

Sample

Annual Energy Consumption Report

and

Monthly Energy Consumption Report

for

Zachry Engineering Center

Energy Systems Laboratory Technical Report

ESL-TR-93/05-01

Zachry Engineering Center

Texas A&M University

324,400 square feet

Site Contact

Mr. Charles Darnell, Jr.
Physical Plant Administration
Texas A&M University
(409)-845-5318
Gene Stewart
(409)-845-5511

LoanSTAR Metering Contact

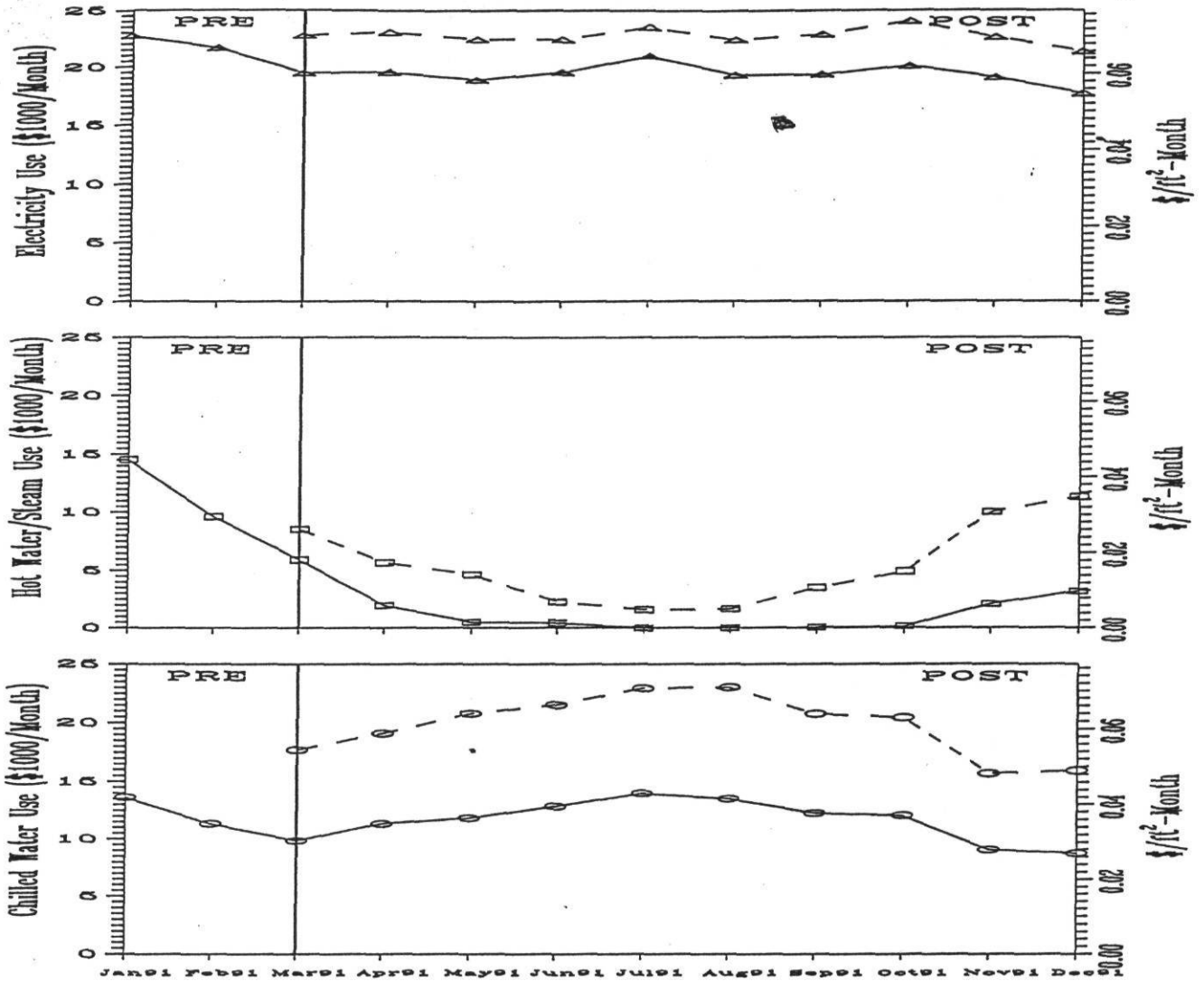
Aamer Athar
053D WERC
Texas A&M University
College Station, TX 77843-3123
(409)-845-9213

