

# UTA

## Environmental Improvement Project Results

### Project #1: UTA Air Emission Reduction Project

#### Measurements:

- 1) Reduction of UTA’s bus fleet NOx and particulate matter (PM) emission rate through the acquisition of 24 new CNG buses in 2013 to replace older existing buses manufactured in 1997 and previous years.

UTA has developed a 6 year plan, beginning in 2009, to acquire new buses as replacements for older buses that will reduce Particulate Matter (PM) and Nitrogen Oxides (NOx) emissions.

#### Particulate Matter (PM)

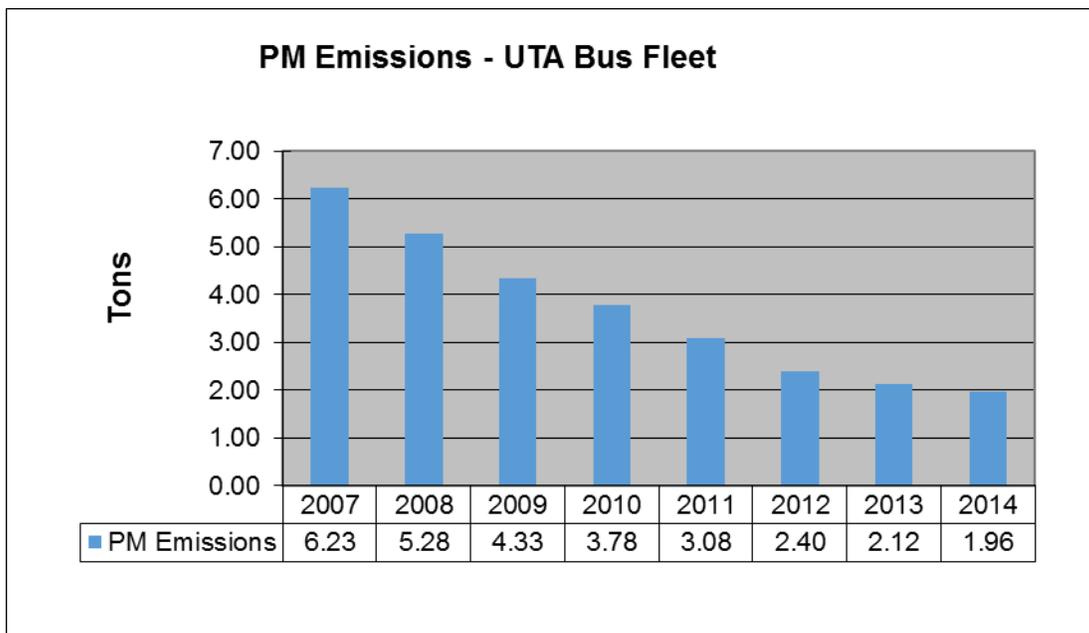
The following table lists the federal emission standards for particulate matter (PM) from heavy-duty diesel engine exhaust in urban buses.

Federal PM Emission Standard			
Model Year	g/bhp-hr	CF bhp-hr/mi	g/mi
1991 – 1992	0.25	4.68	1.17
1993	0.1	4.68	0.468
1994 – 1995	0.07	4.68	0.3276
1996 – 2006	0.05 <sub>(1)</sub>	4.68	0.234
2007 –	0.01	4.68	0.0468

UTA’s fixed route and express route bus fleet travels 17 million miles annually. Scheduling newer more efficient buses to accumulate more miles than older buses reduces the emissions of PM from UTA’s bus fleet. UTA has set a goal of a 10% reduction for the total pounds of PM emitted each year.

Model Year	2013		2014	
	Miles	PM (lbs)	Miles	PM (lbs)
1991 – 1992	0	0	0	0
1993	0	0	0	0
1994 – 1995	0	0	0	0
1996 – 2006	6,141,830	3,166	5,537,622	2,854
2007 –	10,376,913	1,070	10,352,648	1,067
CNG Bus	177,475	1	909,981	6
<b>Total</b>	<b>16,696,218</b>	<b>4,235</b>	<b>16,800,251</b>	<b>3,921</b>

Based on the annual miles and the age of UTA’s fleet in 2007, the estimated PM emissions were 6.23 tons. By acquiring new buses that meet the 2007 Federal PM standards to replace older buses, PM emissions were reduced to 2.12 tons in 2013 and 1.96 tons in 2014. UTA reduced its PM emissions from 2013 to 2014 by 7.5%.



