

## Staff Report

**2013 CARBON FOOTPRINT UPDATE**

August 12, 2014

**BACKGROUND:**

The City Council has adopted a goal of reducing CO2 from City operations by 15% from their average 2001-2006 levels by the year 2014. City staff measures electrical and natural gas consumption in City facilities (excluding utilities), parks, streetlights, traffic signals, and other miscellaneous sites, and gasoline and diesel consumption versus miles in the CyRide Fleet and the non-CyRide Fleet of vehicles.

**BUILDING SECTOR:**

**The City has achieved its carbon reduction goal in the Building Sector in 2013.** Due to its renovation, the Library has been removed from the analysis and the baseline. The remaining facilities are evaluated on electrical and natural gas consumption. The analysis controls for square footage changes and degree days. The goal is that as facilities expand, their carbon intensity on a square footage basis is reduced. The degree day adjustment eliminates energy changes due to seasonal weather changes.

| Natural Gas Used - Therms, Adjusted for Degree Days and Bldg. Size |                |               |               |               |               |               |
|--|----------------|---------------|---------------|---------------|---------------|---------------|
| Building or Department   | BASELINE       | 2009          | 2010          | 2011          | 2012          | 2013          |
| Airport  |                |               |               |               |               |               |
| Animal Shelter   | 3,737          | 2,812         | 2,715         | 2,502         | 2,073         | 2,036         |
| Cemetery   | 1,810          | 1,615         | 1,417         | 1,639         | 1,319         | 1,616         |
| City Hall  | 2,708          | 1,843         | 1,694         | 1,704         | 3,058         | 3,133         |
| Cy-Ride  | 28,617         | 19,548        | 17,268        | 19,459        | 13,600        | 16,865        |
| Electric Administration  |                |               |               |               |               |               |
| Electric Distribution  |                |               |               |               |               |               |
| Fire Station 1   | 7,783          | 6,239         | 5,746         | 5,346         | 4,193         | 5,053         |
| Fire Station 2   | 2,688          | 2,552         | 2,318         | 2,188         | 1,890         | 2,427         |
| Fire Station 3   | 6,496          | 6,367         | 6,518         | 5,437         | 5,120         | 4,453         |
| Golf Course  | 1,375          | 1,741         | 1,352         | 1,465         | 1,332         | 1,187         |
| Ice Arena  | 25,749         | 25,912        | 23,021        | 24,232        | 23,591        | 20,578        |
| Information Services   | 674            | 198           | 674           | 579           | 438           | 475           |
| Maintenance Facility   | 19,017         | 14,064        | 13,748        | 13,789        | 9,633         | 12,066        |
| Parks Maintenance  | 1,577          | 1,762         | 1,726         | 1,729         | 1,187         | 1,494         |
| Parks Office   | 2,868          | 2,940         | 2,905         | 3,039         | 2,100         | 3,035         |
| <b>TOTAL BLDG. SECTOR</b>  | <b>105,100</b> | <b>87,594</b> | <b>81,103</b> | <b>83,108</b> | <b>69,534</b> | <b>74,419</b> |

(Note: Buildings/years shaded green have greater than a 15% decrease from baseline level. Darker shading on left side of the box. Buildings/years shaded red have greater than a 15% increase from baseline level. Darker shading on right side of the box.)

**Adjusted natural gas consumption is down 29.2% in 2013 (74,419 therms in 2013 vs. 105,100 therms baseline).** This is a substantial reduction in percentage. However, because natural gas is much less carbon-intensive than electricity, this decrease equates to only a small reduction in the City's overall carbon footprint.

