Attaining GHG reductions in rental units is complicated by the fact that utility bills are often the responsibility of the tenant. The owner, therefore, has little economic incentive to expend capital on energy efficiency, especially for existing units. Likewise, a short-term tenant has virtually no incentive to make substantial improvements.

The SAC notes that rental units make up about two thirds of Urbana's housing stock as well as a significant amount of commercial space. Improvements in residential rentals could contribute significantly to the climate action plan goals. However, these units are typically ineligible for incentive funds, and, due to the structure of typical rental arrangements, investment in energy efficiency works against the financial interests of both the tenants and the property owners. In addition to emissions, this conflict has implications for housing affordability and quality of life.

Note that emissions data for residential rentals may fall into either the commercial or residential categories used in this plan. Data from Ameren is based on account type. Depending on the number of units in a building and whether they are separately metered, a residential rental property may have a residential or commercial account.

Data for the commercial sector therefore include both residential and commercial properties.

Strategy: It will be important to devote further study and discussions to the problem of energy efficiency investment in rentals. The SAC recommends that a task force of landlords, tenants, planning staff, SAC representatives, and subject matter experts be formed to develop GHG reduction strategies for both residential and commercial properties.

Special Considerations Related to the Industrial Sector

Electric usage by the industrial sector is the fourth largest source of GHG emissions in Urbana, accounting for 16% of emissions. Because industrial processes vary, it is difficult to make a blanket recommendation for emissions reduction in this sector. In addition, there are implications for economic development that are tied to growth of the city's industrial sector.

Strategy: It will be important to devote further study and discussion to the impact of industrial activity on overall GHG emissions. The SAC recommends that a task force of business owners, planning staff, SAC representatives, and energy efficiency subject matter experts be formed to develop GHG reduction strategies for the industrial sector.

Additional Strategies

Individual Actions

In addition to the priority areas listed above, which are likely to produce significant reductions, there are numerous steps that individuals and others can take to reduce emissions. These largely relate to energy efficiency and consumer choices. They cover a wide range of options such as thermostat settings, local purchases, water conservation and lighting choices. The Commission recognizes that collectively such activity will be an important part of achieving the overall goals, and recommends that educational and other assistance on such options be made available to building owners and occupants.

Efficiency in New Developments

The planning and construction of new developments presents an opportunity to use construction methods and technologies that allow for high degrees of energy efficiency. Ensuring that such methods and technologies are employed will help mitigate negative impacts of growth and, where new developments replace older building stock, may result in GHG reductions. Planning processes should focus on these critical opportunities.

Sustainability Advisory Commission Review

To assist the City in reaching its GHG reduction goals, the SAC will review and make recommendations on city plans, legislation, and projects:

- Comprehensive Plan updates
- Capital Improvement Plan
- Downtown Strategic Plan updates
- Ordinances related to energy use, such as building codes
- Transportation-related projects
- Major land-use and development issues
- City and regional transportation plans, including the Long Range Transportation Plan
- Master Bicycle Plan
- Greenways and Trails Plan
- Other policies, plans, and ordinances whose content relates to GHG emissions, including but not limited to transportation, economic development, and land use.

The SAC expects that taking the actions presented in this document will have a measurable impact on GHG emissions. The City will monitor progress by taking an annual emissions inventory. In Phase II, the SAC will recommend strategies designed to close any remaining gap between a then-current inventory and the goal of an inventory of no more than 411,600 MT CO_2e by the year 2020. The SAC expects to do further planning prior to 2020 so that strategies will be in place to guide the city in its long-term goal of reducing annual emissions by 80% from the 2007 baseline.

Technical Appendix: Climate Science, Context, City Efforts to Date, GHG Inventories, and GHG Reduction Target

Executive Summary

The consensus is in. The overwhelming scientific consensus is that anthropogenic (human-induced) climate change is among the most pressing environmental and social problems facing this generation and those to come.

The time to act is now. Never in the past 1,000 years has the planet warmed at a faster rate than during the 20th century, and the most recent decade has been the warmest ever on record. Allowing this trend to continue could result in decreased agricultural output, increased catastrophic weather events such as forest fires, drought and floods and displacement of entire populations due to rising sea levels.

Urbana must do its part. Although the United States accounts for a mere 4% of the world's population, it produces 20% of the world's greenhouse gas emissions. Urbana released 584,746 metric tons of carbon dioxide equivalent units (MT CO_2e) in 2007 and, if no steps are not taken to achieve reductions, is projected to emit about 16% more in 2020. Urbana's community-wide greenhouse gas emissions in its baseline year are equivalent to the emissions generated annually by 562,734 passenger vehicles, the annual energy used by 248,480 homes, or the emissions generated by burning 15,627 railcars' worth of coal.

However, by signing on to the U.S. Mayors Climate Protection Agreement and joining ICLEI's Cities for Climate Protection® (CCP) campaign, the City of Urbana pledged to take action against the negative impacts of greenhouse gas emissions.

