

Green House Gas Emissions Inventory

City of Rock Island



Table of Contents

Green Team	3
A History of Environmental Responsibility	3
Greenhouse Gas Emission Report	7
Accountability and Methodology	10
Governmental Emissions	11
Community Emissions	13



The Rain Gardens for Rock Island program has provided funding for over 150 rain gardens in its first four years. This is just one of the many sustainable initiatives the City exhibits.

City of Rock Island Green Team

The City's Green Team, which is composed of representatives from all municipal departments, works as a collaborative brainstorming and assessment organization to research sustainable initiatives.

The Green Team involves members from the following departments: Public Works, Administrative Services, Police, Fire, Parks & Recreation, Community & Economic Development, Finance and the Library.

2009 Green Team

Bob Hawes	Cherise Schwabe	Mark Nenninger
Tim Ridder	Jennifer Fowler	Tom Ayers
Mike Kane	Bill Woeckener	Blake Humphrey
Carrie Roelf	Marcus DeMarlie	Richard Landi
Roberto Medina	Shawn Simmonds	Amy Penry

The City has implemented a number of cost-saving, emissions-reducing strategies to date:

1. Hybrid cars fleet
2. Replacement of three AC units higher efficiency units
3. Acquisition and expansion of the Sears Powerhouse Hydroelectric Plant
4. The methane gas produced at the Mill Street Sewage Treatment plant is captured and used for heating.
5. The City is an area leader in stormwater management.
6. Indoor and outdoor lighting systems are being upgraded to more efficient fixtures.
7. All traffic signal light bulbs have been replaced with LED bulbs.
8. A recycling program is provided at all City facilities.
9. The city fleet uses biodiesel fuel whenever it is available.
10. City Hall windows were replaced in 2008 with more energy efficient units.
11. Most of the city's sewage treatment sludge disposal is accomplished by agricultural land application instead of landfilling.
12. Leaf burning is banned and an annual Free Fall and Spring Leaf Collection Program has been implemented.
13. The City offers a free recycling drop-off center.
14. The City offers a voluntary curbside recycling program for residents and businesses
15. The City continues to expand the system of bicycle paths.
16. The City sponsors the Sustainable Design Assistance Team (SDAT).
17. The City is implementing an Environmental Management Plan based on ISO (International Organization of Standardization) 14001 Environmental Management System.
18. The City sponsors an adopt-a-highway program and supports Keep Rock Island Beautiful.
19. The City has completed several Brownfield redevelopments.
20. The City reduces the use of road salt in the winter through timely anti-icing compound applications.
21. The City golf courses follow the environmental guidelines established by the Audubon Club.

History of Environmental Responsibility

Brownfield Development

The City of Rock Island realized the opportunity for brownfield development early on and researched ways to revitalize such sites. As a post-industrial river city, Rock Island has blighted or abandoned industrial sites that pose a risk for re-use. These sites, called brownfields, are recognized by city officials as prioritized areas for development since the 1990s. Development of brownfields ensures that the impacted land is cleaned of any chemical leachates and development is kept to already impacted areas, rather than constructing on natural lands.

The **Sylvan Slough Natural Area**, located along the Mississippi River Trail, is a brownfield site in the City, as an old oil company headquarters and a bulk-distribution center were the previous buildings on this property. Gone are most of the buildings, with only a few building frames standing to rekindle the sense of place. In place of the edifices are rain gardens, bioswales, and educational signs. Many other once-contaminated sites have been cleaned up to house the Illinois Casualty Company and a community mental health clinic.

Adaptive Re-Use

It can be said that the greenest buildings are the one that was never built, as every new building is typically constructed on non-impacted land and require the acquisition of new building material. Rock Island has succeeded in turning much of its vacant infrastructure into buildings with new uses. In the downtown, old warehouses have been retrofitted for loft apartments (e.g. McKesson Lofts, Voss Brothers Lofts), the former Rock Island Train Depot-now Abbey Station-serves as a reception facility, the renovated Sala Flats are a mixed-rate (market and affordable) apartment center, and the “Upstairs Downtown” movement has turned upper floors of commercial areas into loft apartments.

