Environmental Savings Summary

Emissions (Pollution) Reduction

			KWh	Customers	kWh/Customer
Energy Efficiency Projects	662,828	annual kWh savings	5,638,900	5,270	1,070

Air Pollution	Saved this much Carbon Dioxide (CO_2) from being emitted:	398.0	Metric tons	or	877,453	pounds	or	439	tons
	Saved this much Nitrogen Oxides (NOX) from being emitted:	0.277	Metric tons	or	612	pounds	or	0.31	tons
	Saved this much Sulfur Dioxide (SO_2) from being emitted:	0.251	Metric tons	or	553	pounds	or	0.28	tons
	Saved this much Carbon Monoxide (CO) from being emitted:	0.193	Metric tons	or	425	pounds	or	0.21	tons
	Saved this much Total Suspended Particulants (TSP) from being emitted:	0.034	Metric tons	or	75	pounds			
	Saved this much Volatile Organic Compounds (VOC) from being emitted:	0.010	Metric tons	or	21	pounds			
	Total	**398.8**			**879,138.746**			**440**	
Toxic Metals Pollution	Saved this much Mercury (Hg) from being emitted:	5,230	mg.	or	0.012	pounds	or	0.18	ounces of Hg
	Saved this much Cadmium (Cd) from being emitted:	238	mg.	or	0.001	pounds	or	0.01	ounces of Cd
	Saved this much Lead (Pb) from being emitted:	7,740	mg.	or	0.017	pounds	or	0.27	ounces of Pb

These projects effectively planted 10,225 **trees or** 511 **acres of forest in Austin's parks.**

Or

These projects effectively removed 893,613 **Vehicle Miles or** 76.2 **cars from Austin's busy roadways.**

Or

These projects effectively provided electricity to 59 **average Austin residences for a year.**

1. Source of Emissions data: "Delta Emissions", a combined effort of Lauer, Muraya, and Breeze (rev.1/18/07). Revised: Muraya 2009
2. Average residence (homes and multi-family) consumption: 11,300 kWh for Austin, a combined effort of Muraya, and Glenn Moore (rev.12/20/07).
3. 23.2 lbs C/tree or = 0.039 metric ton CO_2 per urban tree 10 year survival rate. http://www.epa.gov/cleanenergy/energy-resources/refs.html#vehicles
4. 5.23 metric tons CO2Eq/vehicle/year at 11,720 miles/year. http://www.epa.gov/cleanenergy/energy-resources/refs.html#vehicles

Water conservation at generation power plant (evaporation only)	298,273	**Gallons**	
Water conservation if air conditioning and cooling tower exists	518,428	**Gallons costing**	$ 5,008

Source of water conservation data: Bill Hoffman City of Austin Water and Waste Water Utility (rev. 06/20/07).

Water Conservation - Bill Hoffman

kWh		662,828	12000	gal/kWh=>	0.45
Cooling tower					
ton-hour		188,519	3,413	kWh/gal=>	1.28
Gallons		518,428	-	gal/kWh=>	0.78
$0.0097/Gal	$	5,008	971	0.00966	

Pumping **2.5 kWh/1,000 gal?**

David Greene new water conservationist

	1982-2006 with attrition			
AE DSM	MWh	MW		
	29,300	0	0	
			Annual	
Power plant	MW	Reserve	Load Factor	MWh
constant full	500	0%	100%	4,380,000
Typical	500	10%	45%	1,773,900
Austin Energy	MW	MWh	EQFLH	
own	2,747			
renewable	225			
total	2,972	11,771,000	45%	
Homes	MWh	DSM eqv		
	9.965	2,940	498,250	0.28

Saved electricity (cumulative since 1982)
x = Annual output of a 500 megawatt power plant
x = Enough power for 50,000 homes