The City of Urbana is committed to leading the effort to reduce community-wide greenhouse gas emissions 25% below our 2007 emissions level by the year 2020 and 80% by 2050.

Urbana's Emissions Inventory

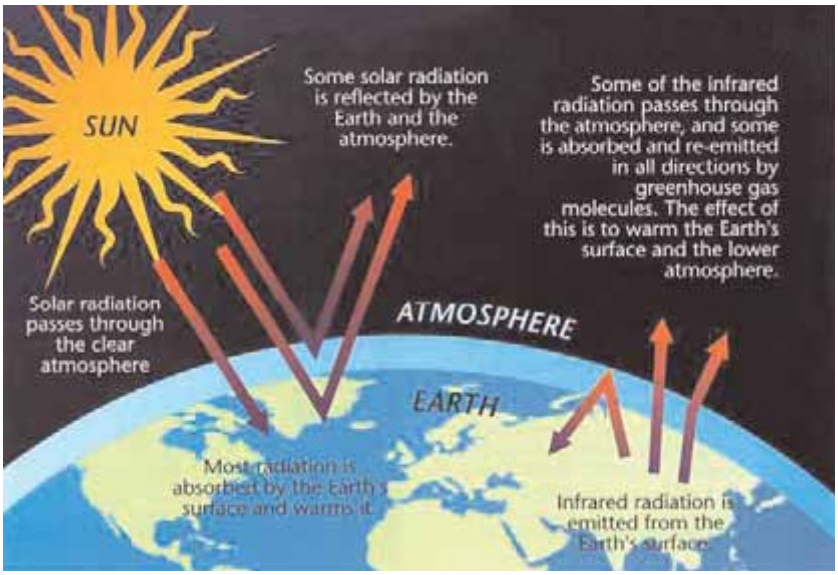
- Provides background on the science and impacts of climate change
- Presents Urbana baseline greenhouse gas emissions inventory and emissions reduction targets
- Details the planning process and tools utilized to develop the emissions inventory

I. Introduction

A. Introduction to Climate Change Science

The Earth's atmosphere is naturally composed of a number of gases that act like the glass panes of a greenhouse, retaining heat to keep the temperature of the Earth stable and hospitable for life at an average temperature of 60ºF. Carbon dioxide (CO_2) is the most prolific of these gases. Other contributing gases include methane (CH_4), nitrous oxide (NO_2), ozone (0_3) and halocarbons. Without the natural warming effect of these gases the average surface temperature of the Earth would be around 14ºF.

Figure 1: The Greenhouse Gas Phenomenon



Source: US Environmental Protection Agency

However, recently elevated concentrations of these gases in the atmosphere have had a de-stabilizing effect on the global climate, fueling the phenomenon commonly referred to as global warming. The global average surface temperature increased during the 20th century by about 1°F. According to the World Meteorological Organization, the ten warmest years on record have all occurred since 1998.

Scientific Facts and Projections:

- The atmospheric concentration of carbon dioxide (CO_2) during the last two decades has increased at the rate of 0.4% every year.
- Current CO_2 concentrations are higher than they have been in the last 420,000 years, and according to some research, the last 20 million years.

- About three-quarters of the CO_2 emissions produced by human activity during the past 20 years are due to the burning of fossil fuels.

Source: The Intergovernmental Panel on Climate Change

The climate and the atmosphere do not react in a linear fashion to increased greenhouse gases. That is to say that you cannot simply predict the specific degree of warming that each ton of carbon dioxide emitted from a power plant or a vehicle's tailpipe will cause. The Earth's climate has a number of feedback loops and tipping points that scientists fear will accelerate global warming beyond the rate at which it is currently occurring. For example, as CO_2 emissions have increased in recent human history, the oceans have been absorbing a significant portion of these gases, but as the oceans become more permeated with CO_2, scientists anticipate they will reach a saturation point, after which each ton of CO_2 emitted will have a more substantial impact.[1]

Another example of this compounding can be found in the polar ice caps. Ice is highly reflective and acts effectively like a giant mirror, reflecting the sun's rays back into space. As the planet warms and some of this ice melts away, a darker land or ocean surface is revealed. This darker surface tends to absorb more heat, accelerating the speed at which the planet warms with each ton of greenhouse gas emitted. As these examples illustrate, the stakes are high, and the longer emissions reduction actions are delayed, the greater future actions will have to be to have the same impact.

B. Effects & Impacts of Climate Change

Global/National Impacts

In addition to causing an increase in average global surface temperature, rising levels of greenhouse gases have a destabilizing effect on a number of different micro-climates, conditions and systems. According to the Intergovernmental Panel on Climate Change, surface temperatures are on course to increase by between 2.5 and 10.5ºF by the year 2100, with regions in the northern parts of North America and Asia heating by 40% above the mean increase.[2] The increase in the temperature of the oceans is projected to accelerate the water cycle, thereby increasing the severity and rate of both storms and drought, which, along with decreased snow pack, could disrupt ecosystems, agricultural systems and water supplies.

