

ENERGY DEPARTMENT NEWS

(FY 2019-20)

During the fiscal year there is an Energy Department News section written in the Monthly Energy Report to keep CFISD Managers up to date with what is happening in the Energy Management Department. The following is a monthly summary for the fiscal year (2019-20).

JULY 2019

TDSP SAVINGS

We have been making a lot of effort this year in reducing our kW charges (both Ratchet & 4CP). We are starting the HVAC earlier in the morning, running the HVAC on Memorial/Labor Day, and have been dropping load during 4CP warnings that we get from TXU. Our efforts have paid off; our savings are **\$437,960** for the year!! TXU sends us a warning when the 4CP event will take place (see below). Regarding the Ratchet Kw, there is a kWh penalty for starting the chiller plant early and running the HVAC on Memorial Day/Labor Day. We can improve on these savings by starting even earlier on Monday mornings. There is a kWh “penalty” for starting early (around 10%).

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
\$1,500,069	\$1,557,089	\$1,566,161	\$1,335,834	\$1,216,982	\$1,162,554	\$1,343,566	\$1,222,901	\$1,343,573	\$1,470,003	\$1,243,340	\$1,146,081
-0.29%	-4.14%	0.79%	-0.74%	-3.65%	-5.30%	-2.87%	-1.14%	-4.19%	-2.55%	-4.90%	-5.10%
-\$4,352.18	-\$64,531.87	\$12,433.43	-\$9,867.65	-\$44,426.71	-\$61,607.35	-\$38,529.95	-\$13,922.58	-\$56,254.92	-\$37,526.85	-\$60,923.65	-\$58,450.12
											TDSP SAVINGS
											-\$437,960

To Help Alleviate the Big Early Morning kW Peak:

- Reached Zn Set-Point one hour before teachers arrive.
- Between April 1st to October 31st.
- Changed our *Maximum Optimal Start* from 3 hrs. to 5 hrs.
- Running the HVAC on Memorial Day & Labor Day
- Main school only - not talking about portables.

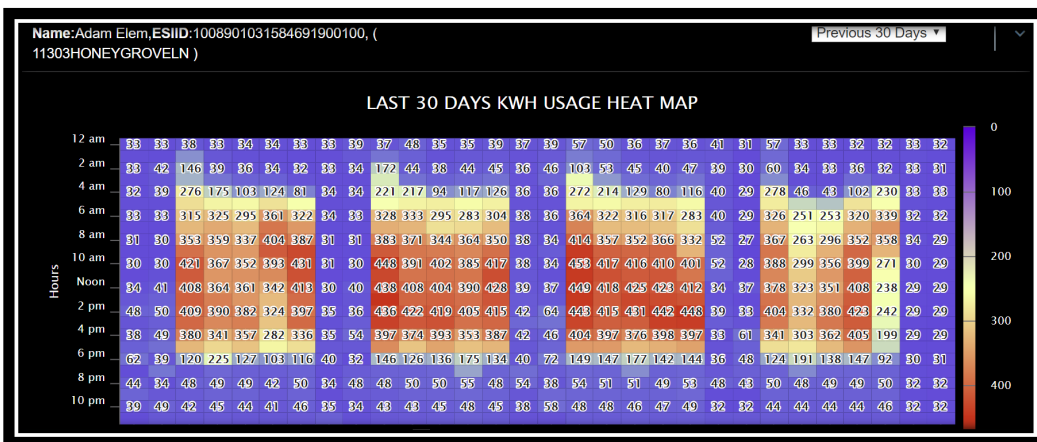
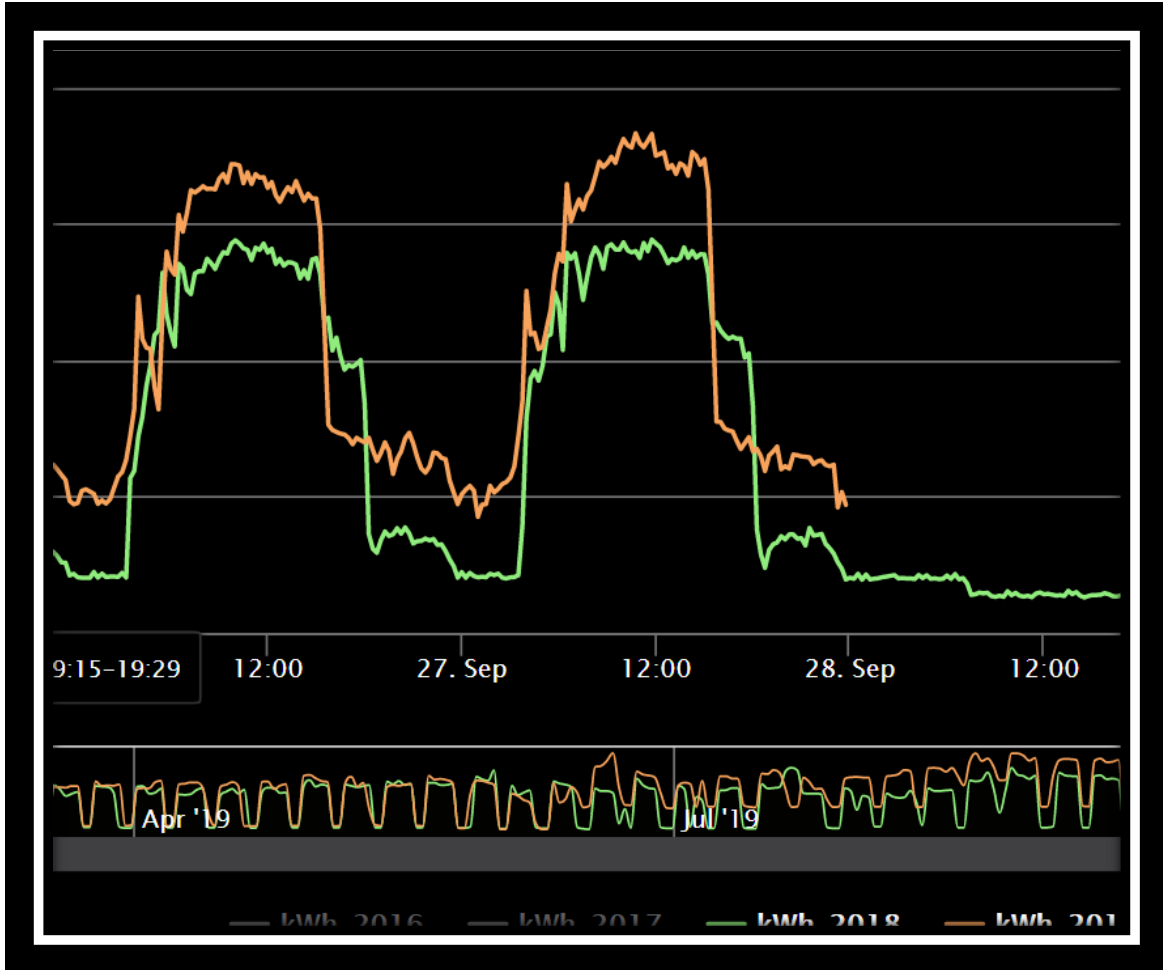
RMS BUILDING OPTIMIZATION SOFTWARE

