

ESL-TR-98/11-01

THE UNITED STATES
DEPARTMENT OF ENERGY

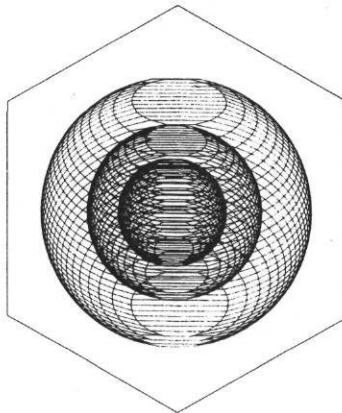
REBUILD AMERICA PROGRAM
BRAZOS VALLEY
ENERGY CONSERVATION COALITION

QUARTERLY PROGRESS REPORT

FOR

July 1998-September 1998

November 1998



**ENERGY SYSTEMS
LABORATORY**

Department of Mechanical Engineering
Texas Engineering Experiment Station
Texas A&M University System

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THE UNITED STATES DEPARTMENT OF ENERGY

REBUILD AMERICA PROGRAM

BRAZOS VALLEY ENERGY CONSERVATION COALITION

Quarterly Progress Report for July 1998 - September 1998

BACKGROUND

The Brazos Valley Energy Conservation Coalition (BVECC), administered by the Energy Systems Laboratory (ESL) of Texas A&M University, in College Station, Texas received notification of the U.S. Department of Energy (USDOE)-Rebuild America award in June, 1996. The contract was finalized between the Texas Engineering Experiment Station (TEES) and USDOE in November 1996. The BVECC members include the Energy Systems Laboratory (Texas A&M University), Texas Energy Engineering Services Inc. (TEESI), City of Bryan/Bryan Utilities (COB), Smart Energy Systems (SES) financing company (see organization chart, Fig. 2). The coalition was awarded \$499,522 to conduct energy conservation/environmental improvement projects in Texas with a total cost of approximately \$6 million, in facilities with 2 million square feet area, over five years project period.

Since November 1996, the BVECC has performed several activities related to the Rebuild America Program. Some of the BVECC effort is summarized below.

SUMMARY OF ACCOMPLISHMENTS

The BVECC has contacted forty-eight (48) facilities in Texas to join the Rebuild America project. Twenty-one (21) facilities have signed the special form that authorizes the BVECC to conduct walk-through energy audits of their sites. The BVECC has conducted preliminary walk-through energy audits in ten (10) of these facilities. To date nine (9) facilities have joined the Rebuild America program covering total area of more than eight (8) million square feet. The total estimated project cost is over \$10 million and the estimated annual savings are well over \$2.5 million with an estimated payback of 4.1 years. See Table 1.

BUDGET

The following are our expenses on the project as of the end of September 1998:

<u>Description</u>	<u>September 1998</u>
Salary	\$68,621.25
Travel	\$3,073.46
Supplies	\$7,651.02
Subcontract to TEESI	\$40,854.00
Total	\$120,199.73

METHODOLOGY

The BVECC has developed and currently utilizes a methodology flow chart that summarizes the procedure to be followed through the different phases of the Rebuild America project. The flow chart is shown in Fig. 1. In addition, we have developed a preliminary walk-through registration form, which is filled out by the clients that are willing to participate in the Rebuild America program.

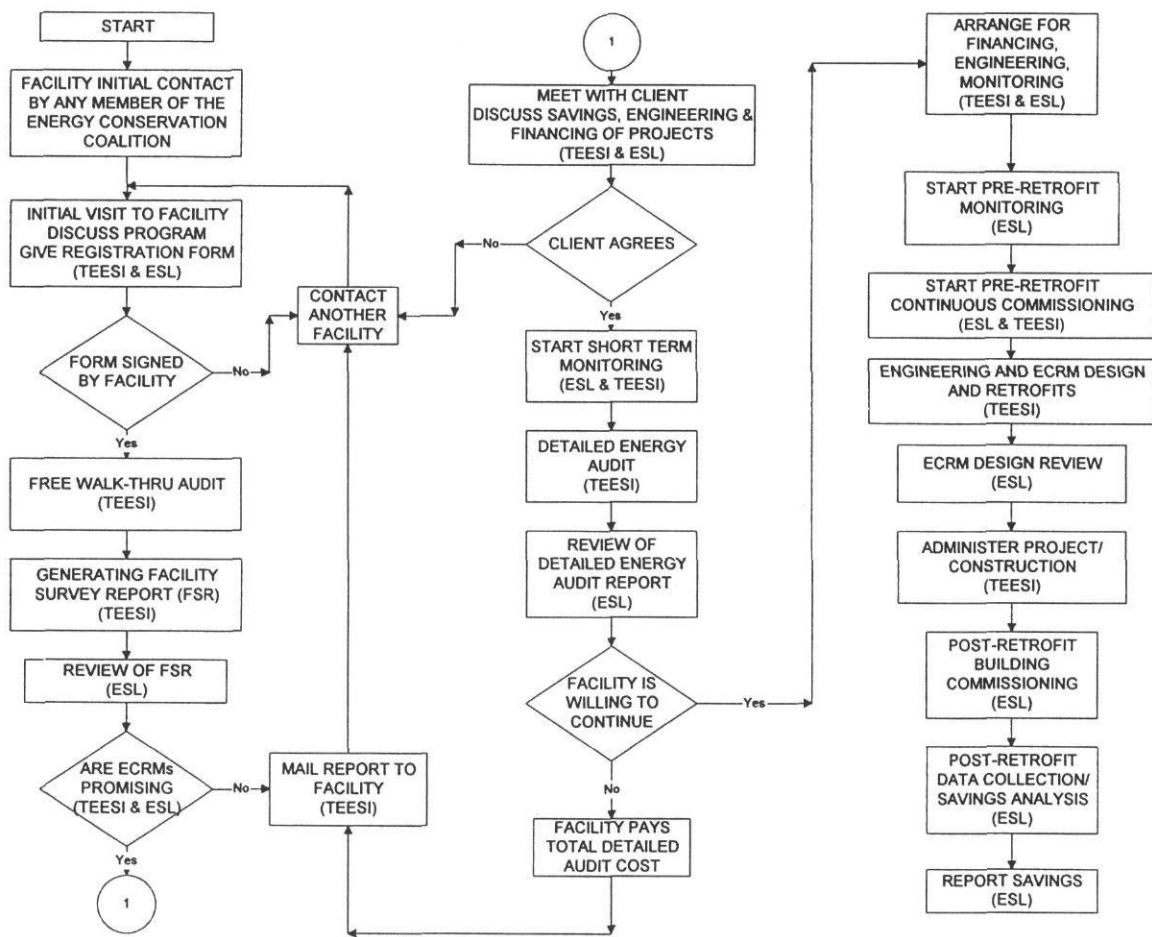


Figure 1- Flow Chart of the Procedure followed by the BVECC on Rebuild America Projects.

REBUILD AMERICA ACTIVITIES

During the last quarter Dr. W. Dan Turner and Bahman Yazdani, in cooperation with Texas Energy Engineering Services Inc. (TEESI) and The Arizpe Group Inc. (TAG) made on-site presentations of the Rebuild America program to twenty-six (26) potential Rebuild America facilities. This brings the total number of facilities contacted to date to forty-eight (48). The following is the list of the twenty-six (26) facilities that received on-site presentations:

- City of Carrollton
- City of Carrollton
- City of Richardson
- Dallas ISD
- Richardson ISD
- Mansfield ISD
- City of Desoto
- Collin County Community College
- Kent Moore Cabinet / Bryan
- U.T. Southwestern Medical Center
- Bexar County
- Krogers / Houston
- Dallas County Community College District
- Tarrant County
- Zales Liphsy Medical Center / Dallas
- Tarrant County Junior College
- Duncanville ISD
- SCI-ROV /Dallas
- St. Joseph Gardens Hospital / Fort Worth
- John Peters Hospital / Fort Worth
- Harris Methodist Hospital / Fort Worth
- City of Fort Worth
- Southwestern Bell / Fort Worth
- City of Hearne
- Drug Imporium / Dallas
- KTR (Galleria) / Bryan
- Transwestern LTD (Norwest Bank Building) / Bryan

There are two additional facilities that have contacted ESL and have received information on Rebuild America Program:

- Texas Department of Criminal Justice
- Tarleton State University

Seven of the above listed facilities have signed the Rebuild America application form. Currently, The walk-through audit of Collin County Community College is under way.

In addition:

- TEESI has completed the final engineering audit report for San Marcos ISD.
- Bahman Yazdani of ESL and Ernie Moore and Leo Rachal of TEESI Visited San Marcos ISD administrators to present the final Engineering audit report.
- TEESI is currently completing the engineering audit report for the College Station ISD. This report should be completed by December 1998.
- Bahman Yazdani and Kelly Milligan visited Wichita Falls ISD to facilitate the Rebuild America project being implemented there.
- Bahman Yazdani and Robert Henry of TEESI met with the City of Bryan Facilities Management Division Director, Mark Hollas in order to try to put the Rebuild America project back on track in Bryan.
- Bahman Yazdani and Saleem Khan of TEESI met with Ms. Anne Moder, Brad Bonfiglio, and Roy Young of Hitachi to follow up on the Rebuild America presentation.
- Bahman Yazdani met with the Brazos County Judge, Alvin (Al) Jones to discuss the Rebuild America project status.
- Ernie Moore and Bahman Yazdani made an on site visit of three of the Brazos County facilities to assure that the lighting projects have successfully been completed.
- Kelly Milligan, Dr. Jeff Haberl and Bahman Yazdani of ESL visited Ed Dobbins, of Brazos County at the Brazos Center to verify the metering and monitoring plan.
- Victor Kootin-Sanwu, Bahman Yazdani and Atch Sresthraputra have visited the Brazos center on three occasions to perform various data gathering tasks.
- The Rebuild America ESL team consisting of Dr. Haberl, Victor Kootin-Sanwu, Aamer Athar, Atch Sresthraputra and Bahman Yazdani are meeting weekly to assess and plan monitoring and analyses of various projects.
- Mr. Kyle Dicke of Bryan Utilities is no longer employed by the city. Ms. Jane Sayers will represent Bryan Utilities in the Coalition.
- Members of the BVECC, Dr. W. Dan Turner, Ernie Moore, Dr. Jeff Haberl, Aamer Athar, Dr. David Claridge and Bahman Yazdani have met twice to discuss the progress of the Rebuild America projects and to plan to attract future clients to the program. Ms. Jane Sayers of Bryan Utilities has not been able to attend. It was decided to include continuous commissioning, if applicable, as an ECRM in the engineering reports and show the cost of metering and monitoring in the site reports.
- ESL has established a WebPages for the Rebuild America project. Modifications to the WebPages are underway to show current projects.

No new continuous commissioning projects have been initiated but there are two potential projects involving continuous commissioning as an ECRM.

CURRENT PROJECTS

The BVECC team is now working on nine Rebuild America projects in Texas. The projects cost is over \$10 million covering more than eight (8) million square feet of facility area. The estimated annual savings are over \$2.5 million. The summary of the projects is shown in Table 2 below.

Table 2 - Summary of the BVECC Rebuild America projects.

Item	Brazos County	Wichita Falls ISD	Bryan ISD
Area (sq.-ft)	277,077	1,417,671	1.6 million
Project Cost (\$)	601,541	2,511,382	741,427
Annual Savings (\$/yr.)	95,139	293,090	178,657
Payback Period (yr.)	6.3	8.6	4.2
Retrofits	Lighting retrofit, HVAC-replace DX units, replace cooling tower, Energy Management and Control System installations.	HVAC system upgrades and modifications including, Chiller replacements, Air Handling Unit replacements, Control system upgrades, VFD installations, Energy Management System installations and modifications, General lighting system upgrade, Lighting controls, Stadium lighting modification and upgrade, Gymnasium lighting retrofits,	Building Automation and Comfort Control, General lighting, Stadium lighting retrofit, Gymnasium lighting retrofits, Replace AHUs, IAQ projects (heat recovery systems), Boiler replacements, Chiller replacements (7), Install chiller plants, Air condition old gyms, Cooling tower replacements, Chill water and hot water pump replacements, Replace HVAC pipes, etc.
Energy Monitoring	Whole building electricity, chillers, lighting.	Whole building electricity, whole building gas at six schools.	Whole building electricity, chillers, and lighting at three BISD schools. (Will be expanded to other schools).
IAQ Measurements	Indoor/outdoor CO ₂ levels, indoor/outdoor relative humidity, indoor/outdoor temperature.	Indoor/outdoor CO ₂ levels, indoor/outdoor relative humidity, indoor/outdoor temperature.	Indoor/outdoor CO ₂ levels, indoor/outdoor relative humidity, indoor/outdoor temperature.

Table 2 - Summary of Three BVECC Rebuild America Projects (continued)

Item	College Station ISD	Texas A&M University	Education Service Center Region II
Area (sq.-ft)	915,195	3,000,000	135,000
Project Cost (\$)	828,891	2,150,000	285,631
Annual Savings (\$/yr.)	111,275	1,550,000	30,878
Payback Period (yr.)	7.4	1.4	9.3
Retrofits	Lighting retrofit, LED exit signs, Gymnasium lighting retrofit, HVAC upgrades, Boiler replacements, Pool heating boiler, Chiller replacement, Gym condensing unit replacement, Install dedicated MZU control	Project involves Continuous Commissioning which involves evaluating and optimizing building HVAC controls in order to reduce energy costs without sacrificing customer comfort. A more subtle but equally important goal is to uncover and address maintenance deficiencies, and to conduct opportunity assessments of mechanical systems	Lighting system upgrade, Exit light modifications, Replace 110 ton air cooled chiller, replace four AHUs, Upgrade HVAC controls
Energy Monitoring	Pending	Whole building electricity, whole building gas.	Utility Bills analysis
IAQ Measurements	Pending	None	None

Item	Webb ISD	Scott & White Clinic College Station	San Marcos ISD
Area (sq.-ft)	143,152	180,000	902,963
Project Cost (\$)	240,500	106,000	3,034,640
Annual Savings (\$/yr.)	32,000	16,500	239,600
Payback Period (yr.)	7.5	6.4	12.7
Retrofits	General lighting retrofit, Exit light replacements, Air conditioning upgrades, Manual timers.	Office lighting retrofit, Lighting controls.	Lighting Retrofit, HVAC system modifications and installations, Control system modifications, Energy Management System installations, Electric rate study, meter consolidation study,
Energy Monitoring	Pending	None	Whole building electricity, chillers, and lighting at the high school.
IAQ Measurements	Pending	None	Pending

SHORT-TERM/PRE-RETROFIT MONITORING

The ESL has performed short-term/pre-retrofit monitoring of energy consumption at different Rebuild America projects. The ESL is currently collecting data at three Brazos County Buildings. The monitoring includes whole building electricity and Indoor Air Quality (IAQ) measurements. Samples of the data collected by the ESL are shown in Appendix A and Appendix B.

The ESL is also collecting energy conservation data at three Bryan ISD schools. Savings calculations have been performed on the three schools and the savings for FY96 and FY97 compared with FY95 (baseline year) show savings of \$269,696 in electricity and \$87,618 in gas. See Appendix B for a sample of the monthly energy consumption report generated by the ESL team.

GENERAL

TEESI is supplying the ESL with copies of the site reports (SR) of the walk-through energy audits for review and evaluation. The BVECC team is using these reports to present the energy conservation projects to the clients in order to obtain approval to conduct detailed energy audits.

When a detailed energy audit report is completed by TEESI the ESL receives a copy of the report for review and evaluation. The revised report will then be used by the client (as part of an application package) to apply for a loan to implement the energy conservation projects.

TEESI also supplies the ESL with letters from the clients to TEES stating the amount of loan borrowed by the client. This will be used to cover the Energy Coalition's cost sharing necessary for the program.