Waste Management

When it comes to the waste stream, Rock Island residents have a variety of municipally provided options to minimize their waste. The City offers recycling services to residents through a drop-off center. The City offers a convenient curbside recycling subscription service. Recycling rates increased 47.57% in 2008 in comparison to 2007 levels, in part due to the new curbside subscription service.

Hazardous materials, tire recycling and appliance pick-ups are also available to Rock Island residents free of charge. Residents have the opportunity to schedule pick-up and drop-offs at appropriate facilities through the Rock Island County Waste Management Agency and the Scott County Hazardous Materials Facility.



Recycling rates rose 47.5% in one year when the City offered a curbside recycling subscription service.

Alternative Transportation Means

The City of Rock Island adopted a **Complete Streets** policy which it uses to assess the construction of any new streets. The City works to revitalize sidewalks and develop bike lanes in conjunction with street maintenance and reconstruction projects.

Rock Island is home to roughly five miles of the Mississippi River Trail's Great River Trail located on the City's border with the Mississippi River.

Public transportation is available in Rock Island and throughout the Quad Cities through the **MetroLINK** bus service

The **future Quad Cities passenger rail** will have its Amtrak stop located 1.3 miles from Rock Island's eastern boundary, or 3.5 miles from the downtown. The new Quad Cities line will connect the area's population with Chicago via public transportation.

Stormwater Management

The City of Rock Island takes a progressive and highly effective approach to teaching residents how to manage stormwater. Responsible environmental management for this region shows that property owners should retain as much rainwater on-site as possible in order to reduce runoff velocities, minimize pollutant runoff into the river, recharge the underground water supply (minimizing drought effects), and reduce erosion.

The City of Rock Island began a **Rain Gardens for Rock Island** program in 2005, and has seen an overwhelming response to the program each year. The City reimburses residents for approved rain gardens (up to a maximum value) and provides owners with a rain barrel if it is incorporated into their plan. As of 2008, Rock Island has over 57,000 square feet of water-retaining gardens provided thru this program, in addition to numerous sample municipal rain gardens.

These items represent only a few of Rock Island's history of sustainable initiatives. Read more at Rock Island's website: <http://www.rigov.org/green/initiatives.html>.

Energy Efficiency

Beginning in 2005, the City of Rock Island began to upgrade its traffic lights to LEDs. LEDs (Light Emitting Diodes), which are prevalent in electric devices such as the power light on computers and televisions, are new to enter the white-hued light market. The City found that where previous traffic lights would consume enough energy to emit 6-11 tons of CO₂e, an LED traffic light would emit less than 1 ton of CO₂e a year!

LED traffic lights consume 9-16% of the energy of traditional traffic lights!

In 2008 Rock Island purchased 24 hybrid vehicles to replace its entire administrative fleet. This commitment to the reducing the City's green house gas levels results in reduction 50,000 pounds of carbon dioxide a year.



Rock Island's Schwiebert Riverfront Park will soon be a public park which will provide outdoor music opportunities, an urban beach, picnicking space, a bike path connection, and increase pedestrian access to the downtown.



Where do our emissions stand today?

The City of Rock Island conducted a GHG emissions inventory which investigated area greenhouse gas emissions from energy consumption. Investigating residential, commercial and industrial energy use, transportation-based fuel consumption, and the waste stream found that in 2008 the City of Rock Island produced 616,327 tons of carbon dioxide equivalents (CO₂e)

What is a carbon dioxide equivalent? CO₂e is a measure of various GHG's atmospheric effects relative to the effects of carbon dioxide (CO₂). These values are assessed at GHG's effects over a 100-year time period with Methane (CH₄) having a Global Warming Potential (GWP) of 21, Nitrous oxide (N₂O) is 310 and Hydro fluorocarbons (HFC-134a) have a GWP rating of 1,300 CO₂e.ⁱ

In 2008, the average Rock Island citizen produced 16 tons of CO₂e through home heating and cooling, electricity, transportation, and food waste disposal. Not accounted for in this inventory are the lifestyle options which an individual employs, such as dietary choices (meat and prepackaged foods have more embedded energy use), frequency of air travel, entertainment, out-of-the-area vehicular travel, etc.