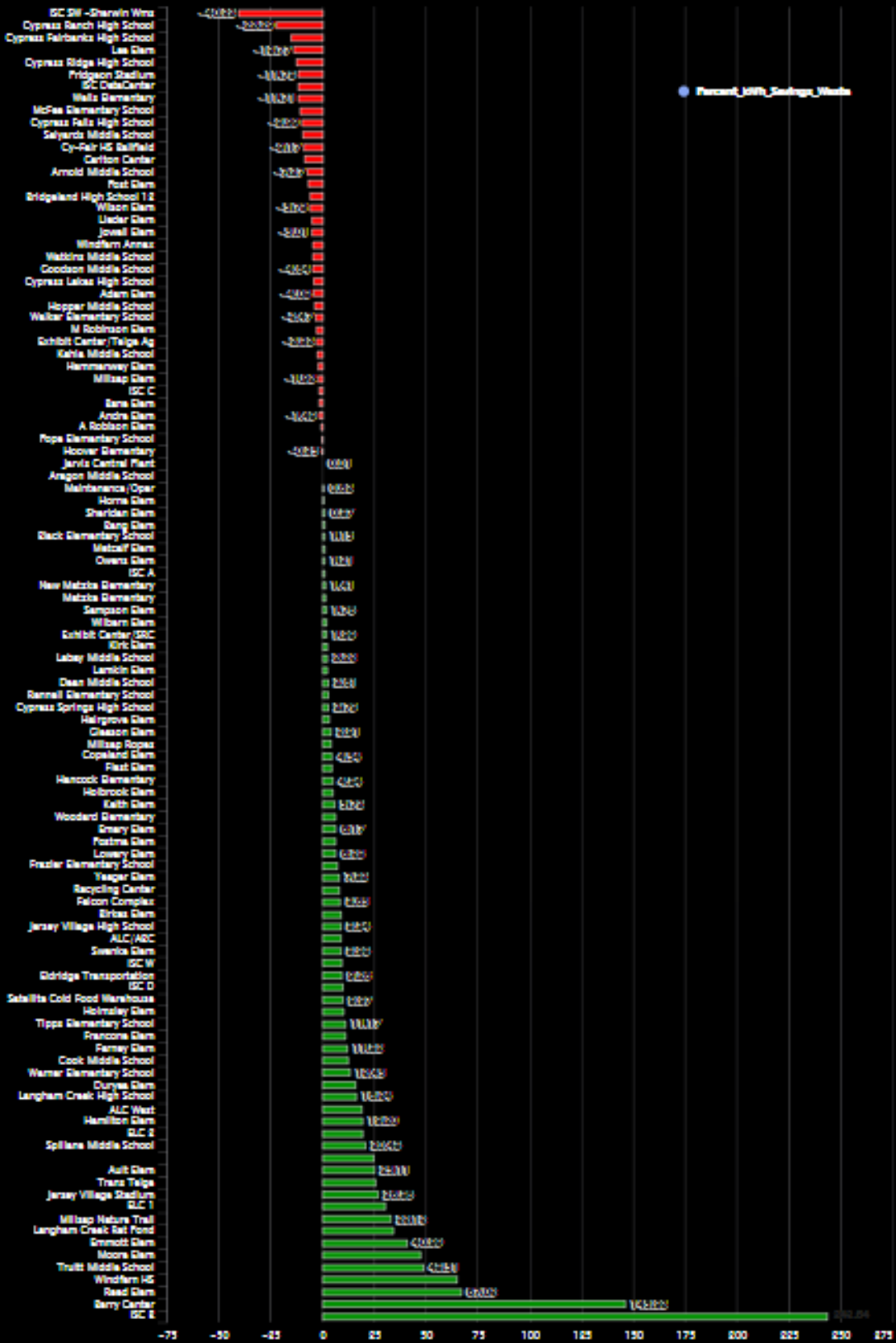
RMS building optimization software is used to monitor almost all CFISD facilities' kWh and kw usage. RMS can be utilized many ways (see below specifications). It was just used to discover a chiller plant that was left ON 24/7 at Lee Elementary School (see below); just finding and fixing this problem saved the District over \$30,000. Here are some of the features of this software that CFISD has been using for over a year:

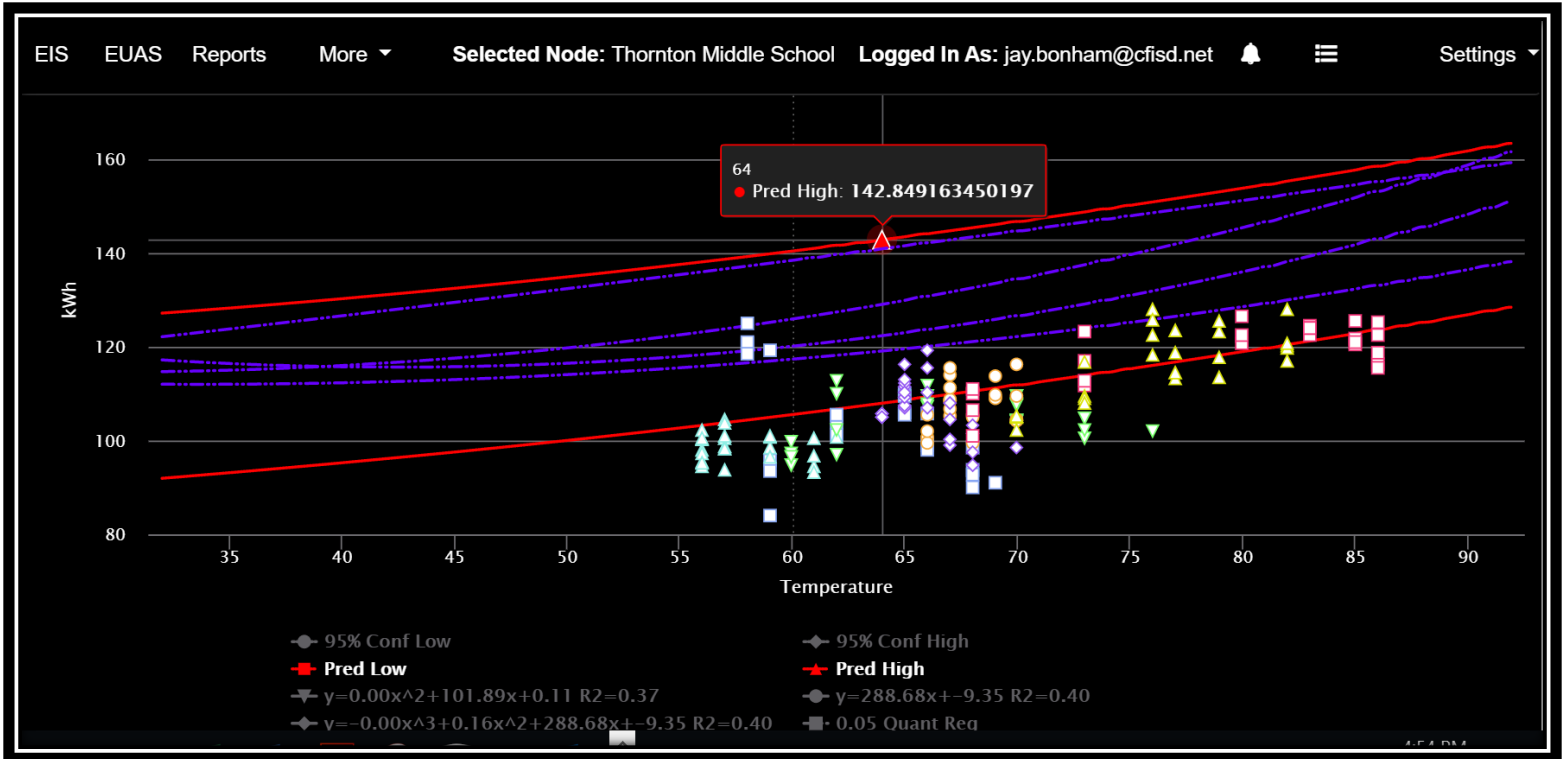
Technical Specifications:

