

# Iowa City Community-wide Greenhouse Gas Emissions

June 2017

## Inventory Update



Prepared by the City of Iowa City

City of

**IOWA CITY**

A UNESCO CITY OF LITERATURE

# Table of Contents

Introduction .....	1
Methods .....	3
Community Analysis.....	4
Community Results Summary.....	5
2005 Community-wide Greenhouse Gas Baseline Emissions .....	6
2015 Community-wide Greenhouse Gas Emissions.....	8
Population & Per Capita Emissions Trends .....	11
Trends by Sector.....	18
Renewable Energy Commitments .....	20
Conclusion.....	22
Appendix 1. Compact of Mayors Letter of Intent .....	23
Appendix 2. Community-Wide Target Reduction Resolution.....	24
Appendix 3. Steering Committee Resolution .....	27
Appendix 4. Updated Steering Committee Resolution .....	29
Appendix 5. Calculated Annual Emissions (metric tonnes CO <sub>2</sub> e).....	32
Appendix 6. Emissions Factors for 2015 .....	33
Appendix 7. Community Energy Usage Numbers.....	34
Appendix 8. Definitions.....	35
Appendix 9. Global Warming Potentials (GWP) .....	38
Appendix 10. Summary of Iowa City’s STAR Rating .....	39

# Introduction

Iowa City began actively working on climate issues in 2007, when Mayor Ross Wilburn signed the Mayor's Climate Protection Agreement (Figure 1). In 2008, Iowa City joined the "Cities for Climate Protection Campaign" which resulted in Iowa City's creation of a community-wide greenhouse gas (GHG) inventory, which was completed in August, 2009. Iowa City was the first city in the state of Iowa to complete a GHG inventory. Community-wide GHG emissions data is updated annually to track the progress and trends of the community's emissions. This report is an update from the 2009 GHG inventory report and includes a continuous record of annual data from the time of that report.

On February 17, 2016, Mayor Jim Throgmorton affirmed the City's continued commitment to climate change by signing a letter to join the U.S. Compact of Mayors. The Compact of Mayors recently joined with the European Union's Covenant of Mayors to form the Global Covenant of Mayors for Climate and Energy. While cities can work towards climate mitigation independently, joining the Covenant of Mayors offers a recognized framework, provides city staff with information and support, and connects the community with numerous cities around the globe committed to taking actions to reduce GHG emissions.

By formally committing to the Global Covenant of Mayors for Climate & Energy, Iowa City agreed to complete the following milestones over a three year period:

#### At engagement:

- Mayor makes a formal commitment to reduce GHG emissions and address climate change risks (signed Feb. 17, 2016)

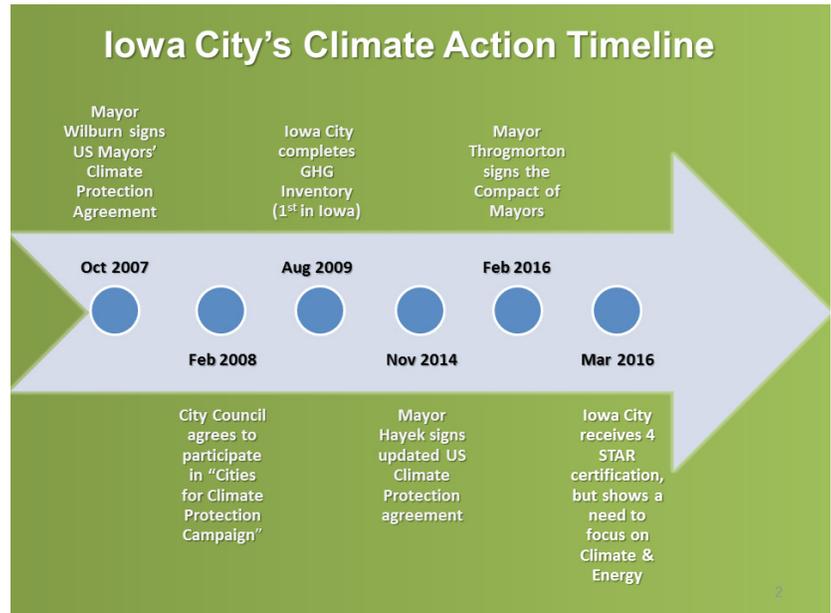


Figure 1. Iowa City's Climate Action Timeline

#### Within 1 Year:

- Complete a Community-wide GHG inventory, using the Global Protocol for Community-Scale GHG Emissions (submitted Dec. 2016)
- Report local hazards related to climate change (submitted Dec. 2016)

#### Within 2 years:

- Set a GHG Reduction Target (Resolution signed Dec. 6, 2016)
- Complete a climate risk vulnerability assessment

#### Within 3 Years:

- Complete a Climate Action and Adaptation Plan

Documentation that has been completed for the Covenant of Mayors can be found in the Appendices.

# Introduction



## STAR Community Rating

On March 9, 2016, Iowa City was awarded a 4-STAR Community Rating for sustainability excellence by being formally certified in the STAR (Sustainability Tools for Assessing and Rating Communities) Community Rating System. Although Iowa City was the highest-scoring city in the state and achieved high rankings in most goal areas, the City scored lowest in its Climate and Energy goals. The creation of the Climate Action and Adaptation Plan and appointment of the Climate Action Steering Committee along with other actions that that City staff are undertaking, regarding climate have been a focus of the City Council. The

STAR framework is a tool that communities can use to quantify these efforts. Iowa City plans on recertifying with STAR in 2020. More information about Iowa City's STAR rating can be found at [icgov.org/STAR](http://icgov.org/STAR) and in Appendix 10.

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## Purpose and Goals

The purpose of this report is to summarize the results of the community-wide GHG inventory using the Global Protocol for Community-Scale GHG Emissions which identifies both the quantity and sources of GHG emissions produced from activities within the City of Iowa City. This data is made available to the Climate Action Steering Committee and Iowa City residents in order to assist informed decision-making to determine future actions to be taken by the community. These emissions-reducing actions will be included in Iowa City's Climate Action and Adaptation Plan, after calculations are totaled to reach the reduction targets set forth by the City Council.

On Dec. 7, 2016, the City Council approved a resolution setting community-wide greenhouse gas reduction goals of 26-28% for the year 2025 and 80% by 2050. The baseline year for these reductions is 2005. At the time the reduction goals were set, they were in alignment with the U.S. targets set by the Paris Agreement and agreed upon for the United States by President Obama in 2016 ([http://unfccc.int/paris\\_agreement/items/9485.php](http://unfccc.int/paris_agreement/items/9485.php)). The Development and implementation of the Climate Action and Adaptation Plan will assist in meeting these targets.

The methods used in this inventory are consistent with guidelines outlined by the Global Protocol for Community-Scale GHG emissions (GPC). This protocol is the most up-to-date method for establishing community-wide greenhouse gas emissions standards and provides consistency in reporting for cities around the world. City staff worked with CDP (formerly known as the Carbon Disclosure Project), an organization which works with local governments and corporations to disclose greenhouse gas emissions. More information about CDP can be found here: [cdp.net/en/climate](http://cdp.net/en/climate).

For this report, GHG emissions generated in the community were totaled by calculating emissions of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) from data on energy use and waste generation. CH<sub>4</sub> and N<sub>2</sub>O were converted to CO<sub>2</sub> equivalent (CO<sub>2</sub>e) global warming potential (GWP) units developed by the Intergovernmental Panel on Climate Change (IPCC). The total units of CO<sub>2</sub>e then represent the sum total of all greenhouse gases multiplied by their corresponding global warming potential factor. The protocol does not calculate the hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF<sub>6</sub>), or other GHGs in the community analysis. All gases are reported in the standard GHG units of metric tons (tonnes) CO<sub>2</sub>e. One metric tonne is equal to 2,205 U.S. pounds.

The Global Protocol for Community-Scale Greenhouse Gas Emissions Inventory (GPC) also requires

reporting of emissions by “scope.” Scope 1 refers to emissions produced within the city limits and released into the community atmosphere. This includes combustion of all fossil fuels such as gasoline, diesel, natural gas, coal, propane and any other fuel producing greenhouse gases within the city limits. Methane produced from landfill waste and wastewater treatment is also included in Scope 1. Scope 2 emissions include greenhouse gas emissions that occur as a consequence of using grid-supplied electricity, which occur due to usage within the city, but the emissions occur outside the city limits. This report does not address Scope 3 emissions, which refers to all other greenhouse gas emissions that occur outside of the city as a result of activities that take place within city limits. Some examples of Scope 3 emissions include employee commute, business travel, and production of goods used or consumed within the city. These scope distinctions help to avoid double counting between communities and to clarify where emissions are generated.

In addition to the community-wide inventory, City staff also completed an inventory for the city government operations, which will be useful for community awareness, especially in terms of landfill, water, and wastewater-related emissions, since those are a direct result of actions of community members.

# Community Analysis

Community GHG totals included emissions from activities within the city limits of Iowa City. The total combined energy usage and emissions were calculated from the following sectors:

- Residential
  - Private residences
- Commercial
  - Businesses, Public Sector, University of Iowa
- Industrial
  - Industry
- Transportation
  - Fuel usage for vehicles
- Waste
  - Solid waste (landfill) and wastewater treatment
- Other
  - University of Iowa Power Plant

Data was collected from local utility companies for aggregate totals of electrical and natural gas usage for residential, commercial and industrial sectors. MidAmerican Energy supplies the vast majority of electricity and natural gas for the Iowa City community (99.5% of purchased energy). A small

percentage of electricity is supplied by Eastern Iowa Light and Power (0.5% of purchased energy), which services a small section of the southern portion of the city. Transportation data was provided by the Iowa Department of Transportation (IDOT) using a computer modeling program which estimates vehicle miles traveled on all streets, roads, and highways within the city limits. Waste data was provided by the Iowa City Landfill, and adjusted by City staff to reflect the portion of waste generated by the population of Iowa City since the landfill service area includes all of Johnson County. The University of Iowa provided data for amounts of fuel (coal, natural gas) used by the University of Iowa Power Plant (UI Power Plant). The UI Power Plant co-generates steam used for heating and chillers and also produces, on average, 15-20% of the campus' electricity. The UI Power Plant does not represent the entire energy use for buildings and facilities owned by the University, and purchased electricity and natural gas for the University falls under the commercial sector in the community analysis. Additionally, all other public sector energy use also falls under the commercial sector in this analysis. Separating out the total energy use data for the public sector was not possible at the time of this inventory, but all public sector emissions are represented in the community total. Total energy usage data can be found in Appendix 7.

