

## Staff Report

**2012 CARBON FOOTPRINT UPDATE**

July 23, 2013

**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), gasoline and diesel consumption versus miles in the CyRide Fleet and the non-CyRide Fleet of vehicles, and electrical and natural gas consumption of parks, streetlights, traffic signals, and other miscellaneous sites.

**BUILDING SECTOR:**

The City has almost achieved its carbon reduction goal in the Building Sector. Due to its renovation, the Library has been removed from our analysis and our baseline. The remaining facilities are evaluated on electrical and natural gas consumption. Their figures are then adjusted based on square footage changes and on 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.

<b>Natural Gas Used - Therms, Adjusted for Degree Days and Bldg. Size</b>						
<b>Building or Department</b>	<b>BASELINE</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
Airport						
Animal Shelter	3,737	3,168	2,812	2,715	2,502	2,073
Cemetery	1,810	1,703	1,615	1,417	1,639	1,319
City Hall	2,708	2,257	1,843	1,694	1,704	3,058
Cy-Ride	28,617	20,236	19,548	17,268	19,459	13,600
Electric Administration						
Electric Distribution						
Fire Station 1	7,783	6,715	6,239	5,746	5,346	4,193
Fire Station 2	2,688	2,680	2,552	2,318	2,188	1,890
Fire Station 3	6,496	7,499	6,367	6,518	5,437	5,120
Golf Course	1,375	1,731	1,741	1,352	1,465	1,332
Ice Arena	25,749	25,610	25,912	23,021	24,232	23,591
Information Services	674	-	198	674	579	438
Maintenance Facility	19,017	15,532	14,064	13,748	13,789	9,633
Parks Maintenance	1,577	1,892	1,762	1,726	1,729	1,187
Parks Office	2,868	3,105	2,940	2,905	3,039	2,100
<b>TOTAL BLDG. SECTOR</b>	<b>105,100</b>	<b>92,127</b>	<b>87,594</b>	<b>81,103</b>	<b>83,108</b>	<b>69,534</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)

**Adjusted natural gas consumption is down 33.8% in 2012 (69,534 therms in 2012 vs. 105,100 therms baseline).** This is a substantial reduction. 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. **On a cost basis, the City's 2012 natural gas bill was nearly half what it was in 2007 (\$60,000 savings).**

Electricity Used - kWh, Adjusted for Degree Days and Bldg. Size						
Building or Department	BASELINE	2008	2009	2010	2011	2012
Airport	24,675	18,631	15,794	12,055	14,177	17,566
Animal Shelter	33,917	25,501	25,973	26,424	24,654	28,819
Cemetery	11,116	12,068	11,776	12,706	11,410	11,464
City Hall	2,110,237	1,910,480	2,049,903	1,914,982	1,834,057	1,544,035
Cy-Ride	367,352	364,360	430,803	459,434	458,197	465,788
Electric Administration	66,226	70,453	72,038	69,529	66,615	67,060
Electric Distribution	342,743	321,072	330,585	330,245	386,941	342,714
Fire Station 1	182,448	104,048	116,919	109,302	105,197	123,275
Fire Station 2	57,932	48,331	51,788	52,388	46,075	56,427
Fire Station 3	86,149	89,620	84,080	83,152	79,431	87,297
Golf Course	21,516	20,068	21,010	20,888	22,580	24,540
Ice Arena	1,116,920	962,464	1,062,293	949,514	1,033,111	1,203,354
Information Services	29,670	22,445	23,946	19,143	18,977	21,312
Maintenance Facility	177,556	190,959	190,787	175,299	153,000	175,494
Parks Maintenance	14,972	14,770	20,019	17,785	21,591	25,262
Parks Office	59,279	44,817	43,402	38,274	35,607	39,726
<b>TOTAL BLDG. SECTOR</b>	<b>4,702,707</b>	<b>4,220,089</b>	<b>4,551,116</b>	<b>4,291,120</b>	<b>4,311,621</b>	<b>4,234,132</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)

**Adjusted electrical consumption is down 10.0% in 2012 (4,234,132 kWh in 2012 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 13.1% in 2012 (3,902 tons in 2012 vs. 4,488 tons baseline).**