1. Collect automatic interval energy data from utilities websites.
2. Display kWh per hour interactive graphs to be visualized in heat maps,
3. Displays kWh line graphs, column bar graphs for daily, monthly comparing year-over-year.
4. Automatic Daily Reporting and Alarms: the technology will provide a daily report per facility.
5. Capabilities to generate an alarm if a threshold is reached when an increment of energy use in kWh is obtained comparing current use versus last year's use.
6. Data export: the technology will provide these reports in pdf format.
7. Automatic monthly reporting
8. kWh consumption analysis per facility, compared with last year, considering kWh, kWh/ Sf Ft, Peak kW, and Load Factor.
9. Data export: the technology will provide these reports in pdf format.
10. Weekly Benchmark: the technology will provide visual benchmarking per facility to compare with last year's weekly energy consumption with descending sorting and calendar weekly selection capabilities.
11. Pivot Data Tables: this technology will display energy consumption in kWh, kWh/SF, kWh/student, KW Peak, per facility considering the name with capabilities of filtering and sorting by building type, Utility or source, year, month, day, week and day. Will show partial and totals per year, month, day. Pivot Tables will be able to be deployed as Bar-chart heat-map, Row heat-map or Column heat-map.
12. Load Factor: the technology will show daily, monthly, and yearly load factor in a graph bar.
13. Track and manage peak demand: the technology will generate an annual graph showing the kWh used versus the percentage in time it was used to identify the peak load in each facility.
14. Regression Analysis: The technology will generate a polynomial regression function per facility using the 12 past months' interval kWh and temperature, omitting off-hours, holidays, and vacations as we would like to analyze the facilities' behavior which is dependent on temperature. Ability to present current daily scatter points to compare performance to the base year.

- 15. Normalization of energy consumption and Prediction Model: The technology will generate an algorithm for prediction model of energy consumption in each facility to compare energy consumption to that model and deploy in bar graphs the savings or waste of energy.







AUGUST 2019

TXU REDUCTION REWARDS

Cypress Fairbanks ISD’s Energy Management Department will receive a TXU Reduction Rewards check for **\$43,000** for limiting electricity load during all three “Demand Events” this past summer. The Reduction Rewards program is voluntary and there is no contract. A notice is sent in the morning of the impending event; CFISD signs up for the event, and then gets ready to curtail during the hours requested (usually 1-3 hours).

CFISD reduces their electrical load using several Demand Response (DR) Programs which Energy Management has invested approximately \$140,000 on these programs. One program is in ALC (Fig. 6) and another program is in Unify (Fig. 7). We also can limit outside air (OA) in Trane. Most control companies provide this DR feature – sometimes as an add-on. Please see snapshots below:

With the DR programs, CFISD can reduce its load in the following ways:

- Resetting the temperature during the demand event (1, 2 or 4) degrees.
- Limiting the OA during the event period.
- Returning to an earlier chiller state or shutting the chiller plant down all together.
- Limiting all the VFDs in the school – using a multiplier (i.e. 70%).

CFISD has 69 schools on either the ALC, Unify and Trane programs. CFISD also uses the same programs for Summer Dehumid (limiting OA), School-Day Morning Start-up (limiting OA), 4CP Reduction, Demand Response- ERS Events, along with TXU Reduction Rewards. The program paid for itself the first year – just limiting the OA during the Summer Dehumid. We also can make exceptions for special events and floor refinishing.