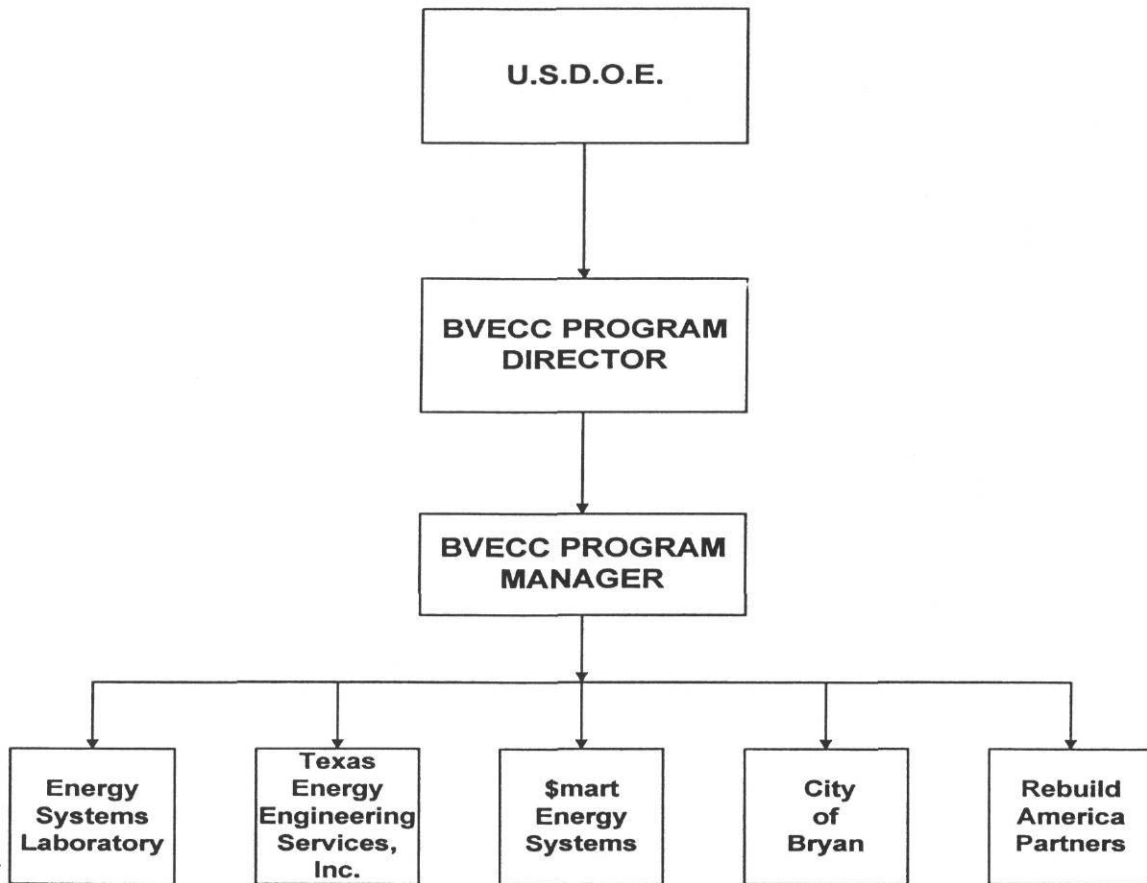
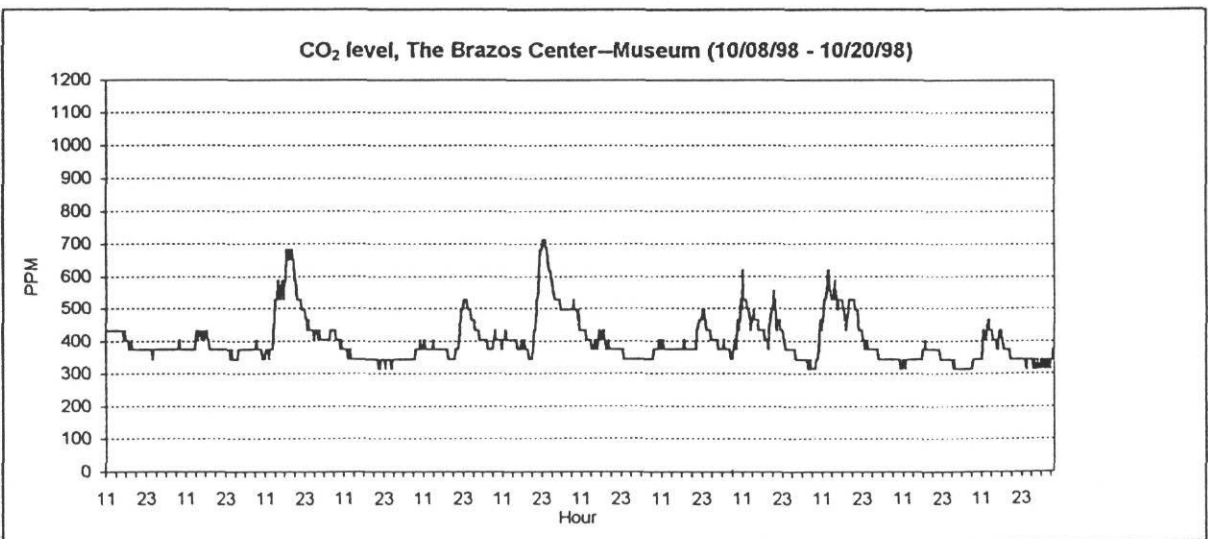
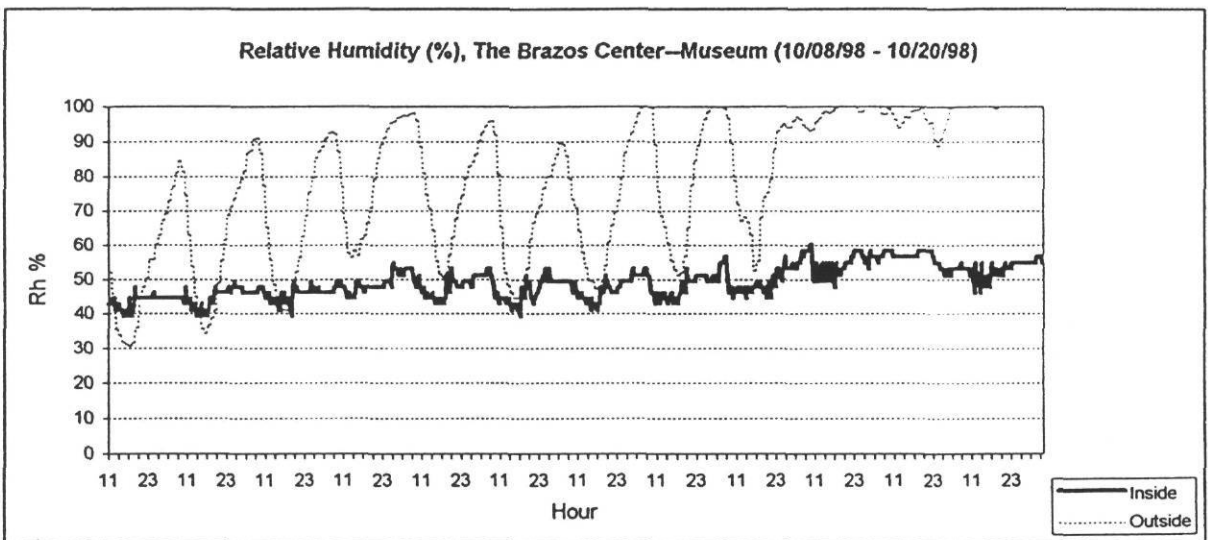
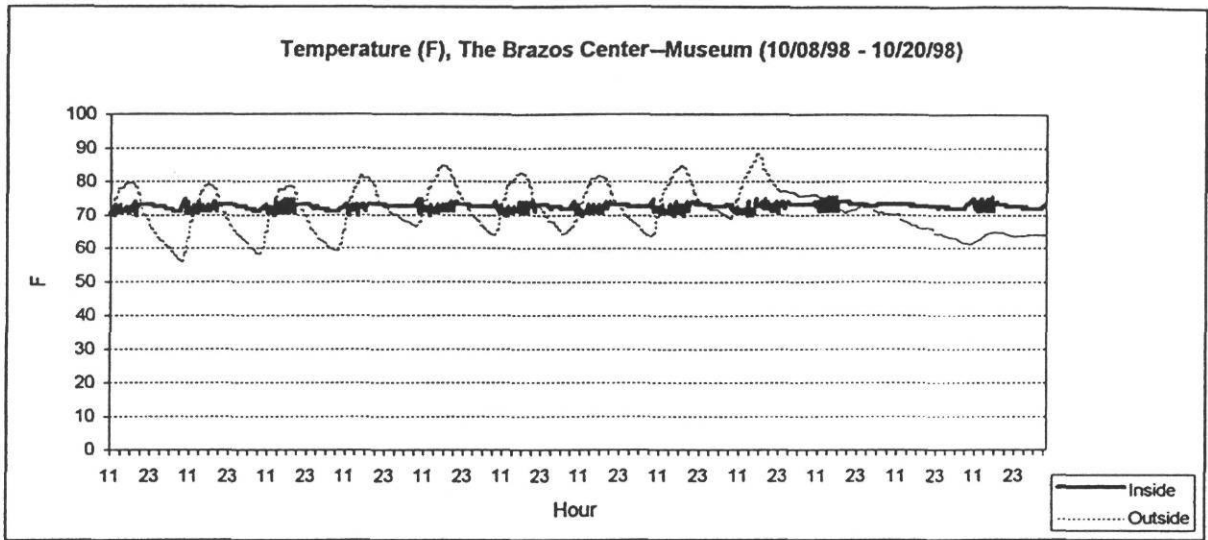


Figure 2-Organizational Chart of the BVECC Rebuild America Program.

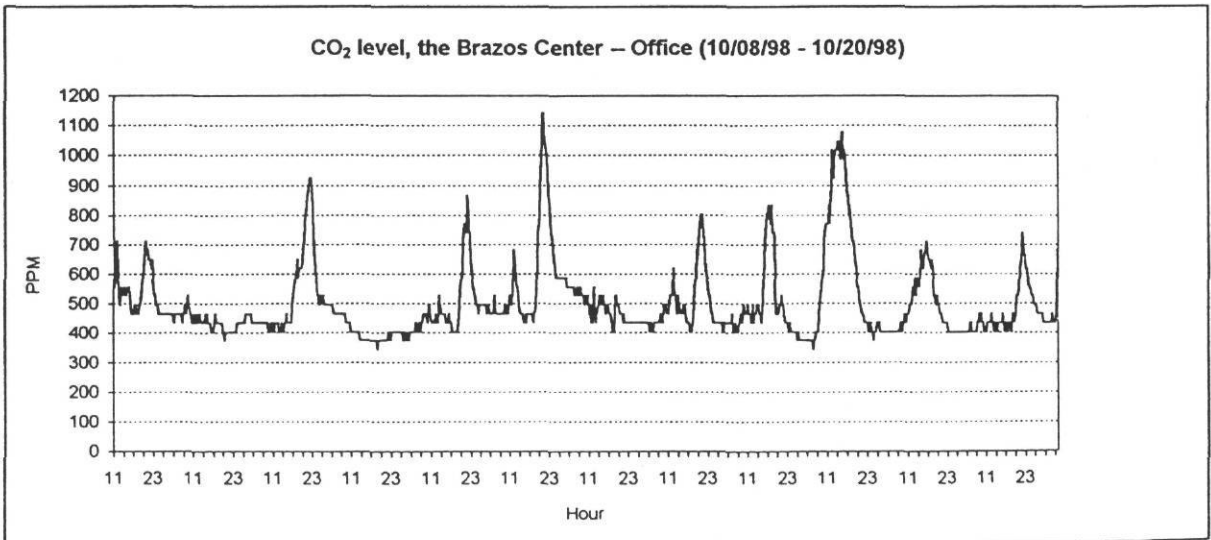
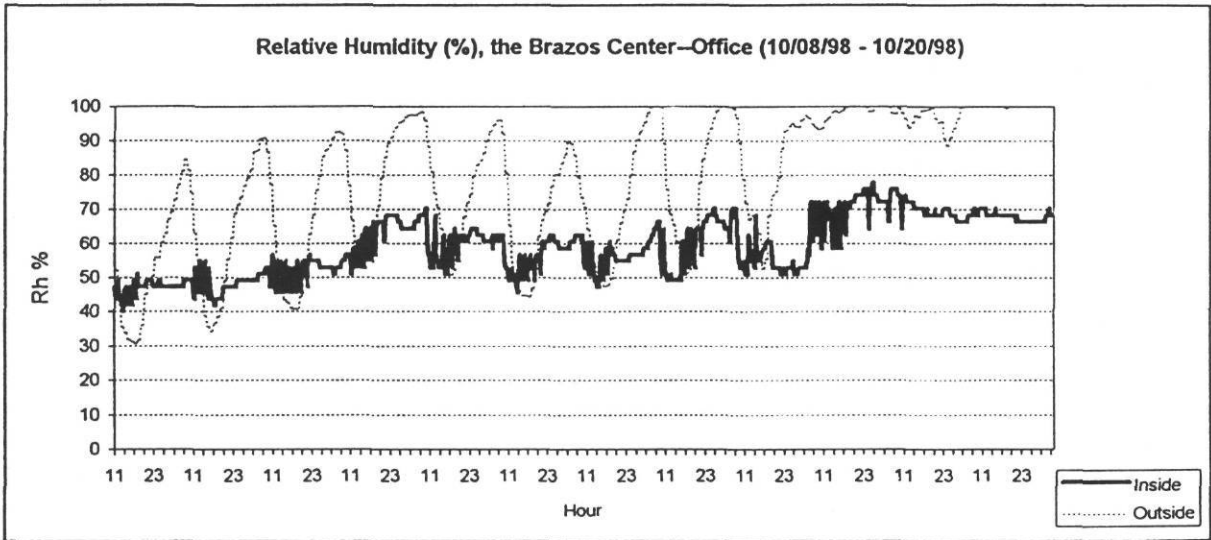
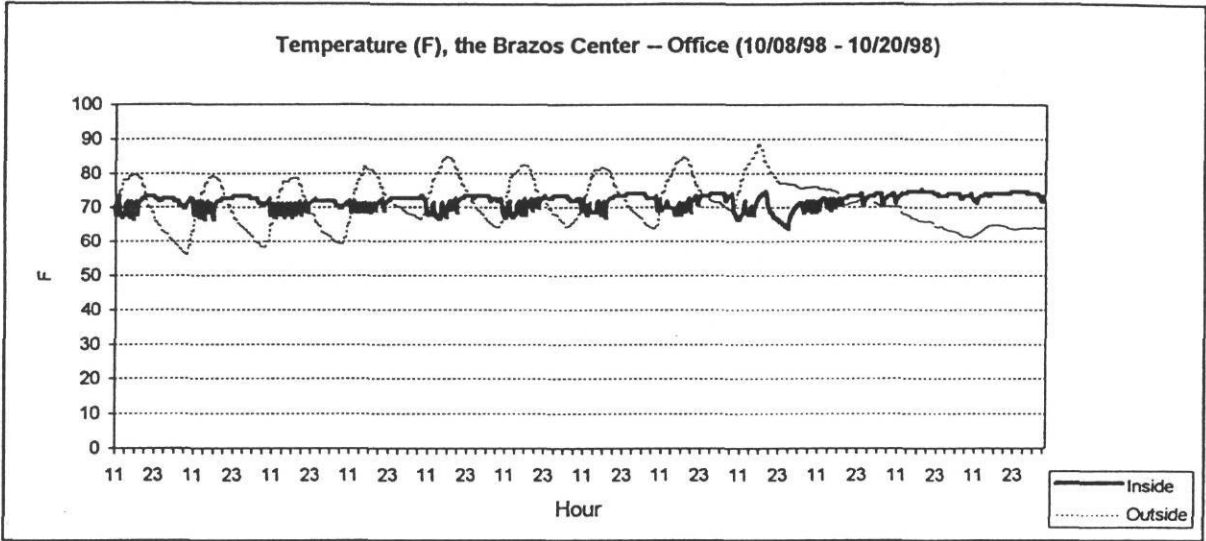
APPENDIX A

**SAMPLE ENERGY/IAQ MONITORED DATA
AT
BRAZOS CENTER
BRAZOS COUNTY**

The Brazos Center—Museum



The Brazos Center – Office



APPENDIX B

**SAMPLE ENERGY MONITORED DATA
AT
THREE BRYAN ISD SCHOOLS
AND
THREE BRAZOS COUNTY BUILDINGS**

Sam Houston Elementary

Bryan ISD
62,000 square feet

Site Contact

Mr. Mike Kristynik
Executive Director
Planning & Operations
101 N. Texas Avenue
Bryan, TX 77803
(409) 361-5200

ESL Metering Contact

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

Summary of Energy Consumption

	Measured Use	% hours reported	Unit Cost	Estimated Cost
Electricity	113623 kWh	100	\$0.07250	\$8238
Peak 60 Minute Demand	330 kW	100	-	-
Natural Gas	11.0 MMBtu	100	\$4.840	\$53

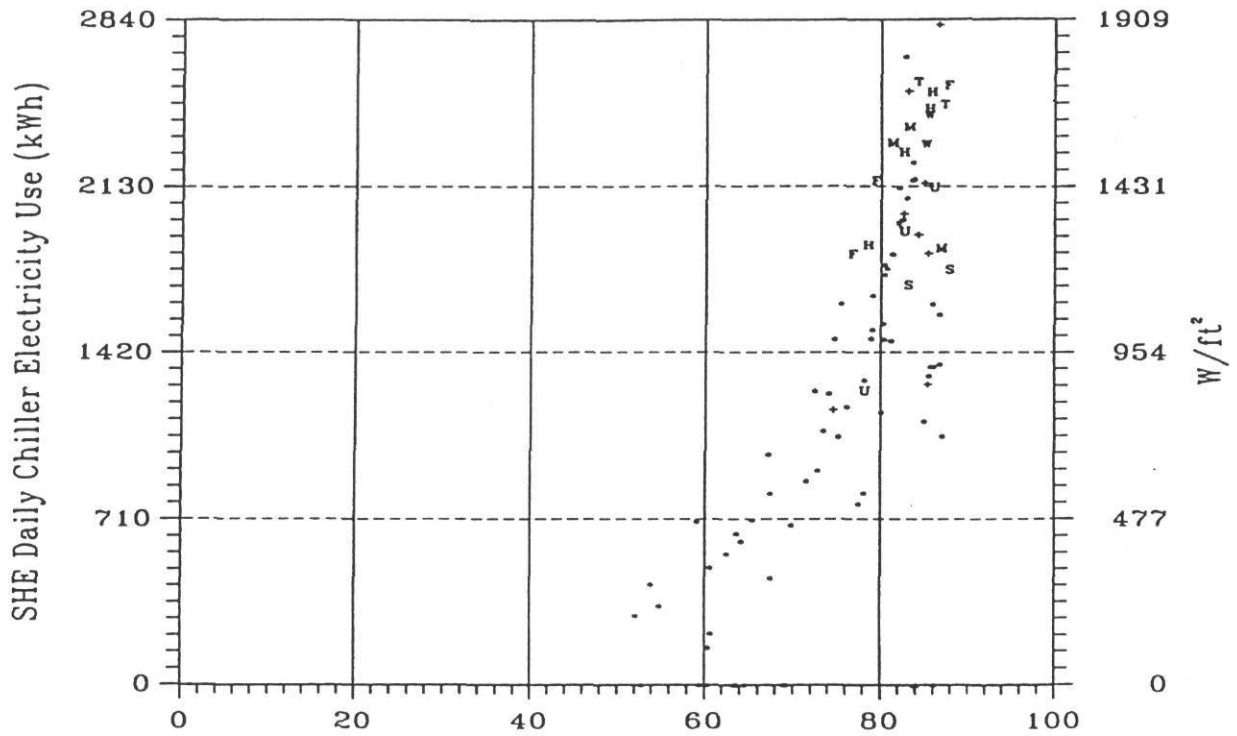
Peak 60 minute demand was recorded at 1300 Wednesday 08/19/98.
There were 744 hours in this month.

