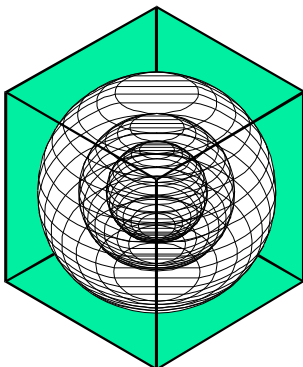


**NO_x EMISSIONS REDUCTION FROM
CONTINUOUS COMMISSIONING[®] MEASURES FOR THE
DALLAS-FORT WORTH INTERNATIONAL AIRPORT**



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**ENERGY SYSTEMS
LABORATORY**

**Texas Engineering Experiment Station
Texas A&M University System**

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NO_x EMISSIONS REDUCTION FROM CONTINUOUS COMMISSIONING[®] MEASURES FOR THE DALLAS-FORT WORTH INTERNATIONAL AIRPORT

Energy Systems Laboratory (ESL) engineers began implementation of Continuous Commissioning[®] (CC[®])¹ measures at the DFW Airport Administration Building in May 2007. The implementation was substantially completed by August 2007. Since then, the ESL has been monitoring the building performance and fine-tuning the CC[®] measures. The cumulative electricity, gas and chilled water savings total \$89,834 for the time period between the months of June 2007 through August 2008 (See Figure 1). This represents a 22.8% cost reduction compared with the weather normalized baselines.

For Terminal D, energy consumption baselines for the time period from October 2006 to September 2007 were developed using the daily chilled water and hot water usage and the monthly electricity bills. These weather-dependent models were used to predict what the energy usage would be had the CC[®] process not occurred. The differences between the predicted consumption model and the actual measured consumption are the energy savings. The cumulative electricity, gas and chilled water savings total \$521,619 for the time period of October 2007 through August 2008.²

Summary of NO_x Emissions Reductions

The start of the project on the DFW International Airport proceeded at several different times, one on May 2007 and the other on October 2007. In order to normalize the emissions reduction in a particular period, the total emissions were estimated on an annual basis. Total annual emissions reductions from the application of the CC[®] measures account for 4.22 tons NO_x/yr, with a daily average of 42.5 lb NO_x/day in the Ozone Season Period (OSD)³.

Table 1. Annual and OSD Emissions Reductions for the DFW International Airport due to CC[®] Measures.

ADMIN and TERMINAL D BUILDINGS	Annual Emissions Reduction			Ozone Day Season (on Daily basis)		
	Savings	Total NO _x Reductions (lbs)	Total NO _x Reductions (Tons)	Savings	Total NO _x Reductions (lbs/day)	Total NO _x Reductions (Tons/day)
TOT EQ ELECTRICITY (MWh) (Electricity and Chilled water)	4,761	7,278.7	3.6393	24.2	36.7	0.0184
HOT WATER (MCF)	8,358	1,170.2	0.5851	41.0	5.7	0.0029
Total		8,448.9	4.2244		42.5	0.0212

NOTES: 1) Assuming 7% for T&D losses and a Discount factor of 25%. Corresponding factors to integrated savings presented to the TCEQ.

2) A factor of 0.140 lb of NO_x/MCF of Natural Gas (Controlled - Low NO_x burners 140 A).

¹ Continuous Commissioning[®] and CC[®] are Registered Trademarks of the Texas Engineering Experiment Station. Contact the Energy Systems Laboratory, Texas A&M University, College Station, TX 77843-3581.

² Energy savings for each of these buildings can be found in the corresponding reports for the Administration Building and Terminal D of the DFW International Airport.

³ OSD includes the period from July through September and correspond to the peak day emission reduction.

Methodology

The methodology used to determine the annual emissions reduction is based on the weather-normalized estimation of the energy savings for the whole year and for the ozone season period. Once the savings are estimated, the corresponding energy savings are inserted into the 1999/2007 version of eGRID⁴ for Texas. Tables 2 and 3 present the distribution of the emissions reduction by PCA (Power Control Area) for the annual and ozone season periods, respectively. Measured energy savings (and the estimate of savings) first were increased by 7% to account for the average distribution and transmission losses of the electrical lines before the electricity reached the airport. Secondly, those savings were *discounted* by 25% as recommended by the TCEQ to account for the uncertainty in all the measurements and procedures.