# Community Results Summary

Nine years of community-wide greenhouse gas inventories have been calculated and are graphed below (Figure 2). The baseline year for target reductions is 2005 and community-wide data has been analyzed annually from 2008. From 2005, community-wide GHG emissions have decreased 23.1%. Although this is a remarkable achievement, in order to meet the 80% reduction target set by the City Council, significant work will still be needed.

From 2005 to 2015:

- The population of Iowa City grew by 12%
- Energy use increased by 3.6%
- Total CO<sub>2</sub>e emissions fell by 23.1%, from 1,285,168 metric tonnes in 2005 to 987,735 metric tonnes in 2015
- Per capita CO<sub>2</sub>e emissions dropped from 19.6 metric tonnes to 13.3 metric tonnes
- Industrial, commercial, and residential sectors all saw reductions in emissions
- The University of Iowa Power Plant also reduced emissions
- Emissions reductions are a result of MidAmerican Energy's increasing renewable wind energy

- production (for electricity), increased use of biomass at the University of Iowa Power Plant, and general energy efficiency improvements
- Emissions increased slightly for both transportation and waste due to a larger population driving more total miles and producing more waste

Iowa City set goals of reducing emissions from the 2005 baseline by 26-28% in 2025, and by 80% in 2050. As renewable energy production continues to grow in the coming years, Iowa City is set to meet its 26-28% emissions reduction target before 2025.

Reducing emissions by 80% from the 2005 baseline will require continued renewable energy growth, significantly reduced natural gas use, and significantly reduced transportation fuel use. If current population growth rates continue, per capita CO<sub>2</sub>e emissions will need to drop from 13.3 metric tonnes in 2015 to roughly 2.0 metric tonnes in 2050 to meet the 80% reduction goal.

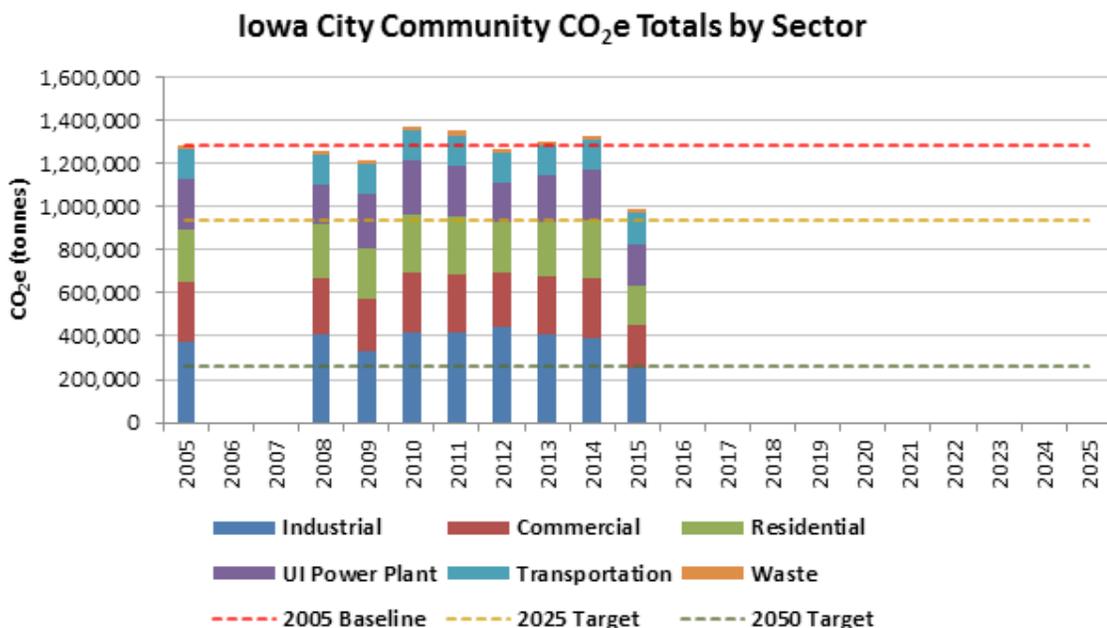


Figure 2. Iowa City Community total annual emissions, 2005-2015, and emission reduction targets

# 2005 Community-wide Greenhouse Gas Baseline Emissions

The 2005 baseline was chosen to match the national baseline set in the Paris Agreement. Although community-wide GHG inventories were completed in 2000 and 2008, complete data for 2005 is unavailable. For missing data, energy usage estimates were made using a linear regression between 2000 and 2008 data. Emissions from electricity use in for 2005 and all other years were calculated using data from MidAmerican Energy Iowa Annual Fuel Reports. Emissions factors were calculated using the numbers for the generation fuel mix of energy delivered to Iowa customers. The University of Iowa Power Plant provided data on 2005 emissions. While data for 2005 is estimated, the number is seen as a good approximation.

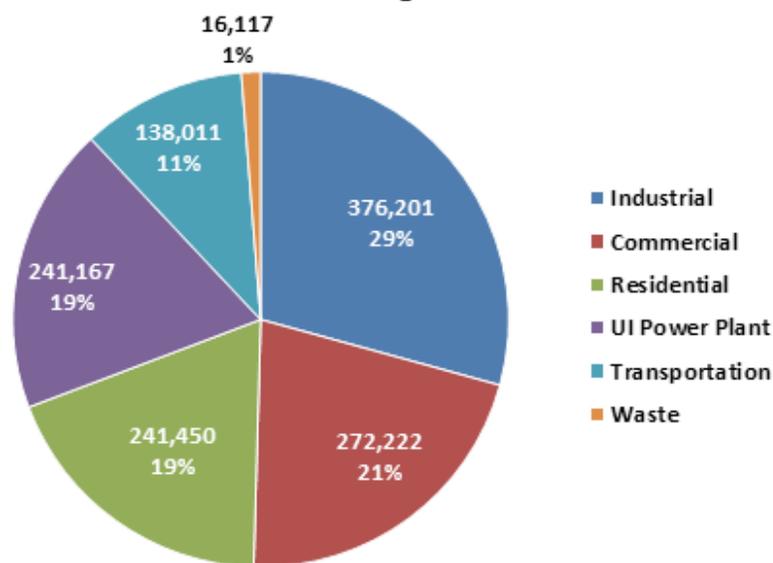
The Iowa City community produced an estimated total of 1,285,168 metric tonnes CO<sub>2</sub>e in 2005. With

a population of 65,641 in 2005, Iowa City per capita emissions equaled 19.6 tonnes CO<sub>2</sub>e (Figure 3).

Each community's CO<sub>2</sub>e emissions vary depending on climate and the variations in the residential, commercial and industrial sectors. The CO<sub>2</sub>e total for the Iowa City community is fairly representative of other communities within the country and is about average for U.S. CO<sub>2</sub>e emissions per capita in 2005.

CO<sub>2</sub> was the largest percentage (>99%) of the total greenhouse gases emitted in 2005. N<sub>2</sub>O and CH<sub>4</sub> have GWPs of 265 and 28, respectively. Although they are emitted in smaller amounts, these amounts are multiplied by their respective GWPs to calculate their CO<sub>2</sub> equivalents (refer to GWP table in Appendix 9).

**2005 Community-wide Emissions by Sector  
(metric tonnes CO<sub>2</sub>e)**

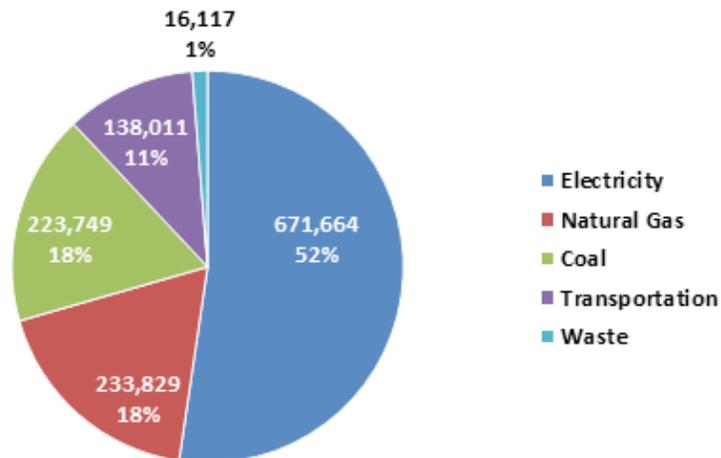


*Figure 3. Iowa City Community estimated CO<sub>2</sub>e totals by sector, 2005*

Industrial activities generated the largest portion of Iowa City's emissions in 2005, at 29%. Commercial activities generated 21%, residential 19%, the University of Iowa Power Plant 19%, transportation 11%, and waste 1% (Figure 3).

