

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 new buses to replace older existing buses manufactured in 1999 and previous years.

UTA 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)

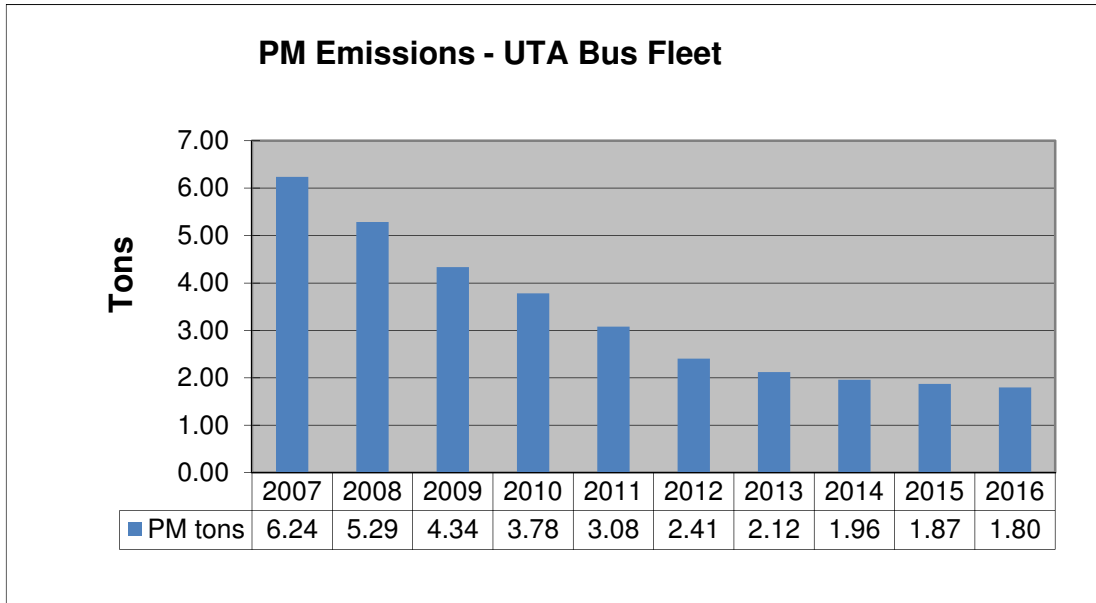
The following table lists the federal emission standards for particulate matter (PM) from heavy-duty diesel engine exhaust in urban buses.

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 ₍₁₎	4.68	0.234
2007 –	0.01	4.68	0.0468

UTA's fixed route and express route bus fleet travels more than 18 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 to reduce the emissions of its bus fleet to < 4,000 pounds of PM in a calendar year.

Model Year	2007		2016	
	Miles	PM (lbs)	Miles	PM (lbs)
1991 – 1992	775,445	2,000	0	0
1993	843,389	870	0	0
1994 – 1995	3,178,949	2,296	0	0
1996 – 2006	14,101,430	7,275	4,568,062	2,357
2007 –	285,752	29	12,055,628	1,244
CNG Bus			1,598,967	35
Total	19,184,965	12,470	18,222,657	3,600

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 1.80 tons in 2016. UTA has reduced the bus PM emissions from 2007 to 2016 by more than 71%.



Nitrogen Oxides (NO_x)