Discount Factors

The persistence of savings is very important to accurately determine future-year savings. It is also important to the TCEQ, since the agency is accountable to the EPA for emissions credits from voluntary control measures that do not occur as projected in 2007.

The ESL has experience with monitoring and verifying energy efficiency projects in over 70 million square feet of facilities since 1989. Based on this and information from the International Performance Measurement and Verification Protocol (IPMVP) developed by the U.S. Department of Energy (DOE) [<http://www.ipmvp.org/>] and a national study by U.S. DOE personnel, the ESL estimates that large energy retrofit projects, which are monitored monthly and fully commissioned after the retrofits, perform at 75% of the original engineering estimates.⁵

Summary of Savings

The Dallas-Fort Worth International airport is located within the TXU Electric PCA. Its annual estimated equivalent electricity savings for the last 12 months were 4,971 MWh (44% coming from the saved chilled water). This included a discount factor of 25 %, an applied degradation factor of 0%, and 7% from Transmissions and Distribution (T&D) losses.^{6,7} The total annual estimated gas savings corresponded to 8,358 MCF.

The peak daily total electricity savings, corresponding to the ozone season period, are estimated by the average of the available data of the months of July, August and September, and the corresponding factors. Therefore, the combined peak daily electricity savings are 24.2 MWh/day. The peak daily gas savings, estimated in a similar way as above gives a daily average gas savings of 41 MCF/day.

⁴ eGRID, ver. 2, is the EPA's emissions and generation resource integrated database. This publicly available database can be found at www.epa.gov/airmarkets/egrid/

⁵ Claridge, D.E. et al. (1996) "Implementation of Continuous Commissioning in the Texas LoanSTAR Program," *ACEEE Summer Study on Energy Efficiency in Buildings*; and Kats, G.H. et al. (1996) "Energy Efficiency as a Commodity," *ACEEE Summer Study on Energy Efficiency in Buildings*.

⁶ Shearman, J.M. (1994) "Emerging Responses: How Utilities are Coping in the New Environment," *IEEE Power Engineering Review*, p. 13, November, and the file at <http://ist-socrates.berkeley.edu/~kammen/er100/lec16.pdf>.

⁷ Anderson, Steve. Interview by author. Telephone conversation. Texas A&M University, College Station, TX, 19 August 2004. September 2008

The NO_x reductions from gas savings occur wholly within the Dallas-Fort Worth area, the point of combustion, and comprise (assuming a controlled –Low NO_x burner’s boilers):

- Annual savings: $(0.140 \text{ lb-NO}_x/\text{MCF}) \times (8,358 \text{ MCF/Yr})$
=1,170.2lbs-NO_x/yr or 0.585 Tons-NO_x/yr;
- Peak-day savings are: $(0.140 \text{ lb-NO}_x/\text{MCF}) \times (41 \text{ MCF/Yr})$
=5.7 lbs-NO_x/day or 0.0029 Tons-NO_x/day

The annual total electricity and peak daily total electricity savings were entered into the eGrid spreadsheet for the TXU Electric PCA. Table 4 shows the corresponding eGrid columns for the calculation and output for annual electricity savings and Table 5 presents the eGrid results for the ozone season period.

Table 2. Annual NOx Emissions Reductions Calculations by Power Control Areas Based on Total Electricity Savings from the Application of Continuous Commissioning® Measures on DFW International Airport using the eGRID Database.