# 2005 Community-wide Greenhouse Gas Baseline Emissions

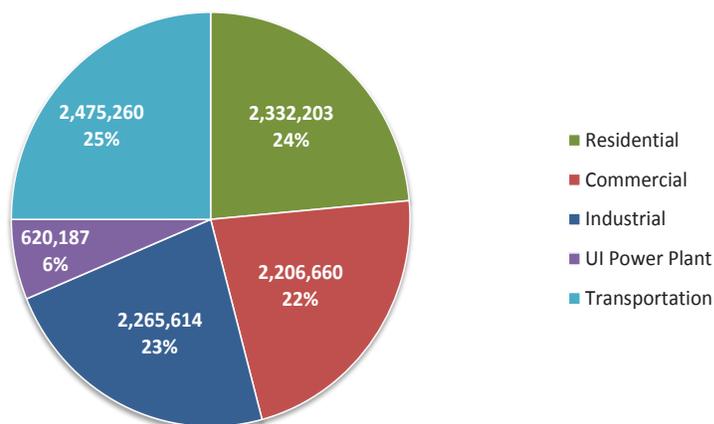
**2005 Community-wide Emissions by Source  
(metric tonnes CO<sub>2</sub>e)**



*Figure 4. Iowa City Community estimated CO<sub>2</sub>e totals by source, 2005*

Electricity use accounted for the majority of Iowa City’s greenhouse gas emissions in 2005, with 52% of the total (Figure 4). Grid electricity is a Scope 2 emission, so emissions are produced outside city limits. Natural gas accounted for 18%, coal burned at the University of Iowa Power Plant 18%, transportation 11%, and waste 1%. These emissions fall under Scope 1 and were released within city limits.

**2005 Energy by Sector  
(MMBTUs)**

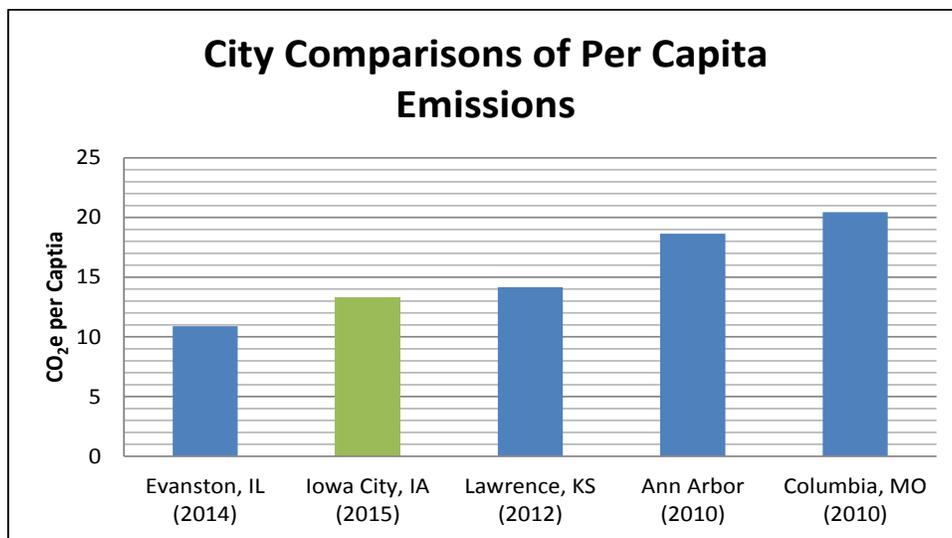


*Figure 5. Iowa City Community total annual emissions, 2005-2015, and emission reduction targets*

The energy used by the community in 2005 totaled 9,839,827 MMBTUs (Million British Thermal Units), with all sectors using a roughly equivalent amount of energy (Figure 5).

# 2015 Community-wide Greenhouse Gas Baseline Emissions

The Iowa City Community produced 987,735 metric tonnes CO<sub>2</sub>e in 2015. With a population of 74,220 in 2015, per capita emissions totaled 13.3 metric tonnes CO<sub>2</sub>e, a 32% reduction per capita from 2005. Iowa City's per capita emissions are compared with other college towns in the Midwest with data that was available online (Figure 6).



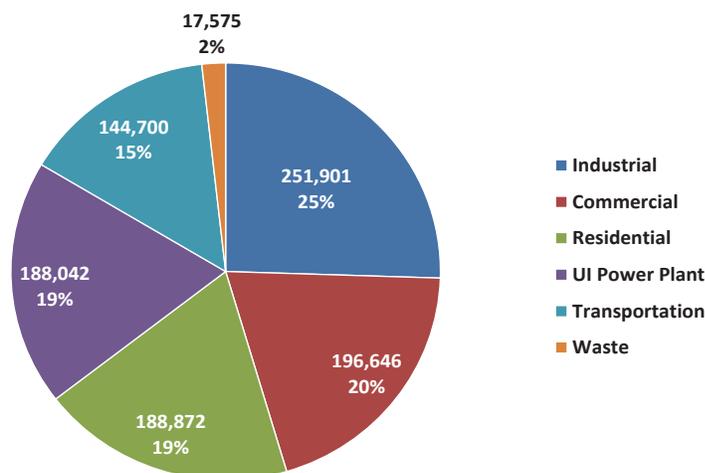
**Figure 6.** Comparisons of per capita emissions with other Midwestern college towns (data from [reportingSTARcommunities.org/indicators](http://reportingSTARcommunities.org/indicators) and [lawrenceks.org](http://lawrenceks.org))

Total CO<sub>2</sub>e emissions for the community decreased 23.1% from 2005 to 2015. Decreases were in the residential (-21.8%), commercial (-27.8%), and industrial (-33%) sectors. Emissions decreases were largely due to renewable wind energy production (for electricity) by MidAmerican Energy increasing from 0% in 2005 to 35.5% in 2015. The UI Power Plant CO<sub>2</sub>e emissions decreased 22% between 2005 and 2015; this decrease was due to the partial substitution of biomass (oat hulls and miscanthus) for coal. The overall decrease in per capita emissions from 2005 to 2015 was due to a combination of these factors.

Increases in emissions were seen in transportation (+5%) and waste (+9%) and were due to increases in population outpacing efficiency improvements.

# 2015 Community-wide Greenhouse Gas Baseline Emissions

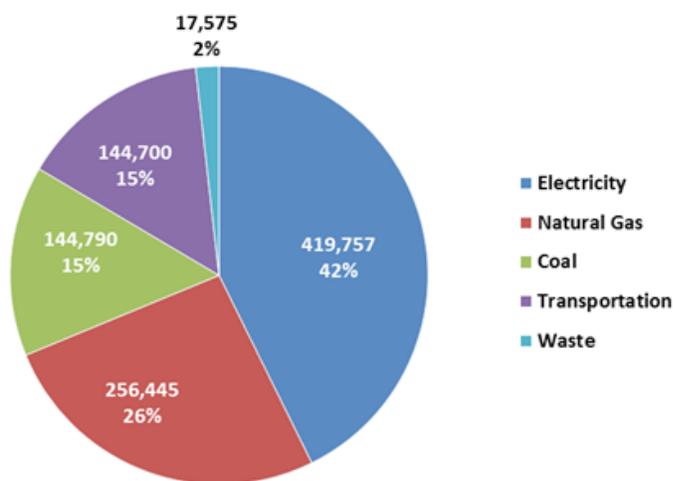
**2015 Community-wide Emissions by Sector  
(metric tonnes CO<sub>2</sub>e)**



*Figure 7. Iowa City Community CO<sub>2</sub>e totals by sector, 2015*

Industrial activities generated the largest portion of Iowa City’s emissions in 2015, at 25%. Commercial generated 20%, residential and the UI Power Plant generated 19% each, transportation generated 15%, and waste generated 2% (Figure 7).

**2015 Community-wide Emissions by Source  
(metric tonnes CO<sub>2</sub>e)**



*Figure 8. Iowa City Community CO<sub>2</sub>e totals by source, 2015*

In 2015, electricity use accounted for just 42% of the community’s CO<sub>2</sub>e, as compared to 52% in 2005 (Figure 8). This decrease in electrical emissions will continue as MidAmerican Energy, which provided 99% of Iowa City’s and 70-80% of the University of Iowa’s electricity in 2015, increases their wind energy production. MidAmerican Energy’s goal is to produce enough renewable energy each year to equal 100% of its customers’ usage.

# 2015 Community-wide Greenhouse Gas Baseline Emissions

2015 Energy by Sector  
(MMBTUs)

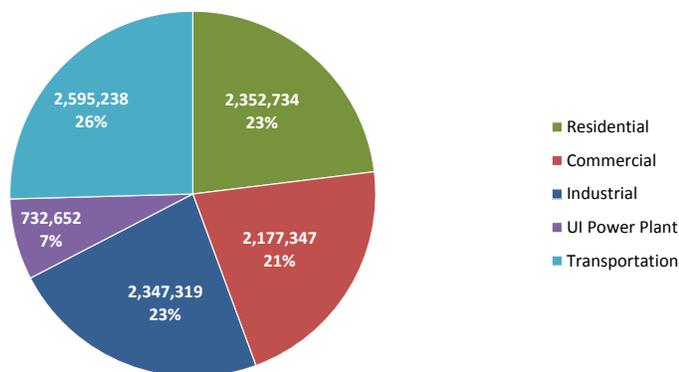


Figure 9. Iowa City Community energy use by sector, 2015

The energy used by the community in 2015 totaled 10,205,291 MMBTUs, an increase of 3.6% from 2005. All sectors used a roughly equivalent amount of energy.

# Population & Per Capita Emissions Trends

Iowa City's population grew from 65,641 in 2005 to 74,220 in 2015 (Figure 10).