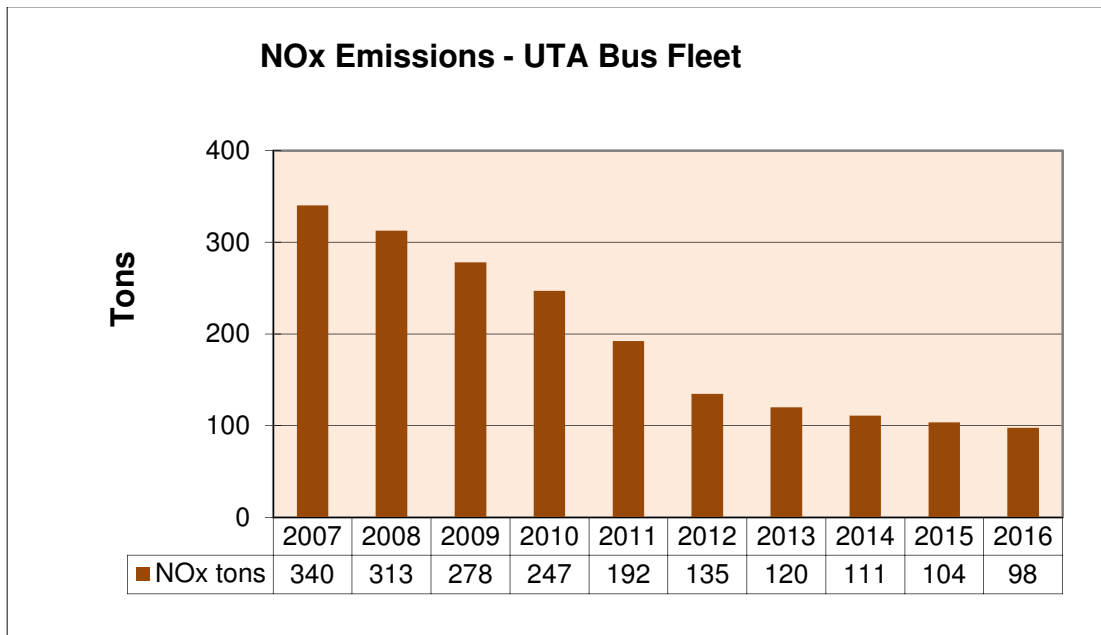
For NO_x emission calculations EPA sites an 8% compliance margin from manufacturers based on historical certification data. Therefore, for a NO_x standard of 5.0 g/bhp-hr, a level of 4.6 g/bhp-hr is used as the emission level. The following table illustrates the differing emission standards of NO_x for diesel engine exhaust from urban buses.

Federal NO _x 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_x emissions were 340 tons. By acquiring new buses that meet the 2010 Federal NO_x standards to replace older buses, NO_x emissions were reduced to 98 tons in 2016.

Model Year	2007		2016	
	Miles	NO _x tons	Miles	NO _x tons
1992 – 1997	5,920,736	140	80,108	2
1998 – 2001	7,406,780	140	1,562,224	30
2002 – 2006	5,571,697	58	2,925,730	31
2007 - 2009	285,752	2	4,807,508	27
2010 –			7,248,120	7
CNG Bus			1,598,967	1
Total	19,184,965	340	18,222,657	98

UTA has reduced the bus NOx emissions from 2007 to 2016 by more than 71%.



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%
2015	1.87 tons	4.6 %	103 tons	6.4 %
2016	1.80 tons	3.7 %	98 tons	4.9 %

Benefit or savings for company:

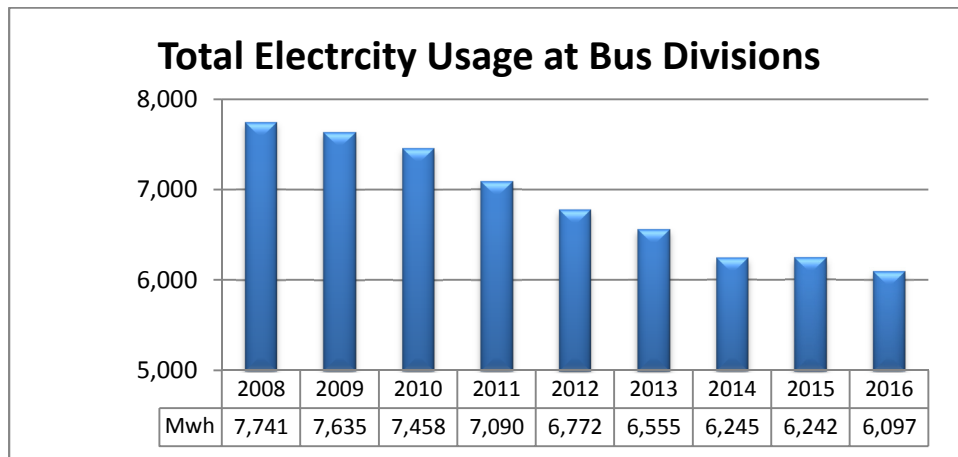
The acquisition of new buses as replacements for older models reduces UTA’s investment per rider because of the improved fuel efficiency of the newer buses. UTA operates a fleet of over 500 buses that has 32 hybrid-electric buses and 47 CNG buses. Today’s technology of hybrid-electric buses is 20% more fuel efficient than their diesel bus counterparts. CNG buses offer less particulate matter emissions and NOx emissions per mile than today’s EPA mandated clean diesel buses.