Nitrogen Oxides (NO<sub>x</sub>)

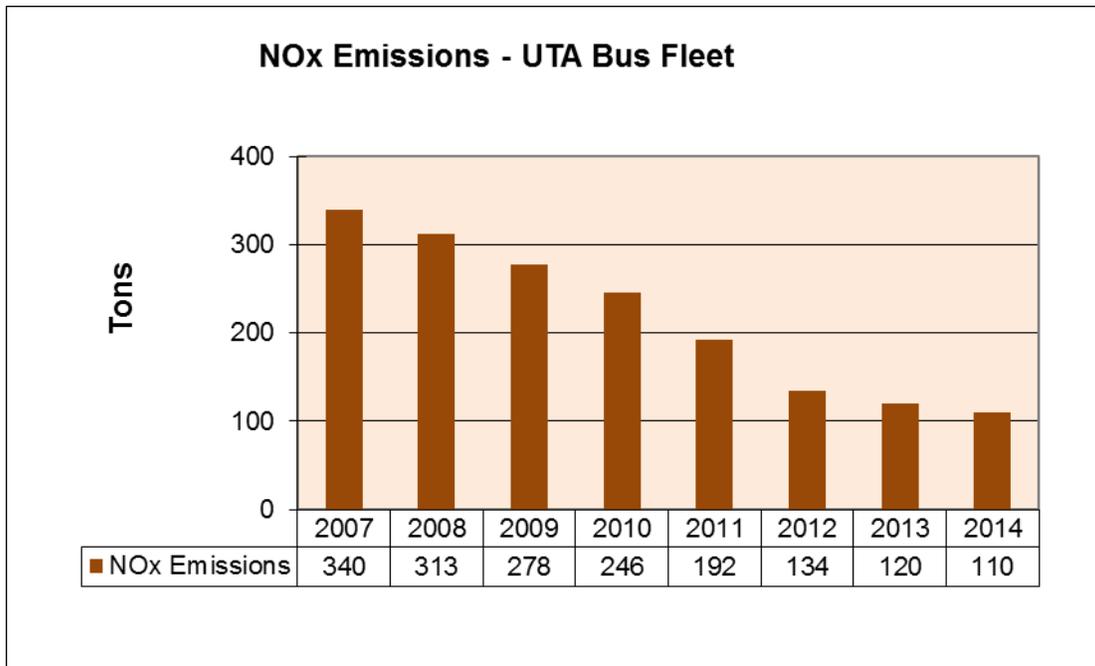
For NO<sub>x</sub> emission calculations EPA sites an 8% compliance margin from manufacturers based on historical certification data. Therefore, for a NO<sub>x</sub> standard of 5.0 g/bhp-hr, a level of 4.6 g/bhp-hr is used as the emission level. The following table illustrates the differing emission standards of NO<sub>x</sub> for diesel engine exhaust from urban buses.

Federal NO <sub>x</sub> Emission Standard			
Model Year	g/bhp-hr	CF bhp-hr/mi	g/mi (8% margin)
1991 – 1997	5.0	4.68	21.53
1998 – 2001	4.0	4.68	17.22
2002 – 2006	2.2	4.68	9.47
2007 – 2009	1.2	4.68	5.17
2010 –	0.2	4.68	0.86

Based on the annual miles and the age of UTA’s fleet in 2007, the estimated NO<sub>x</sub> emissions were 340 tons. By acquiring new buses that meet the 2010 Federal NO<sub>x</sub> standards to replace older buses, UTA estimates that NO<sub>x</sub> emissions by 2015 will be <100 tons. This will reduce NO<sub>x</sub> emissions from UTA’s bus fleet by over 70%.

Model Year	2013		2014	
	Miles	NO <sub>x</sub> tons	Miles	NO <sub>x</sub> tons
1992 – 1997	84,721	2	80,476	2
1998 – 2001	2,506,026	47	2,259,462	43
2002 – 2006	3,551,083	37	3,197,684	33
2007 - 2009	5,426,893	28	4,664,624	27
2010 –	5,426,893	5	5,688,024	5
CNG Bus	177,475	<0.1	909,981	<0.25
<b>Total</b>	<b>16,696,218</b>	<b>120</b>	<b>16,800,251</b>	<b>110</b>

UTA reduced its NOx emissions from 2013 to 2014 by 8.3%.