| Electricity Used - kWh, Adjusted for Degree Days and Bldg. Size |                  |                  |                  |                  |                  |                  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|
| Building or Department  | BASELINE         | 2009             | 2010             | 2011             | 2012             | 2013             |
| Airport   | 24,675           | 15,794           | 12,055           | 14,177           | 17,566           | 14,135           |
| Animal Shelter  | 33,917           | 25,973           | 26,424           | 24,654           | 28,819           | 22,064           |
| Cemetery  | 11,116           | 11,776           | 12,706           | 11,410           | 11,464           | 8,864            |
| City Hall   | 2,110,237        | 2,049,903        | 1,914,982        | 1,834,057        | 1,544,035        | 1,525,725        |
| Cy-Ride   | 367,352          | 430,803          | 459,434          | 458,197          | 465,788          | 363,639          |
| Electric Administration   | 66,226           | 72,038           | 69,529           | 66,615           | 67,060           | 60,311           |
| Electric Distribution   | 342,743          | 330,585          | 330,245          | 386,941          | 342,714          | 339,004          |
| Fire Station 1  | 182,448          | 116,919          | 109,302          | 105,197          | 123,275          | 95,701           |
| Fire Station 2  | 57,932           | 51,788           | 52,388           | 46,075           | 56,427           | 48,880           |
| Fire Station 3  | 86,149           | 84,080           | 83,152           | 79,431           | 87,297           | 71,161           |
| Golf Course   | 21,516           | 21,010           | 20,888           | 22,580           | 24,540           | 19,714           |
| Ice Arena   | 1,116,920        | 1,062,293        | 949,514          | 1,033,111        | 1,203,354        | 926,117          |
| Information Services  | 29,670           | 23,946           | 19,143           | 18,977           | 21,312           | 16,906           |
| Maintenance Facility  | 177,556          | 190,787          | 175,299          | 153,000          | 175,494          | 148,063          |
| Parks Maintenance   | 14,972           | 20,019           | 17,785           | 21,591           | 25,262           | 23,055           |
| Parks Office  | 59,279           | 43,402           | 38,274           | 35,607           | 39,726           | 29,145           |
| <b>TOTAL BLDG. SECTOR</b>                                       | <b>4,702,707</b> | <b>4,551,116</b> | <b>4,291,120</b> | <b>4,311,621</b> | <b>4,234,132</b> | <b>3,712,486</b> |

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**Adjusted electrical consumption is down 21.9% in 2013 (3,712,486 kWh in 2013 vs. 4,702,707 kWh baseline).**

Because electrical consumption is much more carbon intensive than natural gas consumption, the changes in CO2 output closely mirror the electrical consumption in each building. **Combined and converted to tons of CO2, the Building Sector CO2 is down 21.9% in 2013 (3,504 tons in 2013 vs. 4,488 tons baseline).** This is the first year that the Building Sector has achieved a carbon reduction greater than 15%.

| CO2 Emissions - Tons, Adjusted for Degree Days and Bldg. Size |              |              |              |              |              |              |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| Building or Department  | BASELINE     | 2009         | 2010         | 2011         | 2012         | 2013         |
| Airport   | 20           | 13           | 10           | 12           | 14           | 12           |
| Animal Shelter  | 51           | 39           | 38           | 36           | 36           | 31           |
| Cemetery  | 20           | 20           | 19           | 19           | 18           | 17           |
| City Hall   | 1,747        | 1,692        | 1,581        | 1,514        | 1,285        | 1,270        |
| Cy-Ride   | 466          | 474          | 483          | 496          | 466          | 402          |
| Electric Administration                                       | 54           | 59           | 57           | 55           | 55           | 49           |
| Electric Distribution   | 281          | 271          | 271          | 317          | 281          | 278          |
| Fire Station 1  | 198          | 134          | 125          | 119          | 127          | 110          |
| Fire Station 2  | 64           | 58           | 57           | 51           | 58           | 55           |
| Fire Station 3  | 111          | 108          | 108          | 99           | 103          | 86           |
| Golf Course   | 26           | 28           | 25           | 28           | 28           | 24           |
| Ice Arena   | 1,073        | 1,031        | 921          | 997          | 1,133        | 887          |
| Information Services  | 24           | 21           | 20           | 19           | 20           | 17           |
| Maintenance Facility  | 263          | 243          | 229          | 211          | 203          | 196          |
| Parks Maintenance   | 22           | 27           | 25           | 28           | 28           | 28           |
| Parks Office  | 66           | 54           | 49           | 48           | 46           | 43           |
| <b>TOTAL BLDG. SECTOR</b>                                     | <b>4,488</b> | <b>4,273</b> | <b>4,020</b> | <b>4,049</b> | <b>3,902</b> | <b>3,504</b> |