Snow cover has decreased by 10% in the last forty years. Average sea levels have increased between one-third and two-thirds of a foot over the course of the 20th century and are projected to rise between another one-third of a foot to almost three

[1] Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."
[2] Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."

feet by the year 2100. The resulting coastal infringement on such a large scale could lead to not only significant environmental and ecosystem disturbances, but also major population displacement and economic upheaval.[3]

Decreased economic stability due to climate change impacts can have national security repercussions for the U.S. and other countries. As economies feel the affects of climate change, increased instances of political and military intervention may arise. The issue of climate change relating to destabilized national security has been a topic studied by groups such as the National Intelligence Council and the Council on Foreign Relations. The Central Intelligence Agency established The Center for Climate Change and National Security in 2009. These examples indicate that this issue is one receiving escalating attention at the national level, outside of the legislative branch.

Local Impacts

While climate change is a global problem influenced by an array of interrelated factors, climate change is also a local problem with serious impacts foreseen for the Midwest, Illinois and Urbana.

Impacts on water: Water quality and quantity are also at risk as a result of changing temperatures. With warmer average temperatures, more winter precipitation will fall in the form of rain instead of snow, shortening the winter snowfall season, accelerating runoff and decreasing percolation and recharge of groundwater. More frequent extreme storms will also mean increased runoff, and a decrease in surface water quality. Periods of extreme heat will mean an increase in evaporation and an increase in the use of surface and groundwater to water lawns and agricultural crops.

***Impacts on plants and vegetation*:** Native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects and other threats to native species. Increased runoff and decreased water quality could seriously impact the food web and mating conditions for fish that are of both of economic and recreational interest to residents. In addition, the natural cycle of plant's flowering and pollination could be affected.

Impacts on Illinois agriculture could be significant, with more frequent extreme rainfall events leading to increased runoff and soil erosion, and periods of extreme heat leading to lower crop yields and an increase in the use of irrigation systems. While a potentially longer growing season and increases in atmospheric carbon dioxide could have marginal benefits for Illinois agriculture, these positives are not expected to outweigh the negative factors associated with climate change. All of the negative impacts could result

[3] Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."

in higher food costs and decreased profits, which would have ripple effects throughout Illinois' economy.

***Public health impact*:** Warming temperatures and increased precipitation can also encourage mosquito-breeding, thus engendering diseases that come with mosquitoes, such as West Nile virus, a disease of concern in Illinois. Heat waves are also expected to have a major impact on public health and increase mortality rates. According to the IPCC (2004), the summer mortality rates will increase significantly by 2050 due to hot weather episodes.

Increased temperatures also pose a risk to human health when coupled with high concentrations of ground-level ozone and other air pollutants, which may lead to increased rates of asthma and other pulmonary diseases. Furthermore, anticipated increases in the number and severity of hot days place significant portions of the population, particularly the elderly, young, those already sick, and people who work outdoors, at risk for heat-stroke.

***Natural disasters*:** Climate models predict a 4ºF temperature increase in the next 20 to 40 years, with an increase in the number of long dry spells, as well as a 20-30% increase in precipitation in the spring and fall. More frequent and heavier precipitation could cause flooding in the fall, winter and spring months, leading to damage to property and infrastructure. Increased periods of drought in the summer months could lead to loss of crops and livestock and, over time, lead to water supply disruptions.

Firm evidence linking climate change with an increased frequency of violent storms has not been discovered. A review of the literature reveals some suggestions that such a link is plausible, but this matter needs further study to be conclusive.

About ICLEI and the Cities for Climate Protection Campaign

ICLEI's mission is to improve the global environment through local action. The Cities for Climate Protection® (CCP) campaign is ICLEI's flagship campaign designed to educate and empower local governments worldwide to take action on climate change. ICLEI provides resources, tools, and technical assistance to help local governments measure and reduce greenhouse gas emissions in their communities and their internal municipal operations.

ICLEI's CCP campaign was launched in 1993 when municipal leaders, invited by ICLEI, met at the United Nations in New York and adopted a declaration that called for the establishment of a worldwide movement of local governments to reduce greenhouse gas emissions, improve air quality, and enhance urban sustainability. The CCP campaign achieves these results by linking climate change mitigation with actions that improve local air quality, reduce local government operating costs, and improve quality of life by addressing other local concerns. The CCP campaign seeks to achieve significant reductions in U.S. greenhouse gas emissions by assisting local governments in taking action to reduce emissions and realize multiple benefits for their communities.