Monthly Retrofit Savings

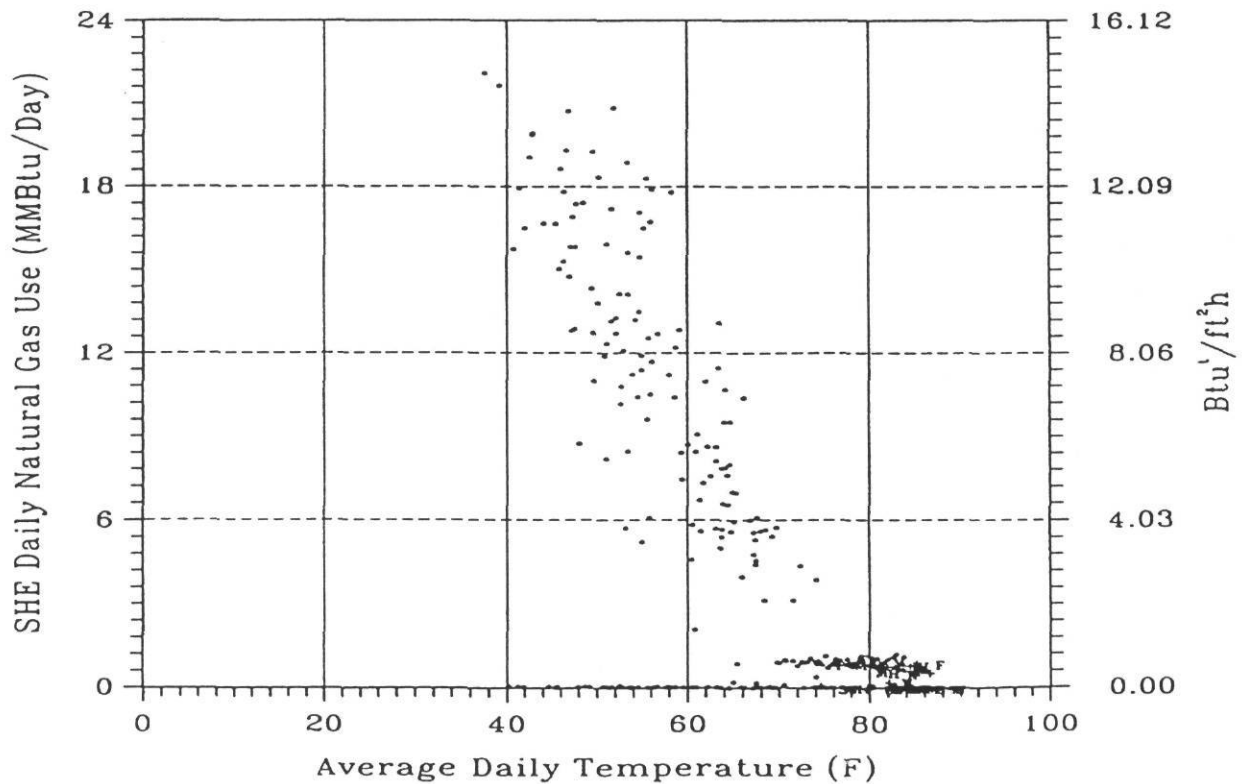
	Measured Savings		Audit Estimated Savings	
Electricity (kWh)	16660	\$1208	N/A	N/A
Cond./H.W./N.G. (MMBtu)	6	\$29	N/A	N/A
Monthly Total		\$1237		N/A
Total to Date*	(14 months)	\$25949	(14 months)	N/A

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

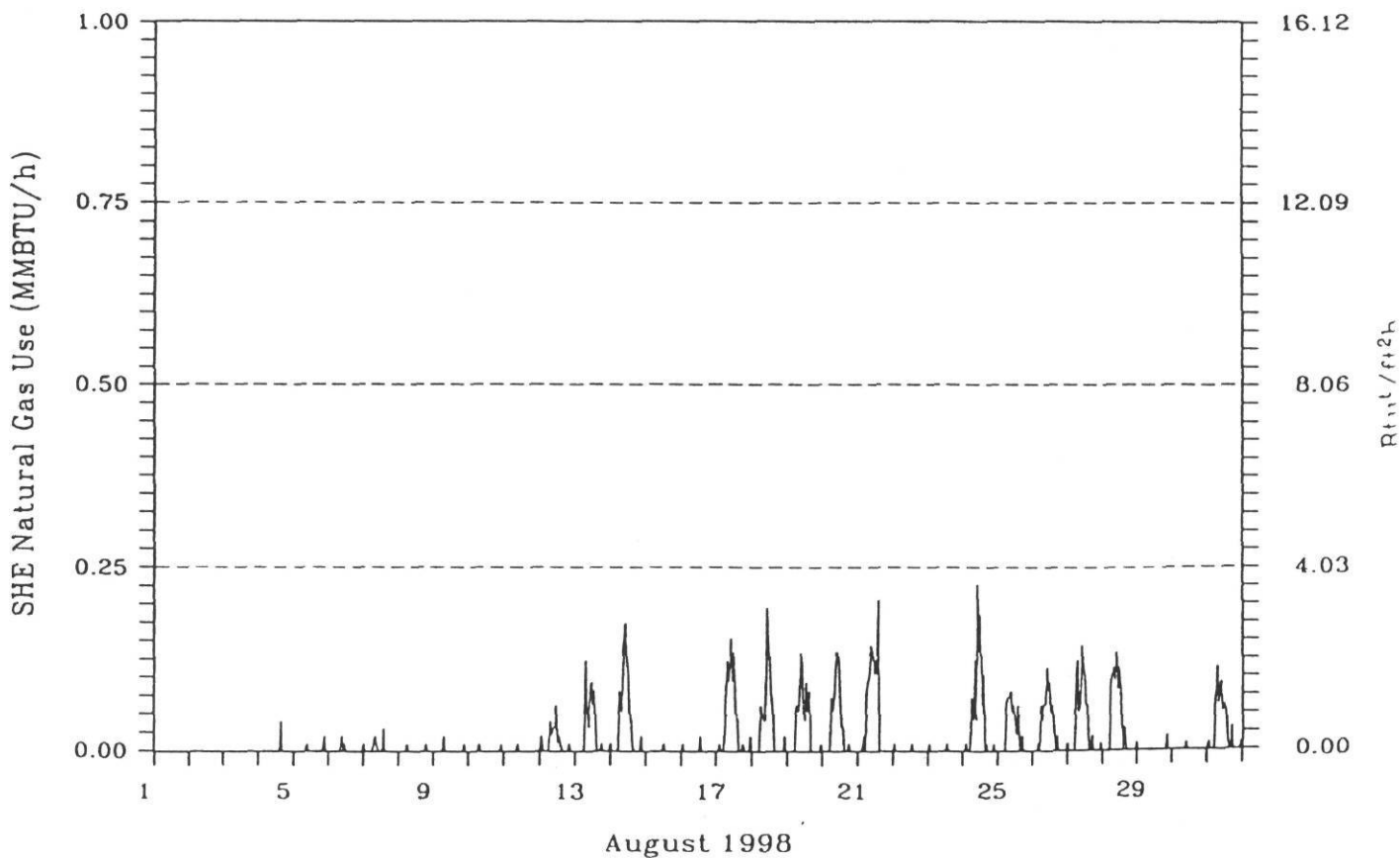
Comments



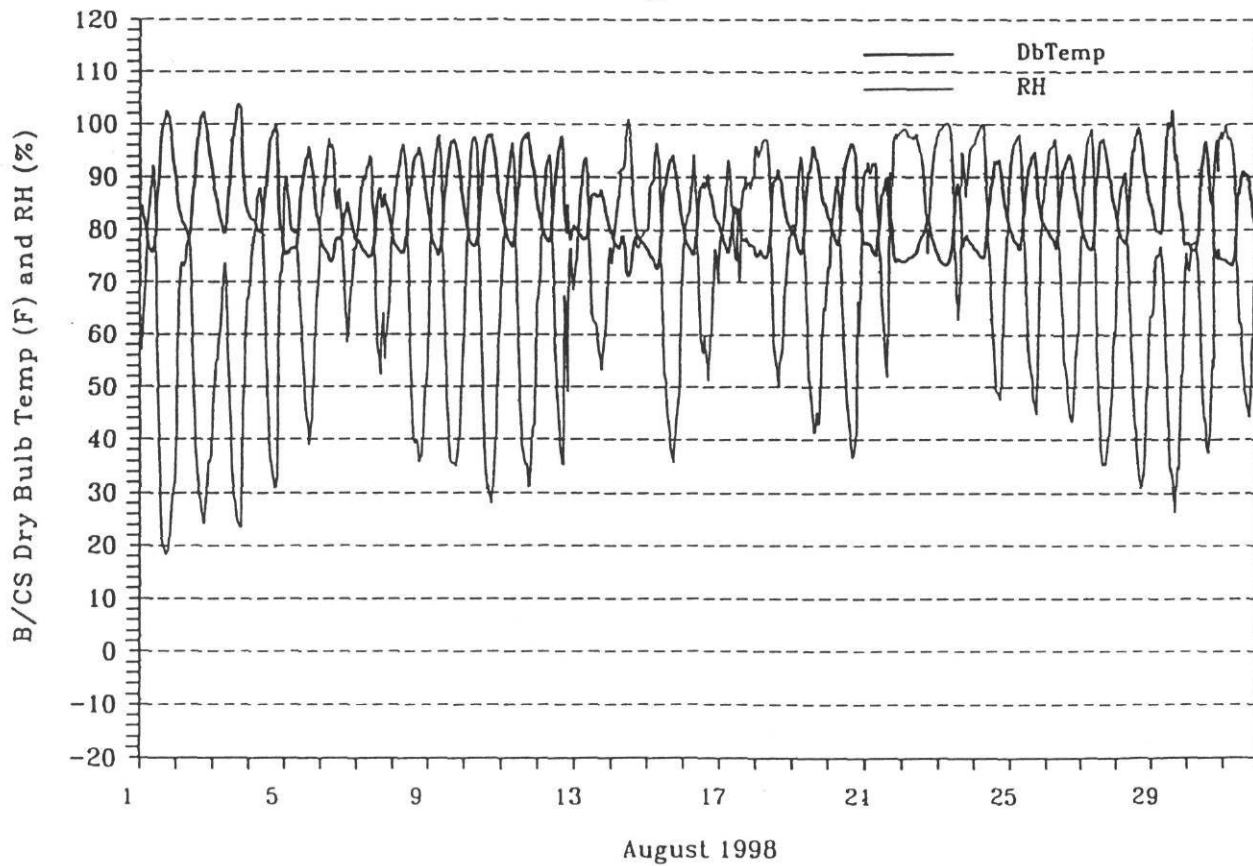
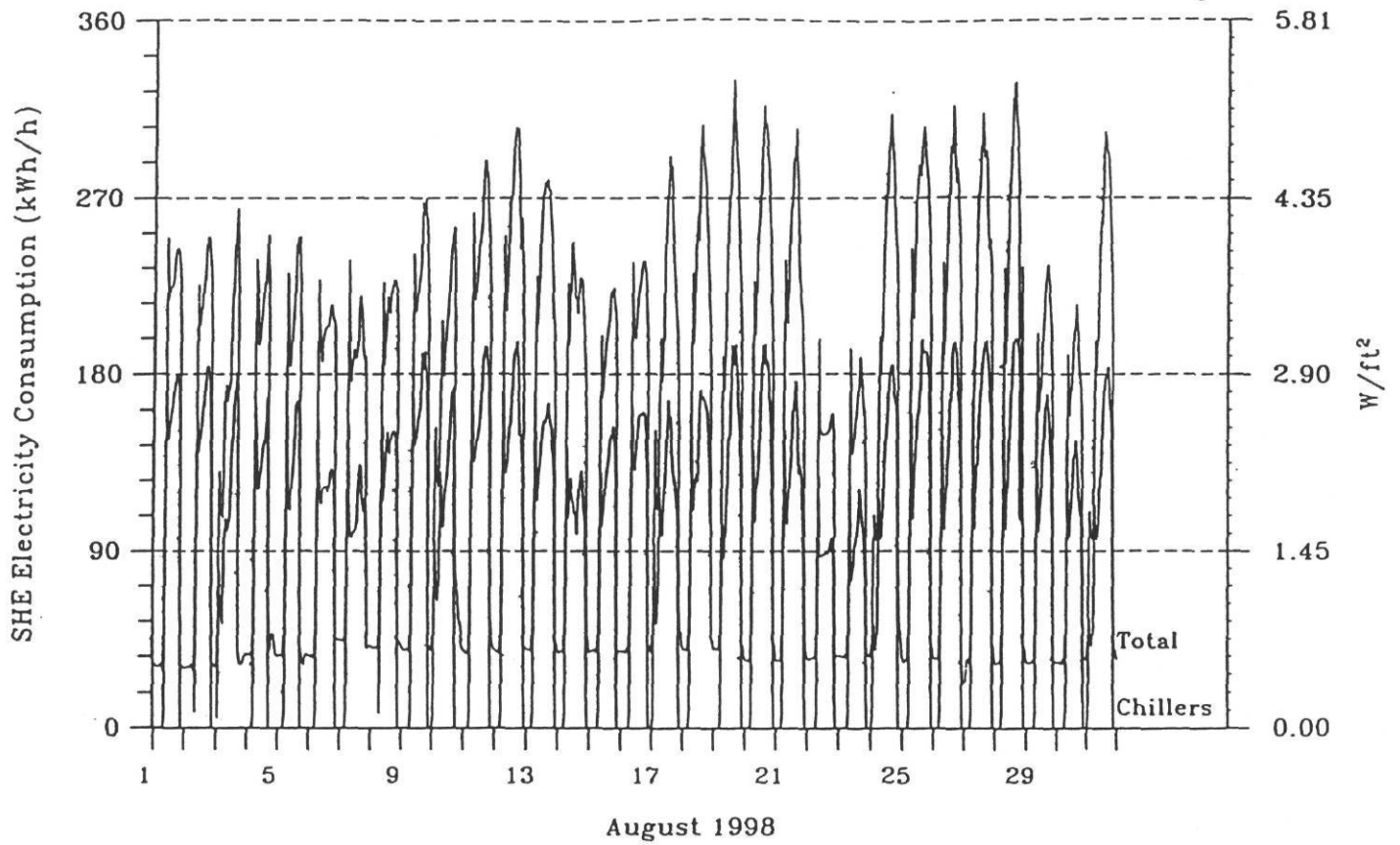
Aug 01 1997 - Aug 31 1998



Data points for the current month are shown as letters. Points from this month last year are shown as +.
 Monday through Sunday are represented as M,T,W,H,F,S,U. All other points are shown as *.