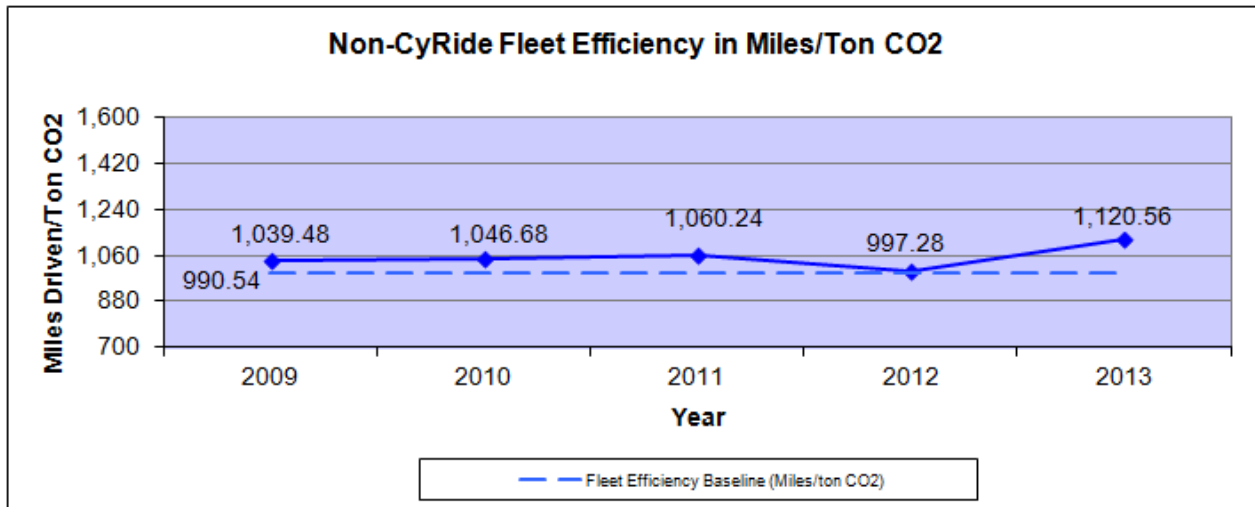
(Note: Buildings/years shaded green have greater than a 15% decrease from baseline level. Buildings/years shaded red have greater than a 15% increase from baseline level)

## FLEET SECTOR:

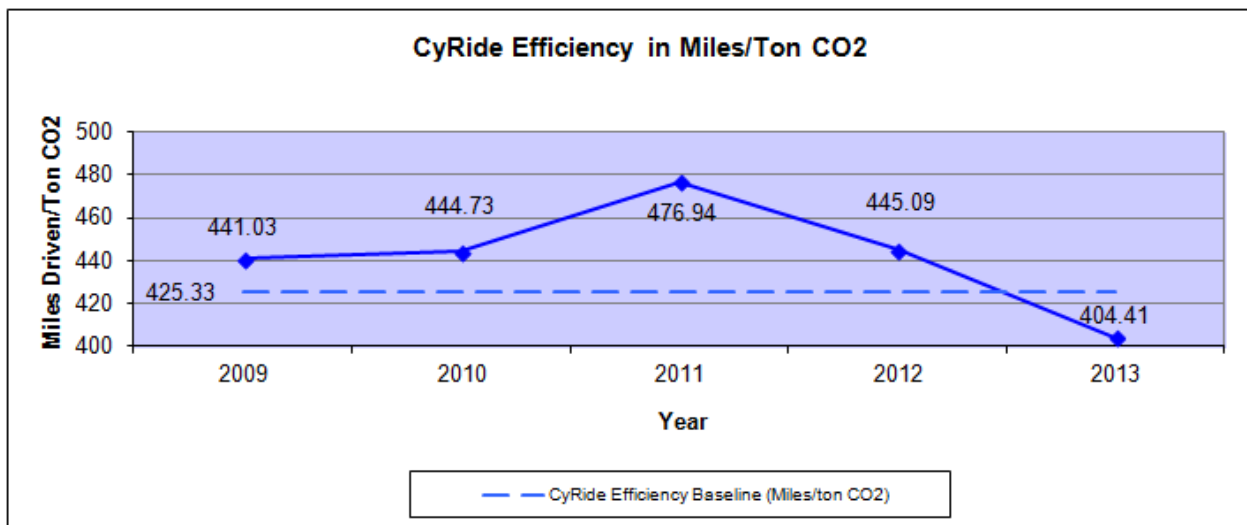
The Fleet Sector continues to see increased demand as the City grows. This sector is measured by totaling the CO2 from gasoline and diesel fuels (According to the U.S. Energy Information Administration, pure ethanol is considered by international convention to emit zero carbon dioxide at the tailpipe and thus does not count towards emissions. Therefore, ten gallons of E10 is measured as nine gallons of pure gasoline and one gallon of carbon-free fuel). The total CO2 is compared to the miles driven to determine a miles per ton of CO2 efficiency ratio. Instead of measuring the overall CO2 output in the Fleet Sector, the changes in efficiency are measured from year to year.