ILCEI uses the performance-oriented framework and methodology of the CCP campaign's 5-Milestones to assist U.S. local governments in developing and implementing harmonized local approaches to reducing greenhouse gas and air pollution emissions, with the additional benefit of improving community livability. The milestone process consists of:

Milestone 1: Conduct a baseline emissions inventory and forecast
Milestone 2: Adopt an emissions reduction target
Milestone 3: Develop a Climate Action Plan for reducing emissions
Milestone 4: Implement policies and measures
Milestone 5: Monitor and verify results

C. Action Being Taken on Climate Change

International Action

As evidence of climate change has mounted, groups at the international, Federal, State and local level have responded with ways to confront the impending threat. The United Nations Framework Convention on Climate Change (UNFCC) leads international efforts to investigate and combat climate change. Recognizing the problem of potential global climate change, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988 to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk associated with human-induced climate change, its potential impacts and options for adaptation and mitigation, releasing it's most recent assessment in 2007.[4]

In 1997, 10,000 international delegates, observers and journalists gathered in Kyoto, Japan to participate in the drafting and adoption of the Kyoto Protocol, requiring industrialized nations to reduce their collective greenhouse gas emissions 5.2% below 1990 levels. As of August 2011, 191 countries had ratified the Protocol, with the United States most notably absent from the list. Additionally, since 1995 the annual Conference of the Parties (COP) has met to discuss action and implementation to combat climate change, with the most recent COP, COP-17, being held in Durban, South Africa in 2011.

Federal Action

The Federal government has been slow to develop policies in regard to climate change mitigation and adaptation. The U.S. government has adopted some policies, such as subsidies and tax credits, to push forward the development and implementation of some technologies which reduce GHG emissions. The Department of Energy (DOE), Environmental Protection Agency (EPA), and the Department of Housing and Urban Development (HUD), among others, have provided grant funds to assist in the

[4] Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: "Climate Change 2007"

deployment of energy efficiency, green building, mass transit and other sustainability-related programs across the country. However, this patchwork of Federal efforts has not been an adequate substitute for comprehensive national policies.

In 2007 the U.S. Supreme Court directed the EPA to regulate emissions of CO_2 and five other greenhouse gases under the Clean Air Act, if EPA were to determine such emissions threatened public health and welfare. EPA issued such a finding in 2009 and, in May 2010, EPA issued a final rule that established thresholds for GHG emissions that define when permits are required for new and existing industrial facilities. Facilities responsible for nearly 70 percent of national GHG emissions from stationary sources will be subject to permitting requirements under this rule.

The American Recovery and Reinvestment Act of 2009 (ARRA) provided grant funds to stimulate work at the State and local level, including the Energy Efficiency and Conservation Block Grant (EECBG) program. These funds were utilized by city and county governments to undertake energy efficiency, renewable energy, and sustainability projects which had emissions reduction impacts. However, Federal funding for the program has not been renewed and most recipients of these grant funds have exhausted their funding or will soon.

In 2010 and 2011, EPA established new fuel efficiency standards for cars and light trucks and heavy-duty trucks and buses which will dramatically reduce GHG emissions from the transportation sector.

State Action

Illinois has been moderately active in addressing climate change through various policies and programs. The following statutes, among others, have been adopted:

Public Act 095-0481, Illinois Power Agency Act, 2007 – Established a Renewable Portfolio Standard requiring electricity providers to increase purchases of renewable energy resources. In 2008 providers were required to purchase at least 2% of their energy from renewable sources. The target increases to 25% by 2025. The Act also established an energy efficiency portfolio standard. Providers were required to achieve a 0.2% reduction in energy use through investments in energy savings programs. This target increases to 2% in 2015.

Public Act 095-0559 – Requires State buildings to reduce energy use 10% within 10 years.

Public Act 095-0104 – Requires State owned and leased building to utilize Energy Star rated lighting.

Public Act 095-0420 – Establishes net metering requirements for distributed renewable energy.

Local Action

No State of Illinois law requires local governments to inventory GHG emissions, plan for emissions reductions, or prepare to adapt to a changing climate. Therefore, only a few communities in Illinois are taking action at the local level to address climate change. Most states, with California as the exception, have not actively addressed climate change.

Almost all Illinois communities that are looking at the climate change issue are members of ICLEI—Local Governments for Sustainability. ICLEI has been a leader both internationally and domestically, representing over 770 local governments around the world. ICLEI was launched in the United States in 1995 and has grown to more than 230 cities and counties providing national leadership on climate protection and sustainable development. ICLEI also works in conjunction with the U.S. Conference of Mayors to track progress and implementation of the U.S. Mayors Climate Protection Agreement, launched in 2005, which more than 1,000 mayors have signed to date. The agreement pledges communities to meet or beat the Kyoto Protocol emissions reduction target for the US in their own communities (7% below 1990 levels by 2012).

Climate Protection Efforts by the City of Urbana

April 2005: The City of Urbana enacts the 2005 Comprehensive Plan, updating its official land use and development policies for the city and extra-territorial planning jurisdiction. A key plan concept is compact and contiguous growth and development. In 2006, the plan won a Gold Award from the American Planning Association – Illinois Chapter.

Sept. 2005: The City Council specified sustainability-related measures among its common goals. Goals included energy conservation.

May 2007: Mayor Prussing signed the U.S. Mayors Climate Protection Agreement, pledging the city to strive to meet or beat Kyoto Protocol targets for reducing GHG emissions in our community. The Kyoto Protocol calls for U.S. emissions to fall 7% below 1990 levels by 2012.