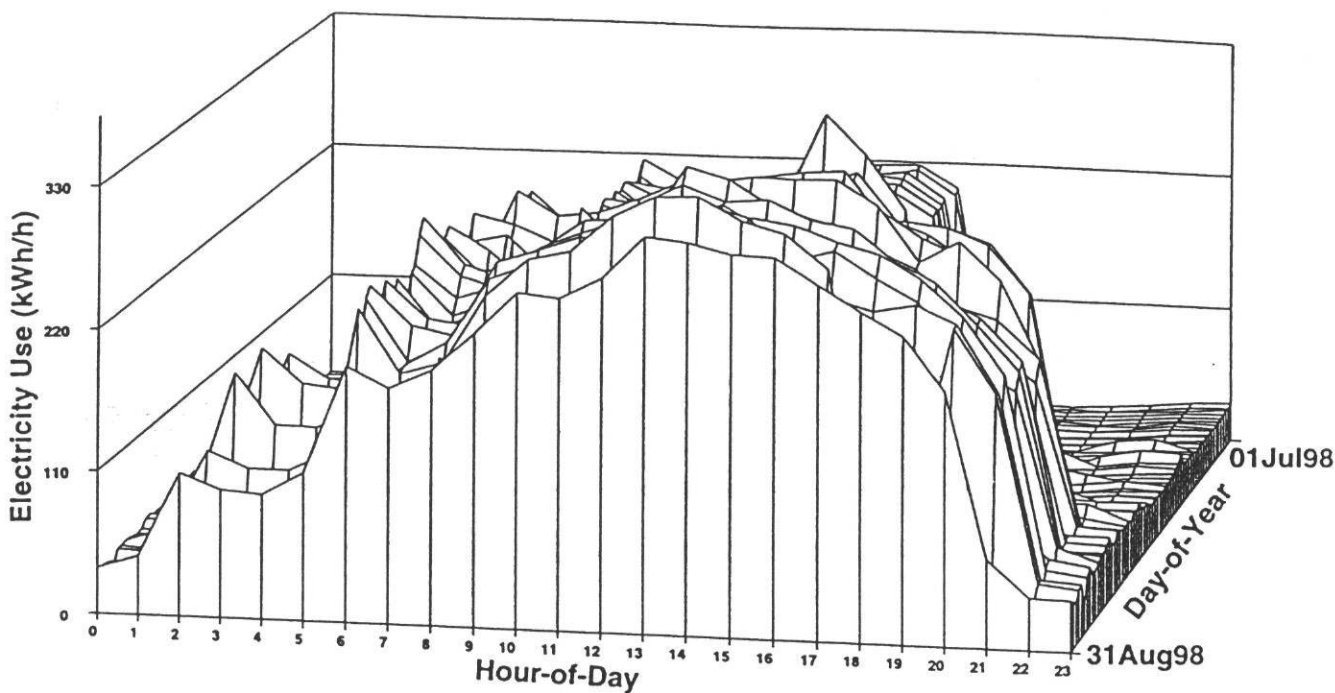


Sam Houston Elementary - Bryan ISD - August 1998

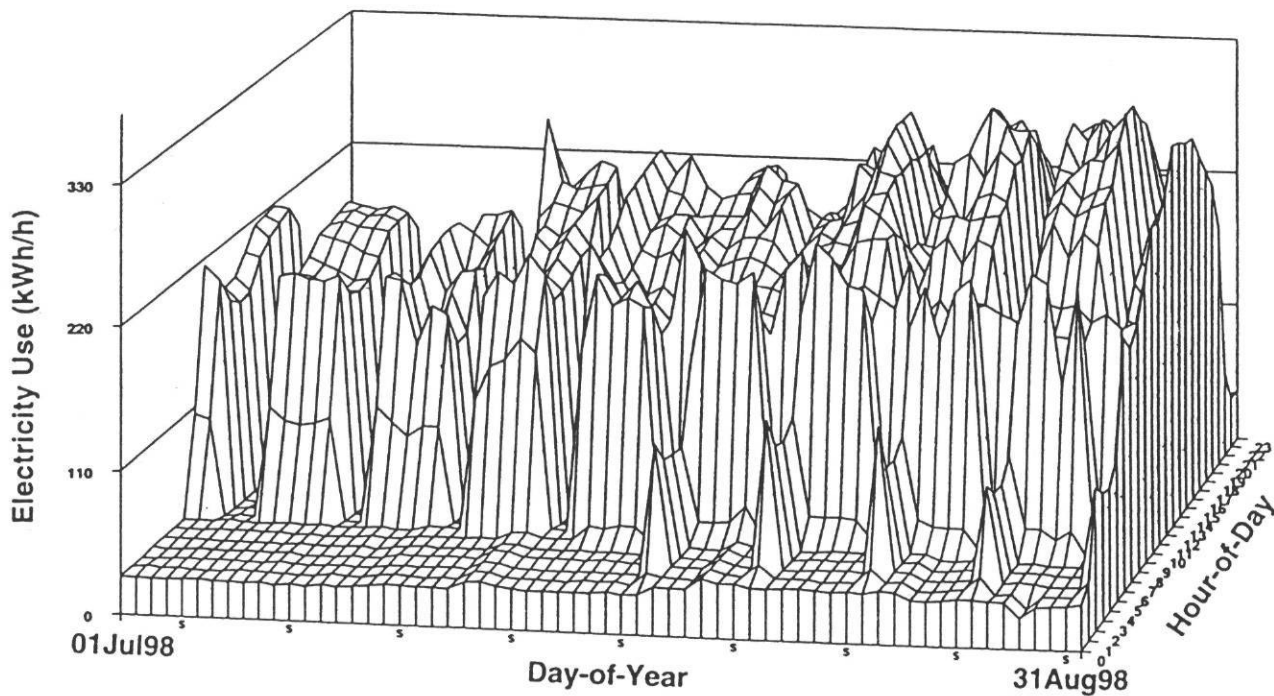


Sam Houston Elementary - Bryan ISD - August 1998

Whole-Building Electric



Whole-Building Electric



Sundays are marked with an "S"

Bryan High School

Bryan ISD
229,033 square feet

Site Contact

Mr. Mike Kristynik
Executive Director
Planning & Operations
101 N. Texas Avenue
Bryan, TX 77803
(409) 361-5200

ESL Metering Contact

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

Summary of Energy Consumption

	Measured Use	% hours reported	Unit Cost	Estimated Cost
Electricity	- kWh	-	\$0.07250	-
Peak 60 Minute Demand	- kW	-	-	-
Natural Gas	62.3 MMBtu	100	\$4.840	\$302

No peak 60 minute demand was recorded this month.
There were 744 hours in this month.

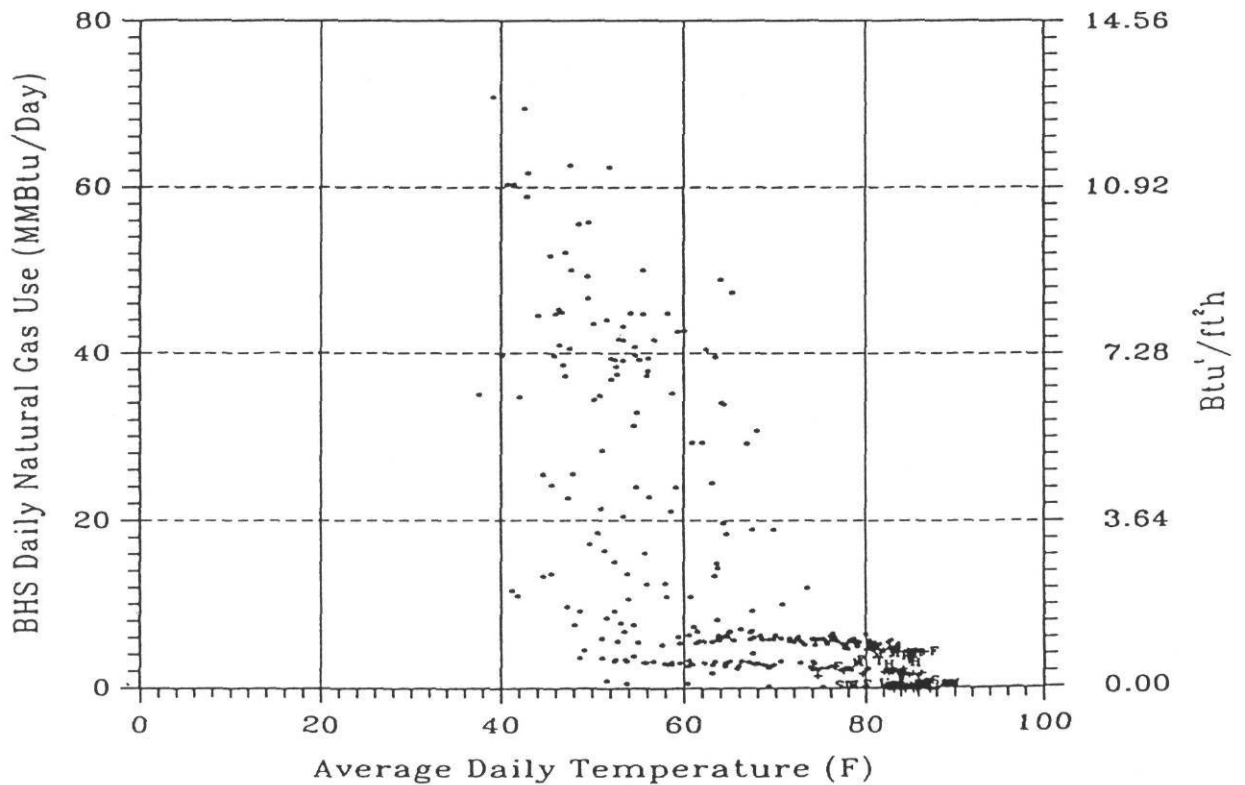
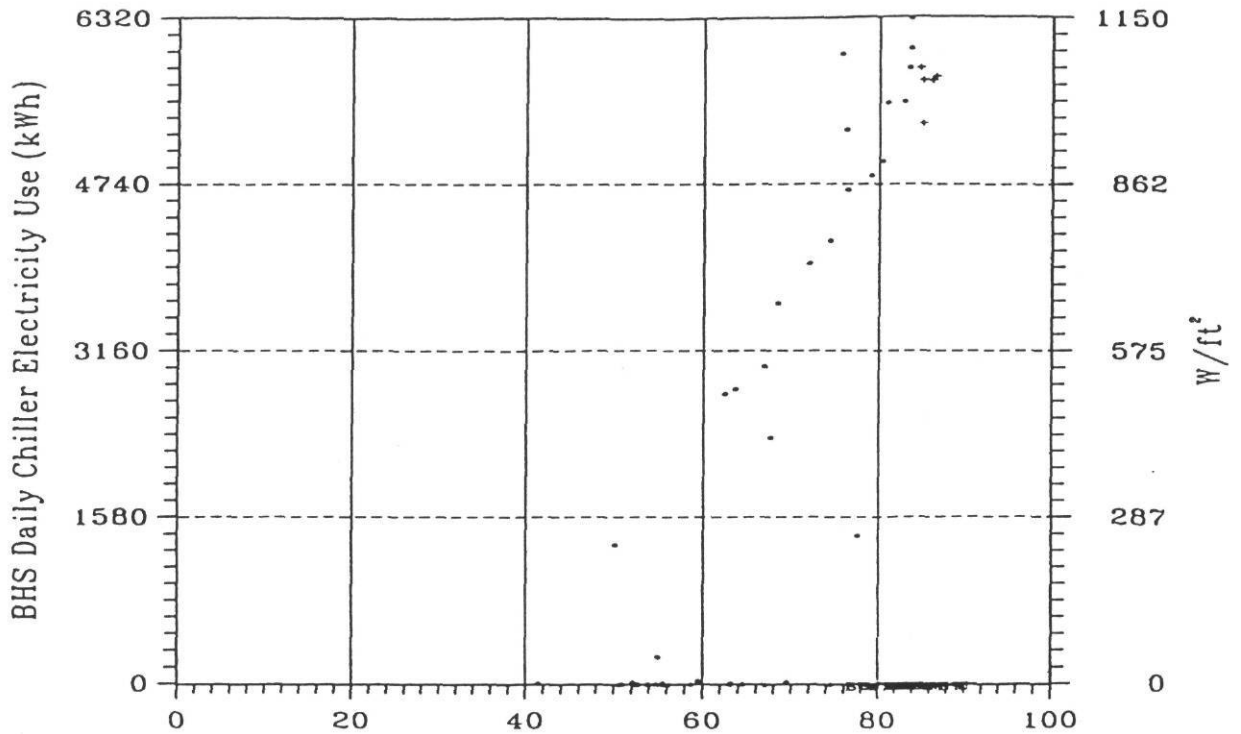
Monthly Retrofit Savings

	Measured Savings		Audit Estimated Savings	
Electricity (kWh)	78258	\$5674	N/A	N/A
Cond./H.W./N.G. (MMBtu)	155	\$748	N/A	N/A
Monthly Total		\$6422		N/A
Total to Date*	(14 months)	\$211982	(14 months)	N/A

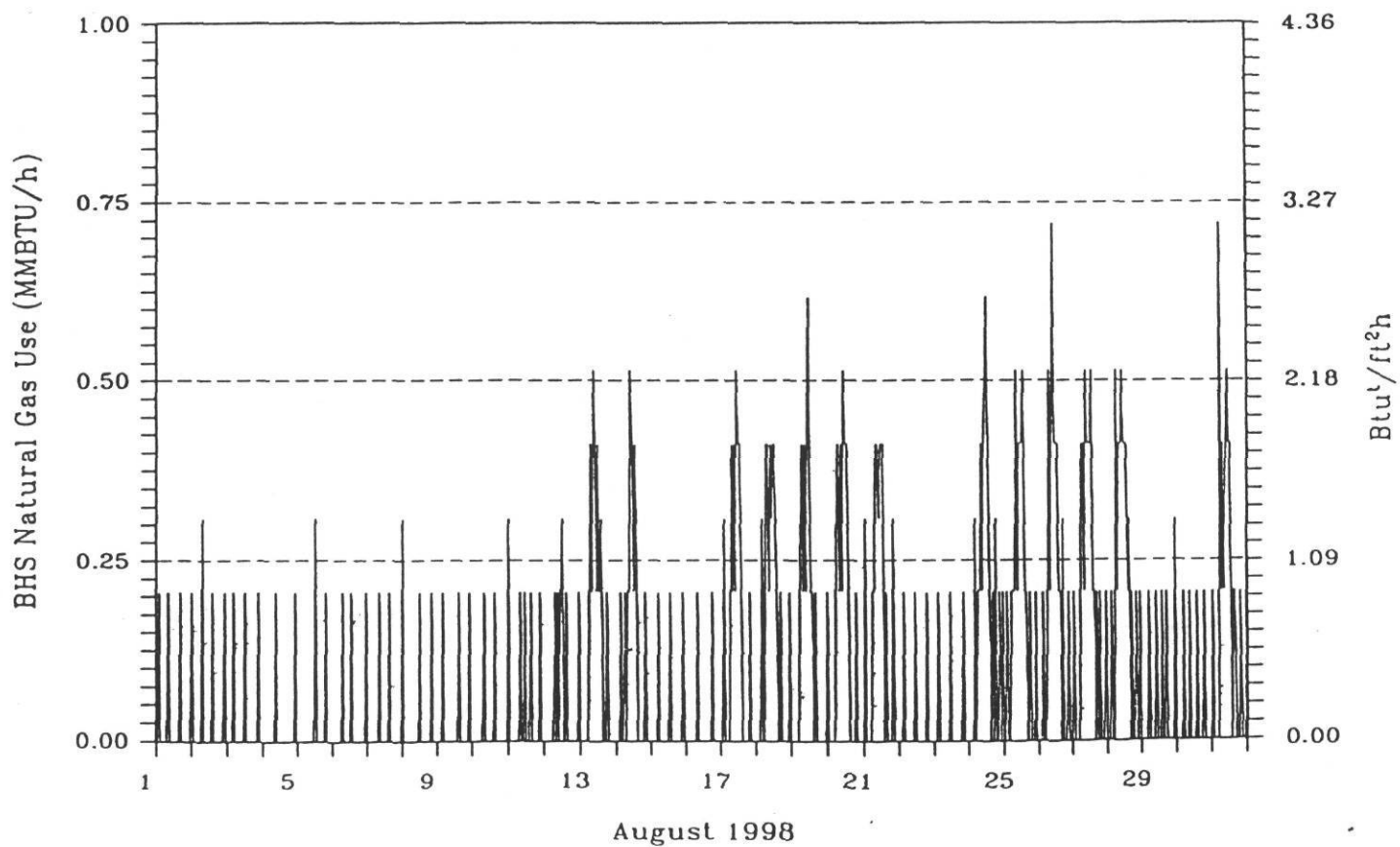
*Measured savings include construction period. Audit estimated savings do not.