**Total non-CyRide Fleet emissions are down 11.7% this year to 1,481 tons of CO2 (compared to a baseline of 1,675 tons). Based on the number of miles driven, the non-CyRide Fleet is 13.1% more efficient than its baseline.**

It should be noted that discrepancies were found in the initial non-CyRide Fleet data this year, due to the mid-year transitioning of some vehicles from tracking by miles to tracking by hours. After thorough investigation, staff feels that the figures presented in this report are as accurate as possible. However, staff will look to the data from 2014 to confirm this trend of improved efficiency.



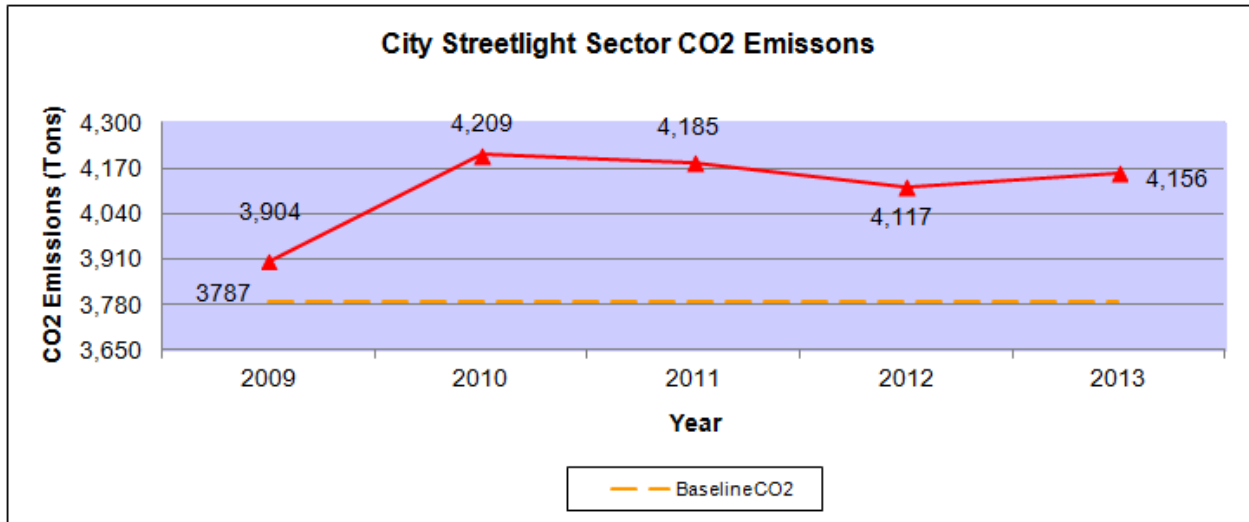
CyRide’s fuel consumption includes the use of gasoline for smaller buses and cars and diesel for full-size buses. Although diesel miles remain stable, diesel consumption increased by about 30,000 gallons, leading to a poorer diesel MPG this year. **Total CyRide emissions are up 25.8% this year to 3,502 tons of CO2 (compared to a baseline of 2,783).** This drops CyRide’s efficiency to 4.9% worse than its baseline. **However, it should be noted that CyRide’s ridership was 6,261,819 in 2013, or 50% greater than its baseline average.**