Figure 1 ALC Elementary School Demand Response Dashboard

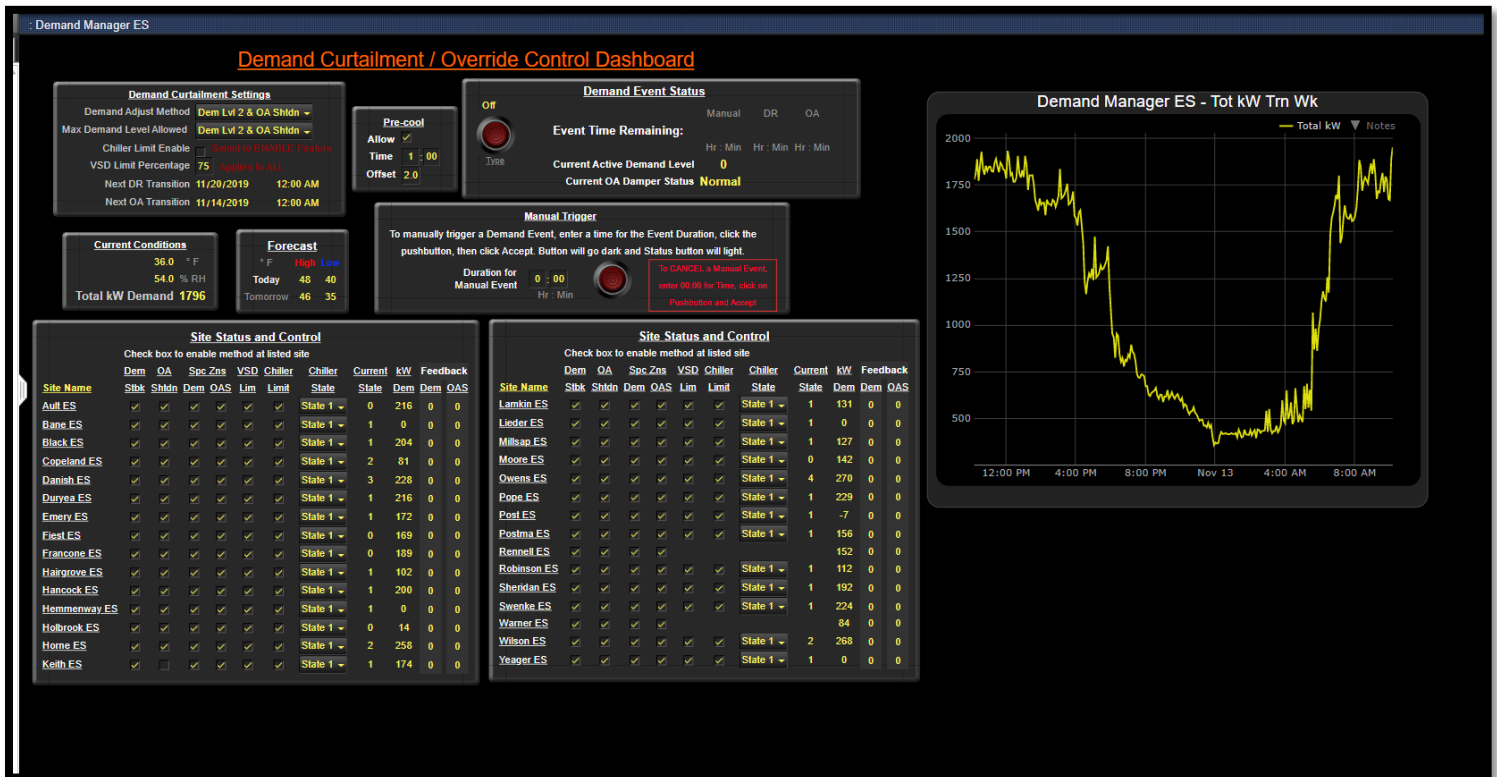


Figure 7: Unify Demand Response Set-Up



TDSP SAVINGS

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2018-19												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,500,069	\$1,557,089	\$1,566,161	\$1,335,834	\$1,216,982	\$1,162,554	\$1,343,566	\$1,222,901	\$1,343,573	\$1,470,003	\$1,243,340	\$1,146,081
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Savings	-\$4,352.18	-\$64,531.87	\$12,433.43	-\$9,867.65	-\$44,426.71	-\$61,607.35	-\$38,529.95	-\$13,922.58	-\$56,254.92	-\$37,526.85	-\$60,923.65	-\$58,450.12
2019-2020												
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Prev Yrs. Costs	\$1,288,264											
TDSP Rate Red.	-8.35%											
Savings	-\$107,555.21											
Combined Savings (They are Cumulative)												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Combined Sav	-\$111,907											
											TOTAL TDSP SAVINGS	-\$549,868

SEPTEMBER 2019

INCENTIVE CHECKS

CFISD received a \$112,526 check from CenterPoint SCORE in November and will receive another \$57,016 check. We also have potential for receiving checks for Moore ES and Metcalf ES M&V Reports = \$66,108 and \$44,913 checks. We're thinking about having a "big check" presentation at the February's board meeting. TXU has expressed a desire to be in such a presentation as well for their Greenback Rewards & for Reduction Rewards. So, they would be joining us (2 big checks). Matt Morgan and Roy Sprague will join us for the presentation as well as representatives from CenterPoint and TXU.

From	Check Status	Amount	Description
SCORE	Check Received	\$112,526.00	40% of Cook, Thornton, Truitt, Langham Creek HS
SCORE	Check Released	\$57,016.00	2019 Bond lighting projects
SCORE	Future Check	\$66,108.00	Moore M&V
SCORE	Future Check	\$44,913.00	Metcalf M&V
		\$280,563.00	
From	Check Status	Amount	Description
TXU	Check Received	\$75,000.00	Greenback Rewards
TXU	Check Received	\$43,000.00	Reduction Rewards
		\$118,000.00	
	TOTAL	\$398,563.00	

LED BULBS

We would like to use part of the incentive money for RCx projects; in addition, we would like to use the incentive money to purchase LED bulbs for schools that are not getting LED fixtures on the 2019 Bond. I will have to find out from Matt and Richelle which schools are not scheduled for LED retrofits. The LED bulbs would pay for themselves in less than two years if we were to install the retrofit; and approximately three and a half years if we hire out the labor. I've talked to two different vendors and will work with Tom Draper on the purchases. I'm thinking about doing Cy-Park HS and Bridgeland HS first (if they are not on the Bond). The lamps should last at least 10 years and will hold us over until a Bond comes along to replace the fixtures. The wattage will be 10W compared to the present bulbs which approximately use 25W. This will help CFISD achieve their sustainability goals (set forth by the State Statue)