Comments

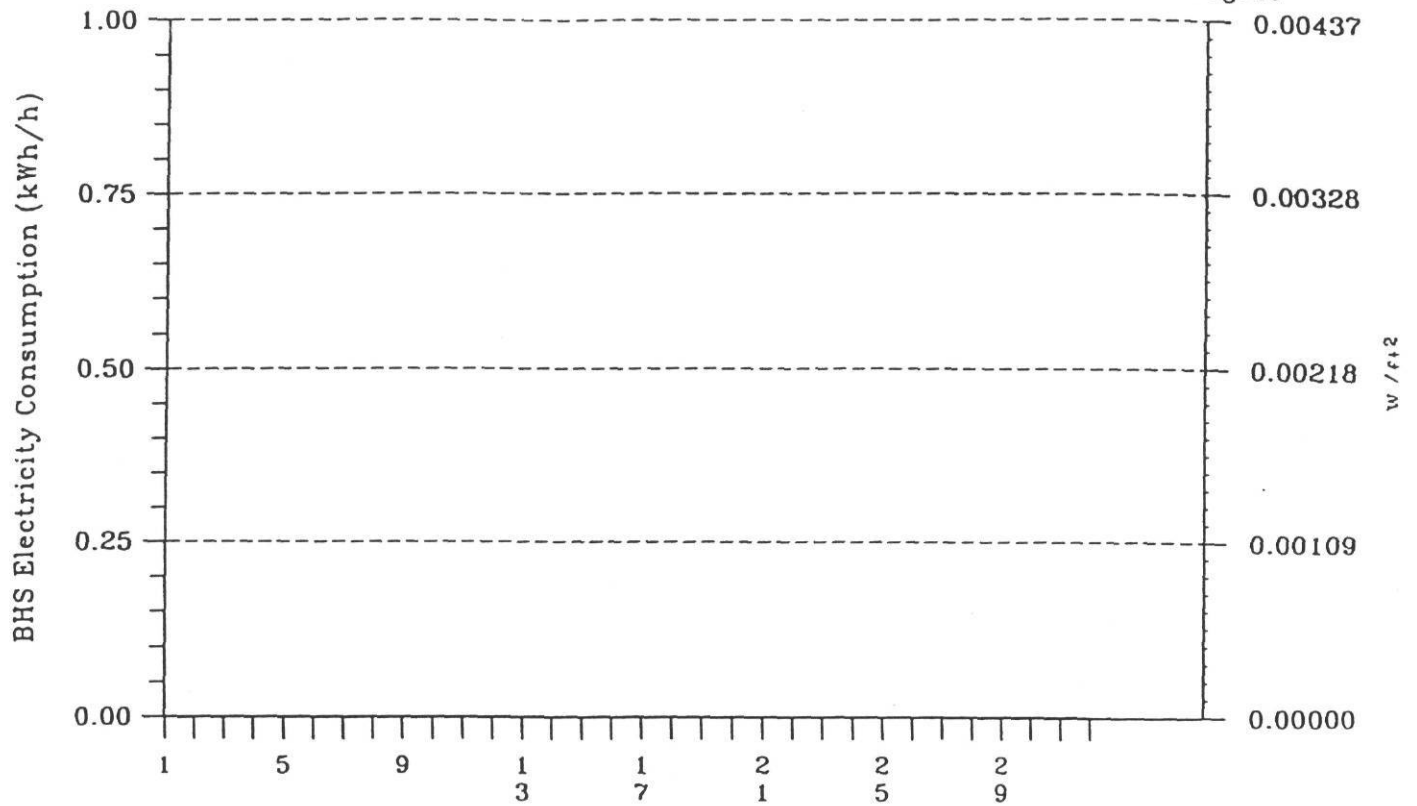
★ Electricity consumption data are missing from 8/1/1998 to 8/31/1998 due to construction.



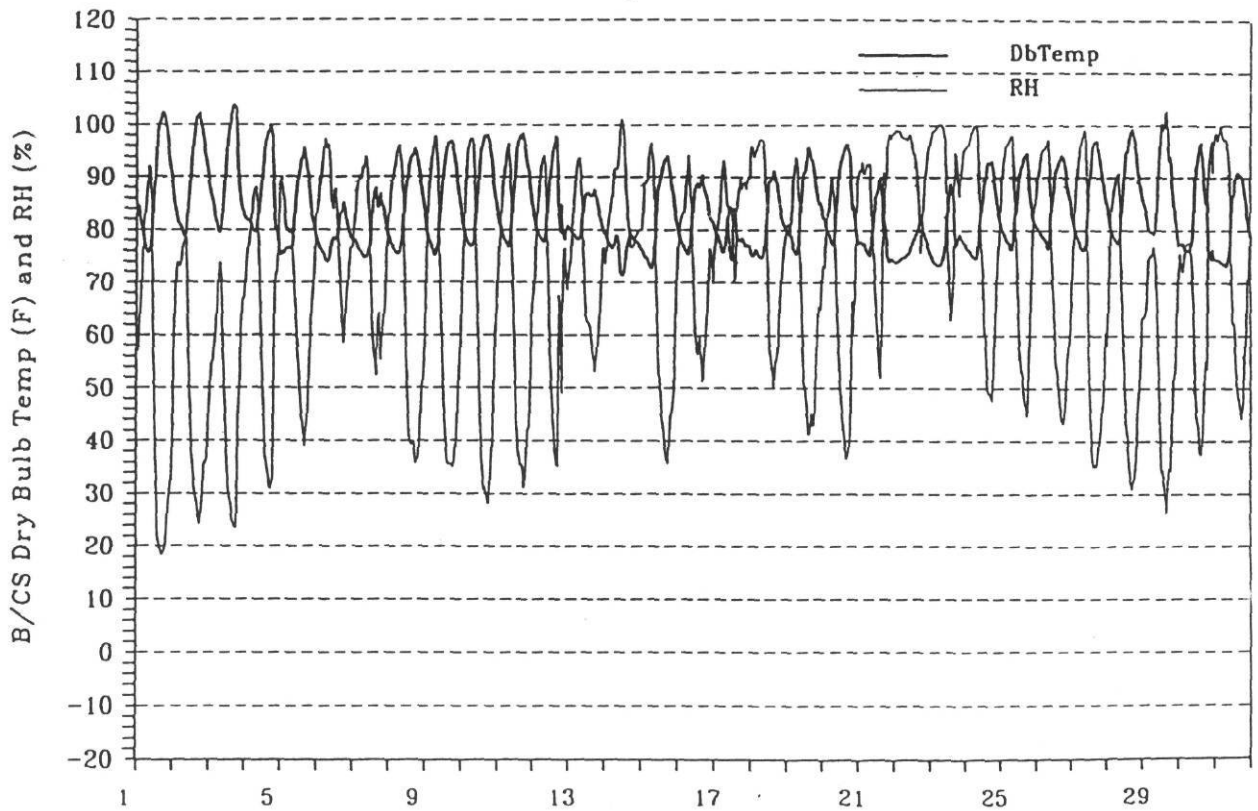
Data points for the current month are shown as letters. Points from this month last year are shown as +.
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Bryan High School - Bryan ISD - August 1998



August 1998



August 1998

Bryan High School - Bryan ISD - August 1998

Rayburn Middle School

Bryan ISD
108,443 square feet

Site Contact

Mr. Mike Kristynik
Executive Director
Planning & Operations
101 N. Texas Avenue
Bryan, TX 77803
(409) 361-5200

ESL Metering Contact

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

Summary of Energy Consumption

	Measured Use	% hours reported	Unit Cost	Estimated Cost
Electricity	182992 kWh	100	\$0.07250	\$13267
Peak 60 Minute Demand	679 kW	100	-	-

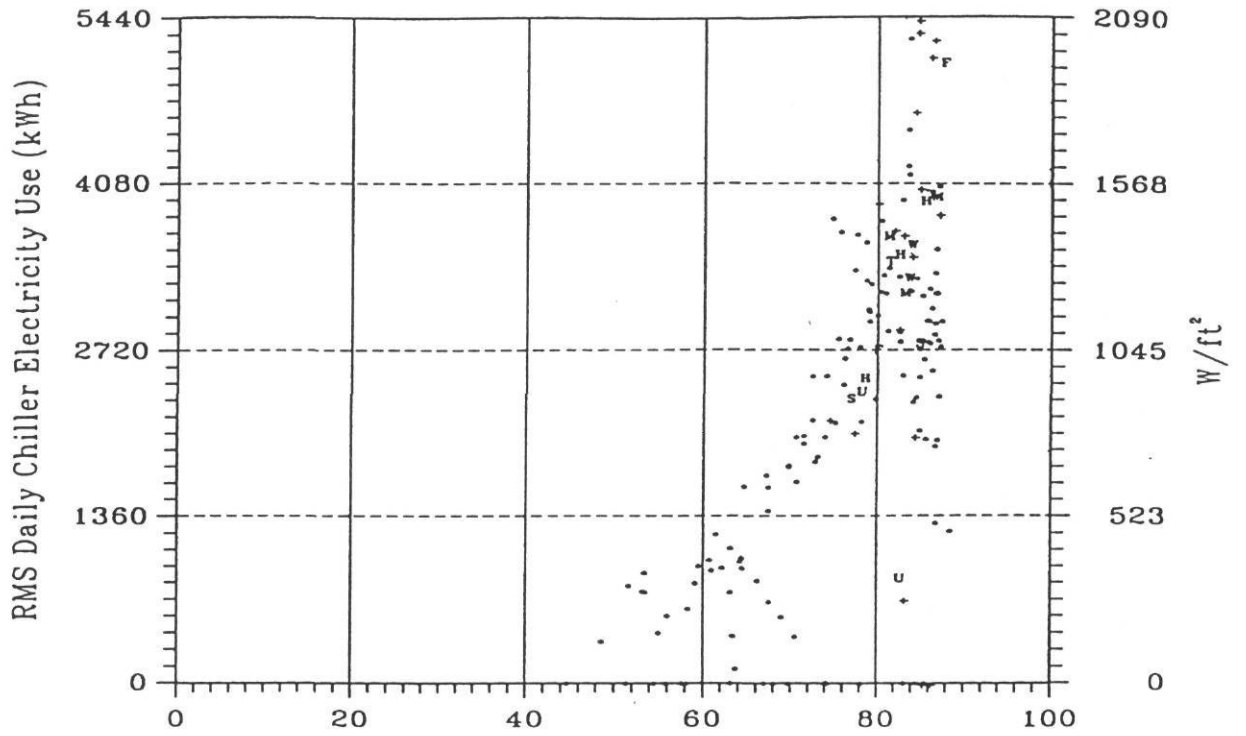
Peak 60 minute demand was recorded at 1500 Friday 08/28/98.
There were 744 hours in this month.

Monthly Retrofit Savings

	Measured Savings		Audit Estimated Savings	
	kWh	\$	kWh	\$
Electricity (kWh)	-13741	\$-996	N/A	N/A
Cond./H.W./N.G. (MMBtu)	-40	\$-192	N/A	N/A
Monthly Total		\$-1188		N/A
Total to Date*	(14 months)	\$30636	(14 months)	N/A

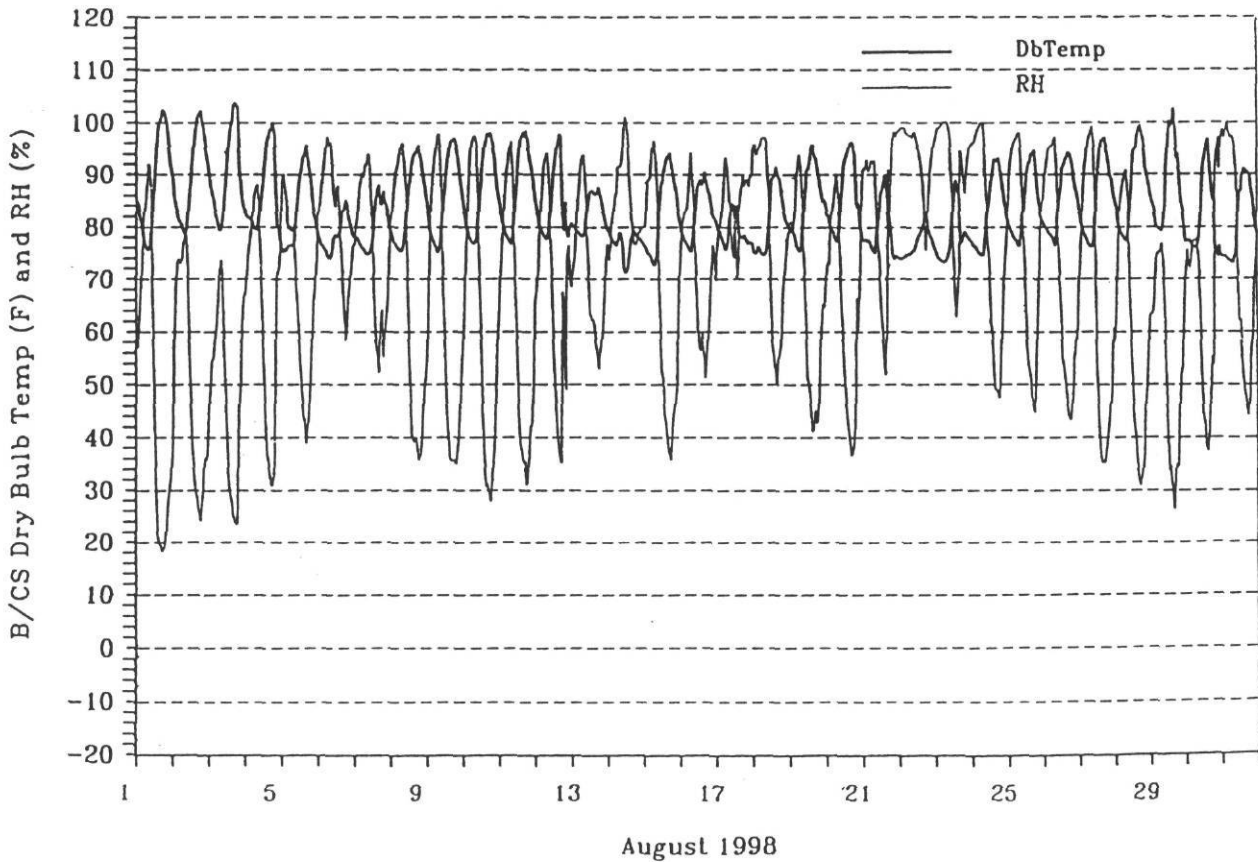
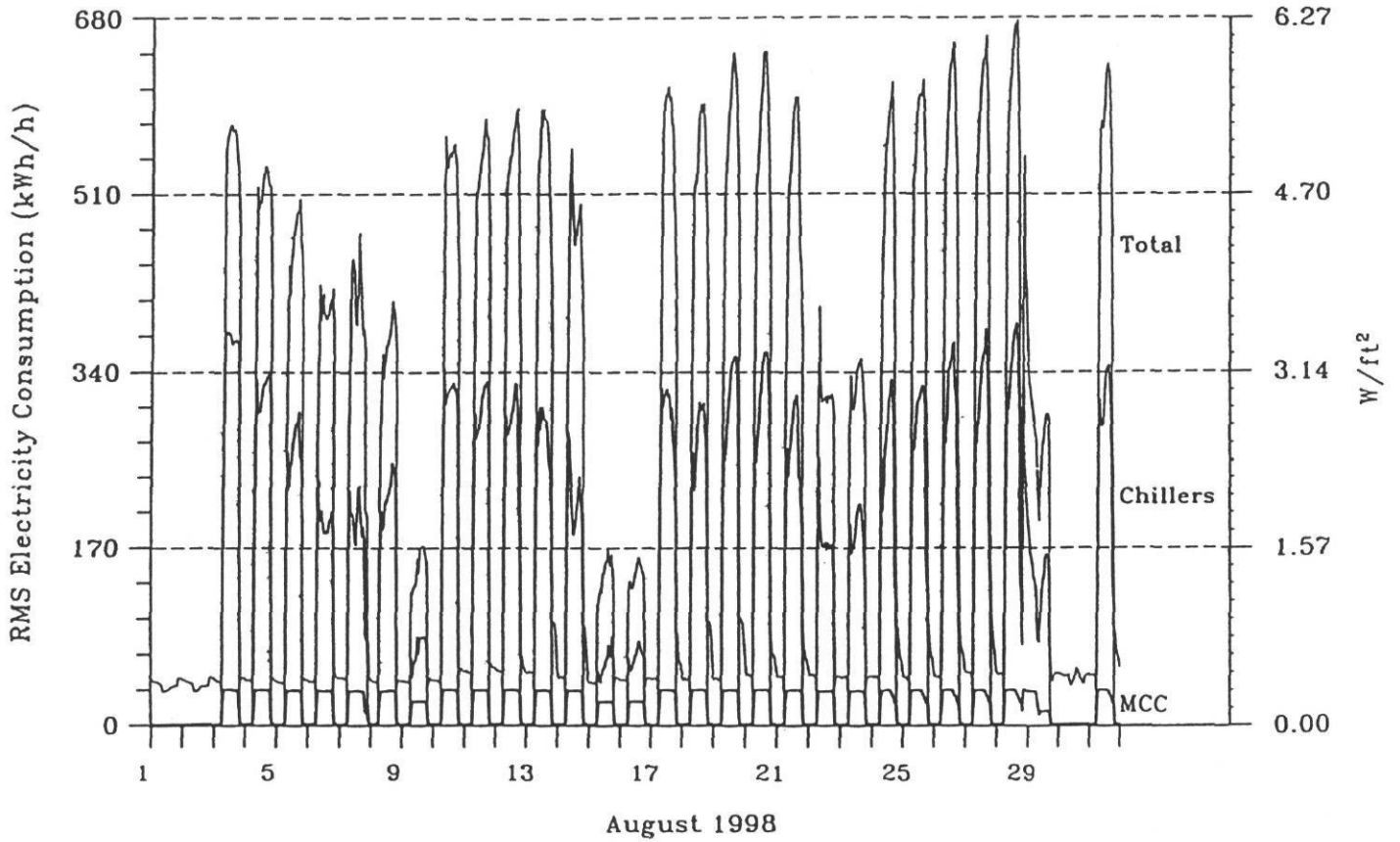
*Measured savings include construction period. Audit estimated savings do not.