Project #2: Energy Savings Program

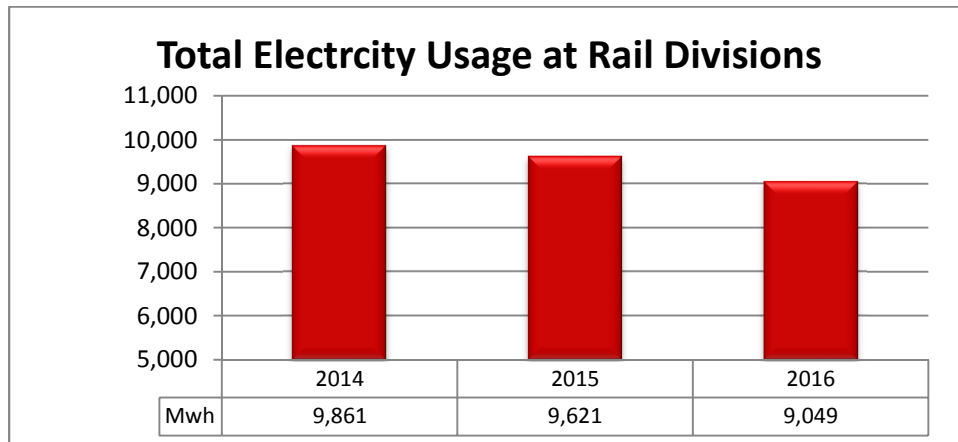
1) Monitor and measure the total consumption of electricity at UTA Bus and Rail facilities.

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.