<https://codes.findlaw.com/tx/health-and-safety-code/health-safety-sect-388-005.html>

Here is the LED Lamp Cut Sheet of one of the vendors:

https://www.halcolighting.com/pdf/sell_sheet/9209.pdf

LED Retrofit Lamps & Labor (Electric Savings Only)

1050	Fixtures				
75	Watts/Fixt Pre				
36	Watts/Fixt Post				
39	Watts				
40.95	kW Savings				
3500	Hours	50,000.00	hour life	14.29	
143,325	Kwh				
0.074	Blended Electric Rate				
10,606.05					
1.25	HVAC Savings				
\$13,257.56	Total Annual Savings				
\$37,462.50	Cost				
2.8	Payback				
\$11.89	Per/lamp (installed)				

LED Retrofit Lamps/No Labor (Electric Savings Only)

1050	Fixtures				
75	Watts/Fixt Pre				
36	Watts/Fixt Post				
39	Watts				
40.95	kW Savings				
3500	Hours	50,000.00	hour life	14.29	
143,325	Kwh				
0.074	Blended Electric Rate				
10,606.05					
1.25	HVAC Savings				
\$13,257.56	Total Annual Savings				
\$19,980.00	Cost				
1.5	Payback				
\$6.34	Per/lamp (installed)				

TDSP SAVINGS

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Combined Savings (They are Cumulative)												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Combined Sav	-\$111,907	-\$103,211										
											TOTAL TDSP SAVINGS	-\$653,079

OCTOBER 2019

POWER FACTOR CORRECTION CAPACITORS

We received a quote to install power factor correction capacitors at Langham Creek High School and Cook Middle School. As we are doing whole-building M&V at both schools for SCORE, any conservation measure that add to those buildings will also be captured by the M&V. At LCHS, we can save 67.6 KVA, and at Cook, we can save 71.3 KVA. SCORE pays \$175 per KVA making the rebate \$24,312. I calculated the annual savings – see financials below:

LCHS		Cook MS			
Old	New	Old	New		
1557	1557	928	928		
0.94	0.98	0.92	0.99		
1656.4	1588.8	1008.7	937.4		
Diff	67.6	Diff	71.3	Turnkey Cost	\$48,000.00
% Drop	4%	% Drop	7%	Rebate	\$24,312.64
Rebate	\$11,831.31	Rebate	\$ 12,481.34	SubTotal	\$23,687.36
Ratchet KVA	1329	Ratchet KVA	1329	Annual Savings	\$ 9,398.35
Monthly KVA	1100	4CP KVA	352	Payback Yrs.	2.5
4CP KVA	466	Monthly Savings	\$ 453.34		
Monthly Savings	\$ 329.86	Annual Savings	\$ 5,440.06		
Annual Savings	\$ 3,958.29				

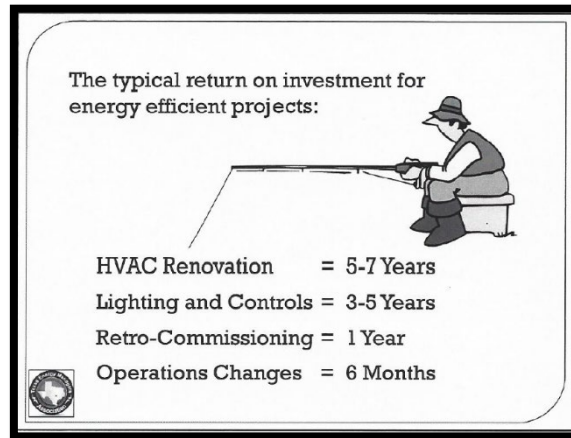
RETRO-COMMISSIONING

We just finished implementing the RCx report at Langham Creek HS in October. Combined with the LED retrofit last summer, it's looking like Langham Creek is now the most efficient high school in the District. Of course, the number of "after-hours" events plays a part in this. Still, it's a 26% reduction over last year, when you take both (the RCx and LEDs) into account.

We are currently working on CyRanch and replicating the same energy conservation measures. We could install LED bulbs there as well and get close to the same result. The main ECMs are adding VFDs to convert constant volume AHUs to variable volume and adding CO2 sensors to control outside air dampers.

November	kWh/Sq.Ft
CY-FAIR HS	1.09
CY-LAKES HS	0.91
CY-RANCH HS	0.91
CY-SPRINGS HS	0.85
CY-WOODS HS	0.82
CY-FALLS HS	0.77
JERSEY VILLAGE HS	0.75
CY-PARK HS	0.74
CY-CREEK HS	0.74
CY-RIDGE HS	0.71
BRIDGELAND HS	0.65
LANGHAM CREEK HS	0.56

The PowerPoint below (from TEMA) shows the typical payback times of energy efficient projects. As one can see, Retro-commissioning is one of the quickest paybacks.