1991 Summary of Measured Energy Consumption and Savings

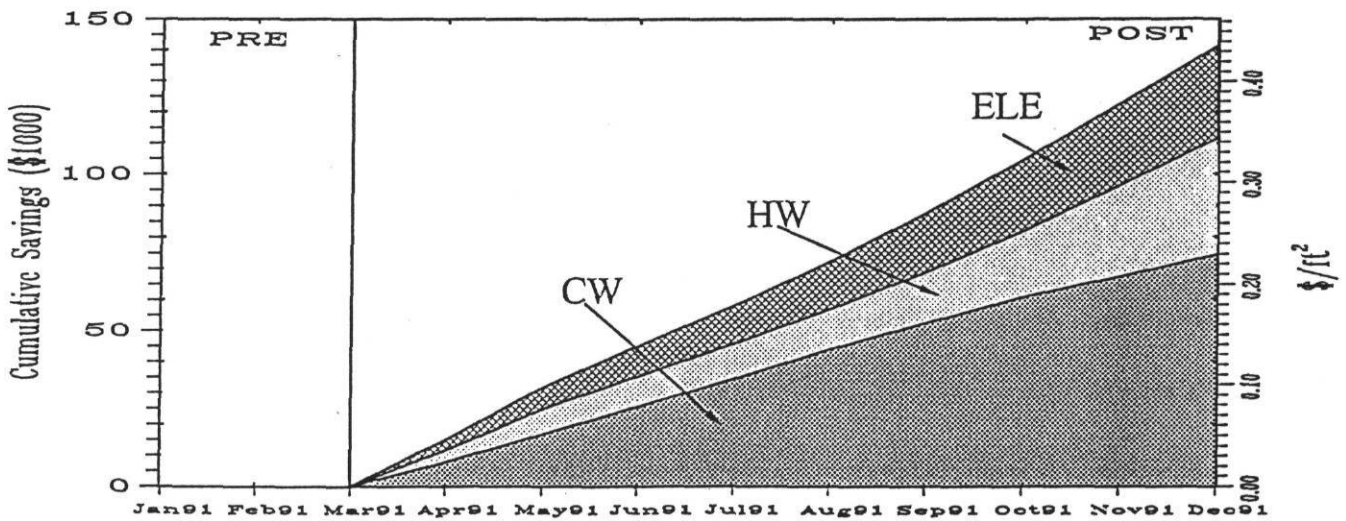
Month	Electricity			Chilled Water			Hot Water/Steam			Total Monthly Savings	Cumulative Savings
	Consumption kWh	Savings \$	Savings \$	Consumption MMBtu	Savings \$	Savings \$	Consumption MMBtu	Savings \$	Savings \$		
Jan	815100	\$22724	\$0	2914	\$13609	\$0	3056	\$14518	\$0	\$0	\$0
Feb	776800	\$21657	\$0	2424	\$11321	\$0	2021	\$9599	\$0	\$0	\$0
Mar	699000	\$19489	\$0	2111	\$9858	\$0	1249	\$5932	\$0	\$0	\$0
Apr	703600	\$19617	\$3488	2426	\$11329	\$7773	415	\$1971	\$3710	\$14971	\$14971
May	679700	\$18949	\$3506	2532	\$11826	\$8965	103	\$488	\$4149	\$16620	\$31591
Jun	702500	\$19586	\$2835	2748	\$12833	\$8688	91	\$432	\$1842	\$13365	\$44956
Jul	753000	\$20994	\$2551	2989	\$13958	\$8977	0	\$0	\$1573	\$13101	\$58057
Aug	694600	\$19366	\$3058	2890	\$13497	\$9517	0	\$0	\$1636	\$14211	\$72268
Sep	695600	\$19393	\$3511	2618	\$12228	\$8517	9	\$43	\$3459	\$15487	\$87755
Oct	722000	\$20130	\$3942	2577	\$12036	\$8403	25	\$121	\$4786	\$17131	\$104886
Nov	686200	\$19131	\$3489	1938	\$9051	\$6603	438	\$2082	\$7907	\$17999	\$122885
Dec	636400	\$17743	\$3627	1875	\$8754	\$7130	671	\$3188	\$8087	\$18844	\$141729
Total	8564500	\$238779	\$30007	30042	\$140300	\$74573	8078	\$38374	\$37149		\$141729
EUI	26.4	$\frac{kWh}{ft^2yr}$		92600	$\frac{Btu}{ft^2yr}$		24900	$\frac{Btu}{ft^2yr}$			

Comments

- ★ The LoanSTAR monitoring began in June 1989.
- ★ The HVAC retrofit was completed in March 1991.
- ★ The unit costs used for estimating the audit and the measured savings are: \$0.02788/kWh, \$4.67/MMBtu (CW), and \$4.74/MMBtu (HW).
- ★ The audit estimated savings beginning in April are: \$41,000 (ELE), \$93,000 (CW), \$41,000 (HW), and \$175,000 (Total).
- ★ The chilled water and hot water consumption between July 1991 and November 1991 was predicted using post-retrofit regression models, because of meter failures.