Rock Island's per capita greenhouse gas emissions are calculated through energy use and waste production. The source of electricity and natural gas consumption is MidAmerican Energy Company, calculations derived from vehicle-miles-travelled data offers transportation-generated emissions, and waste is calculated from city-supplied waste collection.

Urban areas are known to produce less CO₂e per capita than rural areas, although urban areas contribute the majority of a country's emissions. Per capita emissions in urban settings are lower than rural areas since the population will not have to travel as far for goods and services, and smaller, adjoined urban residences demand less heating/air conditioning needs. As Rock Island has an urban core with decreasing housing density, and a southern rural zone, how do its emissions compare to other cities?



On average, each Rock Island resident is responsible for 16 tons of CO₂e emissions every year.

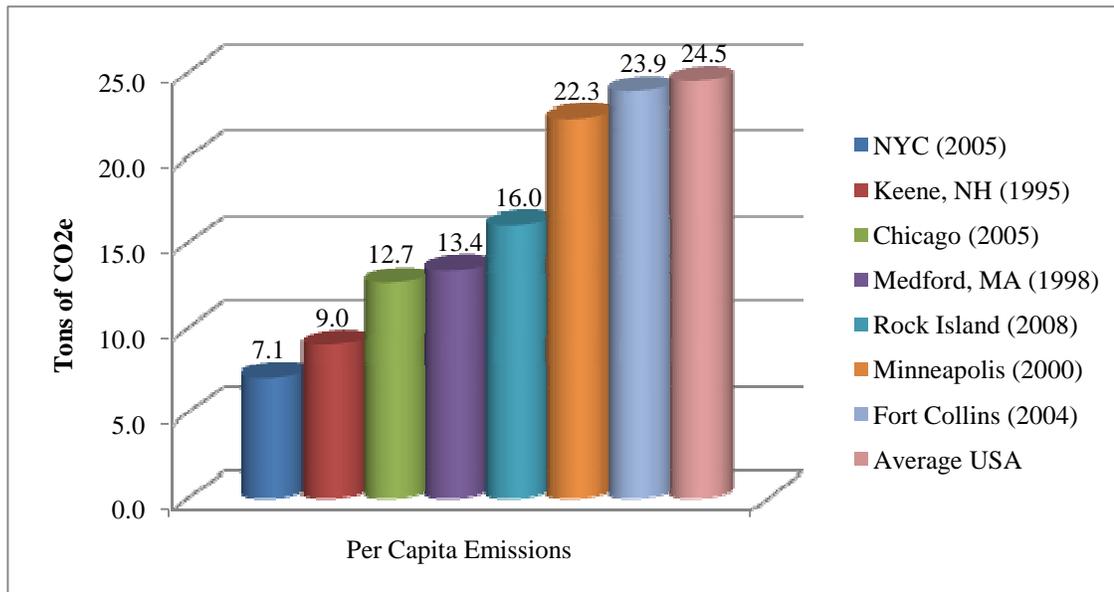


Figure 1 Per Capita Emissions: A Comparison of Cities

It is important to note that different methodologies exist for the calculations of each city’s GHG emissions (Figure 1). Some cities may account for air travel and the decomposition of waste in their emissions inventory. Rock Island does not account for these, nor for interstate travel as the airport, landfill, and interstate are located outside of municipal boundaries. USA Average per capita emissions appear higher than the cities shown (Figure 1) since this total value includes all travel (such as air, train and interstate), mining, electrical generation, land use change, shared landfill waste emissions, etc., that cannot be attributed to an individual city.

Comparing the City of Rock Island’s per capita emissions to other cities is difficult, as population, location and demographics are causes for varying emissions levels. Additionally, many small cities have yet to release their GHG emissions inventory, which makes it necessary to compare Rock Island to large cities.