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2019-2020												
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Prev Yrs. Costs	\$1,288,264	\$1,391,388	\$1,241,799									
TDSP Rate Red.	-8.35%	-2.78%	-4.05%									
Savings	-\$107,555.21	-\$38,679.03	-\$50,326.37									
Combined Savings (They are Cumulative)												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Combined Sav	-\$111,907	-\$103,211	-\$37,893									
											TOTAL TDSP SAVINGS	-\$690,972

UPS COMPARISON

I monitored uninterruptible power supplies for the IT department, comparing three different UPSs, one of which will be purchased across the District.

Introduction

The Input and Output of the three UPSs were monitored for 2-3 days, using a high speed Dranetz HDPQ power meter. Both current and voltage were measured at the input/output. The Dranetz HDPQ is capable IEEE 1459 Advanced Power Measurements. High Definition PQ and Energy Monitoring – 1000Vrms, AC/DC, 512 samples/cycle. A scope snapshot was taken of both current and voltage prior to leaving the meter for monitoring for 2-3 days. Channel A is the Input (both current and voltage). Channel B is the Output (both current and voltage). The energy consumption in kVAhs was accumulated during the time period. A picture was taken of the final result for each unit. A special adapter was made for the voltage probes to connect into the 120V outlet. The current was made using Dranetz CTs with a 3A scale, and by splitting an extension cord and monitoring just the hot; the load (switches) and UPS were connected to the extension cords.

Monitoring Results

After monitoring for two-three days each, the following results were obtained:

Figure 6: Efficiency Results

	Input kVA-h	Output kVA-h	Eff
Tripp-Lite	25.36	13.15	52%
Eaton	19.29	17.0	88%
Vertiv	5.36	5.08	95%

Vertiv was the most efficient UPS, coming in at a 95% efficiency.

District Electricity Costs

Assuming that these results (shown above – Fig 6) were a good representation for continual loading for the complete calendar year, and assuming a 24/7-day operation and a 70% load on 1000, 2000VA units, the electrical costs to the District are as follows:

Figure 7: District Utility Costs

	kVA-h Eff Loss	Annual Electricity Costs (\$)
Tripp-Lite	7,971,358	\$412,916
Eaton	1,965,482	\$101,812
Vertiv	864,887	\$44,801

The following pages show the scope snapshots and the monitoring consumption results in kVAhs:

Tripp-Lite UPS (2/7 to 2/10/2020)

Figure 8: Tripp-Lite: Input Voltage (Red), Current (Burgundy), Output Voltage (Yellow), Current (Goldenrod)