Solid line indicates measured and dashed line indicates the energy that would have been consumed had the retrofit not been installed
 △ Electric ○ Cooling □ Heating



Zachry Engineering Center - Texas A&M University

TEXAS A&M UNIVERSITY

Zachry Engineering Center

Building Envelope:

- 324,400 sq.ft
- 3-1/2 floors and a ground floor level, erected 1973, classes, offices, labs, computer facility, and clean rooms for Solid State Electronics
- walls: cement block
- windows: 22% of total wall area
single pane with built-in-place vertical blinds
- roof: flat

Building Schedule:

- classrooms and labs: 7:30 am to 6:30 pm weekdays
- offices: 7:30 am to 5:30 pm weekdays
- computer facility: 24 hrs/day

Building HVAC:

- 12 variable volume dual duct AHUs (12-40hp)
- 3 constant volume multizone AHU (1-1 hp, 1-7hp, 1-10hp)
- 4 constant volume single zone AHU (4-3hp)
- 10 fan coils (10-0.5 hp)
- 2 constant volume chilled water pump (2-30hp)
- 2 constant hot water pump (2-20hp)
- 7 misc. pumps (total of 5.8hp)
- 50 exhaust fans (50-0.5hp)

HVAC Schedule:

- 24 hrs/day

Lighting:

- fluorescent

Retrofits Implemented:

- control modifications to the dual duct system
- variable volume dual duct system

Other Information:

- EMCS system to control HVAC was also installed along with the retrofits: 3/30/91.

Date of Retrofits:

- Date of completion for VAV and control modifications to the dual duct system: 3/30/91.

Savings Calculations:

- Estimated savings are the annual savings from the audit report.

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Summary of Energy Consumption

	Measured Use	% hours reported	Unit Cost	Estimated Cost
Electricity	677521 kWh	100	\$0.02788	\$18889
Peak 60 Minute Demand	1273 kW	100	-	-
Chilled Water	1535.3 MMBtu	100	\$4.670	\$7170
Hot Water	571.0 MMBtu	100	\$4.750	\$2712

Peak 60 minute demand was recorded at 1600 Wednesday 12/2/92.
There were 744 hours in this month.

Monthly Retrofit Savings

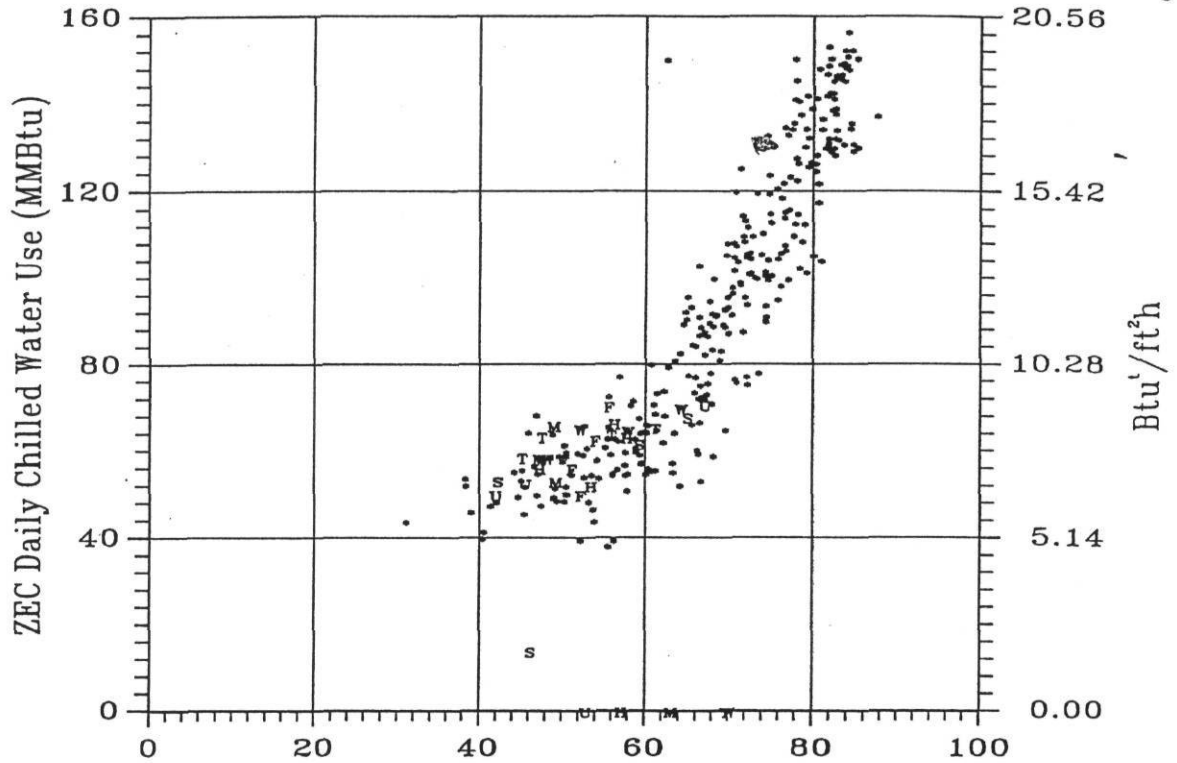
	Measured Savings		Audit Estimated Savings	
Electricity (kWh)	128460	\$3581	162730	\$4524
Chilled Water (MMBtu)	1940	\$9060	2215	\$10344
Cond./H.W. (MMBtu)	1772	\$8417	956	\$4541
Monthly Total		\$21058		\$19409
Total to Date*	(26 months)	\$306763	(22 months)	\$426997

*Measured savings include construction period. Audit estimated savings do not.