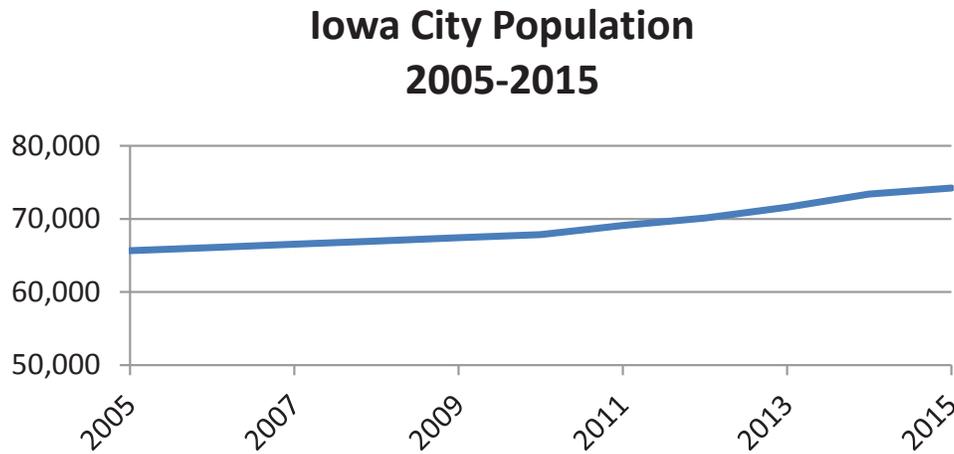


Figure 10. Iowa City population, 2005-2015

During this same period, per capita emissions decreased from 19.6 tonnes per capita to 13.3 tonnes per capita (Figure 11 and Table 1).

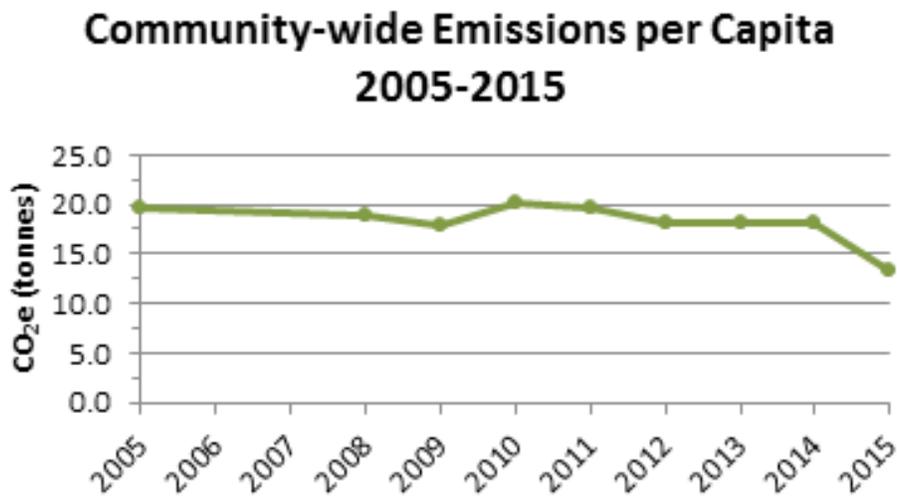
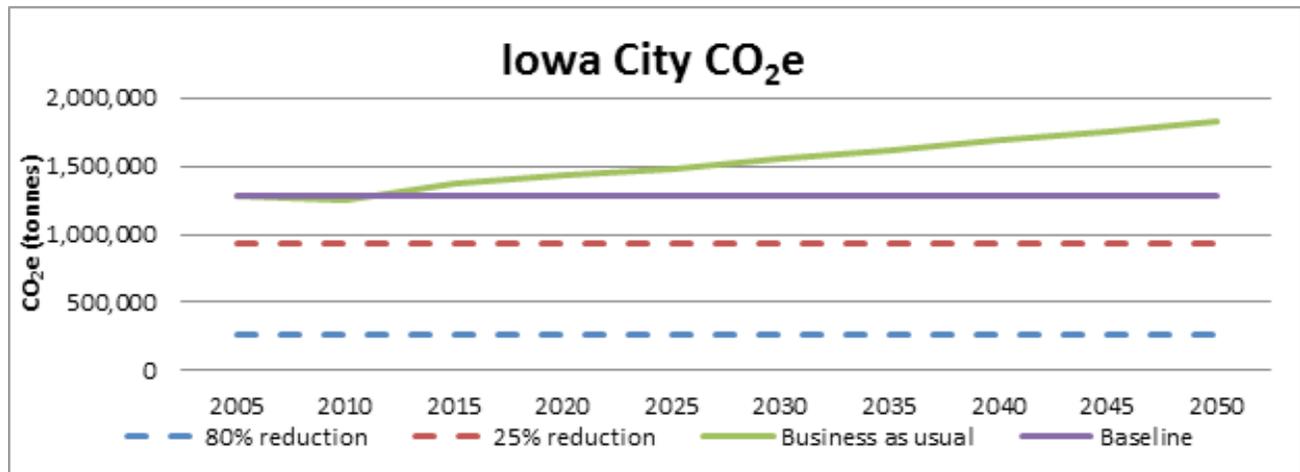


Figure 11. Iowa City emissions per capita, 2005-2015

# Population & Per Capita Emissions Trends

Year	CO <sub>2</sub> e emissions per capita in Iowa City (in metric tonnes)
2000	20.8
2005	19.6
2008	18.8
2009	18.0
2010	20.3
2011	19.6
2012	18.1
2013	18.1
2014	18.1
2015	13.3

*Table 1.* Per capita CO<sub>2</sub>e emissions, 2000-2015



*Figure 12.* Iowa City emissions with projected population growth

To meet the City Council’s 80% reduction goal by 2050, population growth must be factored into the equation. By the year 2050 the population of Iowa City is projected to be 100,000 or about 51% more than 2005 (Figure 11). Projections from 2005 for “business as usual” (i.e. no actions taken) predict that GHG emissions would be 1,949,220 mtCO<sub>2</sub>e by 2050 taking into account the projected increase due to population growth.

# Population & Per Capita Emissions Trends

To meet the reduction goal for the year 2050, Iowa City's emissions should equal 257,034 mtCO<sub>2e</sub>. To reach this target, a total of 1,692,186 mtCO<sub>2e</sub> emissions that must be reduced by the year 2050, from the 2005 baseline total.

Iowa City's Climate Action and Adaptation Plan will prioritize the measures to reduce these emissions by looking at each of the sectors and identifying those actions that the community is willing to undertake to reach this goal.

# Trends by Sector

## Industrial

Emissions from the industrial sector of the Iowa City community include CO<sub>2</sub>e emissions from electricity and natural gas used in the industries within the community. Data was provided by MidAmerican Energy as an aggregate usage number within the city limits. (Figure 13).

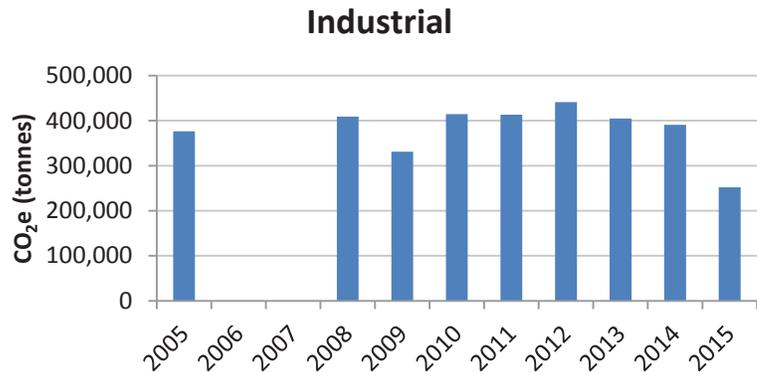


Figure 13. Industrial emissions, 2005-2015

## Commercial

Emissions from the commercial sector of the Iowa City community include CO<sub>2</sub>e emissions from electricity and natural gas used by businesses within the community as well as University of Iowa buildings and facilities. Data was provided by MidAmerican Energy as an aggregate usage number within the city limits. (Figure 14).

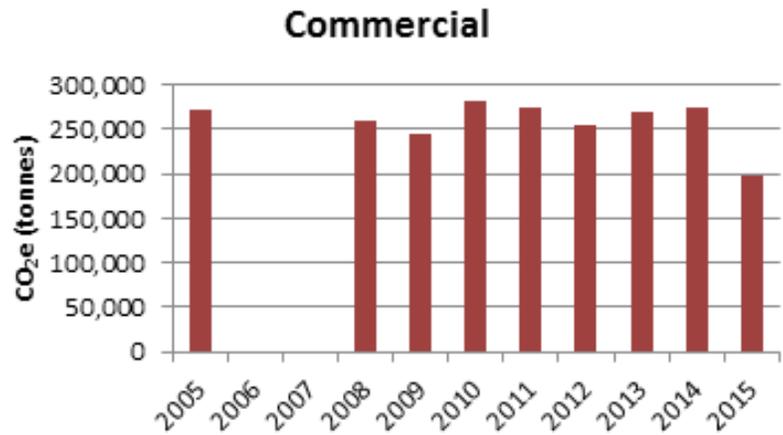


Figure 14. Commercial emissions, 2005-2015

## Residential

Emissions from the residential sector of the Iowa City community include CO<sub>2</sub>e emissions from electricity and natural gas used in residential homes, condominiums and apartments within the community. Data was provided by MidAmerican Energy as an aggregate usage number within the city limits (Figure 15).

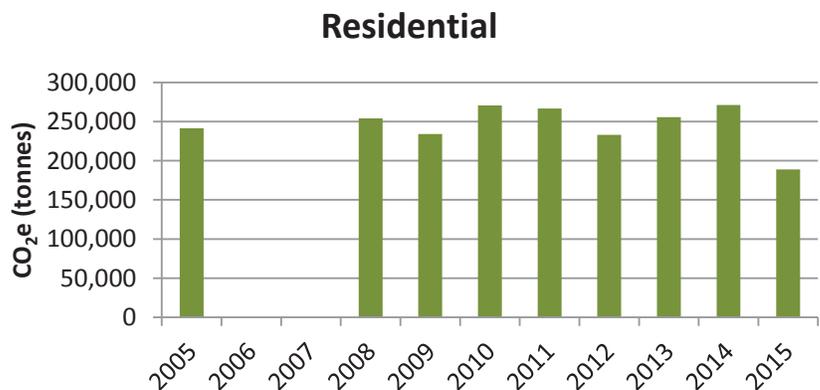


Figure 15. Residential emissions, 2005-2015

# Trends by Sector

## Transportation

Transportation emissions come from Vehicle Miles Traveled (VMT), calculated annually by the Iowa Department of Transportation (DOT). Traffic counts on a variety of street types are collected in Iowa City and are used by the DOT in a computer model to generate the estimated number for all miles traveled for all vehicles on all streets and highways within the community (Figure 16).