Comments



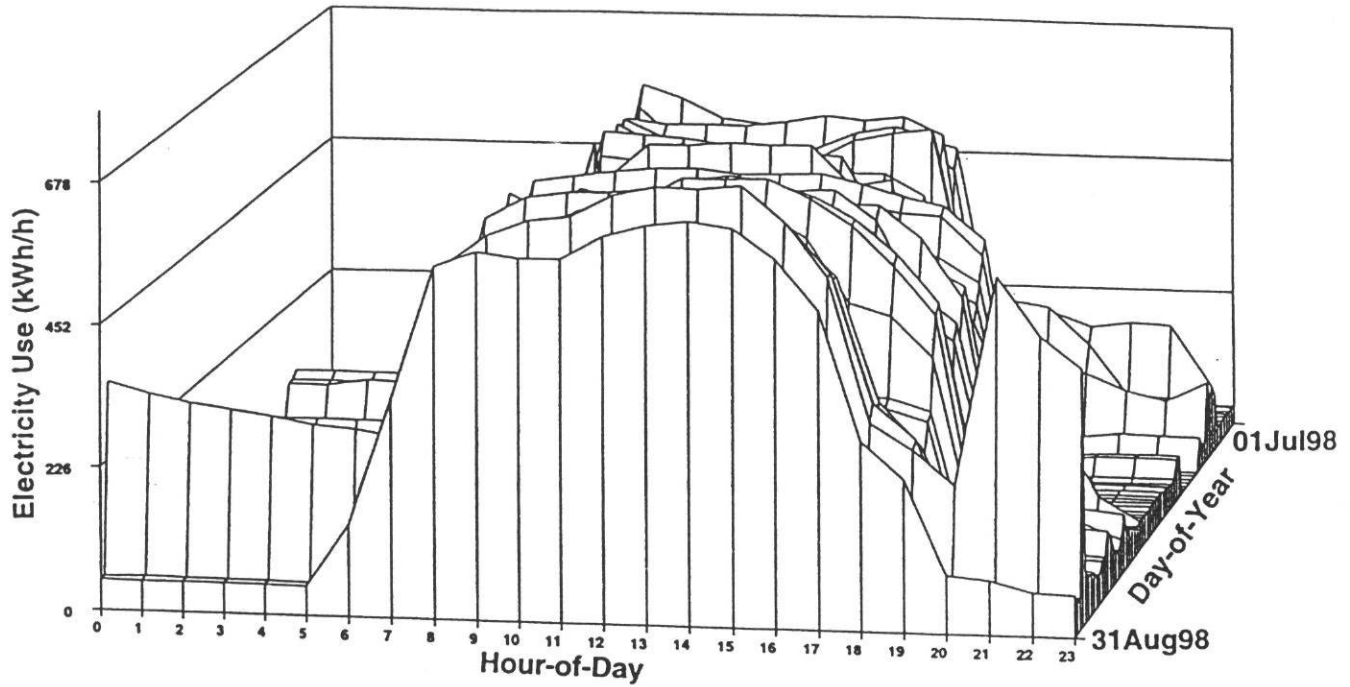
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All other points are shown as *.

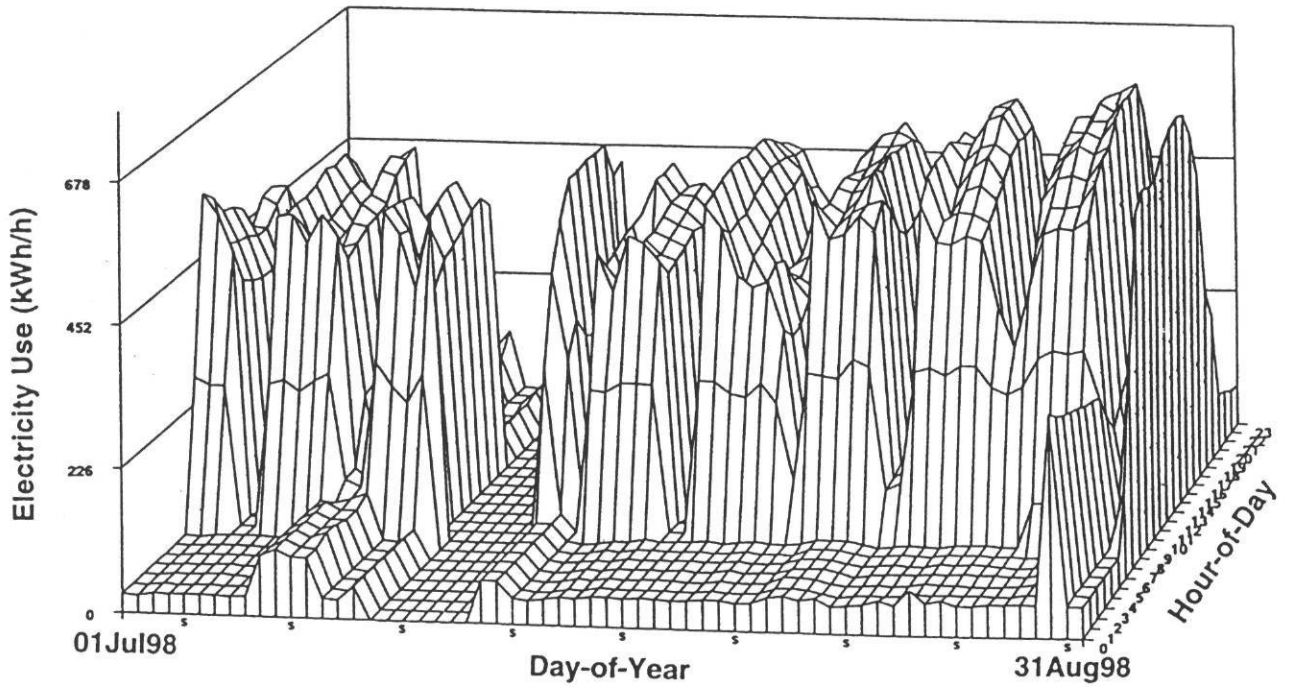


Rayburn Middle School - Bryan ISD - August 1998

Whole-Building Electric



Whole-Building Electric



Sundays are marked with an "S"

BRC
Brazos Center
 Brazos County
 45,000 square feet

Site Contact

Mr. Ed Dobbins
 Plant Maintenance Manager
 Brazos County
 206 North Washington St.
 Bryan, TX 77803

(409) 361-4460

ESL Metering Contact

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

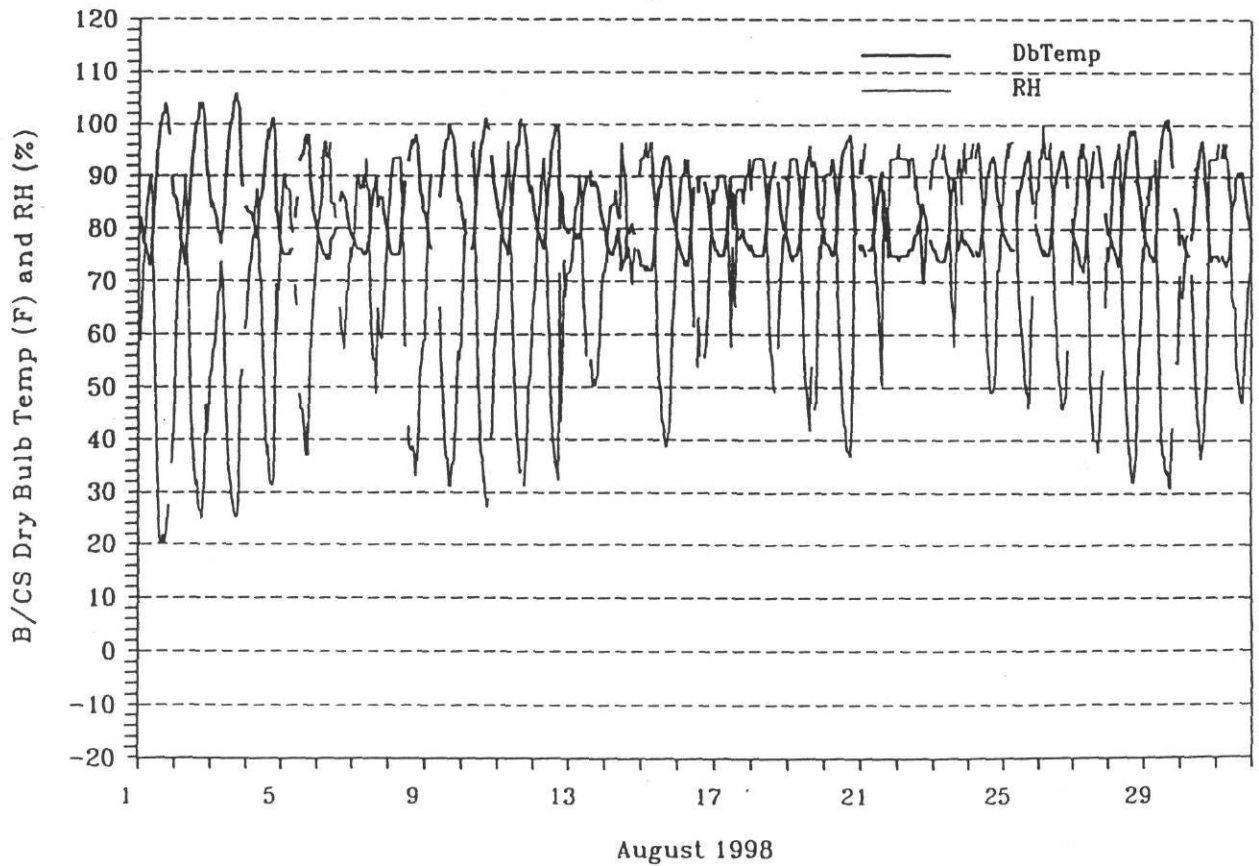
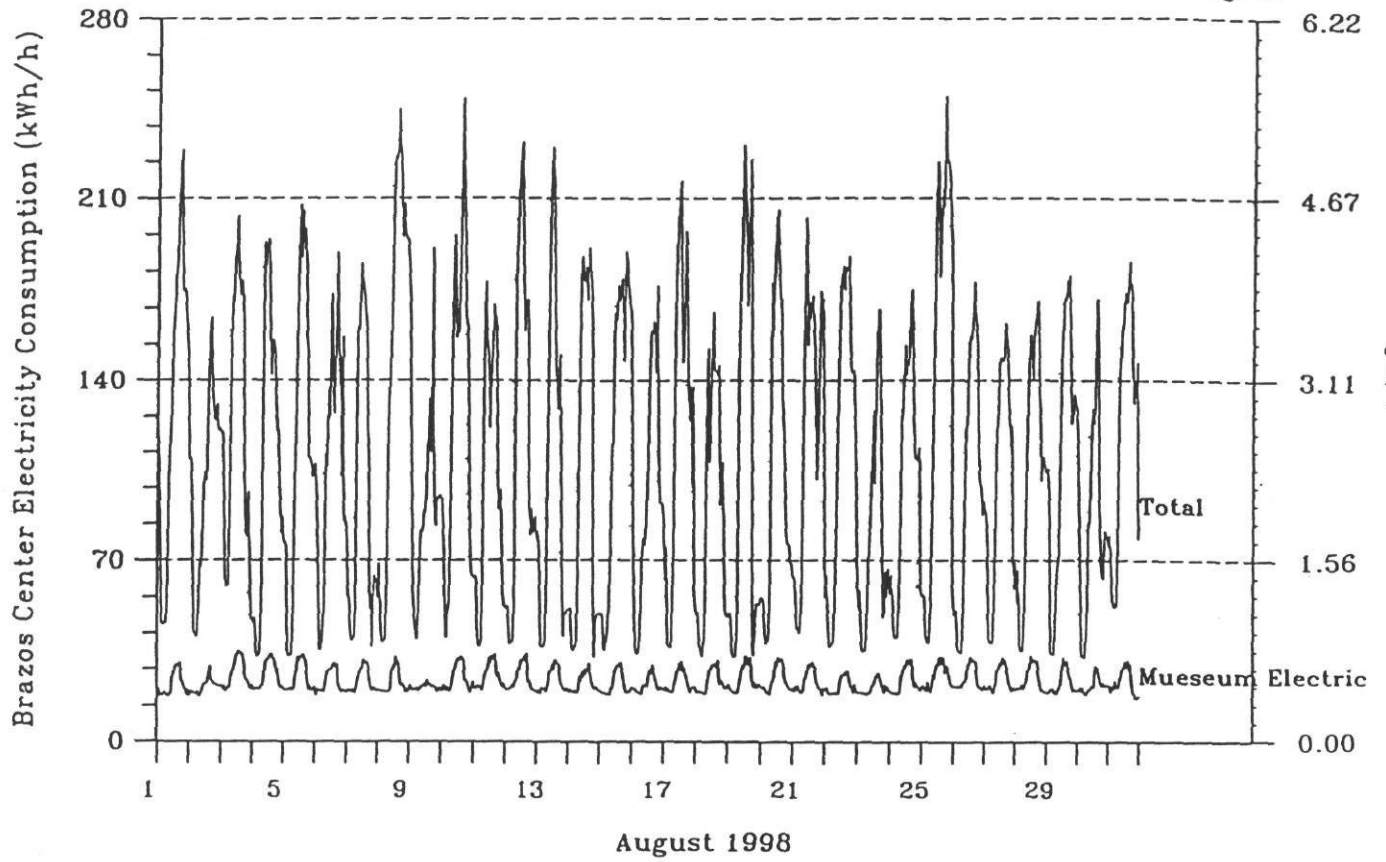
Summary of Energy Consumption

	Measured Use	% hours reported	Unit Cost	Estimated Cost
Electricity	82722 kWh	100	\$0.04300	\$3557
Peak 60 Minute Demand	251 kW	100	\$6.35	\$1589

Peak 60 minute demand was recorded at 1700 Tuesday 08/25/98.
 There were 744 hours in this month.