**Benefit to the environment for year:**

Air Pollutant	Particulate Matter	% Reduction	Nitrogen Oxides	% Reduction
2007	6.23 tons	–	340 tons	–
2008	5.28 tons	15.2 %	313 tons	7.9 %
2009	4.33 tons	18.0 %	278 tons	11.2 %
2010	3.78 tons	12.7 %	246 tons	11.5 %
2011	3.08 tons	18.5 %	192 tons	21.9 %
2012	2.40 tons	22.1 %	134 tons	30.2 %
2013	2.12 tons	13.4%	120 tons	10.4%
2014	1.96 tons	7.5%	110 tons	8.3%

**Benefit or savings for company:**

The acquisition of new buses as replacements for older models reduces UTA’s investment per rider because of the improved fuel efficiency of the newer buses. In 2013 UTA added 24 CNG buses, as a part of our bus replacement 6 year plan. UTA now operates a fleet of over 500 buses that has 32 hybrid-electric buses and 24 CNG buses. Today’s technology of hybrid-electric buses is 20% more fuel efficient than their diesel bus counterparts. CNG buses offer 10 times less particulate matter emissions and 4 times less NOx emissions per mile than the EPA mandated clean diesel buses.

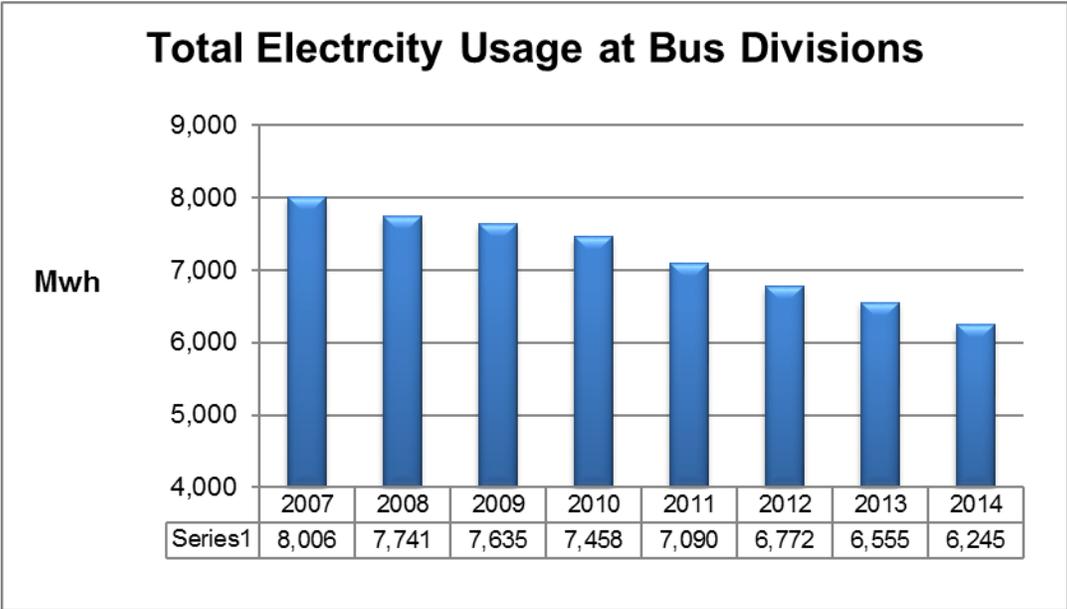
**Project #2: Energy Savings Program**

- 1) Monitor and measure the total consumption of electricity at UTA Bus facilities.