CO2 Emissions - Tons, Adjusted for Degree Days and Bldg. Size						
Building or Department	BASELINE	2008	2009	2010	2011	2012
Airport	20	15	13	10	12	14
Animal Shelter	51	40	39	38	36	36
Cemetery	20	20	20	19	19	18
City Hall	1,747	1,581	1,692	1,581	1,514	1,285
Cy-Ride	466	424	474	483	496	466
Electric Administration	54	58	59	57	55	55
Electric Distribution	281	263	271	271	317	281
Fire Station 1	198	127	134	125	119	127
Fire Station 2	64	56	58	57	51	58
Fire Station 3	111	120	108	108	99	103
Golf Course	26	27	28	25	28	28
Ice Arena	1,073	947	1,031	921	997	1,133
Information Services	24	18	21	20	19	20
Maintenance Facility	263	253	243	229	211	203
Parks Maintenance	22	24	27	25	28	28
Parks Office	66	56	54	49	48	46
<b>TOTAL BLDG. SECTOR</b>	<b>4,488</b>	<b>4,030</b>	<b>4,273</b>	<b>4,020</b>	<b>4,049</b>	<b>3,902</b>

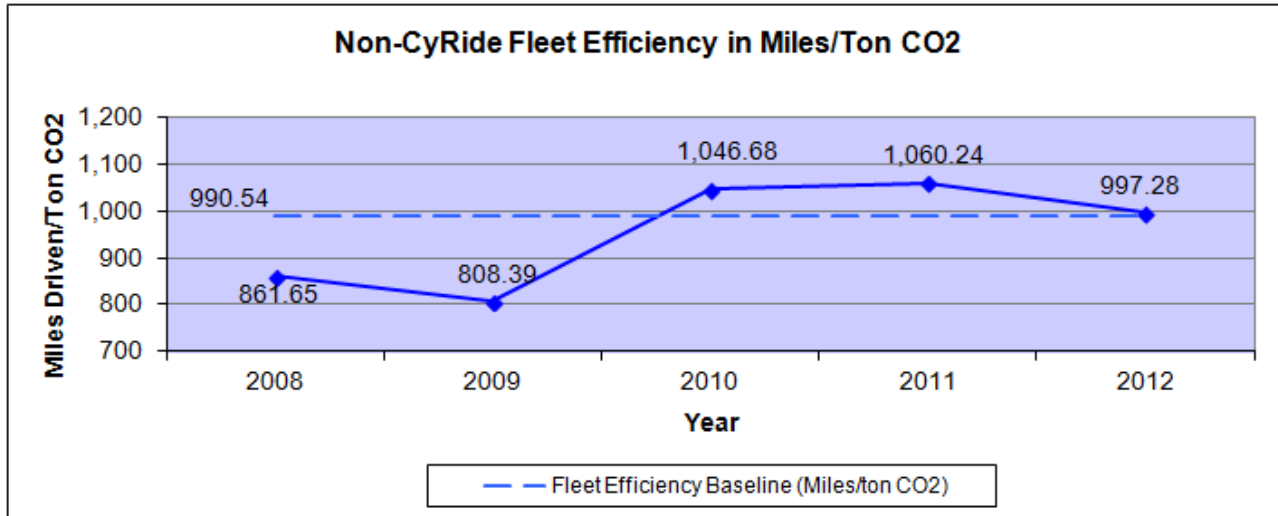
(Note: Buildings/years shaded green have greater than a 15% decrease from baseline level. Buildings/years shaded red have greater than a 15% increase from baseline level)

## FLEET SECTOR:

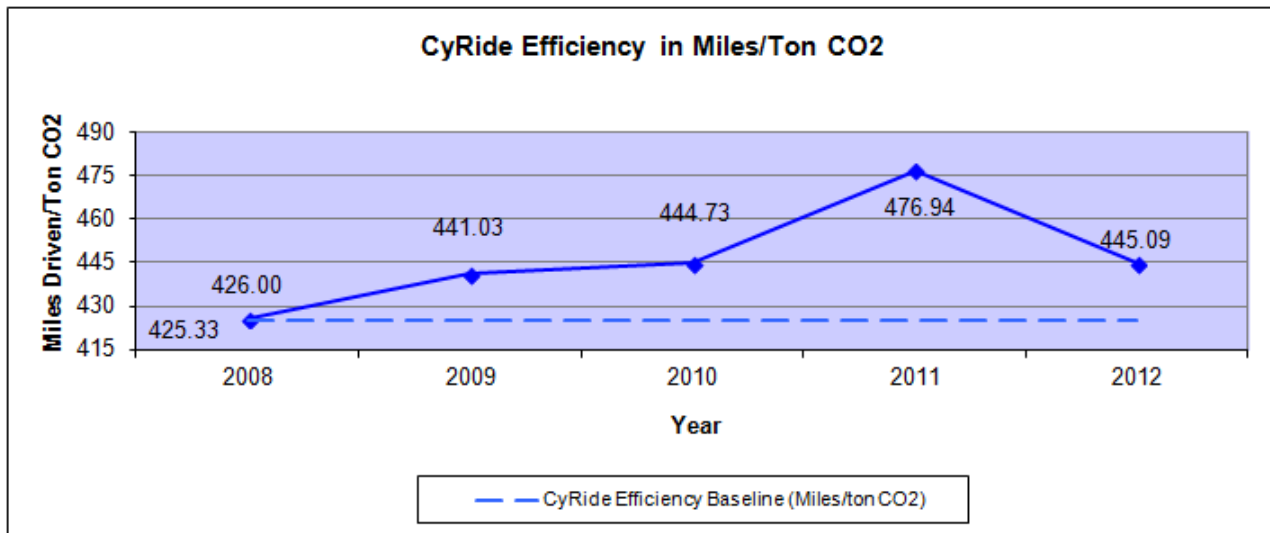
The Fleet Sector continues to see increased demand as the City grows. CyRide ridership records new highs each year, and the miles driven by both the CyRide and non-CyRide fleets in 2012 was the second-highest ever.