May 2008: The Mayor and City Council created a Sustainability Advisory Commission (SAC). The Commission, made up of seven appointed community members, was initially tasked with identifying and recommending to the Mayor and City Council goals to achieve sustainable management of natural resource management, water and energy in particular. The Commission's chief objective to meet this mandate has been the development of a climate action plan.

2008: City helped fund redevelopment of Lakeside Terrace housing project as Crystal Lake Townhomes, an affordable housing project with substantial

energy saving features such as enhanced insulation, geothermal heating and cool, photo-voltaic panels on the community center, LED street lights, and bio-swale stormwater management.

2008: The City of Urbana developed a Bicycle Master Plan with three goals: 1) To increase bicycle mode share in Urbana for all trip purposes by 50% in the next five years; 2) To achieve a Bicycle Friendly Community award through the League of American Bicyclists; and 3) To substantially expand the bicycle network.

Aug. 2008: City of Urbana provided a financial guarantee to enable establishment of the ZIP Car sharing program in Urbana-Champaign.

March 2009: City-wide outdoor lighting standards were enacted through a Zoning Ordinance amendment.

2009-2011: The City applied for and received a Federal Energy Efficiency Community Block Grant, which is being used for:

- Municipal building lighting retrofits;
- A white reflective roof over a portion of the City Building;
- A partnership with Ameren's Act On Energy program to pay for home energy audits, shell improvements (insulation and air sealing), and installation of compact fluorescent bulbs, sink aerators, low-flow shower heads, and pipe insulation.

Dec. 2009: The City endorsed the Champaign-Urbana Urbanized Area Transportation Study (CUUATS) Long Range Transportation Plan 2035 which includes a significant focus on reducing automotive trips.

2009: The City became a member of the U.S. Green Building Council and key personnel reviewing site and building plans became LEED-accredited (Leadership in Energy and Environmental Design).

Feb. 2010: New City Council and Mayoral Goals are adopted. Goals across six broad categories are established, including "Environmental Sustainability" which contains 12 distinct strategies. Development of a climate action plan is included as an Environmental Sustainability strategy.

May 2010: The League of American Bicyclists designates Urbana as a Bicycle Friendly Community at the Bronze level.

May 2010: The City of Urbana co-sponsors the first Champaign-Urbana Bike to Work Day which had over 700 registered participants.

2010: The long-standing city staff position of Environmental Manager was changed to Environmental Sustainability Manager. Duties were added to the position, including oversight of climate action/sustainability plan development and implementation.

2010: The City begins co-sponsoring periodic bike rodeos and other bicycle safety and education clinics to encourage bicycling for transportation.

Oct. 2010: Enacted zoning standards to allow wind turbines throughout the City of Urbana and within 1.5 miles of the city limits.

Oct. 2010: The City co-sponsors 'C-U Sharing the Road', a bicycle education video that introduces the public to the bicycle infrastructure that is being installed as a result of the Bicycle Master Plan and teaches motorists and bicyclists how to interact with each other on the road.

May 2011: The White Street and Springfield Avenue Corridors Analysis Report was presented to the Urbana City Council. The report presents a concept for achieving green infill development linked with non-automotive transportation choices.

Aug. 2011: The City and the League of Illinois Bicyclists participated in a voluntary audit of recent City Public Works projects.

Nov. 2011: Adopted a Complete Streets amendment to the 2005 Comprehensive Plan.

Nov. 2011: Reduced by 50% the minimum parking requirements in the Urbana Zoning Ordinance for new residential developments in the CCD (Campus Commercial District) zoning district.

Other City activities which have decreased greenhouse gas emissions, include

Fleet Division:

- Current City Fleet – 25% of vehicle fleet is flex fuel or hybrid Flex Fuel (E-85) vehicles - 12 full size sedans, 8 mid-size sedans, 3 vans, 6 light trucks; 8 hybrid vehicles; 2 certified clean-idle diesel trucks
- All City diesel equipment is fueling on an 11-18% bio-diesel blend
- Public Works has an anti-idling policy for its vehicles

Engineering Division:

- Hired a consultant to analyze and conduct preliminary design investigation of two City intersections to determine potential benefits of constructing roundabouts at those locations.
- Contractors working on the Windsor Road Project are required to follow specifications set by the federal government for Diesel Vehicle Emissions Control and Idling Restrictions.

Arbor Division:

- Installation of GPS units in compost delivery truck and purchase of a larger trailer to make delivery efforts much more efficient.
- Purchase of a rechargeable battery powered blower for clean-up in the Downtown Business District. This area accounts for 25% of the Division's clean-up work.

Lighting and Traffic Signals:

- Public Works Department's Electric Section performs a twice yearly Signal Coordination check. Signal Coordination is specifically designed as an emissions reduction and fuel savings measure because platoons of cars can be moved through an area with the least number of stops possible.
- Per federal mandate, as of January 1, 2009 the City, when purchasing roadway luminaires, must be in compliance with the Energy Independence & Security Act (EISA) of 2007. Under EISA, certain light ballasts must meet stringent efficiency standards.
- Almost all T12 fluorescent lamps in City facilities have been replaced with more efficient T8 and T5 lamps.
- Almost all incandescent bulbs in City facilities have been replaced with CFLs.