Area	County	American Electric Power - River (ERCOT) (PJCA)	NOx Reductions (lbs)	Austin Energy/PJCA	NOx Reductions (lbs)	Brownsville Public Utilities Board/PJCA	NOx Reductions (lbs/year)	Lower Colorado River Authority (LCRA)	NOx Reductions (lbs)	Reliant Energy/EP&S/PJCA	NOx Reductions (lbs)	San Antonio Electric Service/BJCA	NOx Reductions (lbs)	South Texas Electric Coop (INCPJCA)	NOx Reductions (lbs)	Texas Municipal Power Pool/PJCA	NOx Reductions (lbs)	Texas-New Mexico Power Co/PJCA	NOx Reductions (lbs)	TXU Electric/PC A	NOx Reductions (lbs)	Total NOx Reductions (lbs)	Total NOx Reductions (Tons)		
																								0	0
Houston-Galveston Area	Brazoria	0.0088113	0	0.016989725	0	0.006522761	0	0.00394222	0	0.0254543	0	0.0167277	0	0.0062262	0	0.0045711	0	0.0121725	0	0.0016387	38.8664446	38.8664446	0.01343422		
	Chambers	0.02178222	0	0.028965261	0	0.015027701	0	0.00976183	0	0.1649402	0	0.037472	0	0.0055523	0	0.011912	0	0.01581859	75.31359548	75.31359548	0.03765275	0.02178222			
	Fort Bend	0.07043123	0	0.082723728	0	0.052016606	0	0.029374182	0	0.121275	0	0.0038124	0	0.008728	0	0.0327918	0	0.019528	243.7448434	243.7448434	0.12187242	0.07043123			
	Galveston	0.03388274	0	0.0411710518	0	0.025004711	0	0.015351589	0	0.2495974	0	0.0967741	0	0.002143	0	0.0192927	0	0.057751	156.3390688	156.3390688	0.078165534	0.03388274			
	Haris	0.00628763	0	0.004558428	0	0.002418469	0	0.028471701	0	0.174117	0	0.117246	0	0.002229	0	0.0286133	0	0.0069237	236.2581234	236.2581234	0.118120923	0.00628763			
	Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Montgomery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazoria and Port Arthur Area	Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dallas-Fort Worth Area	Collin	0.00203914	0	0.003716345	0	0.001505892	0	0.005895983	0	0.0024815	0	0.0007171	0	0.0019180	0	0.0076809	0	0.000964	0.0040002	19.04527192	19.04527192	0.00952636	0.00203914		
	Dallas	0.00439347	0	0.004863963	0	0.003326202	0	0.00774211	0	0.0202656	0	0.000681	0	0.0070263	0	0.028717	0	0.007252	0.004037045	192.2069808	192.2069808	0.096103495	0.00439347		
	Denton	0.00047380	0	0.000872823	0	0.000349962	0	0.001369944	0	0.0035584	0	0.0001689	0	0.0045444	0	0.0181672	0	0.000167	0.0004941	0.04483762	0.04483762	0.00020204	0.00047380		
	Tarrant	0.01216249	0	0.012282639	0	0.005862543	0	0.020309352	0	0.0031166	0	0.001783	0	0.0171526	0	0.0021168	0	0.0025168	0.011064724	526.8004252	526.8004252	0.26340211	0.01216249		
	Texas	0.00327881	0	0.003307808	0	0.002422899	0	0.005476558	0	0.0014337	0	0.0004473	0	0.0046272	0	0.0162384	0	0.005556	0.002983762	142.0602881	142.0602881	0.071030145	0.00327881		
	Johnson	0.00029806	0	0.000292888	0	0.000211287	0	0.000932377	0	0.0003534	0	0.000102	0	0.0002743	0	0.0109787	0	0.000113	0.00051274	2.441218971	2.441218971	0.001220295	0.00029806		
	Kaufman	0.00032543	0	0.000378446	0	0.000196208	0	0.0007126	0	0.002776	0	0.000211	0	0.0001175	0	0.0010715	0	0.0004237	0.001377631	0.001377631	0.00068927	0.00032543			
	Rockwall	0.00021749	0	0.000440576	0	0.000160636	0	0.000641157	0	0.0002687	0	7.75E-05	0	0.0002085	0	0.0083471	0	0.0003884	1.866052117	1.866052117	0.00092026	0.00021749			
	Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Windsor	0.00081988	0	0.000828983	0	0.001388042	0	0.0003584	0	0.000118	0	0.001189	0	0.0043593	0	0.0013882	0	0.0042663	35.5124028	35.5124028	0.0177852	0.00081988			