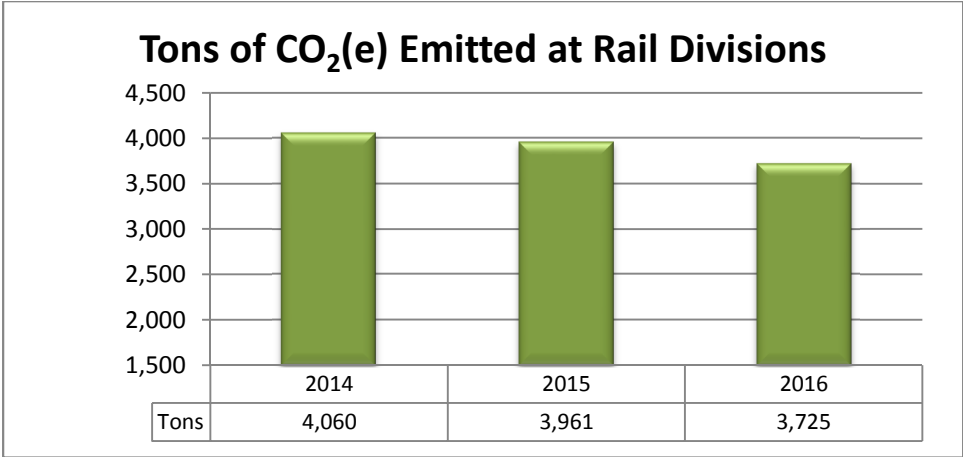
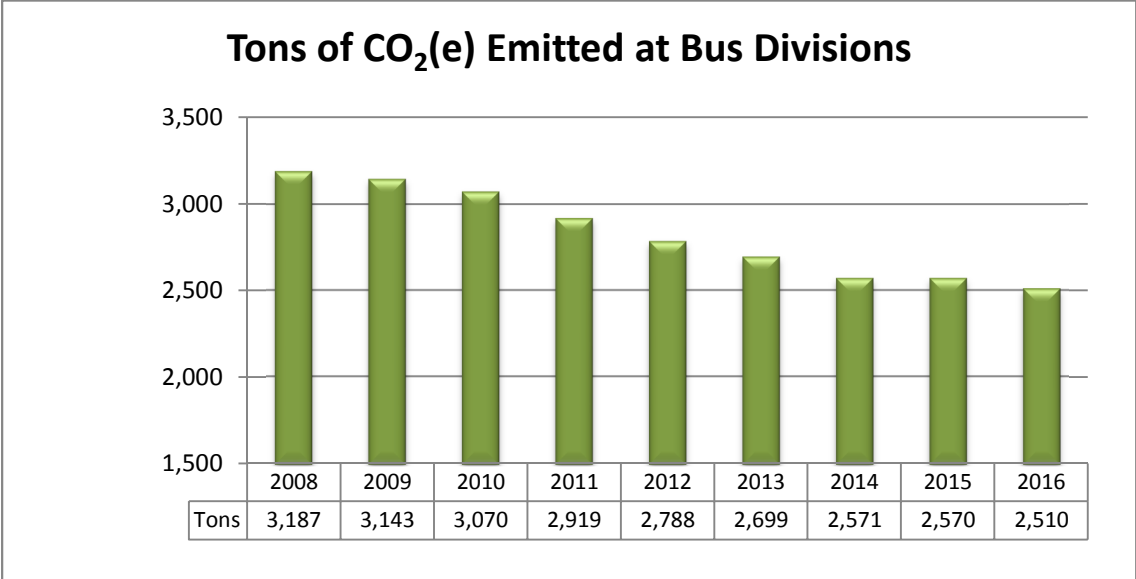
In 2015 UTA achieved a reduction in electrical usage from 2015 to 2016 of 2.3% at its bus maintenance facilities. The overall electricity consumption reduction from 2007, when the project began, through 2016 is more than 21%. The following graph illustrates the reduction in electrical usage at UTA bus maintenance facilities.



In 2013, UTA completed the expansion of the light rail system in Salt Lake County and the Frontrunner service to Utah County, enabling UTA to establish 2014 as a baseline. The overall electricity consumption reduction from 2014 through 2016 is more than 8%. The following graph illustrates the reduction in electrical usage at UTA rail maintenance facilities.



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 CO2 emissions from electricity consumption from this project is illustrated in the graphs below.



Benefit to the environment for year:

CO2 Emissions From Electrical Usage at UTA		
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*	6,631 tons	–
2015	6,531 tons	1.5%
2016	6,235 tons	4.5%

* New baseline with both bus and rail facilities.

** “eGrid2014_data.xls”, United States Environmental Protection Agency, 2014.

Benefit or savings for company:

The average cost per kilowatt-hour is approximately \$0.08.

Electrical Conservation: Year to Year Savings at UTA		
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	–
2015	\$0.08/kwh	\$19,440.00
2016	\$0.08/kwh	\$57,360.00

* New baseline with both bus and rail facilities.

Project #1: UTA Air Emission Reduction Project

In 2016, UTA was awarded a grant from UCAIR to promote UTA's upgraded ski service for the 2016 – 2017 season. By making changes in the ski service from the previous ski season, UTA will realize reductions in criteria air pollutants from:

- The addition of 5 new EPA "Clean Diesel" ski buses; and
- An additional increase (est. 5 – 10%) of ridership.

UTA will monitor and report on the following parameters and monitor the progress towards the 2017 goal of reducing criteria air pollutant emissions of the ski service compared to the previous 2015 – 2016 ski season:

- The number of new buses and the manufactured year of the buses replaced.
- The vehicle miles traveled for all ski buses within a manufactured year.
- The number of passengers and their miles traveled, displacing commuting vehicles.

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.