Office equipment and appliances:

- Energy Star designation required for appliance and office equipment purchases.
- Installed programmable thermostats in all City buildings, where feasible, to better control building temperature.

II. Emissions Inventory

A. Reasoning, Methodology & Model

The City of Urbana's inventory was conducted by municipal staff with assistance from ICLEI tools and staff. The purpose of the baseline emissions inventory is to determine the levels of greenhouse gas emissions that Urbana emitted in its base year, 2007.

ICLEI's Cities for Climate Protection inventory methodology allows local governments to systematically estimate and track greenhouse gas emissions from energy and waste related activities at the community-wide scale.

Once completed, the inventory provides a basis for creating an emissions forecast and reduction target, and enables the quantification of emissions reductions associated with implemented and proposed measures.

For purposes of Urbana's greenhouse gas emissions inventory, energy use by University of Illinois at Urbana-Champaign buildings is excluded. This decision was made due to the University not being able to provide electricity and natural gas consumption data for 2007 for facilities in Urbana because of a lack of metering on individual buildings (Urbana and Champaign data could not be separated). Emissions related to transportation and waste generated on campus are included in this emissions inventory.

Discussions with University staff have indicated that they may be able to provide estimated building energy use data, for those buildings within the City of Urbana's corporate limits, for future updates of Urbana's emissions inventory. Efforts to include such data in the future should be undertaken.

1. ICLEI's Emissions Analysis Software

To facilitate local government efforts to identify and reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection (CACP) software package. This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Emissions are aggregated and reported in terms of carbon dioxide equivalent units, or CO_2e. Converting all emissions to carbon dioxide equivalent units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of CO_2e.

The emissions coefficients and methodology employed by the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National GHG Emissions Inventories), the U.S. Voluntary Greenhouse Gas

Reporting Guidelines (EIA form1605), and, for emissions generated from solid waste, the U.S. EPA's Waste Reduction Model (WARM).

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

2. Inventory Data Sources and Creation Process

An inventory of greenhouse gas emissions requires the collection of information from a variety of sectors and sources. For community electricity and natural gas data, ICLEI consulted Ameren Illinois Utilities. The Champaign Urbana Urbanized Area Transportation Study (CUUATS) served as a source of transportation data. Solid waste data was developed based upon population estimates, recycling data gathered by City officials, and information on waste generation rates from the State of Illinois.[5]

The U.S. Census and other sources were consulted for population data. Since the decennial Census does not provide a population for Urbana for the baseline year of 2007, an estimate was derived by looking at population growth between the 2000 and 2010 Census numbers. In addition, since the City's climate planning process excludes the University of Illinois, 5,600 students in University-owned housing are excluded from the City's population estimate. However, transportation- and waste-related emissions generated by these students are included in the City's inventory.

These data were entered into the software to create a community emissions inventory. The community inventory represents all the energy used and waste produced within Urbana and its contribution to greenhouse gas emissions.

Urbana's inventory is based on the year 2007. When calculating Urbana's emissions inventory, the City included all energy consumed in Urbana for which it has records. Emissions related to use of electricity and natural gas not delivered by Ameren are not included. This means that, even though the electricity used by Urbana residents is produced elsewhere, this energy and emissions associated with it appears in Urbana's inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full ownership of the impacts associated with its energy consumption, regardless of whether the generation occurs within the geographical limits of the community.

[5] Illinois Dept. of Commerce & Economic Opportunity, "Illinois Commodity/Waste Generation and Characterization Study", May 2009.

B. Inventory Results

Urbana Results

The results for Urbana's 2007 baseline GHG emissions inventory are shown in Table A-1.

Table A-1: GHG Emissions—2007 Baseline Community Inventory for Urbana, Illinois (in Metric Tons CO_2e)[1]

Sector	Quantity[2]
Residential	135,900
Commercial	156,200
Industrial	118,100
Transportation	110,400
Waste	28,100
Total	548,700
Population	33,625[3]
Per capita GHG emissions	16[4]

[1] Data includes estimated emissions from all included sources within Urbana. Estimates were calculated using ICLEI's CACP software.

[2] Quantities have been rounded to the nearest hundred, except as noted.

[3] Population figure has not been rounded. Figure excludes 5,600 students living in University of Illinois housing.

[4] Per-capita figure has been rounded to the nearest whole number.

Table A-1 shows communitywide greenhouse gas emissions from all major sources for the year 2007. The residential, commercial, and industrial sectors represent emissions that result from electricity and natural gas used in both private and public sector buildings and facilities. The transportation sector represents emissions from the burning of fossil fuels to propel all forms of vehicles and equipment. The waste sector represents the emissions that result from the degradation of the portion of the waste stream that is disposed of in landfills.