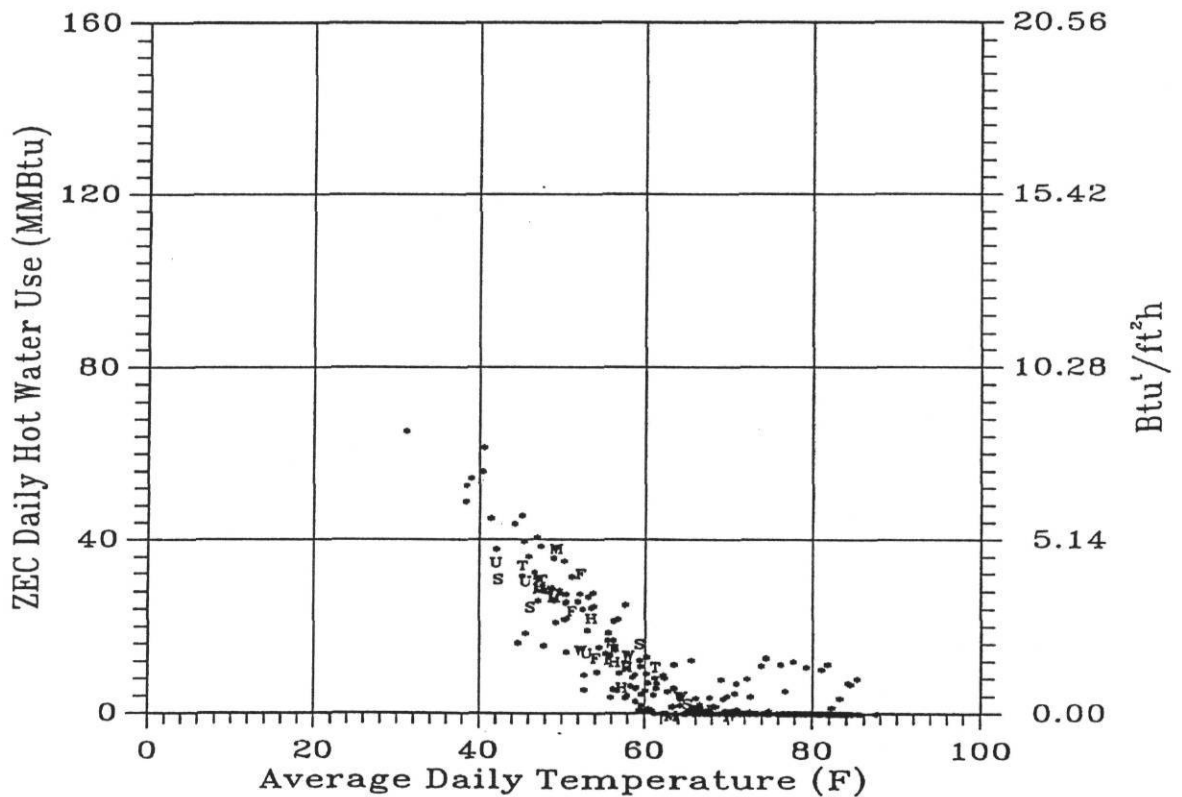
Comments

- ★ Conversations with the Power Plant personnel indicate that the chilled water supply to ZEC was shut-off on 12/26/93.
- ★ The holiday recess is evident towards the end of the month. However, a significant (1.5 W/ft²) amount of electricity remained on continuously over the holiday break.