	Hood	0.01252711	0	0.012634039	0	0.009251929	0	0.02917482	0	0.0054759	0	0.001805	0	0.017948	0	0.062022	0	0.012121	0.01398441	542.933028	542.933028	0.2712965	0.01252711		
Hunt	0.00618756	0	0.006240374	0	0.010331844	0	0.0027047	0	0.000862	0	0.000881	0	0.0007843	0	0.0306234	0	0.010482	0.00623078	268.0049708	268.0049708	0.134002485	0.00618756			
El Paso Area	El Paso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Brewer	0.03341375	0	0.051775843	0	0.024677545	0	0.009863423	0	0.0011418	0	1.143572	0	0.046874	0	0.004695	0	0.00052	0.00250387	11.92110427	11.92110427	0.00599552	0.03341375		
	Corral	0.02020047	0	0.076374745	0	0.014774534	0	0.133848731	0	0.0072371	0	0.003585	0	0.010082	0	0.018587	0	0.000462	0.00163516	8.737267859	8.737267859	0.04396864	0.02020047		
San Antonio Area	Wilson	0.00450233	0	0.017910148	0	0.003325174	0	0.30145468	0	0.00287843	0	0.008001	0	0.002939	0	0.0041765	0	0.000904	0.0041303	19.66467998	19.66467998	0.00983234	0.00450233		
	Guadalupe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Castroville	0.00245286	0	0.002870431	0	0.001815776	0	0.164501762	0	0.0152025	0	0.004396	0	0.001362	0	0.0022502	0	0.0004942	0.00223547	10.73833427	10.73833427	0.003691613	0.00245286		
Austin Area	Texas	0.00051001	0	0.298602906	0	0.003397863	0	0.00033476	0	0.0003347	0	0.0009096	0	0.0004717	0	0.0004717	0	0.0004717	2.225023524	2.225023524	0.001112512	0.00051001			
	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Comal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Blanco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
North East Texas Area	Garland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rusk	0.00089590	0	0.0009182	0	0.00050616	0	0.001145408	0	0.0002999	0	9.89E-05	0	0.000977	0	0.003962	0	0.001162	0.00024051	29.71155607	29.71155607	0.014855778	0.00089590		
	Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Upton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Corpus Christi Area	Nueces	0.22758375	0	0.00455851	0	0.168926952	0	0.00761267	0	0.0018609	0	0.001627	0	0.004672	0	0.0072464	0	0.001609	0.00028339	39.43781097	39.43781097	0.019718955	0.22758375		
	San Patricio	0.00013383	0	0.001007478	0	0.00159853	0	0.001801173	0	0.0003716	0	0.00038	0	0.00102	0	0.000496	0	0.000496	0.00183138	8.719390803	8.719390803	0.04396864	0.00013383		
Victoria Area	Victoria	0.0211874	0	0.022911536	0	0.001274603	0	0.0011998	0	0.0011998	0	0.0025489	0	0.0004477	0	0.0258181	0	0.0005269	0.001259181	10.2551891	10.2551891	0.002867757	0.0211874		
	Andrews	2.472E-05	0	2.4833E-05	0	1.82731E-05	0	4.13138E-05	0	1.82E-05	0	3.7E-06	0	3.52E-05	0	0.0012255	0	0.0002509	1.071668842	1.071668842	0.00055883	2.472E-05			
	Angelita	0.00031082	0	0.000313473	0	0.000229554	0	0.000519	0	0.0001359	0	4.48E-05	0	0.000443	0	0.0013389	0	0.000527	0.00127866	13.46270672	13.46270672	0.006731353	0.00031082		
	Brewer	0.000198304	0	0.001968942	0	0.000482272	0	0.001452078	0	0.0003758	0	0.000212	0	0.000570	0	0.0002924	0	0.0002924	5.01004845	5.01004845	0.002549332	0.000198304			
	Brewer	0.00189793	0	0.00573822	0	0.005718288	0	0.002366	0	0.000826	0	0.000826	0	0.0044581	0	0.000764	0	0.000764	0.003417688	16.5535871	16.5535871	0.00827934	0.00189793		
	Calhoun	0.00289981	0	0.001495986	0	0.01707496	0	0.002786524	0	0.0006108	0	0.000981	0	0.017004	0	0.0026334	0	0.000595	0.00010203	14.33196771	14.33196771	0.007169884	0.00289981		
	Commanche	0.00837143	0	0.006696768	0	0.001818151	0	0.0033023	0	0.0002489	0	0.0002489	0	0.0002489	0	0.00189793	0	0.000837							