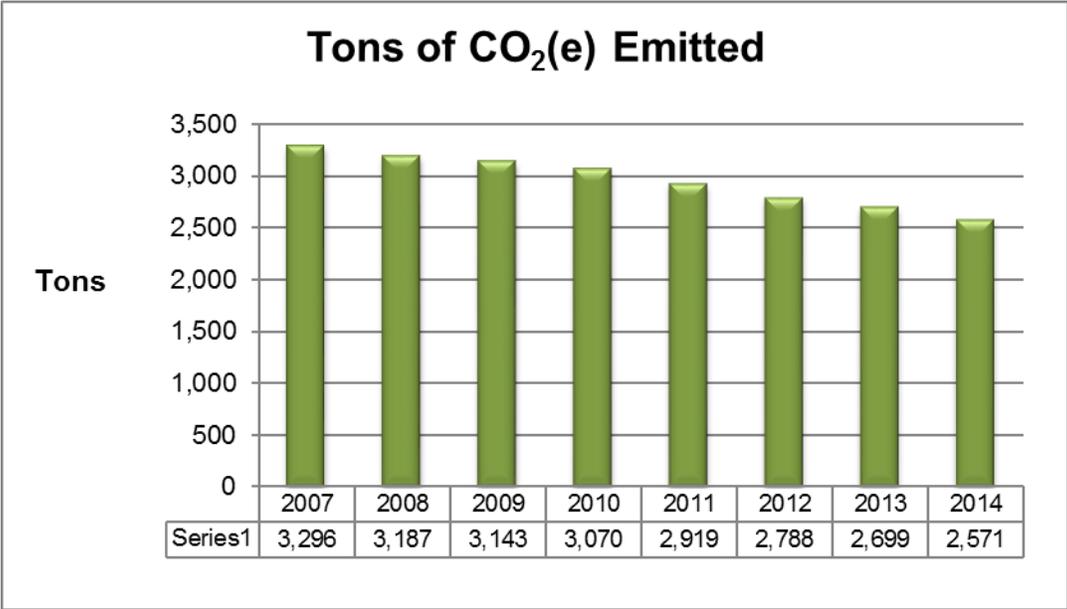
UTA identified Energy Management – Electrical Usage as one of its significant environmental aspects, using our Environmental Management System (EMS), ISO 14001. In 2006, UTA identified the

reduction of electrical energy usage as a Clean Utah project. UTA has been able to reduce electrical energy usage by 3% in each subsequent year of 2007 and 2008 at its transportation facilities. For 2009 UTA set a goal of an additional 3% reduction in electrical energy consumption.

For 2014 UTA achieved a reduction in electrical usage from 2013 of 4.7% at its bus maintenance facilities. The overall reduction from 2007, when the project began, through 2014 was a 22% reduction in electrical consumption. The following graph illustrates the reduction in electrical usage at UTA bus maintenance facilities.



The UTA is a Founding member of The Climate Registry. Annually, UTA calculates its total GHG emissions, both direct and indirect, for all of our facilities. Emissions associated with electricity consumption are indirect. Reduction in CO<sub>2</sub> emissions from electrical consumption from this project is illustrated in the graph below.



**Benefit to the environment for year:**

CO2 Emissions From Electrical Usage at UTA Bus Divisions		
Year	Total Annual Emission	Percent Reduction
2007	3,296 tons	–
2008	3,187 tons	3.3 %
2009	3,143 tons	1.4 %
2010	3,070 tons	2.3 %
2011	2,919 tons	4.9 %
2012	2,788 tons	4.5 %
2013	2,699 tons	3.2 %
2014	2,571 tons	4.7 %

1) “eGrid\_9<sup>th</sup>\_edition\_year\_2010\_data.xls”, United States Environmental Protection Agency, 2010.

**Benefit or savings for company:**

The average cost per kilowatt-hour for 2006 and 2007 was \$0.08.

Electrical Conservation: Year to Year Savings at UTA Bus Divisions		
Year	\$/kwh	Savings
2007	\$0.08/kwh	–
2008	\$0.08/kwh	\$21,200.00
2009	\$0.08/kwh	\$ 8,480.00
2010	\$0.08/kwh	\$14,160.00
2011	\$0.08/kwh	\$29,440.00
2012	\$0.08/kwh	\$25,440.00
2013	\$0.08/kwh	\$17,360.00
2014	\$0.08/kwh	\$24,800.00

**Project #1: UTA Air Emission Reduction Project**

UTA will continue monitor and report on the following parameters and monitor the progress towards the 2015 goal of reducing criteria air pollutant emissions of the bus fleet over the 2007 baseline:

- The number of new buses and the manufactured year of the bus replaced.
- The vehicle miles traveled for all buses within a manufactured year.

**Project #2: Energy Savings Program**

UTA’s objective is to decrease electrical energy usage in all areas possible. UTA will use the total kWh of electricity used by a facility as its target indicator.