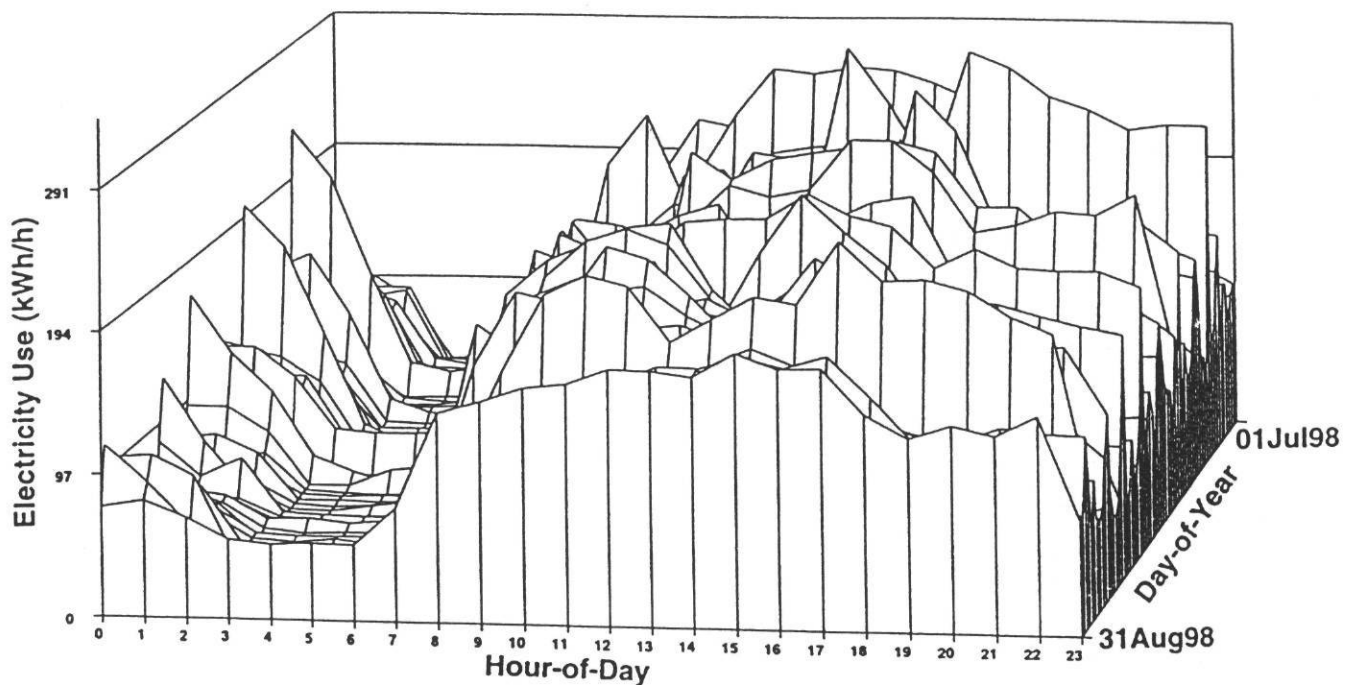
Monthly Retrofit Savings

Comments

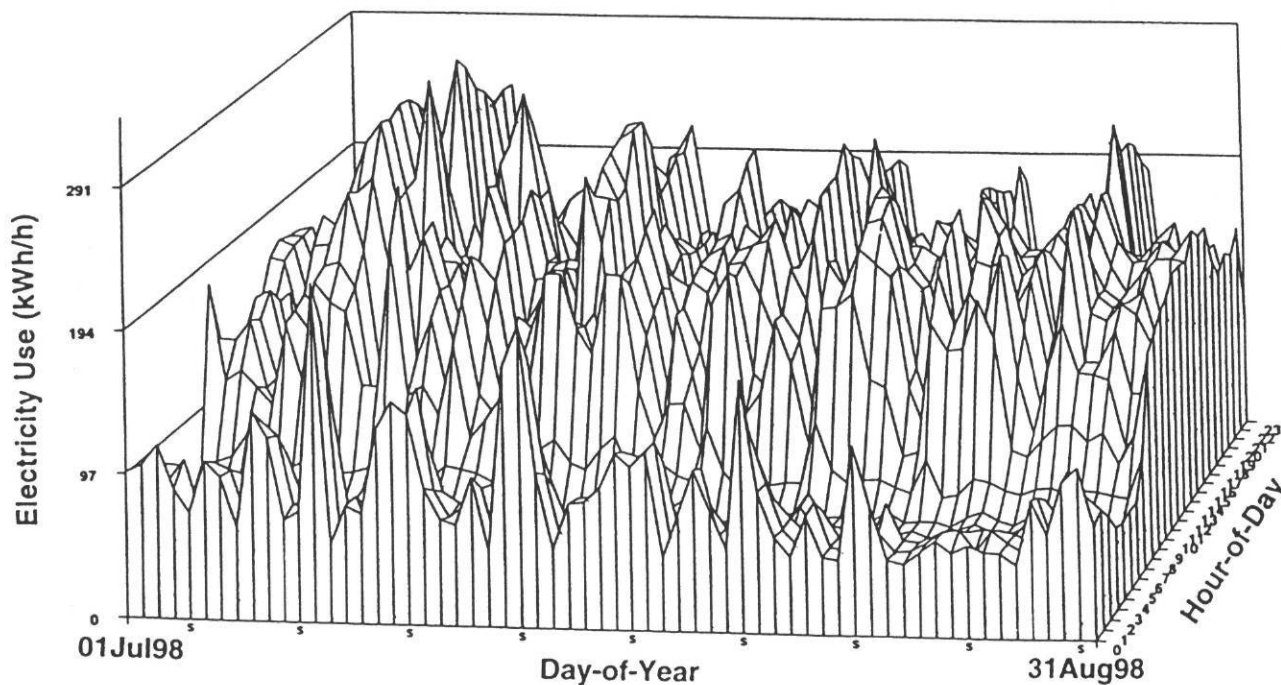


BRC - Brazos Center - Brazos County - August 1998

Whole-Building Electric



Whole-Building Electric



Sundays are marked with an "S"

BCA
Brazos County Courthouse Annex
 Brazos County
 20,288 square feet

Site Contact

Mr. Ed Dobbins
 Plant Maintenance Manager
 Brazos County
 206 North Washington St.
 Bryan, TX 77803

(409) 361-4460

ESL Metering Contact

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

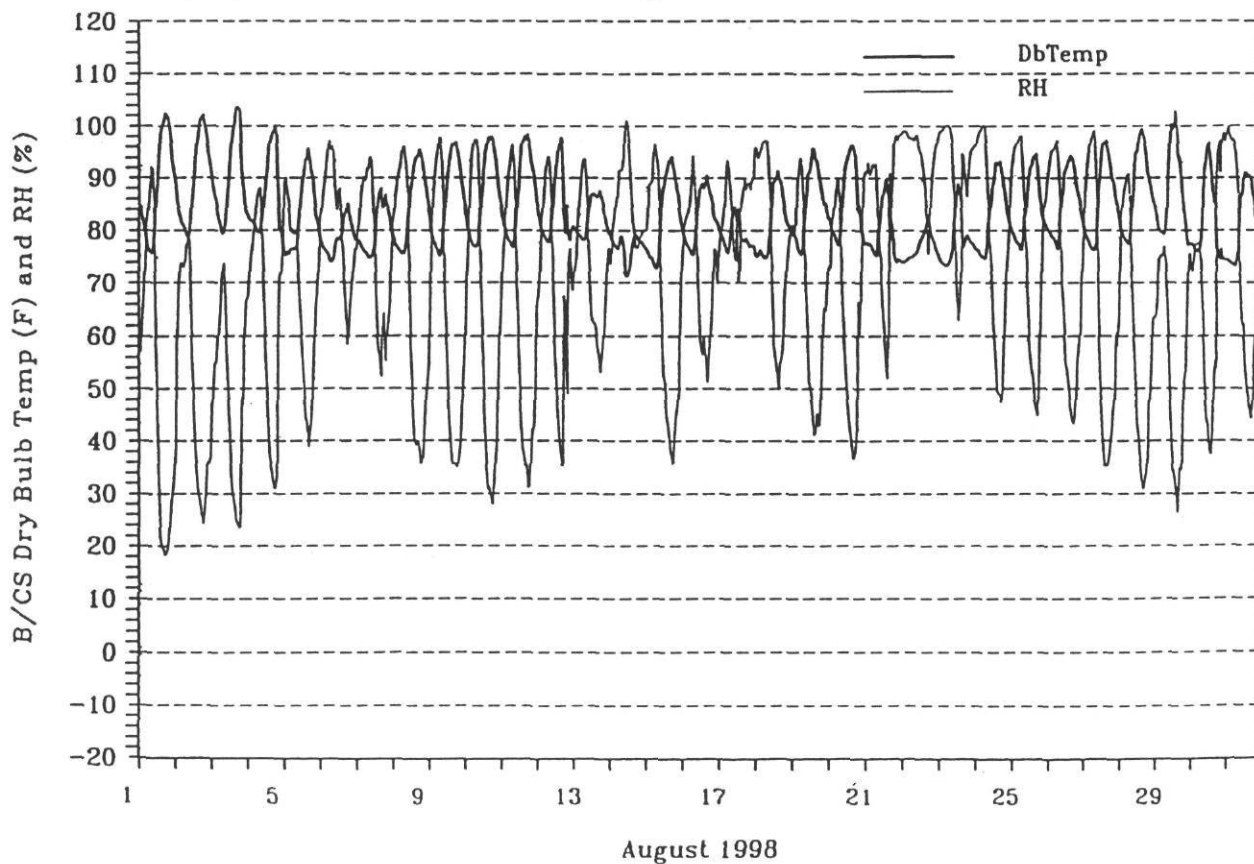
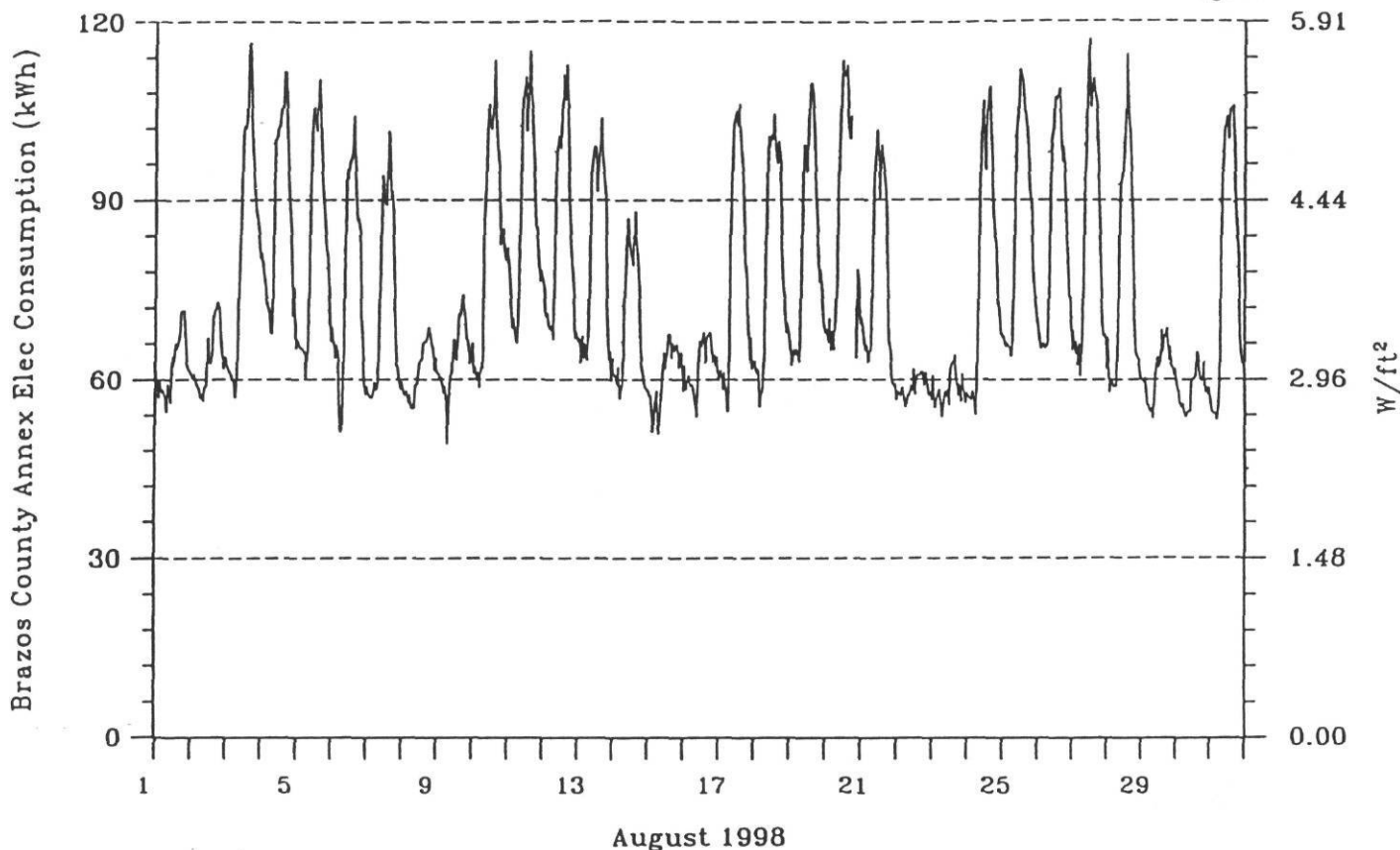
Summary of Energy Consumption

	Measured Use	% hours reported	Unit Cost	Estimated Cost
Electricity	55375 kWh	100	\$0.05050	\$2796
Peak 60 Minute Demand	118 kW	100	\$7.35	\$862

Peak 60 minute demand was recorded at 1200 Thursday 08/27/98.
 There were 744 hours in this month.

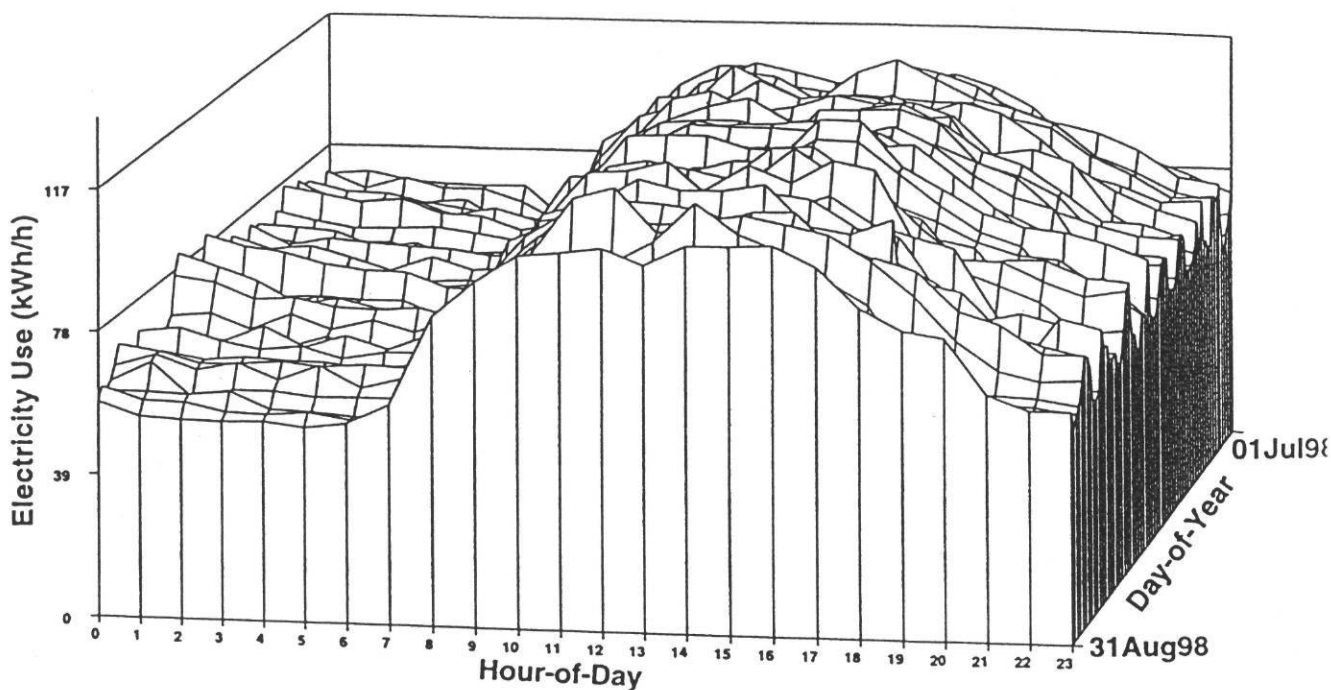
Monthly Retrofit Savings

Comments

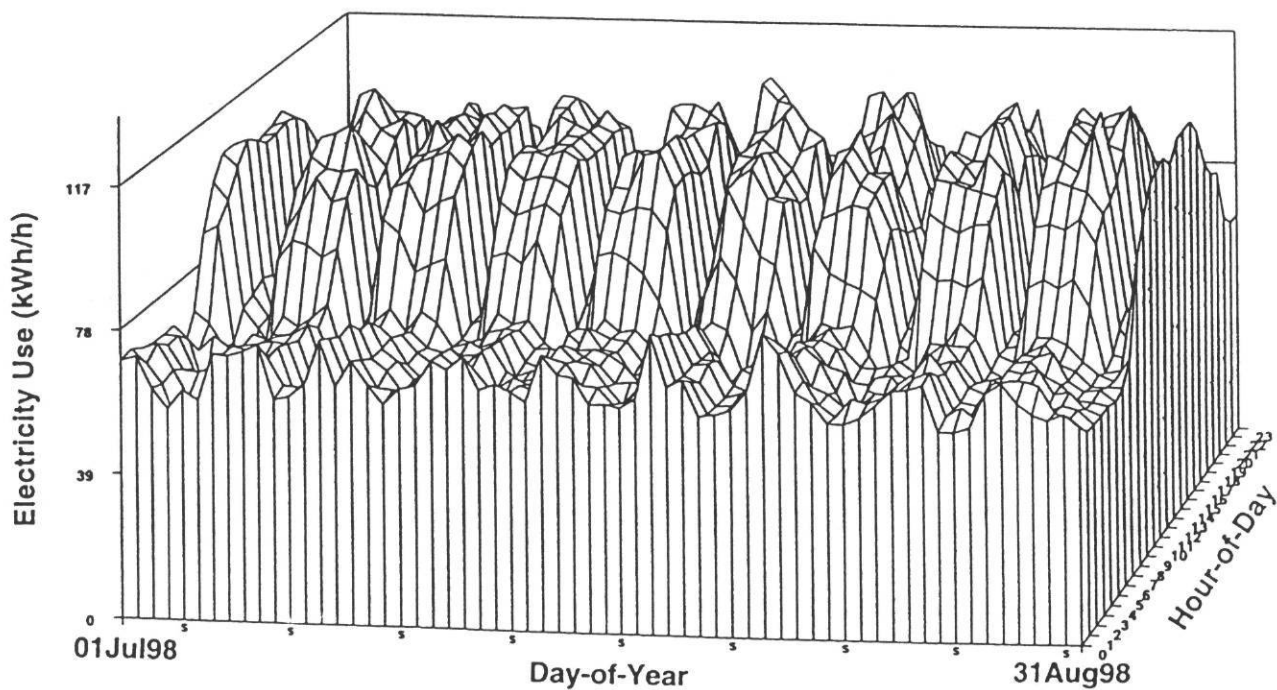


BCA - Brazos County Courthouse Annex - Brazos County - August 1998

Whole-Building Electric



Whole-Building Electric



Sundays are marked with an "S"

BCC
Brazos County Courthouse
 Brazos County
 100,000 square feet

Site Contact

Mr. Ed Dobbins
 Plant Maintenance Manager
 Brazos County
 206 North Washington St.
 Bryan, TX 77803