This sector is measured by considering CO2 from gasoline and diesel (pure ethanol is considered by international convention to be zero carbon at the tailpipe and thus does not count towards emissions). The CO2 is compared to the miles driven to determine a miles per ton of CO2 efficiency ratio. This efficiency is measured from year to year rather than the overall change in CO2 in the Fleet Sector.

**Total non-CyRide Fleet emissions are up 11.7% this year to 1,871 tons of CO2 (compared to a baseline of 1,675).** However, since the number of miles driven is also higher, **the non-CyRide Fleet is 0.7% more efficient than its baseline.** This is a reduction from the peak efficiency seen in 2011. The milder winter in 2012 helped reduce CO2 related to snow plowing. However, technical problems caused the police car fleet (which consumes considerable amounts of fuel) to be unable to use E85 fuel. The carbon output of the fleet was higher as those cars were on a more carbon-intensive fuel for the year. However, the newly ordered police cars should be able to use E85 in the future.

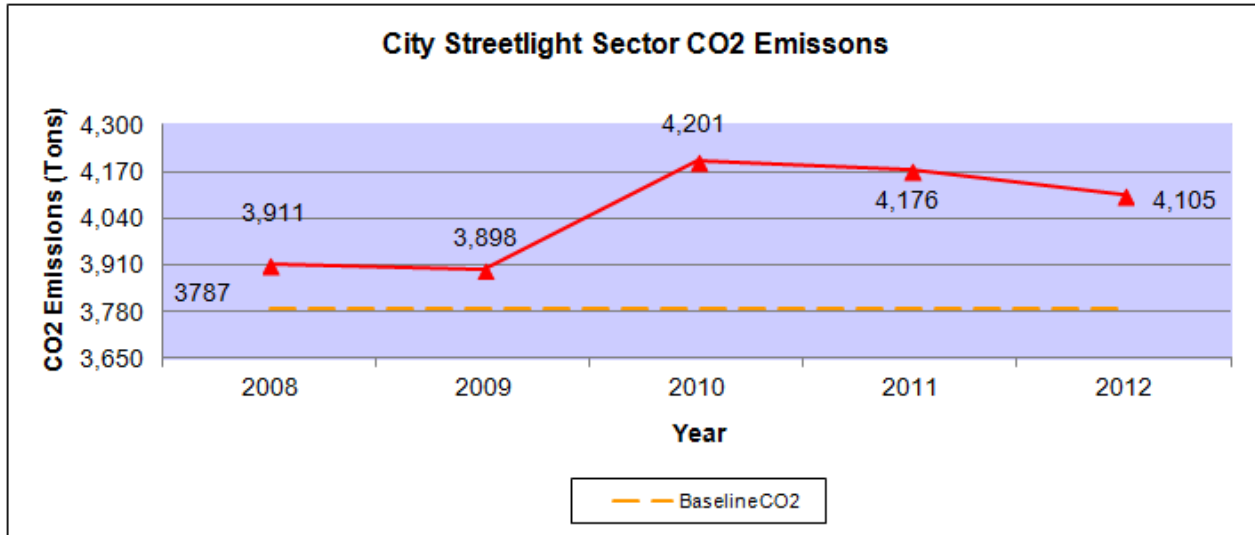


CyRide’s increase in gas-powered vehicle miles and fuel consumption leveled off in 2012. Although diesel miles remain stable, diesel use increased by about 25,000 gallons, leading to a poorer diesel MPG this year. **Total CyRide emissions are up 14.7% this year to 3,192 tons of CO2 (compared to a baseline of 2,783).** However, **CyRide’s efficiency is 4.7% better than its baseline.** It should also be noted that CyRide’s ridership was 5,802,131 in 2012, or 39% greater than its baseline average.