Table 4. Annual NOx Emissions Reductions for DFW International Airport using the eGRID Database.

Area	TXU Electric/PCA	NOx Reductions (lbs)	Total NOx Reductions (Tons)
Houston-Galveston Area	0.00816387	38.86884486	0.019434422
	0.01581859	75.31359548	0.037656798
	0.05119528	243.7448434	0.121872422
	0.03283689	156.3390689	0.078169534
	0.04962237	236.2561234	0.118128062
	0	0	
	0	0	
	0	0	
	0	0	
	0	0	
Beaumont/ Port Arthur Area	0	0	0
	0	0	0
Dallas/ Fort Worth Area	0.0040002	19.04527192	0.009522636
0.04037045	192.2069908	0.096103495	
0.00084941	4.044087624	0.002022044	
0.11064724	526.8004292	0.263400215	
0.02983782	142.0602891	0.071030145	
0.00051274	2.441218971	0.001220609	
0.05754527	273.9776531	0.136988827	
0.00038984	1.856052117	0.000928026	
	0	0	
	0	0	
0.00745892	35.51254053	0.01775627	
0.11396431	542.5933028	0.271296651	
0.05629078	268.0049709	0.134002485	
El Paso Area	0	0	0
	0	0	0
San Antonio Area	0.00250387	11.92110427	0.005960552
	0	0	0
0.00183516	8.737367859	0.004368684	
	0	0	0
	0	0	0
Austin Area	0.00413003	19.66467996	0.00983234
	0	0	0
0.00225544	10.73833427	0.005369167	
0.00046734	2.225023329	0.001112512	
	0	0	0
	0	0	0
North East Texas Area	0	0	0
	0	0	0
0.00624051	29.71155607	0.014855778	
	0	0	0
	0	0	0
Corpus Christi Area	0.00828339	39.43791097	0.019718955
0.00183138	8.719359063	0.004359688	
Victoria Area	0.00225485	10.73551891	0.005367759
0.00022509	1.071666842	0.000535833	
0.00282766	13.46270672	0.006731353	
0.00106721	5.081064845	0.002540532	
0.00347685	16.5535871	0.008276794	
0.00301023	14.33196771	0.007165984	
0.00176071	8.382876903	0.004191438	
0.03187642	151.7662167	0.075883108	
	0	0	0
4.7275E-05	0.225081193	0.000112541	
	0	0	0
0.03216616	153.1456977	0.076572849	
0.06419422	305.6338713	0.152816936	
	0	0	0
0.03345281	159.2715256	0.079635783	
0.00086883	4.222253291	0.002111127	
	0	0	0
	0	0	0
	0	0	0
0.00686231	32.67201527	0.016338008	
0.00505009	24.0439035	0.012021952	
0.0192997	91.8874186	0.045843709	
0.00148214	7.056599297	0.0035283	
0.00865017	41.18413987	0.02059207	
0.00052318	2.49089779	0.001245449	
0.00113586	5.407927441	0.002703964	
0.22319886	1062.667792	0.531333896	
0.02042738	97.25640452	0.048628202	
0.1359442	647.2413294	0.323620665	
0.00513689	24.45714293	0.012228571	
0.00574838	27.3684779	0.013684239	
0.0003727	1.774454632	0.000887227	
	0	0	0
	0	0	0
0.00339774	16.1769021	0.008088451	
	0	0	0
0.05182285	246.7327891	0.123366395	
5.396E-05	0.256909876	0.000128455	
0.00028353	1.349914853	0.000674957	
0.16884373	803.8786278	0.401939314	
0.00072851	3.468504903	0.001734252	
0.00010492	0.499523507	0.000249762	
0.00188893	8.99332647	0.004496663	
0.00104164	4.95932602	0.002479663	
0.02576141	122.6521584	0.061326079	
0.05673017	270.0969258	0.135048463	
1.52878695	7278.678066	3.639339033	
Energy Savings by PCA (MWh)	4761.08072		

Table 5. Peak-Day NOx Emissions Reductions for DFW International Airport using the eGRID Database.