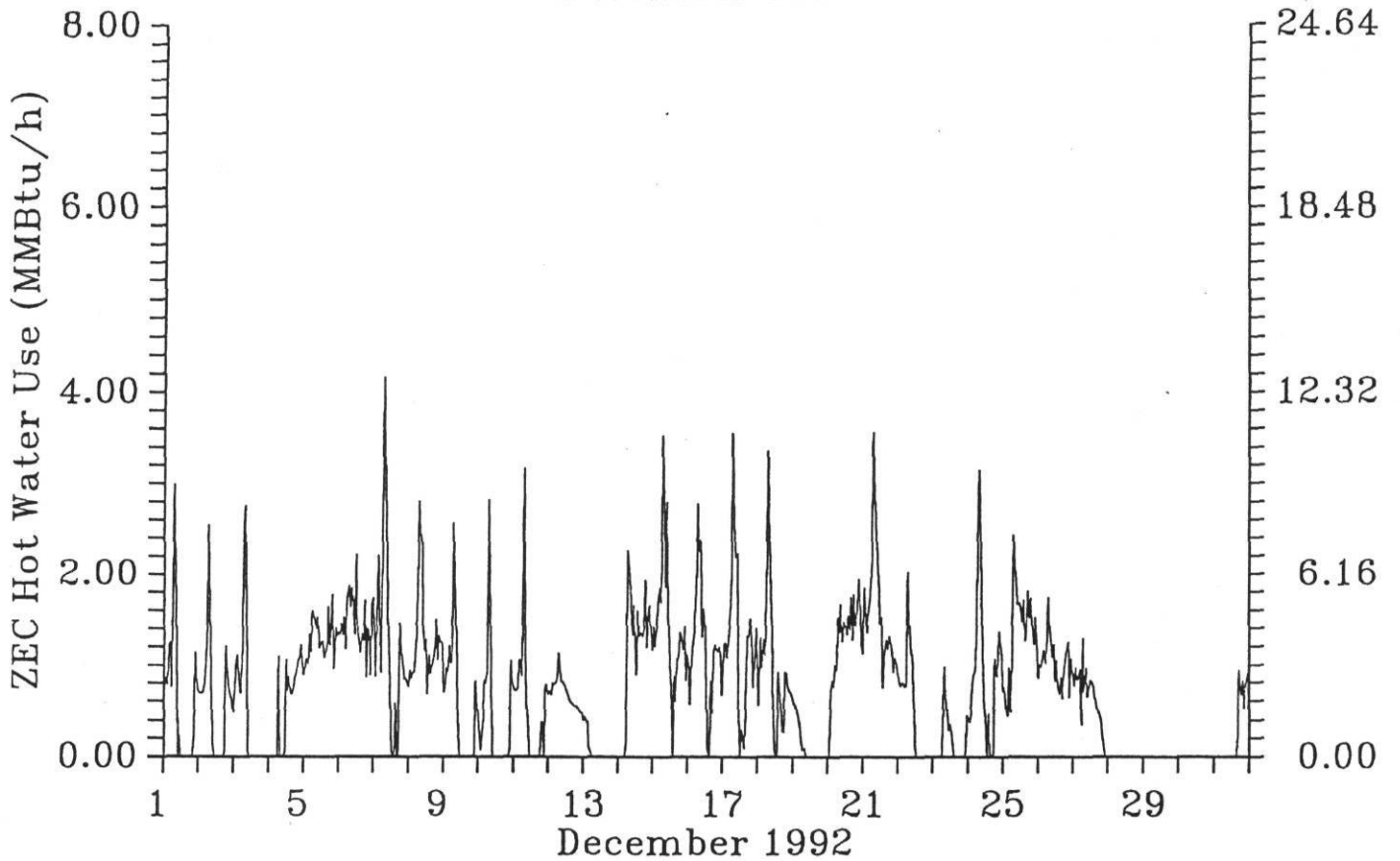
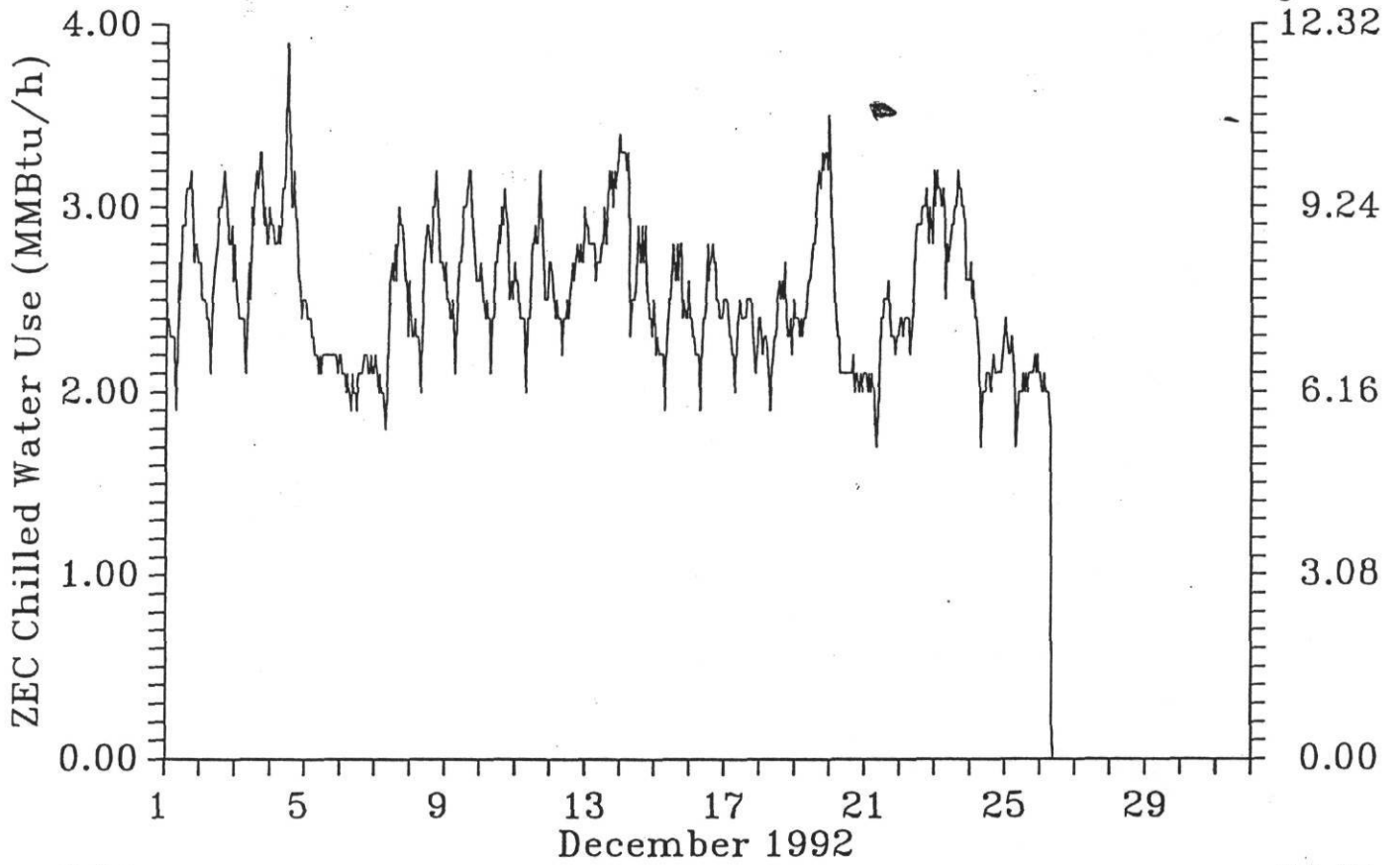
Zachry Engineering Center - Texas A&M University - December 1992