Accountability

The emissions inventory uses the Clean Air and Climate Protection software from the International Council for Local Environmental Initiatives (ICLEI) to calculate emissions and compile local data sources. Emissions accounting principles originate from the Local Government Organizational Protocol, and data included in the inventory is from local sources' reports, and modeled from regional, state and national trends in order to provide an inventory for community and governmental energy use in the City of Rock Island.

Emissions were calculated for criteria air pollutants: carbon dioxide, carbon monoxide, nitrous oxides, sulfuric oxides, volatile organic compounds and particulate matter 10 micrometers or less in diameter, as available from the Illinois Environmental Protection Agency data. These gases, and any electrical or nuclear energy use, were converted to tons of carbon dioxide equivalents (CO₂e). Units of CO₂e allow a comparison of criteria air pollutants to be made across municipalities. The CACP software uses accepted conversion factors from the MidAmerican Interconnected Network (Region 04) average grid electricity set to calculate tons of CO₂e from energy use.

Acknowledgements

The research vested in this report is the result of insight, collaboration and information from the following persons:

Timothy Ridder, City of Rock Island	Lisa Miller, Bi-State Regional Transportation Commission
Mark Nenninger, City of Rock Island	Lalit Patel, Bi-State Regional Transportation Commission
Tammy Mendoza, City of Rock Island	Daya Snapp, Bi-State Regional Transportation Commission
Jennifer Gill, MidAmerican Energy	David "Buzz" Asselmeier, Illinois EPA
Gretta Knight, MidAmerican Energy	Rob Robinson, Illinois Department of Transportation
Bill Halse, MidAmerican Energy	

Methodology

The GHG emissions inventory follows the input requirements of the Clean Air and Climate Protection software (2003) from ICLEI-Local Governments for Sustainability. Inventory reporting is outlined by the Local Governments Organizational Protocol Version 1.0 (September 2008) to address emissions identification, quantification and reporting.

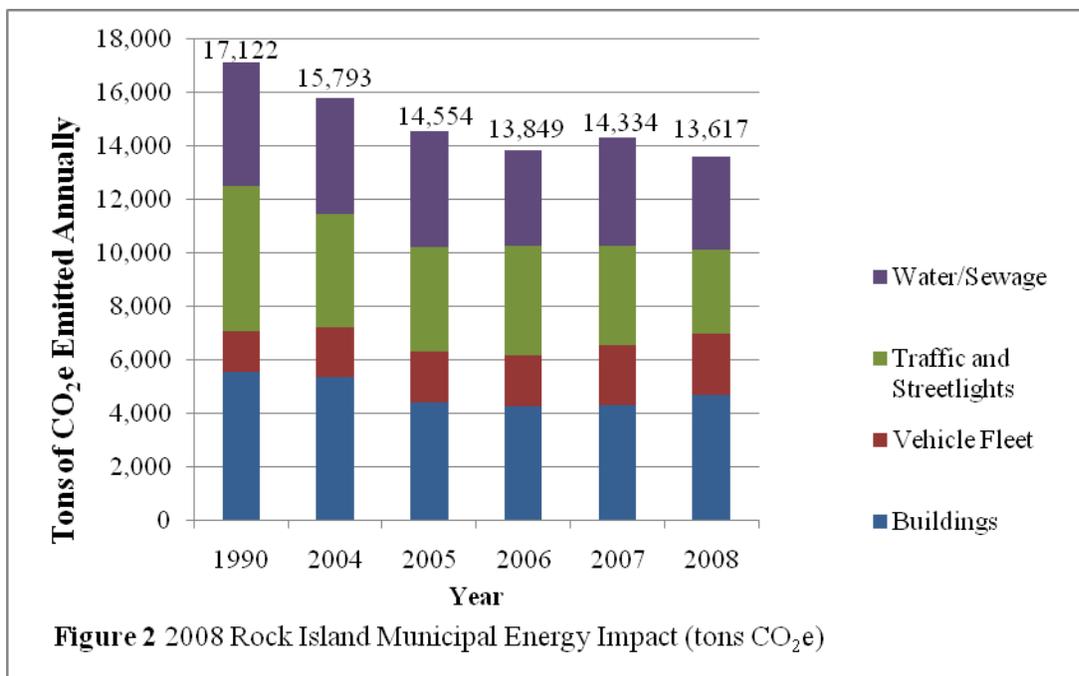
Emissions are recognized on scales of the community and the local government. Community data investigates emissions from residential, commercial, industrial, transportation, and waste sectors; whereas the governmental emissions quantify buildings, vehicle fleet, streetlights, water/sewage, and waste energy sources. The City of Rock Island's emissions inventory includes all known accessible data relating to the inventory for years as far back as 1999, and as recent as 2008. Data was collected from agencies such as MidAmerican Energy, Bi-State Regional Transportation Commission, the Illinois Environmental Protection Agency, the Illinois Department of Transportation, and the City of Rock Island's Department of Public Works, and Information Technology Services. U.S. Census and American Community Survey data was utilized to better understand the changing demographics (e.g. households, population, areas of employment, etc.) that can influence energy use in order to calculate emissions for years which data was unobtainable.