### Transportation

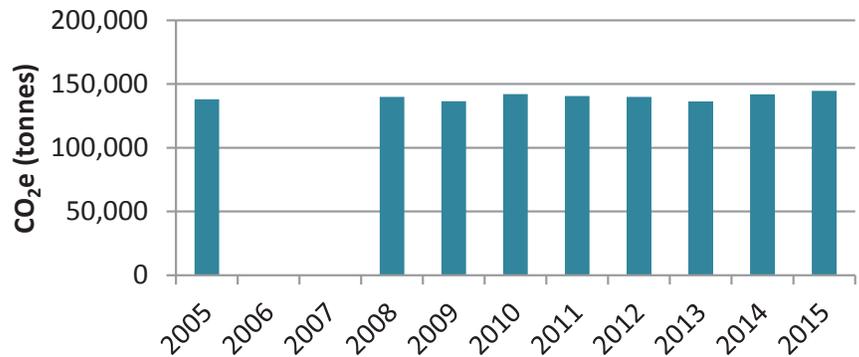


Figure 16. Transportation emissions, 2005-2015

## Waste

Waste from the Iowa City community goes to the Iowa City Landfill and Recycling Center, which accepts waste from all of Johnson County. Calculations were made to account only for the percentage of waste generated by the Iowa City population. Methane from the landfill is captured, flared and converted to CO<sub>2</sub> in the process (Figure 17).

### Waste

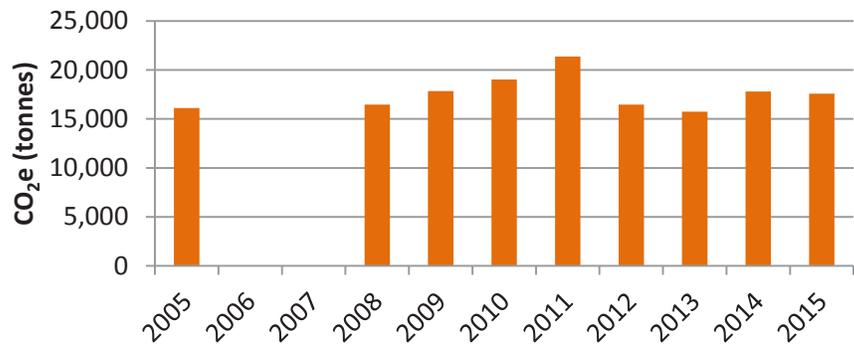


Figure 17. Waste emissions, 2005-2015

## University of Iowa Power Plant

Iowa City is unique among cities its size in the U.S. because it is home to a large University. The University of Iowa is the largest employer in the community and joined the (now defunct) Chicago Climate Exchange in 2005 to account for the CO<sub>2</sub> emissions from their power plant. Substituting oat hulls for a portion of coal burned at the plant has reduced emissions since 2003. Data from the University of Iowa power plant is provided by Facilities Management (Figure 18).

### U of I Power Plant

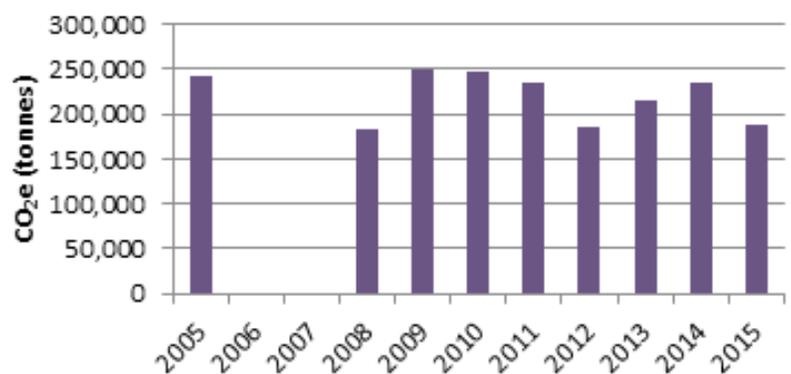


Figure 18. University of Iowa Power Plant emissions, 2005-2015

# Renewable Energy Commitments

MidAmerican has committed to produce enough renewable energy each year to equal 100 percent of its customers' usage. In 2015, 35.5% of electricity in Iowa City came from MidAmerican renewables. MidAmerican's plans have been approved by the Iowa Utilities Board to increase their wind capacity so renewables will supply 89% of our electricity in Iowa City by 2019. This will impact all MidAmerican electricity accounts in Iowa City, which accounts for 99% of non-University electricity usage. While MidAmerican Energy has been increasing their renewable energy production since 2004, emissions factors used for calculating emissions in this report were higher due to MidAmerican selling a significant number of renewable energy credits prior to 2015 (Figure 19).

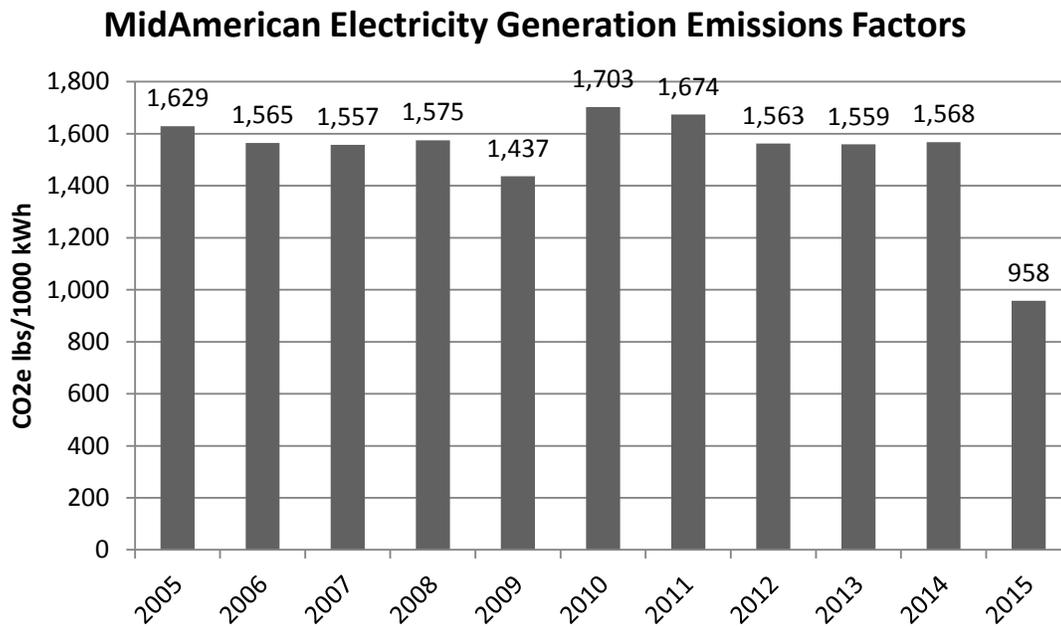


Figure 19. MidAmerican electricity generation emissions factor, 2005-2015

Eastern Iowa Light and Power provides a small portion (0.5%) of purchased electricity to the southern portion of Iowa City. They state that almost 60% of their sources of energy are carbon free with 24.8% wind/hydro and 34.5% nuclear energy supplying their electrical generation, with plans for adding some solar installments in the next few years.

The University of Iowa set sustainability goals in 2008 in their 2020 Vision, including the goal of 40% renewable energy consumption on campus by 2020. The university has been working toward this goal for several years by displacing coal with biomass fuel sources in its solid fuel boilers at the main Power Plant. Due to the success of these efforts, in February 2017 the university committed to eliminating coal from its fuel portfolio by 2025 (Figure 19). The university plans to achieve its goal to stop burning coal largely through increasing and diversifying its renewable fuel sources.