Area	TXU Electric/PCA	NOx Reductions (lbs)	Total NOx Reductions (Tons)
Houston-Galveston Area	0.008772	0.212184094	0.000106092
	0.015905	0.384742989	0.000192371
	0.040484	0.979300337	0.00048965
	0.028709	0.694474036	0.000347237
	0.056232	1.360239485	0.00068012
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
Beaumont/ Port Arthur Area	0	0	0
	0	0	0
Dallas/ Fort Worth Area	0.004013	0.097078426	4.85302E-05
0.044002	1.064401139	0.000532201	
0.00114	0.02756571	1.37829E-05	
0.141667	3.426890902	0.001713445	
0.031867	0.770845549	0.000385423	
0.000604	0.014619555	7.30879E-06	
0.059067	1.428821412	0.000714411	
0.000853	0.0206367	1.03184E-05	
	0	0	0
0.008645	0.209120495	0.00010456	
0.112152	2.712923623	0.001356462	
0.05778	1.397673265	0.000698837	
El Paso Area	0	0	0
	0	0	0
San Antonio Area	0.002333	0.056424747	2.82124E-05
	0	0	0
0.001842	0.044550669	2.22753E-05	
	0	0	0
	0	0	0
Austin Area	0.0041	0.099182513	4.95913E-05
	0	0	0
0.002265	0.054797141	2.73986E-05	
0.000465	0.011251577	5.62579E-06	
	0	0	0
	0	0	0
North East Texas Area	0	0	0
	0	0	0
	0	0	0
	0	0	0
Corpus Christi Area	0.008136	0.196812218	9.84061E-05
0.002014	0.048718566	2.43593E-05	
Victoria Area	0.002128	0.051466931	2.57335E-05
0.000233	0.005645229	2.82261E-06	
0.002925	0.070748428	3.53742E-05	
0.001684	0.040733561	2.03668E-05	
0.003431	0.082985591	4.14928E-05	
0.003222	0.077946033	3.8973E-05	
0.00199	0.048138674	2.40693E-05	
0.031959	0.773083934	0.000386542	
	0	0	0
4.93E-05	0.001193158	5.96579E-07	
	0	0	0
0.033017	0.798670437	0.000399335	
0.0694	1.678762159	0.000839381	
	0	0	0
0.034338	0.830617254	0.000415309	
0.001525	0.036877389	1.84387E-05	
0.000994	0.024039181	1.20196E-05	
	0	0	0
	0	0	0
0.008726	0.211087216	0.000105544	
0.005323	0.128755264	6.43776E-05	
0.01981	0.479202262	0.000239601	
0.001547	0.037421145	1.87106E-05	
0.009825	0.237664874	0.000118832	
	0	0	0
	0	0	0
0.001141	0.027593484	1.37967E-05	
0.209526	5.068376191	0.002534188	
0.015033	0.363654102	0.000181827	
0.154305	3.732606027	0.001866303	
0.005488	0.132758675	6.63793E-05	
0.005512	0.133323143	6.66816E-05	
0.000384	0.009300299	4.65015E-06	
	0	0	0
	0	0	0
0.001655	0.040026019	2.0013E-05	
	0	0	0
	0	0	0
	0	0	0
0.000293	0.007094414	3.54721E-06	
0.180198	4.358946305	0.002179473	
0.000516	0.012485459	6.24273E-06	
0.000112	0.002714656	1.35733E-06	
0.002	0.048379528	2.41896E-05	
	0	0	0
0.026441	0.639589336	0.000319795	
0.050005	1.208617296	0.000604809	
1.517783	36.7147588	0.018357379	
Energy Savings by PCA (MWh)	24.18973		