Emissions

The City of Rock Island's Emissions Inventory brings together available data from 1999 through 2008 to create a complex inventory. The report spotlights energy use from 2008 and 2005, and calculates a base level of emissions for the year of 1990 for the Rock Island Community. The methodology served to make a comprehensive inventory of municipal emissions from 2004 to 2008, and trend assessment (prior energy efficient system installations) identified historic emissions calculation.

Governmental Emissions

Municipal operations for the year of 2008 account for 2.2% of Rock Island's total emissions, similar to most municipalities which contribute 2-5% of the total city emissions. Municipal emissions are composed of energy use data from the Vehicle Fleet, Water and Wastewater Treatment Plants, Streetlights, and Buildings. The City of Rock Island achieved a 13.78% reduction in emissions of CO₂e from 2004 to 2008, with most reductions attributed to the Buildings, Streetlights and Water/Wastewater sectors. The purchase of a 24-vehicle hybrid fleet (to replace existing vehicles in the Public Works, Fire, Community and Economic Development, and Police Departments) helped to decrease the increasing rate of fuel consumption by more than 3% in the cars' first year of operation.



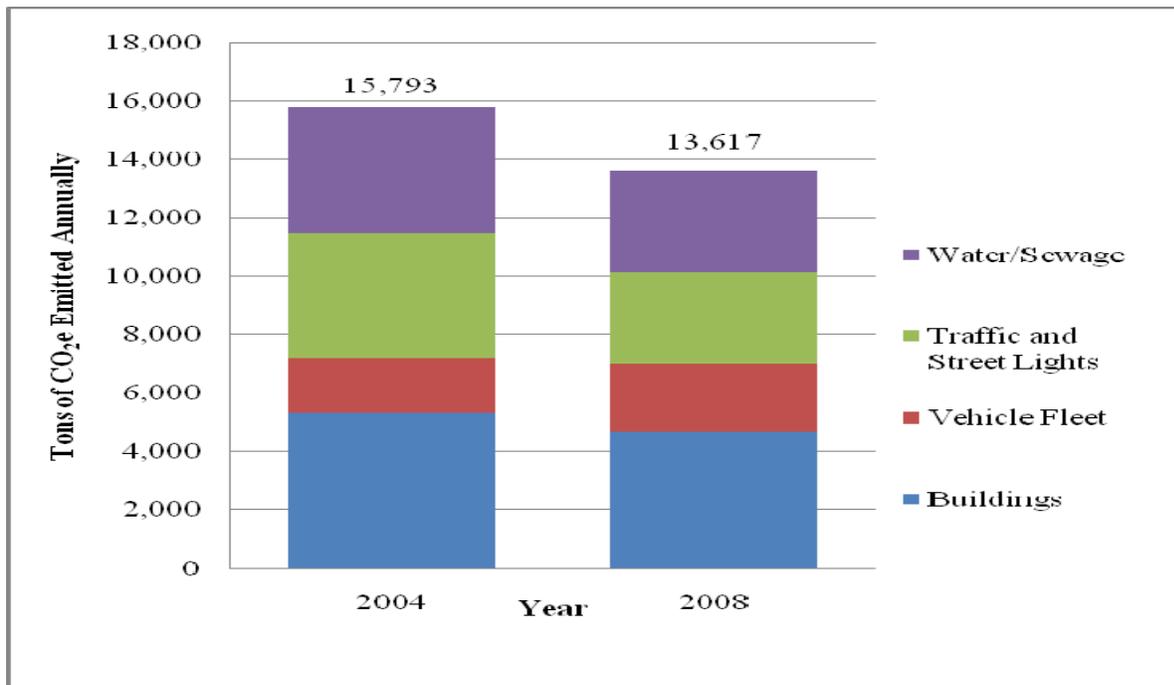
The category Streetlights (traffic signals and city owned street lights) dramatically increased in efficiency when they were switched to LED sources, most traffic signals reduced their annual production of CO₂e to