 (409) 361-4460

ESL Metering Contact

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

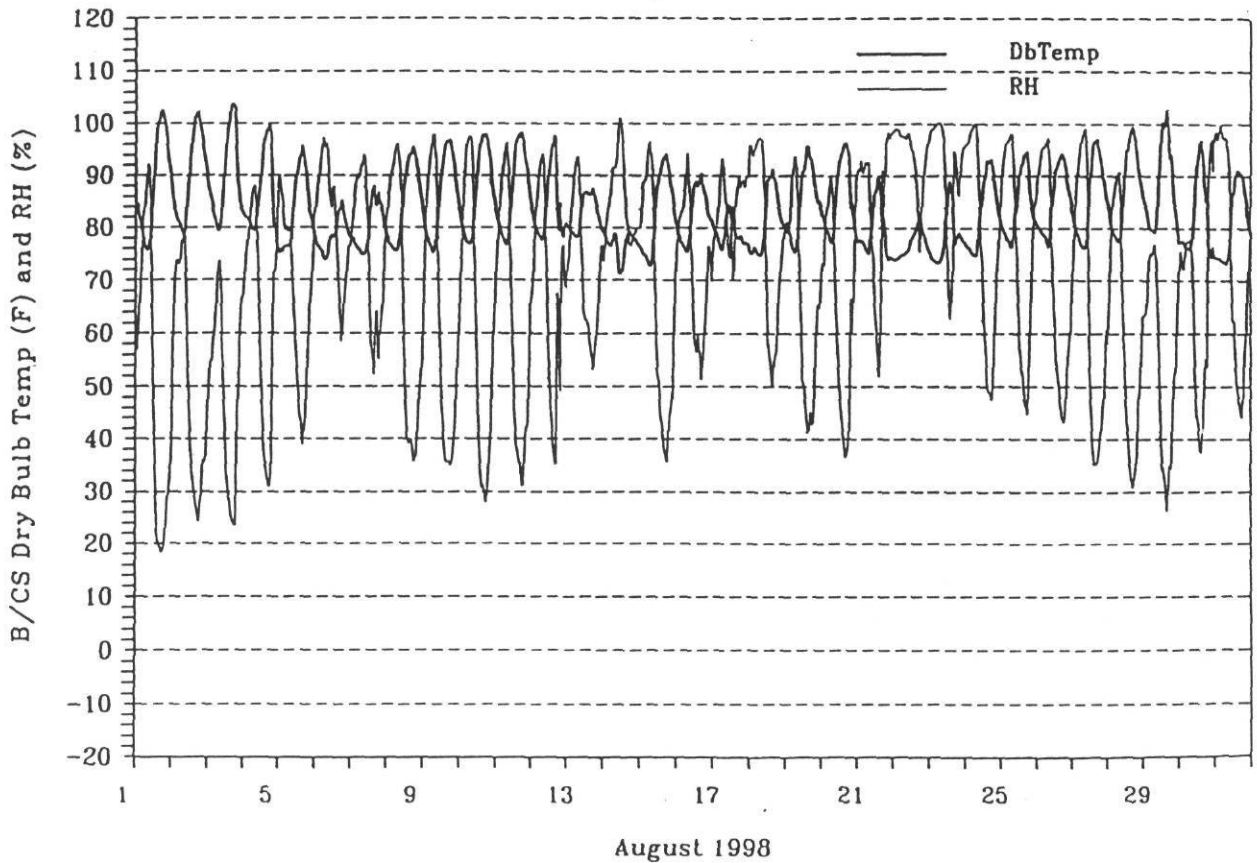
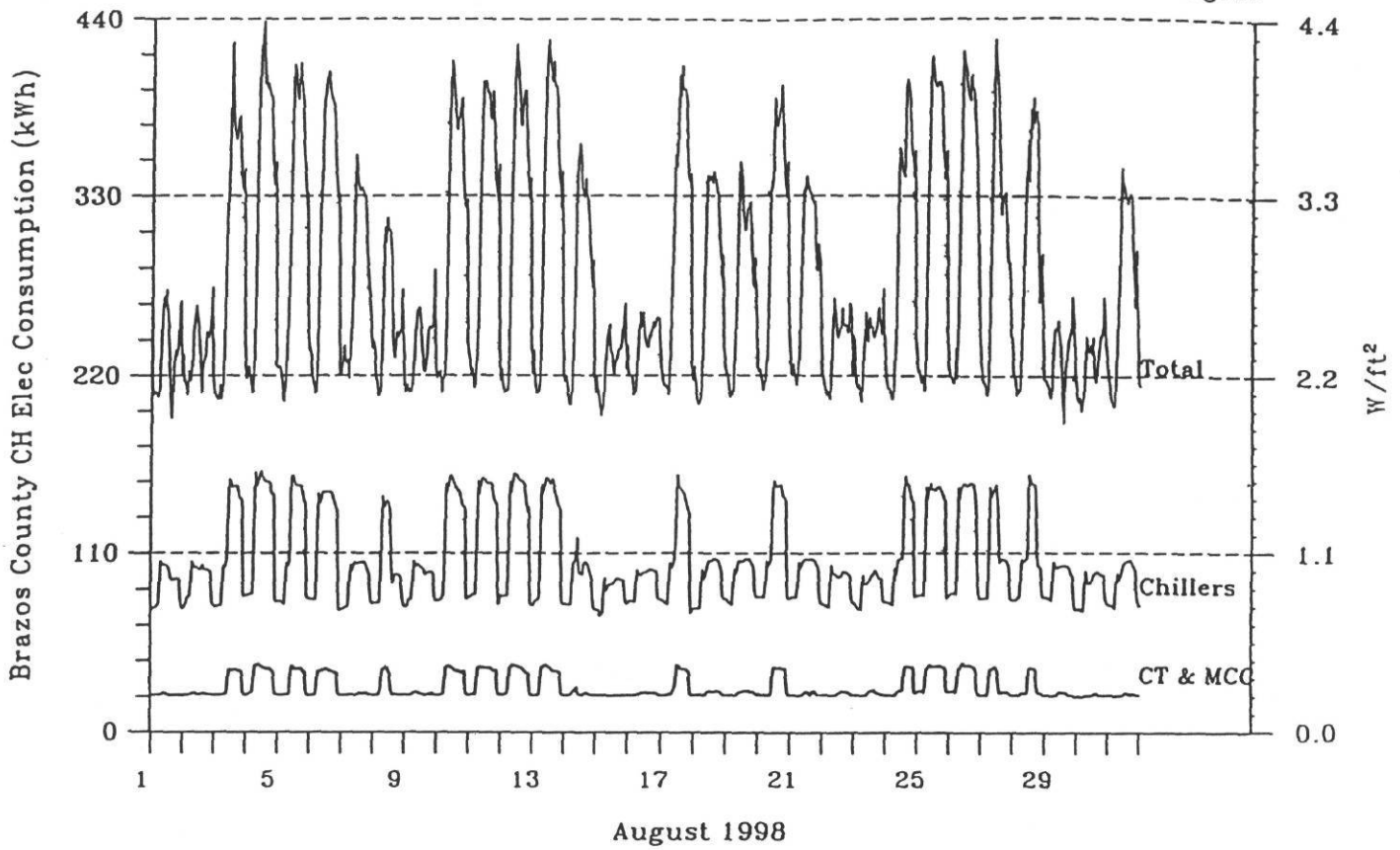
Summary of Energy Consumption

	Measured Use	% hours reported	Unit Cost	Estimated Cost
Electricity	209529 kWh	100	\$0.05050	\$10581
Peak 60 Minute Demand	440 kW	100	\$7.35	\$3228

Peak 60 minute demand was recorded at 1100 Tuesday 08/04/98.
 There were 744 hours in this month.

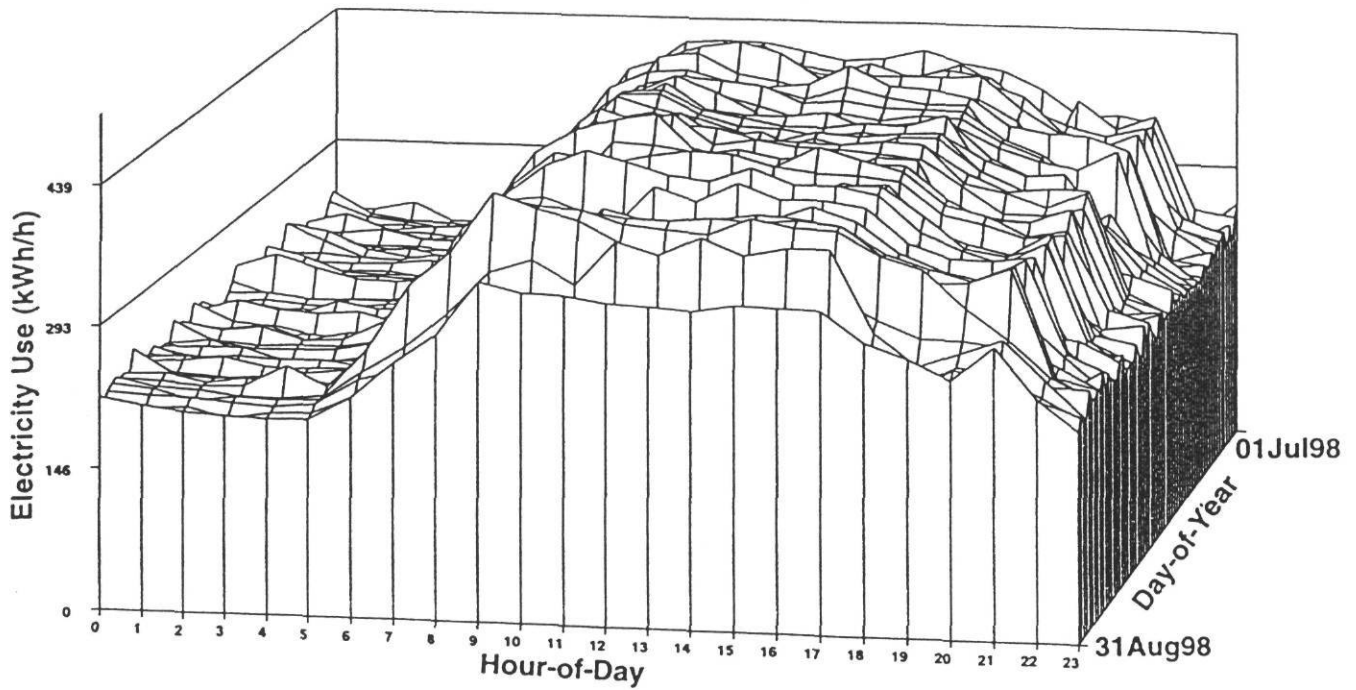
Monthly Retrofit Savings

Comments

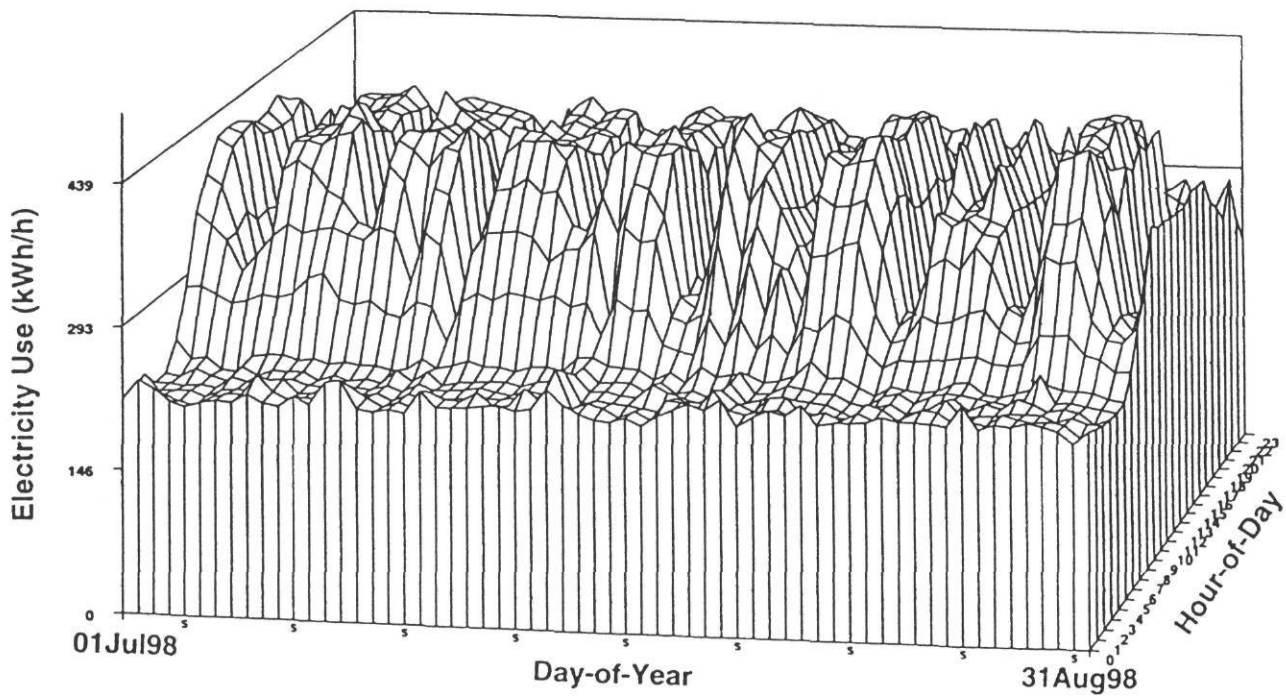


BCC - Brazos County Courthouse - Brazos County - August 1998

Whole-Building Electric



Whole-Building Electric



Sundays are marked with an "S"

APPENDIX C

BUILDINGS MONITORED

UNDER

REBUILD AMERICA PROGRAM

Buildings Monitored Under Rebuild America Program

Code	Logger #	Region	Building	# of MECR Sites	# of Loans	# of Bldg.	Area Sq-ft	Recommended Retrofits	Retrofit Completion Date
			BRYAN ISD		1				
BHS	971	B	Bryan High School				229,033	Lights, CWR, HWR, H/C DR, INS, NSB, TC, EMCS	Completed 1997
RAY	972	B	Sam Rayburn Middle School				108,443	Lights, CHWR, HWR, EMCS, H/C DR, INS, NSB,	Completed 1997
HOU	970	B	Sam Houston Elementary School				62,000	Lights, VAV, VFD, CWR, HWR, INS, NSB, TC, EMCS	Completed 1997
			BRAZOS COUNTY		1				
CTH	973	B	Brazos County Courthouse				100,000	VAV at AC1&2, Heat Recovery at AC1&2, AHU Mod.	Construction
ANN	974	B	Brazos County Courthouse Annex				20,288	Lights (Incd.), MS, VAV	Construction
BCR	975	B	Brazos Center				45,000	VAV (AHUs), VSP	Construction
			WICHITA FALLS ISD		2				
MJH		T	McNeil Junior High School				117,585	HSM, HVACSM, EMCS	Design/Const.
BJH		T	Barwise Junior High School				89,904	EMCS, Lights, HSM, HVACSM	Design/Const.
CAC		T	Carrigan Center				64,692	CR, Lights, EMCS	Design/Const.
WHS		T	Wichita Falls High School				376,201	Lights, EMCS	Design/Const.
KJH		T	Kirby Junior High School				112,736	EMCS	Design/Const.
HHS		T	Hirschi High School						Design/Const.
			SAN MARCOS ISD		1				
CES		T	Crockett Elementary School				56,550	Lights, HVACSM, HSM, Possible EMCS	Design
GJH		T	Goodnight Junior High School				109,835	Lights, HVACSM, HSM, Possible EMCS	Design
SMH		T	San Marcos High School				261,026	Lights, HVACSM, HSM, Possible EMCS	Design
TOTAL	43			0	4	8	1,753,293		
			No. and area of buildings reporting savings			8	1,753,293		100.00%

APPENDIX D

BRAZOS VALLEY ENERGY CONSERVATION COALITION

WEBPAGE

UNDER

REBUILD AMERICA PROGRAM



Brazos Valley Energy Conservation Coalition

The Brazos Valley Energy Conservation Coalition (BVECC) is a Rebuild America partnership consisting of an energy systems research laboratory at Texas A&M University, a private energy management consulting firm, a financing company and government and private interests concerned with saving energy in buildings.

The BVECC can custom design energy conservation programs to fit your needs. We have years of experience with energy audits and energy monitoring. Our highly experienced and responsible field staff have a strong history of on-time, on-budget performance.

What Is Rebuild America

Rebuild America is a U.S. Department of Energy program that helps communities reduce energy use in their buildings.

Rebuild America's Goal

Help communities make wise investments in their buildings through improved energy efficiency.

Rebuild America's Objective

Help state and local governments and businesses cooperate as community partners to:

- Create jobs
- Save money
- Promote growth
- Protect the environment

What the BVECC Offers

- Free walk-through energy consumption assessments
- Detailed energy assessment reports at reduced prices

- Low-interest loans for energy conserving retrofits
- Monitoring and verification of energy savings
- Independent calculations of energy and cost savings for smaller projects
- National publication of successful case studies through the Rebuild America program
- Energy efficient design of new construction
- Utility rate structure selection in deregulated environment
- Rebuild America project implementation approach

Investing in Energy Efficiency

Our experienced team can finance your energy saving investment. Loans cover:

- Remainder of the detailed energy assessment's cost
- Cost of the retrofits
- Consulting engineer fees for analysis, design and supervision of the installation
- Cost of monitoring, tune-up and analysis

For More Information

Energy Systems Laboratory
Texas Engineering Experiment Station
Texas A&M University System
College Station, Texas 77843-3581
(409) 847-8950

Texas Energy Engineering Services Inc.
Suite B-127 Capital View Center
Austin, Texas 78746
(512) 328-2533

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