~~Rec = Metric ton= 1,000kg~~		kWh		Recs	Veh mile
Rec = 1,000 kWh = 0.5 Mt tons			662,828	663	893,613
				kWh/SF	7.84
Residential	0.093	$	61,643	Single Family	exist
All Customers	0.0834	$	55,280	SF	1,900
				kWh/yr	14,900
E01, A,B		Avg FY 2007		450 sf/ton	4.22
# Bills	336,160			500 sf/ton	tons
kWh	3,799,840,419		11,304	10/ 13 SEER	5.07
2006 - kW Revenue	$ 231,212,741	$	687.80	1350 EQFLH	6,840
338,000	1,150		3.40	ZEC 2015	
	16.60		4.879	Net kWh	
English Tons	439.52			Water heater	
Metric Tons	398.84			Net kWh	
RECs	662.83			SF at 3ton	
				kWh/yr	10,587
Biodiesel	3.23			914.285714	3.5
Ethanol	1.3			MF + SF	
Diesel/ICE	130%			kWh/yr	11,300
				SF	1,441
				450 sf/ton	3.20

Mary MCld 4-1-10	GB Rate	GB 3-Star
SF/ton	500	600

	SF	MF
	14,900	6,721
	173,000	136,000
Weight Avg	74%	26%

0.78

		Carbon Dioxide	Nitrogen Oxides	Sulfur Dioxide
CY 2008 Scale		0.66190	0.00046	0.00042
	lbs/kWh	1.32380	0.000923	0.000834
~~Year 2008~~	~~MWh~~	~~NOx Tons Re~~	~~SO2 Tons Red~~	~~CO Tons Redu~~
~~Factor~~		~~0.000451~~	~~0.000408~~	~~0.000313~~
~~tons/MWh~~		~~0.00045~~	~~0.00041~~	~~0.00031~~
~~tons/MWh~~	~~92,239~~	~~41.58960~~	~~38~~	~~29~~
~~lbs/kWh~~		~~0.00090~~	~~0.00082~~	~~0.00063~~
~~lbs/kWh~~	~~92,239,000~~	~~83,179~~	~~75,226~~	~~57,818~~
	~~10,000~~	~~9~~	~~8~~	~~6~~
~~kWh~~				
	3,220	3	3	2
	2,120	2	2	1
Solar only	1,676	2	1	1
3 yr value	1,800	2	1	1
REC	1,400	1	1	1
$3.00		-	-	-
$1,988	10,216	9	8	6

DSM eqv
Plants
0.01
0.02
participants
140.43915

Cars	Trees
76	10,225

7.51

New Const 2
2,262
16,992
tons
4.52
4.18
5,638

Hot Water

3600

0.2416107 3 trees (lifetime) = 1 ton of carbon sequestered

40 Tropical Trees = 1 ton of carbon sequestered per year

*Tropical Trees grow an average of 3 times as fast as a re

#? Regular Trees = 1 ton of carbon sequestered per year

(7,839)

9,153

-4200

4,953

Carbon sequestration value of trees: Fred old t e tr

When trees and vegetation reduce energy use, they also re

Urban trees can offset or even reverse the heat island effec

3200

-Leah

482-5342

tons

GB +site+climate	
1000	

1. 1,million MWH = 110,000 avge homs
2. 700 MW x 1400000 = 140,000 homes

91166.6667

Total

11,300

11,300

3,491,700,000

1433	1433
1500	1500
2680	2933
5613	

Carbon Monoxide	Suspended Particulates	NMOC / VOC	Total	
0.00032	0.00006	0.00002	0.66317	
0.000641	0.000113	0.000032	1.32635	All Generation
~~Particulate Mat~~	~~VOC Tons Rec~~	~~CO2 Tons~~	~~Total~~	~~Bob Breeze~~
~~0.000055~~	~~0.000016~~	~~0.646874~~		