Rock Island municipal operations nearly tripled its emissions reduction goal when it reduced emissions by 20% from 1990 levels!

below one ton per year, from average annual levels of

6-11 tons. (Figure 2).

The City of Rock Island also reduced its municipal emissions with efficiency upgrades in its buildings through the use of more efficient lighting, and selective replacement of three inefficient air conditioning units. During the timetable of this inventory, Rock Island transferred the ownership of lighting of the Centennial Bridge to a non-profit trust and its two associated buildings to the State of Illinois. Reduction of water and wastewater emissions was made possible through upgrading some wastewater treatment plant pumps and installing low-flow plumbing in new projects.



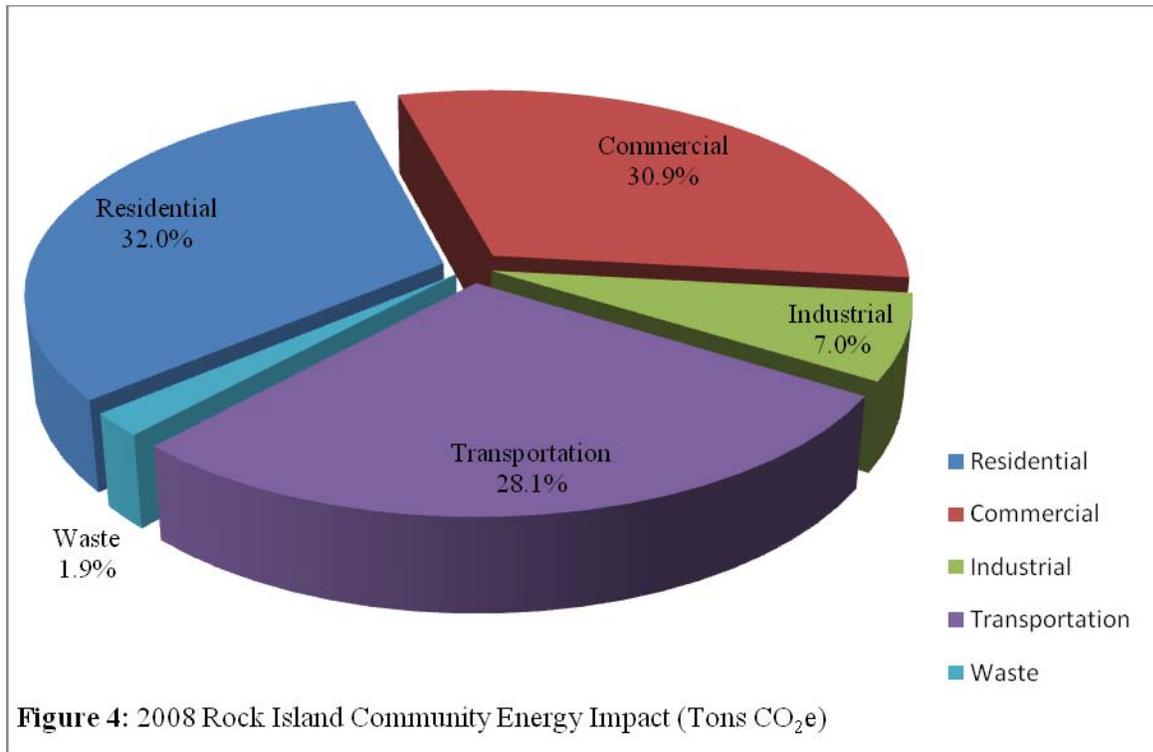
Municipal energy-derived emissions decreased overall from 2004 to 2008 due to various initiatives in sustainability and energy efficiency. Should the City continue to achieve the same annual rates of decreases in emissions, government emissions would be 8,942 tons of CO₂e annually in 2020, a 38.6% decrease from 2005 emissions. Although impactful, the City of Rock Island should focus emissions reduction methods for the community, as municipality emissions comprise a small fraction of overall emissions.