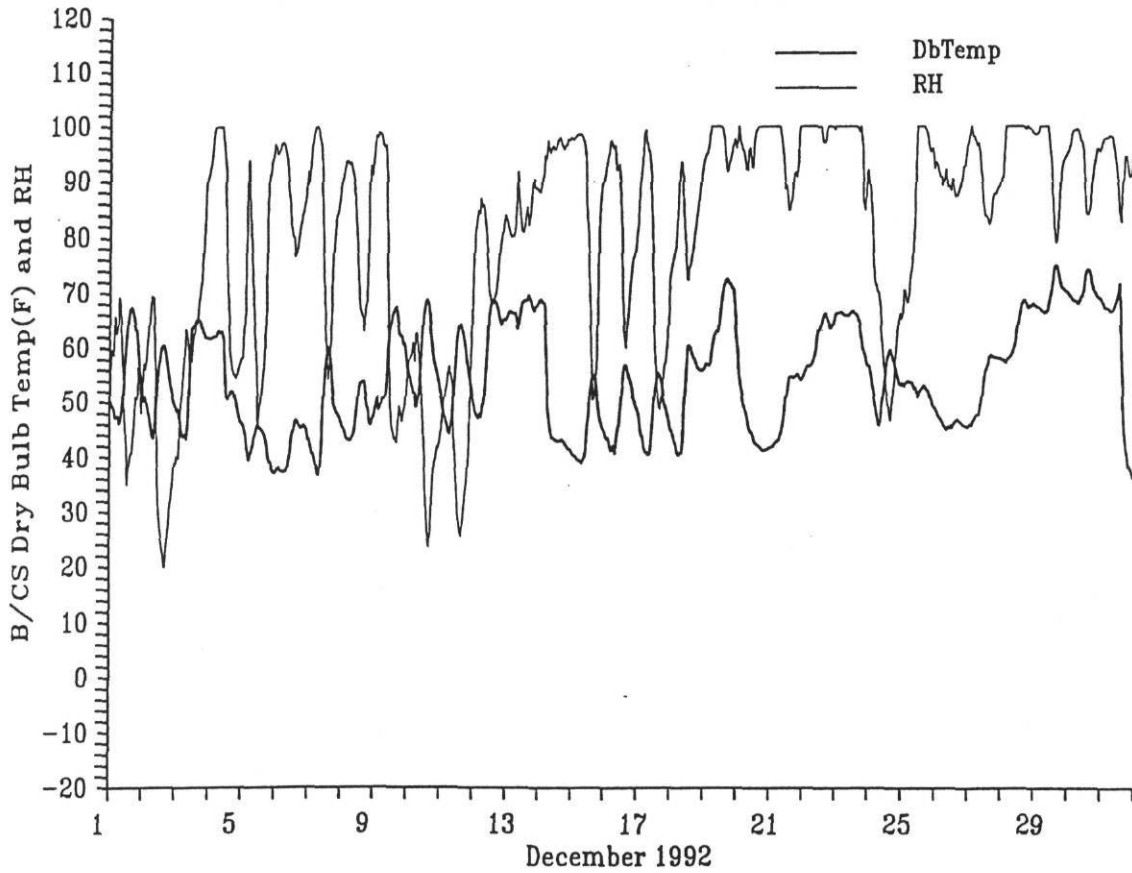
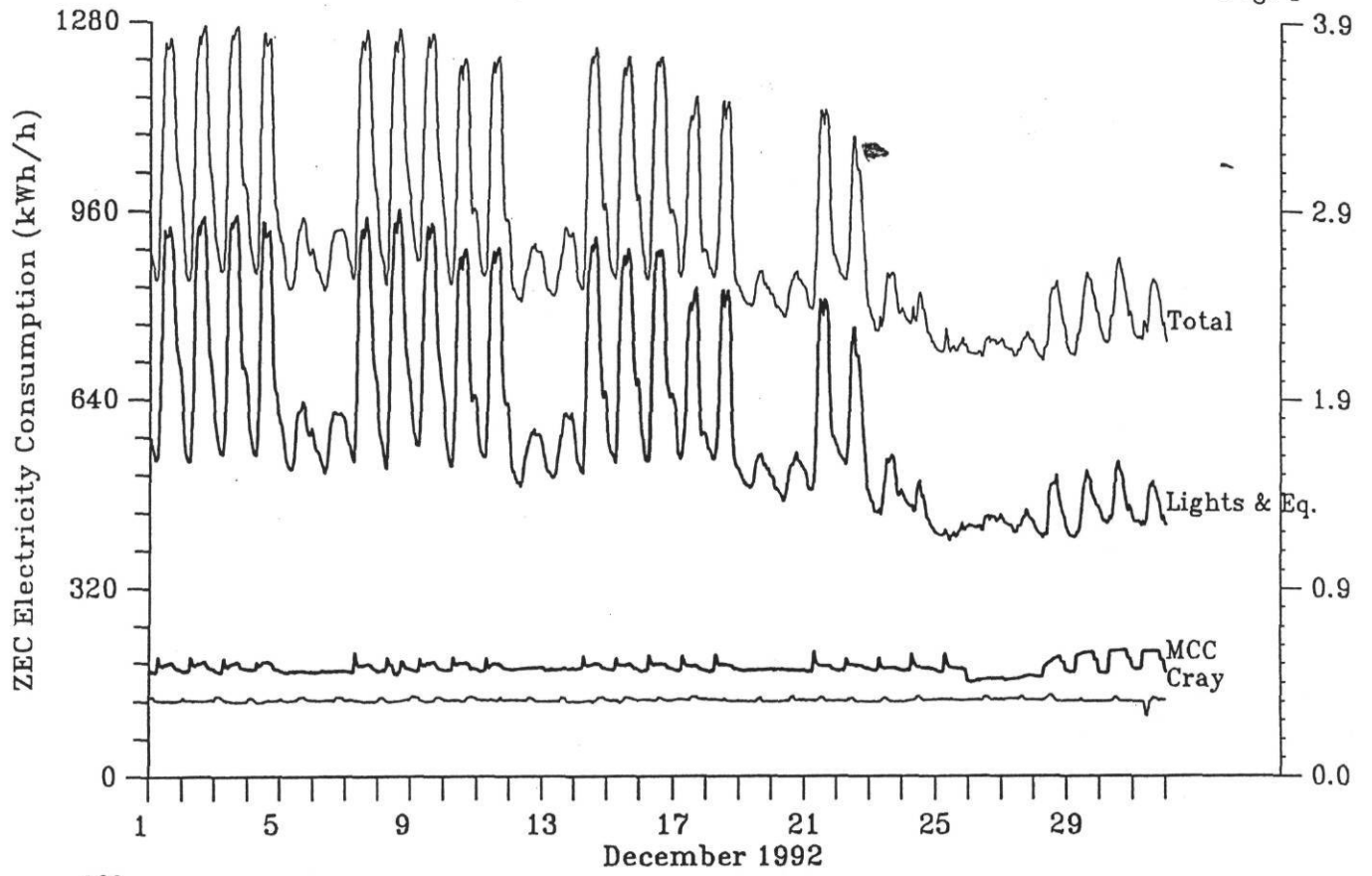
Jan 01 1992 - Dec 31 1992