# Renewable Energy Commitments

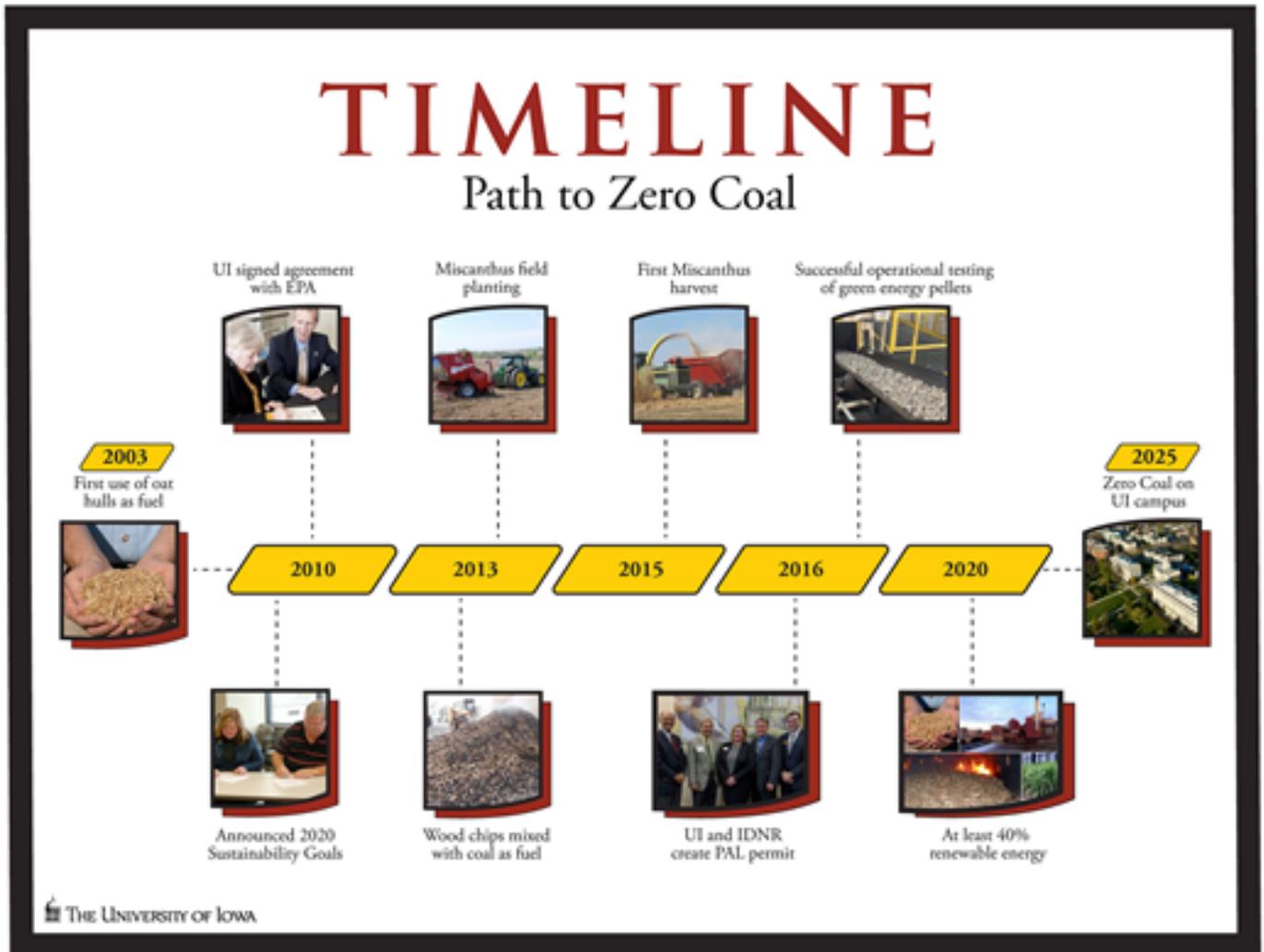


Figure 20. University of Iowa Power Plant coal-reduction timeline

# Conclusion

Several decades of climate research has concluded that human activities are changing our climate. The impact of climate change within Iowa was summarized by the Iowa Climate Change Advisory Council (Iowa Greenhouse Gas Inventory & Reference Case Projections 1990-2025, October 2008). Projected effects of climate change in Iowa include increased frequency of extreme storms, floods, higher rates of soil erosion, and damage to the economy, ecosystems, and human health. These effects have been linked to the rise of GHG emissions due to human activities. The reduction of greenhouse gas emissions is a serious and pressing matter since the U.S. is one of the largest emitters per capita in the world, averaging about 20 metric tonnes of GHG per capita per year. Annual world-wide average emissions are 4 metric tonnes per capita and the estimated sustainable annual limit is 2 metric tonnes per person.

Iowa City estimated the community's baseline 2005 greenhouse gas emissions to be 1,285,168 metric tonnes CO<sub>2</sub>e. Total greenhouse gas emission equivalent (CO<sub>2</sub>e) for the community in 2015 was 987,735 metric tonnes. In 2015, the City of Iowa City government operations activities totaled 49,675 metric tonnes CO<sub>2</sub>e, or 5% of the community total. These amounts were calculated using the most up-to-date protocol approved by the Global Covenant of Mayors. Iowa City's CO<sub>2</sub>e for the baseline year (2005) was 19.6 metric tonnes per capita. Per capita averages depend on climate and community activities, but this number falls within the average range for the American population.

Estimating data for the baseline year of 2005, analysis was done for both the community and government operations for the most recent year that data was available (2015). All sectors measured showed decreases over this 10 year period, except waste and transportation. MidAmerican Energy's transition to wind energy production is driving the reduction in emissions for Iowa City. Further steps can be taken to move forward on the process to reduce these emissions, which can have positive effects on the local and global environment and economy.

In addition to this inventory, a consumption-based inventory for the Iowa City community will be completed by fall 2017. The consumption-based inventory will include additional emissions due to food and materials consumed in the community. Iowa City was awarded grant funding from the Urban Sustainability Directors Network (USDN) for a pilot project to complete this work, which will give additional insight how community behavior can impact global emissions through consumption. Consumption-based inventories are becoming more main stream as cities want a better understanding of economic consumption and emissions which are created from consumable items and materials.

With direct control over less than 5% of the community's greenhouse gas emissions, cooperative partnerships will be needed to make a significant impact on emissions. Cooperation with the University of Iowa, residents, local industries and businesses will be necessary to make community-wide greenhouse gas reductions. The Council has appointed a Climate Action Steering Committee to work towards identifying and prioritizing specific actions to make these reductions possible. The Steering Committee, assisted by a consultant hired by the City, will be soliciting input from the public to develop an action plan to achieve these goals.

## Compact of Mayors Letter of Intent



### CITY COUNCIL

**Jim Throgmorton**  
Mayor

**Kingsley Botchway**  
Mayor Pro Tem

**Rockne Cole**  
**Terry Dickens**  
**Susan Mims**  
**Pauline Taylor**  
**John Thomas**

February 17, 2016

Dear Compact of Mayors Secretariat,

I hereby declare the intent of the city of Iowa City to comply with the Compact of Mayors, the world's largest cooperative effort among mayors and city leaders to reduce greenhouse gas emissions, track progress, and prepare for the impacts of climate change.

The Compact of Mayors has defined a series of requirements that cities are expected to meet over time, recognizing that each city may be at a different stage of development on the pathway to compliance with the Compact.

I commit to advancing the city of Iowa City along the stages of the Compact, with the goal of becoming fully compliant with all the requirements within three years. Specifically, I pledge to publicly report on the following within the next three years:

- The greenhouse gas emissions inventory for our city consistent with the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC), within one year or less
- The climate hazards faced by our city, within one year or less
- Our target to reduce greenhouse gas emissions, within two years or less
- The climate vulnerabilities faced by our city, within two years or less
- Our plans to address climate change mitigation and adaptation within three years or less

Sincerely,

  
James A. Throgmorton  
Mayor

council@iowa-city.org

410 E. Washington Street  
Iowa City, IA 52240

Phone: (319) 356-5041  
Fax: (319) 356-5497

## Community-Wide Target Reduction Resolution

Prepared by: Brenda Nations, Sustainability Coordinator, 410 E. Washington St. Iowa City, IA 52240  
(319) 887-6161

RESOLUTION NO. 16-350

### RESOLUTION AUTHORIZING SETTING COMMUNITY-WIDE GREENHOUSE GAS REDUCTION GOAL OF 25-28% FOR THE YEAR 2025 AND 80% BY 2050

WHEREAS, the Intergovernmental Panel on Climate Change (IPCC), an internationally accepted authority agrees that climate change is due to human activities and that climate change impacts have adverse effects on both environmental and socio-economic systems; and

WHEREAS, Iowa City is vulnerable to the effects of climate change, with climatologists predicting changes to this region that include increased heavy rainfall, more frequent flooding, greater likelihood of severe storms, and higher temperatures; and

WHEREAS, the City Council's strategic plan lists a top priority is to promote environmental sustainability and states the intention of setting a substantive and achievable goal for reducing city-wide carbon emissions; and

WHEREAS the U.S. is one of the largest contributors of greenhouse gas emissions worldwide; and

WHEREAS, the United States along with 193 countries signed the Paris Climate Agreement this year, the most ambitious climate change agreement in history; and

WHEREAS, in signing the Paris Agreement, the United States committed to reducing greenhouse gas emissions 25-28% from 2005 levels by 2025; and

WHEREAS, climate change calls for national and international responses, but ultimately greenhouse gas emissions are generated locally; and

WHEREAS, cities and states through the U.S. have adopted greenhouse gas emission reduction targets and strategies; and

WHEREAS, Iowa City has signed onto the Compact of Mayors (now Global Covenant of Mayors), which requires cities to set a greenhouse gas reduction target; and

WHEREAS, Iowa City is a certified STAR Community, which looks for cities to demonstrate incremental progress towards achieving a 28% reduction by 2025; and

WHEREAS, the City of Iowa City seeks to develop its first Climate Action Plan to develop strategies to achieve this greenhouse reduction goal.

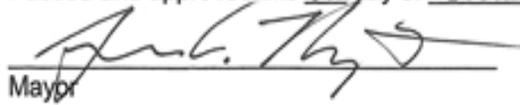
NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF IOWA CITY, IOWA:

Iowa City establishes a greenhouse gas emissions reduction target of 26-28% from 2005 levels by 2025 and a reduction target of 80% by 2050. Greenhouse gas emissions for the Iowa City community in 2005 totaled 1.32 million metric tonnes, therefore the target emissions for 2025 is 964,000 metric tonnes, a reduction of 356,000 metric tonnes.

# Appendix 2

Resolution No. 16-350  
Page 2

Passed and approved this 6th day of December, 2016.