	1990	2004	2005	2006	2007	2008
Buildings	5,553	5,338	4,392	4,242	4,279	4,669
Vehicle Fleet	1,495	1,854 ⁺	1,890	1,920	2,282	2,318
Traffic Signals	5,475	4,258	3,947	4,095	3,693	3,144
Water/Sewage	4,599	4,343	4,326	3,592	4,092	3,487
Totals	17,121	15,793	14,554	13,849	14,345	13,617

Table 1: City Energy Use: Tons CO₂e Contributed from Municipal Operations

Community Emissions

The community of Rock Island contributed 97.8% of the total emissions for the city of Rock Island in the year 2008. Of these emissions, 42.6% are from electricity, 27.3% from natural gas consumption, 28.1% are from transportation emissions and 1.9% is from waste sources.

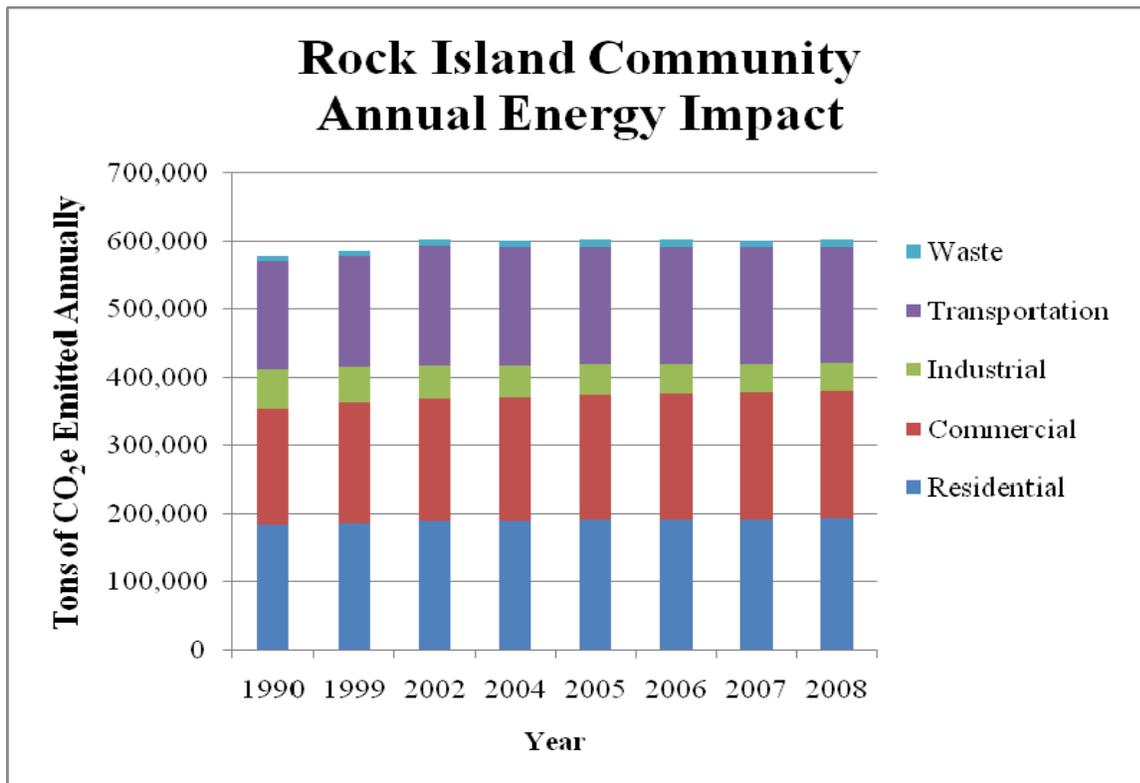


The residential, commercial and industrial sectors form the electrical-based and natural gas-based emissions. Residential emissions are generated half from general electrical consumption and half from natural gas. Within the commercial sector, nearly 2/3 (64.0%) of the emissions are electricity-derived, whereas 63,020 tons of CO₂e come from natural gas power. Industrial energy use, the only sector which decreased its consumption over the years surveyed, contributes 7.0% of the overall community CO₂e emissions, 80.8% of these from electricity, and 19.2% from natural gas.

The 2008 data is comprehensive with residential, commercial, industrial, transportation and waste energy consumption as the bases to calculate greenhouse gas emissions. Available local data was modeled in line with local, regional and national energy use trends to record a comprehensive annual inventory of community emissions for 1990, 1999, 2002, and 2004-2008. The year of 2004 is selected for a comparison study as municipal retrofits for more energy efficient buildings streetlights and water/wastewater facilities began following this year, in addition to 2004 being considered an average year for temperature. These characteristics make 2004 a strong year to evaluate current energy use against, and demonstrate energy use prior to the year of 2005, which nationally will be the base year for energy emissions to be capped below once the American Clean Air and Security Act of 2009 passes.

Rock Island community emissions have increased 4.25% since 1990.

The national average for emission increases for the same time period is 8-9%.