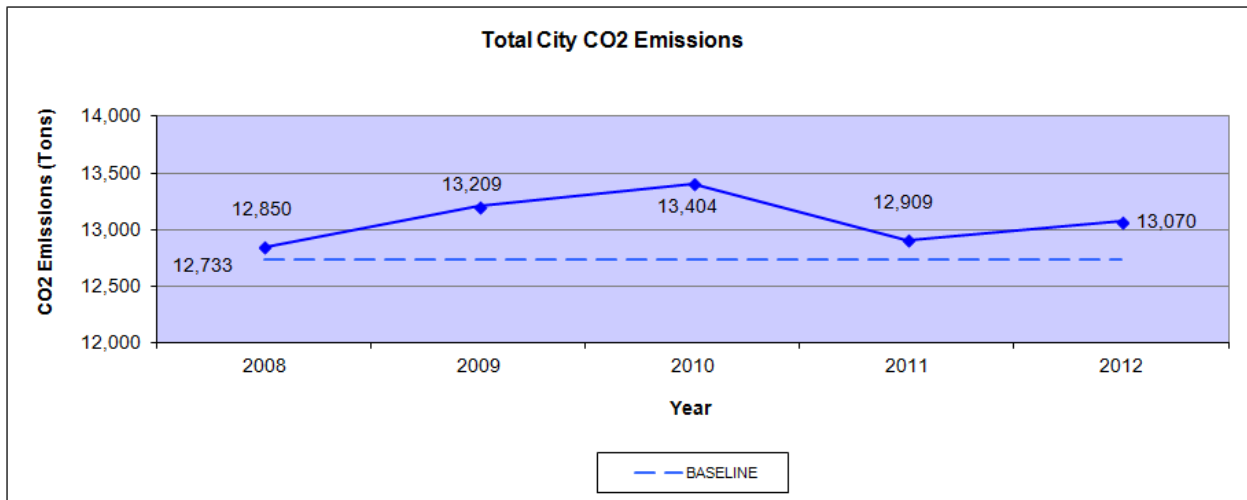
#### **STREETLIGHT SECTOR:**

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. While the larger bump seen in 2010 is attributable to the opening of the aquatic center, the steady growth in this sector can primarily be attributed to increased street lighting infrastructure as the City grows. **The Streetlight Sector is up 318 tons of CO2, or 8.4% compared to the baseline.**



#### TOTAL CITY EMISSIONS:

In total, the CO2 emissions attributed to City operations continue to increase, primarily due to increases in the streetlight sector.



#### NOTABLE PROJECTS IN 2012:

City staff has continued to work at reducing energy consumption and cost. In 2012, staff installed lower-consumption fluorescent lights in City Hall, the Parks Office, the Parks Maintenance building, and the Animal Shelter (the Parks Office and Maintenance projects were funded 50% through a state grant). The Resource Recovery System received new LED lighting throughout the building (funded 50% through a state grant).

The Animal Shelter received two new air conditioning units and a water heater. Fire Station 1 received two new on-demand water heaters to replace a failing standard water heater. The Electric Distribution facility had three of its four heat pumps replaced with energy efficient models (funded 50% through a state grant). In late 2012, the 20-year old

cooling units for the City Hall computer server room were replaced with new energy-efficient models.

An energy study of the Ames/ISU Ice Arena was completed in 2012, and the City Council has authorized a series of projects to improve the efficiency of this space. Most of these projects are scheduled for FY 2013/14.

Finally, in 2012 staff retained a consultant to develop an energy management plan. This plan will help the City transition from installing new energy-efficient equipment to using that equipment in the most efficient ways possible. The plan will develop energy conservation procedures for all City facilities, and address ways to best use the unique equipment in specialized facilities. The result will be an energy consumption reduction while maintaining the level of service the City's customers expect and deserve.

#### **NEXT STEPS:**

The current year (2013) and 2014 are the last opportunities the City has to meet the goal of reducing the City's carbon footprint 15% by 2014. The equipment and mindset being developed for City facilities has kept the facilities on track to meet that goal. However, there remains work to be done in the City's fleets and in the streetlight sector.

Even with new police cars capable of using E85, the efficiency of the fleet must be increased to reach a 15% improvement over our baseline. This can be done by choosing vehicles that are flex fuel capable, have better fuel economy, or improving the manner in which the vehicles are used.

The streetlight sector's carbon output increases as the City grows. The primary driver of CO<sub>2</sub> output and energy consumption is the streetlights. As the City gets larger, more streetlights are added. As less efficient mercury vapor lamps burn out, they are replaced by more efficient high pressure sodium lamps. Electric staff is also evaluating the feasibility of using standard LED fixtures in new street lighting installations. While these reduce energy consumption, a more aggressive plan to convert less efficient lights to LED lighting will likely be necessary to stem the energy increase in street lighting. However, the City Council might determine that the impact on the City's electric rates to accomplish this more aggressive replacement plan is prohibitive.