  
\_\_\_\_\_  
Mayor

ATTEST:   
\_\_\_\_\_  
CITY CLERK

Approved by  
  
\_\_\_\_\_  
12-7-16  
City Attorney's Office

# Appendix 2

Resolution No. 16-350

Page 3

It was moved by Mims and seconded by Botchway the Resolution be adopted, and upon roll call there were:

AYES:	NAYS:	ABSENT:	ABSTAIN:	
<u>X</u>	_____	_____	_____	Botchway
<u>X</u>	_____	_____	_____	Cole
<u>X</u>	_____	_____	_____	Dickens
<u>X</u>	_____	_____	_____	Mims
<u>X</u>	_____	_____	_____	Taylor
<u>X</u>	_____	_____	_____	Thomas
<u>X</u>	_____	_____	_____	Throgmorton

## Steering Committee Resolution

Prepared by: Brenda Nations, Sustainability Coordinator, 410 E. Washington St. Iowa City, IA 52240  
(319) 887-6161

RESOLUTION NO. 17-28

### RESOLUTION AUTHORIZING CREATION OF CLIMATE ACTION STEERING COMMITTEE

WHEREAS, the Iowa City City Council has established a greenhouse gas emissions target of 26-28% from 2005 levels by 2025 and 80% by 2050, and seeks to create its first Climate Action and Adaptation Plan to develop strategies to achieve these targets; and

WHEREAS, in accordance with the City Council's 2016-2017 Strategic Planning Priorities, City staff seeks to form an ad-hoc Climate Action Steering Committee consisting of community members to oversee the development of the Climate Action Plan; and

WHEREAS, the Committee shall consist of both key stakeholders and at-large positions representing key sectors of this diverse community; and

WHEREAS, the Climate Action Steering Committee should consist of the following categorical representation from the Iowa City community:

- 1) One member from the University of Iowa
- 2) One member from MidAmerican Energy
- 3) One member representing the business community in Iowa City
- 4) One member representing a large industry in Iowa City
- 5) One member representing Greater Iowa City Home Builders Association
- 6) One member from Kirkwood Community College, Iowa City campus
- 7) One member who is a certified architect
- 8) Up to five at-large members, based on an application process similar to other City boards and commissions and selected according to the expertise and knowledge the applicant brings to the Committee

WHEREAS, the City Council will appoint a chair for the Committee once all members are selected; and

WHEREAS, the Climate Action Steering Committee will convene during the period of the creation of the Climate Action Plan; and

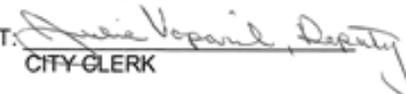
WHEREAS, the Climate Action Steering Committee will work with a consultant hired by the City to create a plan achieve the City's emissions reduction target.

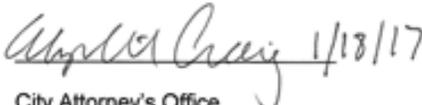
NOW, THEREFORE, BE IT RESOLVED that the Iowa City City Council hereby establishes a Climate Action Steering Committee to oversee the development of the City's first Climate Action and Adaptation Plan in order to meet or exceed the City's emissions targets by 2025 and 2050.

Passed and approved this 17 day of January, 2017.

  
MAYOR

Approved by

ATTEST:   
CITY CLERK

 1/18/17  
City Attorney's Office

# Appendix 3

Resolution No. 17-28  
Page 2

It was moved by Botchway and seconded by Thomas the Resolution be adopted, and upon roll call there were:

AYES:	NAYS:	ABSENT:	ABSTAIN:	
<u>X</u>	_____	_____	_____	Botchway
<u>X</u>	_____	_____	_____	Cole
<u>X</u>	_____	_____	_____	Dickens
<u>X</u>	_____	_____	_____	Mims
<u>X</u>	_____	_____	_____	Taylor
<u>X</u>	_____	_____	_____	Thomas
<u>X</u>	_____	_____	_____	Throgmorton

## Updated Steering Committee Resolution

Prepared by: Brenda Nations, Sustainability Coordinator, 410 E. Washington St. Iowa City, IA 52240  
(319) 887-6161

RESOLUTION NO. 17-96

### RESOLUTION REPEALING RESOLUTION NO. 17-28 AND AUTHORIZING CREATION OF CLIMATE ACTION STEERING COMMITTEE

WHEREAS, the Iowa City City Council has established a greenhouse gas emissions target of 26-28% from 2005 levels by 2025 and 80% by 2050, and seeks to create its first Climate Action and Adaptation Plan to develop strategies to achieve these targets; and

WHEREAS, in accordance with the City Council's 2016-2017 Strategic Planning Priorities, City staff seeks to form an ad-hoc Climate Action Steering Committee consisting of community members to oversee the development of the Climate Action Plan; and

WHEREAS, the Committee shall consist of both key stakeholders and at-large positions representing key sectors of this diverse community; and

WHEREAS, while Resolution No. 17-28 created a Climate Action Steering Committee the City Council has determined that minor changes are necessary; and,

WHEREAS, the Climate Action Steering Committee should consist of the following categorical representation from the Iowa City community:

- 1) One member from the University of Iowa
- 2) One member from MidAmerican Energy
- 3) One member representing the business community in Iowa City
- 4) One member representing a large industry in Iowa City
- 5) One member representing Greater Iowa City Home Builders Association
- 6) One member from Kirkwood Community College, Iowa City campus
- 7) One member who is a certified architect
- 8) One member who is a post-secondary student
- 9) Up to five at-large members, based on an application process similar to other City boards and commissions and selected according to the expertise, knowledge and experience the applicant brings to the Committee

WHEREAS, the Committee will select a chairperson once all members are selected; and

WHEREAS, the Climate Action Steering Committee will convene during the period of the creation of the Climate Action Plan; and

WHEREAS, the Climate Action Steering Committee will work with a consultant hired by the City to create a plan achieve the City's emissions reduction target.

NOW, THEREFORE, BE IT RESOLVED that:

1. Resolution No. 17-28 is repealed.
2. The Iowa City City Council hereby establishes a Climate Action Steering Committee to oversee the development of the City's first Climate Action and Adaptation Plan in order to meet or exceed the City's emissions targets by 2025 and 2080.

Passed and approved this 4th day of April 2017.

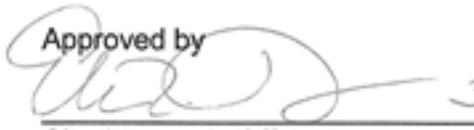
# Appendix 4

Resolution No. 17-96

Page 2

  
\_\_\_\_\_  
Mayor

ATTEST:   
\_\_\_\_\_  
CITY CLERK

Approved by  3-27-17  
\_\_\_\_\_  
City Attorney's Office

# Appendix 4

Resolution No. 17-96

Page 3

It was moved by Botchway and seconded by Dickens the Resolution be adopted, and upon roll call there were:

AYES:	NAYS:	ABSENT:	ABSTAIN:	
<u>X</u>	_____	_____	_____	Botchway
<u>X</u>	_____	_____	_____	Cole
<u>X</u>	_____	_____	_____	Dickens
<u>X</u>	_____	_____	_____	Mims
<u>X</u>	_____	_____	_____	Taylor
<u>X</u>	_____	_____	_____	Thomas
<u>X</u>	_____	_____	_____	Throgmorton

# Appendix 5

## Calculated Annual Emissions (metric tonnes CO<sub>2</sub>e)

### CO<sub>2</sub>e Totals

2005	2008	2009	2010	2011	2012	2013	2014	2015
376,201	408,884	331,126	414,455	413,145	440,907	404,690	390,717	251,901
272,222	259,803	244,324	281,040	274,902	254,393	268,978	274,760	196,646
241,450	254,055	234,259	270,753	266,786	233,171	255,718	271,236	188,872
241,167	182,273	249,557	247,332	234,228	184,572	216,192	234,806	188,042
138,011	139,952	136,517	142,094	140,607	139,877	136,338	141,909	144,700
16,117	16,467	17,856	19,037	21,376	16,461	15,741	17,803	17,575
<b>1,285,168</b>	<b>1,261,433</b>	<b>1,213,639</b>	<b>1,374,712</b>	<b>1,351,043</b>	<b>1,269,382</b>	<b>1,297,657</b>	<b>1,331,231</b>	<b>987,735</b>

# Appendix 6

## Emissions Factors for 2015

Fuel type or activity	Units			Emission factor				Description	Source
				CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	Total CO <sub>2</sub> e		
<i>Fuel A</i>	<i>kg</i>	<i>/</i>	<i>kWh</i>	<i>0.4822</i>	<i>0.003</i>	<i>0.0029</i>		<i>Average emission factor for national electricity grid</i>	<i>National emissions factor database</i>
Electricity	lb	/	kWh	0.9580	0.00008183	0.000011933	0.963453485	MidAmerican	MidAmerican
Natural Gas	kg	/	kWh	0.2020	0.0000036	0.00000036	0.2021962	IPCC	IPCC
VMT	g	/	VMT	431.6536	0.0278	0.0294	440.223	19.64 lbs CO <sub>2</sub> /gal & 20.386mi/gal	eia.gov
U of I Bituminous Coal for Power Plant	lb	/	mmBtu	205.68	0.0250	0.0035	207.3075	University of Iowa Power Plant	UI Power Plant
Natural Gas - Main Plant Only - MMBtu	lb	/	mmBtu	117.00	0.0020	0.0002	117.109	University of Iowa Power Plant	UI Power Plant
Aviation	lb	/	mmBtu	152.7	0.007	0.0013	153.2405	University of Iowa Power Plant (.135mmBtu/gal)	UI Power Plant
Wastewater	kg	/	Person	0	0.044478	0.02549348	8.0011562	Iowa City South WWTP	Iowa City South WWTP
Solid Waste	kg	/	scf/yr	0	2.36558E-06	0	6.62361E-05	Landfill	Landfill
Lawn Care	lb	/	hr	34.85	0	0	34.85	34.85 lbs/h for small gas engines (lawnmowers & lawncare)	eia.gov
Construction	kg	/	hr	60.86	0	0	60.86	2.68kg/L for large diesel engines	eia.gov
Diesel	kg	/	L	2.68	0	0	2.68	2.68kg/L for large diesel engines	eia.gov

For reporting requirements, the University of Iowa uses emission factors of 25 GWP for methane and 298 GWP for nitrous oxide.