As pointed out previously in this section, readers should keep in mind the limits of the data collection and analysis process. While the planning process and tools utilized are recognized as sufficient by those in the climate planning community, future improvements to climate planning tools are anticipated which will increase the certainty of information.

III. Forecast for Greenhouse Gas Emissions

The SAC chose to focus its initial planning efforts on reducing emissions by the year 2020. A forecast for 2020 emissions was developed using ICLEI's CACP software (see Table A-2). The projected 2020 emissions are a "business as usual" forecast, which does not assume the development of new technologies or practices to reduce emissions. A business as usual forecast allows planners to estimate how future emissions might increase or decrease, and thus plan for those expected increases or decreases.

Table A-2: GHG Emissions—2020 Projected Community Inventory for Urbana, Illinois (in Metric Tons CO_2e)[1]

Sector	Quantity[2]
Residential	153,100
Commercial	184,300
Industrial	149,700
Transportation	118,100
Waste	33,600
Total	638,800
Population[3]	40,900
Per capita GHG emissions	16[4]

[1] Data includes estimated emissions from all included sources within Urbana. Estimates were calculated using ICLEI's CACP software.

[2] Quantities have been rounded to the nearest hundred, except as noted.

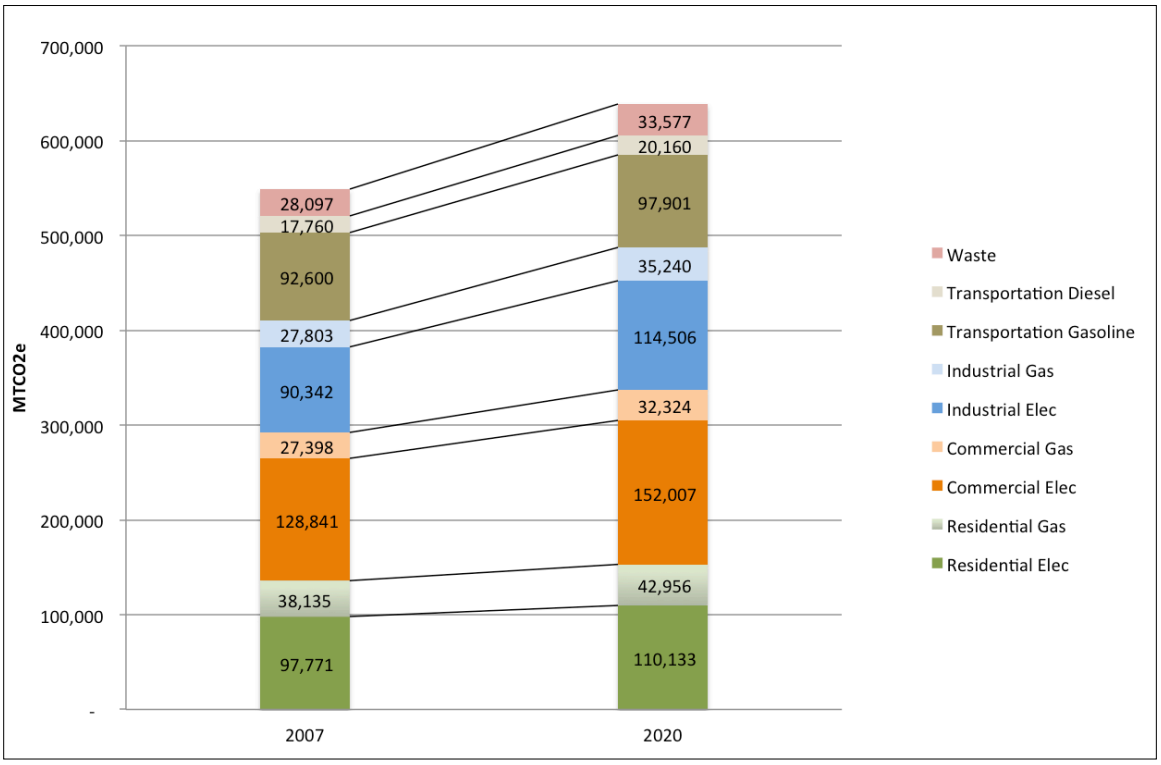
[3] Figure excludes 5,600 students living in University of Illinois housing.

[4] Per-capita figure has been rounded to the nearest whole number.

CACP allows for input of projected increases or decreases in various factors over the planning horizon. The 2020 emissions projections were developed utilizing data from the same sources used to develop the 2007 baseline, with growth rates developed by City staff and the Champaign County Regional Planning Commission (RPC).

Figure A-1 shows a comparison of the 2007 baseline inventory with the projection for 2020.

Figure A-1: 2007 Baseline and 2020 Business-as-Usual
GHG Emissions by Sector and Source



IV. Greenhouse Gas Emissions Reduction Target

A reduction target provides a tangible goal for Urbana's emissions reduction efforts. Urbana's emissions reduction target represents a percentage by which the community aims to decrease emissions, below the 2007 baseline, by 2020. The Urbana Sustainability Advisory Commission recommends adoption of an emissions reduction target for the year 2020 of 25% below 2007 emissions. 2007 community-wide emissions were estimated to be 548,746 metric tons; therefore, the goal is to reduce emissions for 2020 to 411,559 metric tons.