Data points for the current month are shown as letters.
 Monday through Sunday are represented as M,T,W,H,F,S,U.

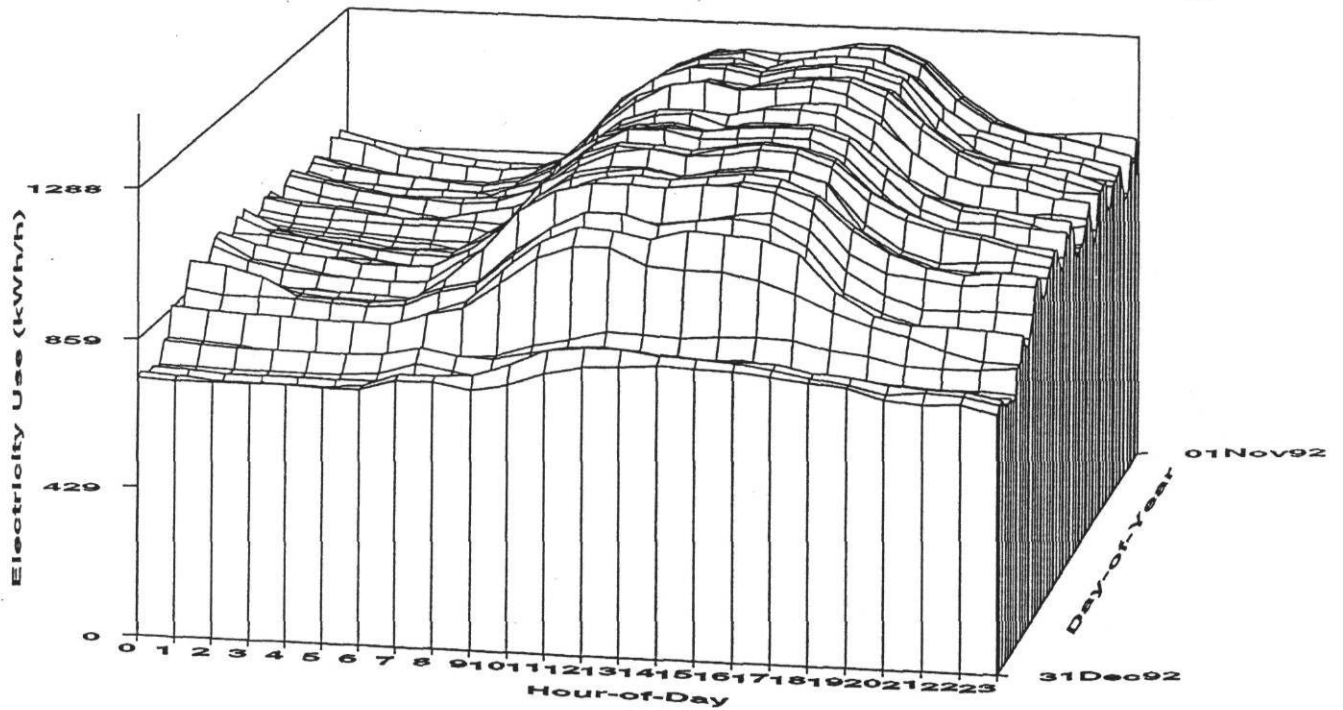


Zachry Engineering Center - Texas A&M University - December 1992

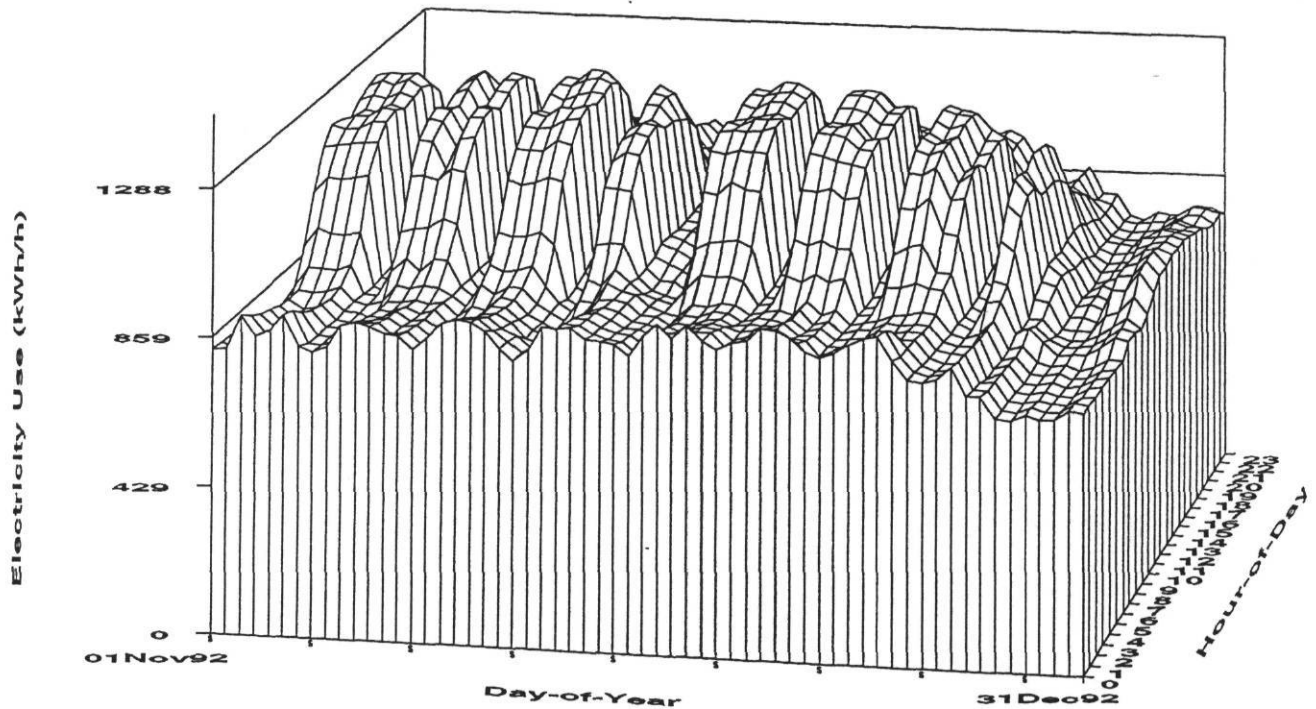


Zachry Engineering Center - Texas A&M University - December 1992

Whole-Building Electric



Whole-Building Electric



Sundays are marked with an "S"

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