## STREETLIGHT SECTOR:

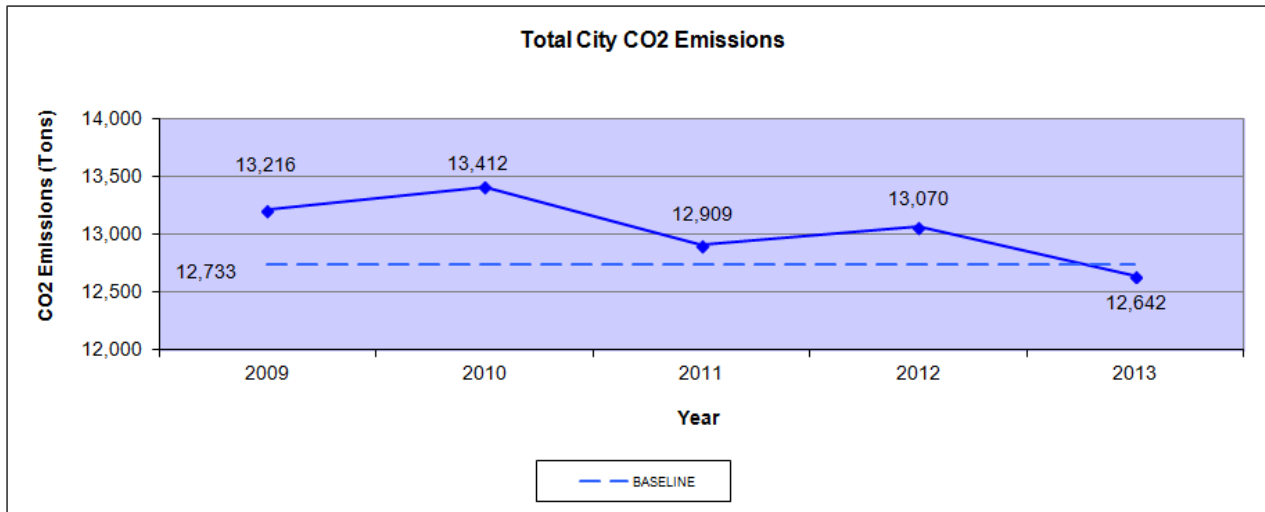
This sector contains the City’s miscellaneous energy consumers: sirens, bookmobile sites, parks, traffic signals, streetlights, and the aquatic center. As the City grows, this sector continues to contribute a greater amount to our carbon footprint. This sector experienced a bump up in CO2 emissions in 2010, attributable to the opening of the aquatic center. However, that increase has leveled off as the City’s streetlighting and

traffic signals have become more efficient. **The Streetlight Sector is up 369 tons of CO2, or 9.7% compared to the baseline.**



### TOTAL CITY EMISSIONS:

In total, the CO2 emissions attributed to City operations has declined 0.7% due to substantial reductions in the building sector and emissions remaining relatively flat in the fleet and streetlight sectors.



### NOTABLE PROJECTS IN 2013:

The City continues to improve its energy efficiency on a variety of fronts. In 2013, the Cemetery Garage received a new heating system after the older system failed, and two mini tank water heaters were installed. The Maintenance Facility, which used window air conditioning units and baseboard heaters in the office spaces, was replaced with a

ducted central air system. This project also has the benefit of greatly improving air quality in the offices.

For the past several years, City use of E85 fuel has declined significantly because the last generation of Crown Victoria Police vehicles was not able to accept that fuel and perform as needed. As the Police Department transitions to the newer Ford Police Interceptors, more E85 consumption is expected to occur, which will offset the use of higher-carbon fuel. These vehicles also have improved driving and idling fuel economy compared to the Crown Victorias.

The Electric Department has been working to identify standard LED street lighting fixtures that will be used in new installations. These fixtures have a longer life and are more energy efficient than mercury vapor and high-pressure sodium lamps. LED lighting is becoming more cost-effective for streetlight installations.

The Resource Recovery System, although not tracked in this analysis, has replaced its original 100 hp primary shredder with a 428 total hp hydraulic shear shredder. This new shredder is capable of shredding more diverse types of materials while using less than half the energy of the original shredder.

City staff has worked with a contractor to develop an energy management plan. This plan identifies steps that City employees and facility users can take to use existing building equipment in the most energy-efficient manner possible. The report was completed in 2014, and City staff hopes to begin implementation of the plan later this year.

## **NEXT STEPS:**

The current year (2014) is the last opportunity to meet the goal of reducing the City's carbon footprint by 15%. **As the final report out of the progress towards this goal draws near, the City Council may wish to consider whether a new goal should be set, or if no further reporting should be provided.**

The implementation of an energy management plan may help improve energy efficiency in city facilities. Additionally, the Energy Office of the Iowa Economic Development Authority is promoting a building benchmarking program for public facilities. This program would allow City facilities to be compared not only to their own progress over time, but also to other similar facilities throughout the state. This program is linked to the U.S. Department of Energy's Energy Star Program, which evaluates the energy efficiency of thousands of public facilities to identify those that are doing exceptionally well in their use of energy. Participating in a program such as this may be a valuable next step to assess the City's progress.