~~0.00006~~	~~0.000016~~	~~0.65~~					
~~5~~	~~1~~	~~59,667~~					
			~~lbs/kWh~~		~~1,117.54~~	Tons/GWh	
~~0.00011~~	~~0.000031~~	~~1.2937~~	~~1.29623~~		~~1.11754~~	648.1169	
~~10,219~~	~~2,870~~	~~119,334,005~~	~~119,334,005~~				
~~1~~	~~0~~	~~12,937~~	~~12,962~~				

						kWh	lbs CO2
0	0	4,166	c		6	3,220	4,166
0	0	2,743	o		8	2,120	2,743
0	0	2,168	o2		16	1,676	2,168
0	0	2,329	c/C02		0.273	1,800	2,329
0	0	1,811				1,400	1,811
-	-	-	lbs CO2				
1	0	13,217	13,242	lbs CO2		10,216	13,242
			6.6211627	tons CO2			6.621163
			1.81	tons C			1.81

30 yr life so 30 trees per year.
0.874074074

egular tree. I'm not sure what they tells me about temperate trees and there ability to absorb carbon. I'll

was 3 trees for 1 ton of carbon sequestered but I think that is for a lifetime. I have also been to

duce CO2 emissions from power plants. In addition, vegetation removes atmospheric CO2 by sequestra

t by transpiring water and shading surfaces. According to previous studies (Akbari et al. 1992; Akbari &

Passenger Cars
April 2000

Hydrocarbons	grams
CO	grams
Nox	grams
CO2	lb
Gas	gal

Lite Truck
April 2000

Hydrocarbons	grams
CO	grams
Nox	grams
CO2	lb
Gas	gal

	Perf Meas	participants	MWh	kWh
Cooling	AEP	4,214	4,290	1,018
Duct Sealing		232	457	1,970
Attic				
Windows	HP Estar	1,381	3,610	2,614
Weatherstr	Free weath	720	789	1,096

% Cars	50%
April 2000	
Hydrocarbons	grams
CO	grams
Nox	grams
CO2	lb
Gas - gallons	gal

lbs CO2
tons CO2
tons C

GWH	
Power Factor	GWH
1.00	12,532
0.95	12,532
0.85	12,532

try and find out more about that.

ɔld (non-profit UHI tree planting group) that for fast growing tropical trees it is 40 trees for 1 ton of ca

ation. Trees sequester – or store – between 35 and 800 pounds annually depending on their size and growth ra

Taha, 1992; McPherson & Rowntree, 1993), a large number of trees and urban parks reduce local air tempera

		Total lbs	
	0.002204	12,500	April 08 cars revert to exceed
Per mi	lbs	Miles	
2.80	0.006171	77	
20.9	0.046064	576	
1.39	0.003064	38	
0.9160	0.9160	11,450	
0.0465	0.0465	581	

	0.002204	12,500
Per mi	lbs	Miles
3.51	0.007736	97
27.7	0.061051	763
0.81	0.001785	22.32
1.1500	1.1500	14,375
0.0581	0.0581	726

	0.002204	12,500	100,000
Per mi	lbs	Miles=lbs	Cars= tons
3.16	0.006954	87	4,346
24.30	0.053557	669	33,473
1.10	0.002424	30	1,515
1.03	1.0330	12,913	645,625
0.0523	0.0523	654	65,375,000

GvaH			661.9006974	
GvaH	Reduction	Delta	CO2 tons	Delta
12,532	-		8,294,940	
13,192	660		8,731,515	436,576
14,744	2,212	1,552	9,758,752	1,027,237

arbon per year (tropical trees tend to grow about 3 times as fast as regular trees). Maybe we need to be

ate. The U.S. Forest Service estimates that carbon storage by urban forests is between 400 and 900 million metr

ature by 1-9 degrees Fahrenheit. Each 1 degree drop in daily maximum temperature, lowers the peak electric de

planting more tropical trees? I have been unable to find anything for regular non-tropical trees

ic tons nationally. In Austin we plant over 5,000 (Neighborwoods, ACT, cycle pruning program, private p

mand by 2-4%. Cooling energy savings and smog reduction are other potential benefits. http://envstudie

but I still working on i

planting?) trees annually with an average sequestration rate of 1 ton per 40 trees with an estimated 125

es.brown.edu/classes/ES201/2003/Forestry/heatislands.htm

tons of CO2 sequestered each year.