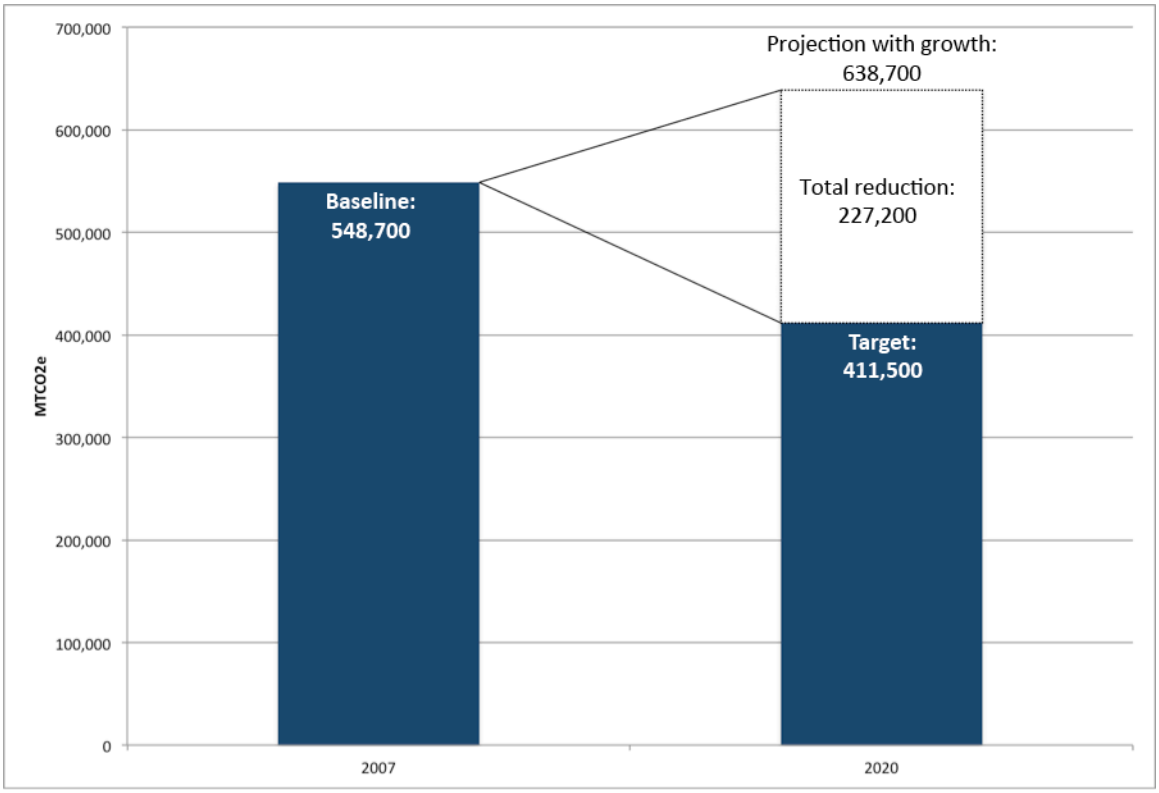
The Kyoto Protocol target of 7% below 1990 levels was the target the United States agreed to in principle at the 1997 United Nations Council of Parties meeting, but has yet to ratify in Congress. Several European nations set similar goals and many have taken action toward meeting them.

Many factors were considered when selecting Urbana's reduction target. The Sustainability Advisory Commission strove to choose a target that is both aggressive and achievable given local circumstances. Local factors considered in selecting the target reduction percentage included estimation of the effects of implemented and planned

programs and policies, an approximate assessment of future opportunities to reduce emissions, and targets adopted by other communities.

Urbana's reduction target is 25% below 2007 emissions levels by the year 2020. Therefore, the targeted level of emissions is 411,559 tons, a drop of 137,187 tons over the baseline year. However, when projected growth in emissions is included, it will take a reduction of 227,243 tons to reach the 411,559 ton goal, as illustrated in Figure A-2.

Figure A-2: GHG Emission Goal: 25% below 2007 by 2020[1]



[1] Figures are rounded to the nearest hundred.

IPCC research suggests that we would need to emit greenhouse gasses at a rate as much as 60% below 1990 levels in order to avoid the worst impacts of global warming. Since Urbana does not have sufficient data to establish a 1990 baseline level, but all indications are that the 2007 emissions baseline would be significantly greater than a 1990 baseline, it is prudent to set a longer term reduction goal of greater than 60%. In order to substantially achieve the necessary emissions reductions indicated by IPCC research, the Urbana SAC recommends the adoption of a long term goal of reducing community-wide emissions of 80% by 2050. The target is in line with that set by the State of Illinois (illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=2&RecNum=5715v). It is also in line with targets set by other states and countries and in legislation introduced in the US Congress (see www.c2es.org/what_s_being_done/targets).