# Appendix 7

## Community Energy Usage Numbers

Community Energy Usage									
Data	2005*	2008	2009	2010	2011	2012	2013	2014	2015
Residential Natural gas MidAmer. (therms)	16,783,292	17,929,377	17,292,300	16,692,943	16,764,340	13,550,178	17,364,007	19,962,383	16,332,115
Residential Electricity MidAmer. (kWh)	191,219,543	205,814,529	200,454,336	220,470,323	218,410,665	213,360,076	212,799,534	213,461,618	209,980,526
Residential Electricity EIL& P (kWh)	365,618	430,139	1,033,795	1,321,114	1,446,856	1,569,483	1,726,432	900,794	839,634
Commercial Natural Gas MidAmer (therms)	15,353,896	17,109,060	16,057,807	16,307,083	14,452,418	16,841,621	21,635,952	18,480,980	19,890,086
Commercial Electricity MidAmer (kWh)	265,575,426	266,527,132	270,497,102	279,447,533	277,563,688	279,536,164	278,331,259	270,529,911	268,999,862
Commercial Electricity EIL& P (kWh)	5,230	94,822	124,215	162,411	175,366	192,944	212,239	193,252	130,099
Industrial Natural gas MidAmer (therms)	7,338,597	7,637,088	6,901,186	6,855,199	6,709,016	7,087,751	7,592,693	7,656,574	7,071,816
Industrial Electricity MidAmer (kWh)	445,263,390	503,204,321	436,815,904	475,621,791	483,739,607	552,794,665	496,479,224	475,586,003	472,399,495
Industrial Electricity EIL& P (kWh)	3,540,509	4,058,195	6,795,234	6,801,462	6,430,902	7,934,269	8,334,487	8,317,092	8,160,804
<i>*U of I natural gas is subtracted to avoid double counting</i>									
U of I Bituminous Coal for Power Plant (tons)	95,086	61,974	92,852	89,832	88,979	59,579	67,370	86,550	61,531
U of I Purchased Natural Gas for PP (mmbtu)	294,060	615,203	524,444	606,868	419,520	749,170	973,470	525,774	730,194
Transportation (VMT)	313,590,000	318,000,000	310,196,000	322,868,000	319,489,000	317,831,000	309,788,000	322,448,000	328,790,000
Total Landfill (tonnes CO2)	22,410	22,413	25,657	26,856	30,284	23,100	21,622	23,902	23,845
% of Landfill total	69%	71%	67%	69%	69%	69%	70%	69%	69%
Community Waste (tonnes CH4)	0	0	0	0	0	0	0	0	0
Iowa City Community Waste (tonnes CO2)	15,463	15,913	17,190	18,531	20,896	15,916	15,049	16,516	16,477
CBOD (Carbonaceous Biochemical Oxygen Demand)	13,892	11,767	14,152	10,749	10,192	11,098	12,873	27,852	23832
Population	65,641	67,768	69,086	67,862	69,094	70,133	71,591	73,415	74220
MidAmerican CO <sub>2</sub> lbs/MWh (from Annual Energy Reports)	1,629	1,575	1,437	1,703	1,674	1,563	1,559	1,568	958

\*2005 numbers are based on a linear regression between 2000 and 2008 energy usage numbers when actual data was not available.

# Appendix 8

## Definitions

ADT	Average Daily Traffic count: the total volume of traffic past a single point over a 24 hour period.
BAU	Business as usual scenario: assumes no strategies are employed to reduce greenhouse gases.
Biogas	The gas produced from decomposition of landfill waste or sewage consisting of methane, carbon dioxide, nitrogen and other trace gases such as hydrogen sulfide, ammonia and hydrogen.
CACP2009	2009 Clean Air and Climate Protection software supplied by ICLEI, formerly used by Iowa City to calculate past years greenhouse gas emissions inventories. Data for this inventory was recalculated using the GPC protocol.
CCX	The Chicago Climate Exchange. A voluntary, but legally binding GHG emissions reduction cap and trade system. ( <a href="http://chicagoclimatex.com/">chicagoclimatex.com/</a> ).
CDP	An organization which works with local governments and corporations to disclose greenhouse gas emissions, formerly the Carbon Disclosure Project. More information about CDP can be found at <a href="http://cdp.net/en/climate">cdp.net/en/climate</a> .
CH <sub>4</sub>	Methane: A hydrocarbon that is a greenhouse gas with a global warming potential 21 times that of carbon dioxide (CO <sub>2</sub> ). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.
CO <sub>2</sub>	Carbon Dioxide: A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal anthropogenic greenhouse gas.
CO <sub>2</sub> e	Carbon Dioxide Equivalent: A measure of the global warming potential of all greenhouse gases emitted including CH <sub>4</sub> , NO <sub>2</sub> and other gasses in addition to CO <sub>2</sub> .
Consumption-Based inventory	A consumption-based inventory refers to an emissions inventory that in addition to traditional emissions created within the city limits, evaluates emissions associated with all consumption, regardless of where it is produced. Many local governments are pursuing this type of inventory to better understand how food and other materials purchased and consumed by the community have an impact on the environment and economy.
GHG	Greenhouse gases, which include carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxide (N <sub>2</sub> O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF <sub>6</sub> ).
GPC	Global Protocol for Community-scale Greenhouse Gas Emissions Inventories: The first global standard to measure greenhouse gas emissions from cities created as a joint project by ICLEI-Local Governments for Sustainability, the World Resources Institute (WRI) and C40 Cities

# Appendix 8

Climate Leadership Group, with additional collaboration by the World Bank, UNEP, and UN-Habitat.

GWP	Global Warming Potential. The GWP-weighted emissions of direct greenhouse gases in the inventory are presented in terms of equivalent emissions of carbon dioxide (CO <sub>2</sub> ). GWP factors represent the ratio of the heat-trapping ability of each greenhouse gas relative to that of carbon dioxide.
HFCs	Hydrofluorocarbons: Compounds containing only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are powerful greenhouse gases with global warming potentials ranging from 140 to 11,700 times that of carbon dioxide by weight.
IPCC	The Intergovernmental Panel of Climate Change is the leading body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences. ( <a href="http://ipcc.ch/">ipcc.ch/</a> )
ICLEI	International non-profit organization providing software and assistance for communities to calculate their emissions. ICLEI was formerly known as International Council for Local Environmental Initiatives and has changed their name to Local Governments for Sustainability. ( <a href="http://icleiusa.org/">icleiusa.org/</a> )
KWh	Kilowatt hour, a unit of electricity.
LED Lights	A high efficiency lighting technology that reduces lighting energy consumption by as much as 80% compared to traditional incandescent lighting. The City of Iowa City has employed this technology in a retrofit of the city's traffic lights, and is looking for other applications of LED lighting to reduce consumption of fossil fuel derived energy.
MMTBTU	One million British Thermal Units, or 10 therms. A unit of energy measurement.
Metric Tonne	One thousand kilograms, or approximately 2,205 U.S. lbs.
Miscanthus	A grass used by the University of Iowa as a biomass, used to replace the burning of coal at the power plant.
Natural Gas	Underground deposits of gases consisting of 50 to 90 percent methane (CH <sub>4</sub> ) and small amounts of heavier gaseous hydrocarbon compounds such as propane (C <sub>3</sub> H <sub>8</sub> ) and butane (C <sub>4</sub> H <sub>10</sub> ). Most prevalent fuel used for home and water heating in Iowa City. Some natural gas in the U.S. is recovered from underground using the process of "fracking."

# Appendix 8

NO <sub>2</sub>	Nitrous Oxide: A powerful greenhouse gas with a global warming potential of 310 times that of carbon dioxide (CO <sub>2</sub> ). Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
Oat Hulls	A byproduct of grain processing at the Quaker Oats plant in Cedar Rapids, Iowa. The hulls, a former industrial waste, are being redirected to the University of Iowa heat and electricity plant to replace some of the coal used at the plant thereby reducing GHG emissions.
PFCs	Perfluorocarbons: A group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly CF <sub>4</sub> and C <sub>2</sub> F <sub>6</sub> ) were introduced as alternatives, along with hydrofluorocarbons, to the ozone depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they are powerful greenhouse gases with global warming potentials ranging from 5,700 to 11,900 times that of carbon dioxide.
Scope 1	Scope 1 includes emissions being released within the city limits resulting from combustion of fossil fuels and from waste decomposition in the landfill and wastewater treatment plant.
Scope 2	Scope 2 includes emissions produced outside the city that are induced by consumption of electrical energy within the city limits.
Scope 3	Scope 3 includes emissions of potential policy relevance to local government operations that can be measured and reported but do not qualify as Scope 1 or 2. This includes, but is not limited to, outsourced operations and employee commute.
SF <sub>6</sub>	A very powerful greenhouse gas used primarily in electrical transmission and distribution systems and as a dielectric in electronics. The global warming potential is roughly 22,200 times that of carbon.
Therm	A unit of measure for energy that is equivalent to 100,000 British Thermal units, or roughly the energy in 100 cubic feet of natural gas. Often used for measuring natural gas usage for billing purposes.
VMT	Vehicle Miles Traveled. A unit used to measure vehicle travel made by private vehicles, including passenger vehicles, truck, vans and motorcycles. Each mile traveled is counted as one vehicle mile regardless of the number of persons in the vehicle.

## Global Warming Potentials (GWP)

Common Name	Chemical Formula	Global Warming Potential <sup>1</sup>
Carbon dioxide	CO <sub>2</sub>	1
Methane	CH <sub>4</sub>	28
Nitrous oxide	N <sub>2</sub> O	265
Sulfur hexafluoride <sup>2</sup>	SF <sub>6</sub>	23,500
Hydrofluorocarbons <sup>2</sup>	Various	Varies
Perfluorocarbons <sup>2</sup>	Various	Varies

<sup>1</sup> Values take from IPCC Fifth Assessment Report, 2014 (AR5)

<sup>2</sup> This greenhouse gas inventory did not take these gases into account

For reporting requirements, the University of Iowa uses emission factors of 25 GWP for methane and 298 GWP for nitrous oxide.

## Summary of Iowa City's STAR Rating