Community Energy Use emissions are represented in the below table, with data values in equivalent tons of carbon dioxide, or CO₂e. Values in blue typeface are modeled to local energy use trends, and the 1990 values are forecasted by ICLEI's CACP software using local growth trends.

	1990	1999	2002	2004	2005	2006	2007	2008
Residential	184,030	186,450	188,540	189,946	190,653	191,363	192,076	192,791
Commercial	171,272	176,924	180,364	181,016	183,097	184,147	185,202	186,264
Industrial	56,445	51,818	48,443	46,316	45,288	44,282	43,299	42,338
Transportation	153,101	183,259	190,259	189,022	179,104	171,586	170,544	169,652
Waste	6,118	8,437	9,176	9,979	10,443	10,894	10,111	11,665
Total	570,966	606,887	616,782	616,279	608,585	602,272	601,232	602,710

The emissions per capita (using a population of 38,442 from the 2006 American Community Survey) is 16.03 tons CO₂e annually. This level is above that of most major cities, as the City of Chicago has a rate of 12 tons per capita; but, it is between emissions levels of other cities less than 200,000 persons. In 2005, the Knoxville, Tennessee emitted 23.7 tons CO₂e per capita, and each citizen of Tacoma, Washington was responsible for 9.36 tons CO₂e. It is difficult to compare Rock Island's emissions to other small U.S. cities as many of these cities are still in the infancy of creating a greenhouse gas emissions inventory.

It is important to note that while the city of Rock Island's community emissions are increasing at a gradual level of less than a quarter of a percent a year, or 4.25% over 18 years, the population of Rock Island declined 5.38% during the same time period. These statistics have great weight on community per capita emissions, as 1990 per capita emissions were 14.05 tons CO₂e, and 2008 residents of Rock Island contribute 16 tons CO₂e to the city aggregate, a 14.09% per capita increase over the 18-year span.

¹ These values are based off of the International Panel on Climate Change's 2nd Assessment Report (1996). The IPCC has released two reports with altered global warming potentials for these gases, but the US EPA has not adopted the subsequent reports' data for emissions inventories.

* Emissions font in blue represents values which are calculated using demographic trends and available data.