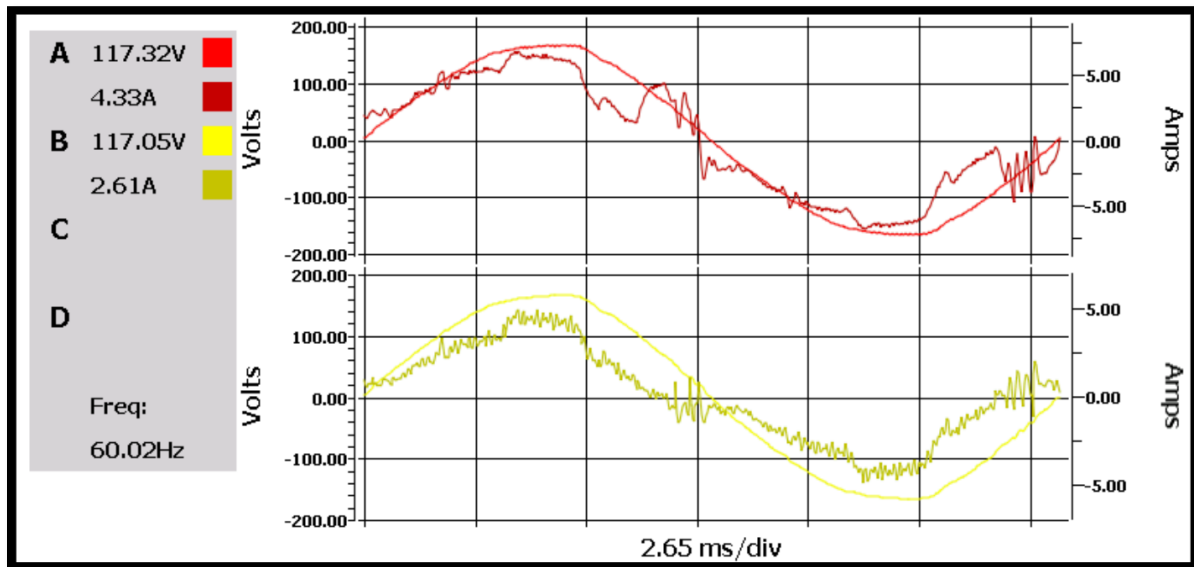
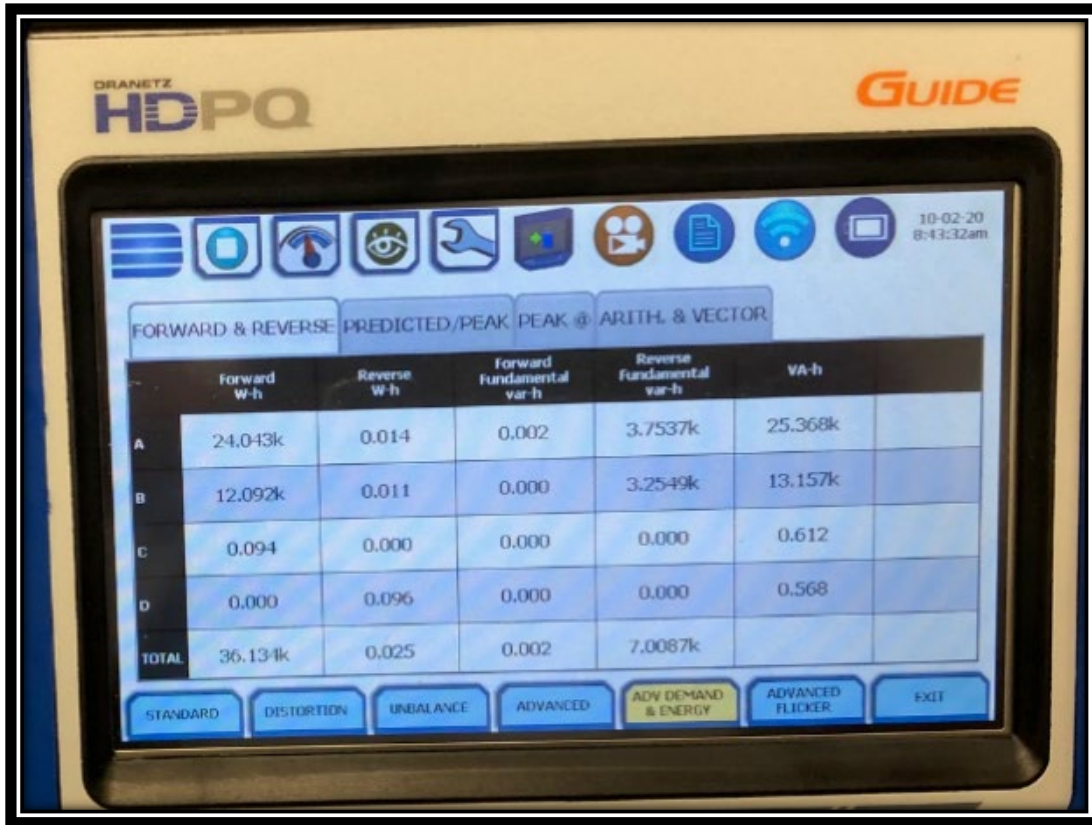


Figure 9 Tripp-Lite: Input (Ch A) / Output (Ch B)



Eaton UPS (2/10 to 2/12/2020)

Figure 10 Eaton: Input Voltage (Red) Current (Burgundy); Output Voltage (Yellow), Current (Goldenrod)

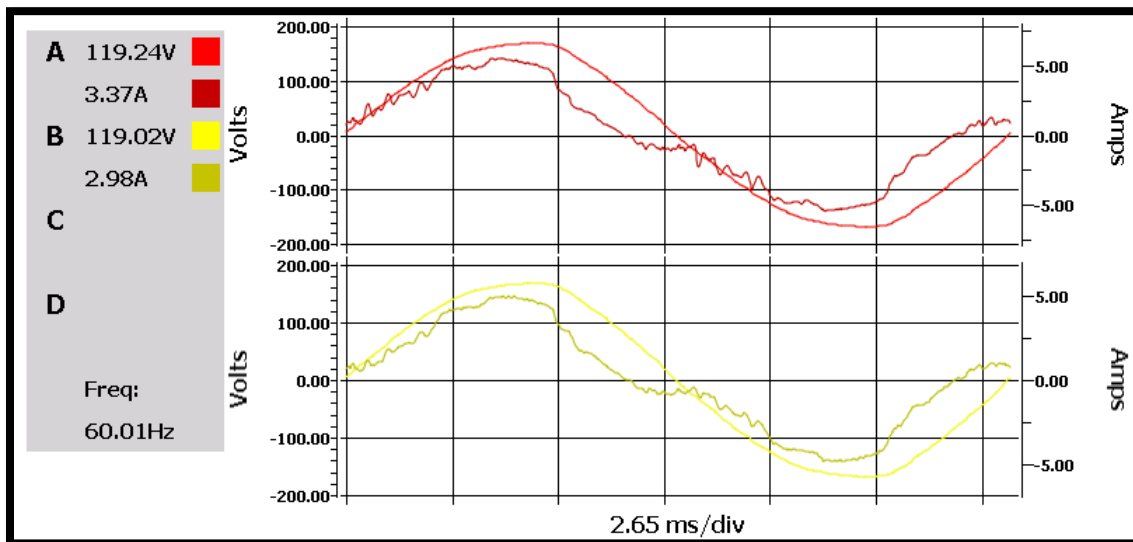
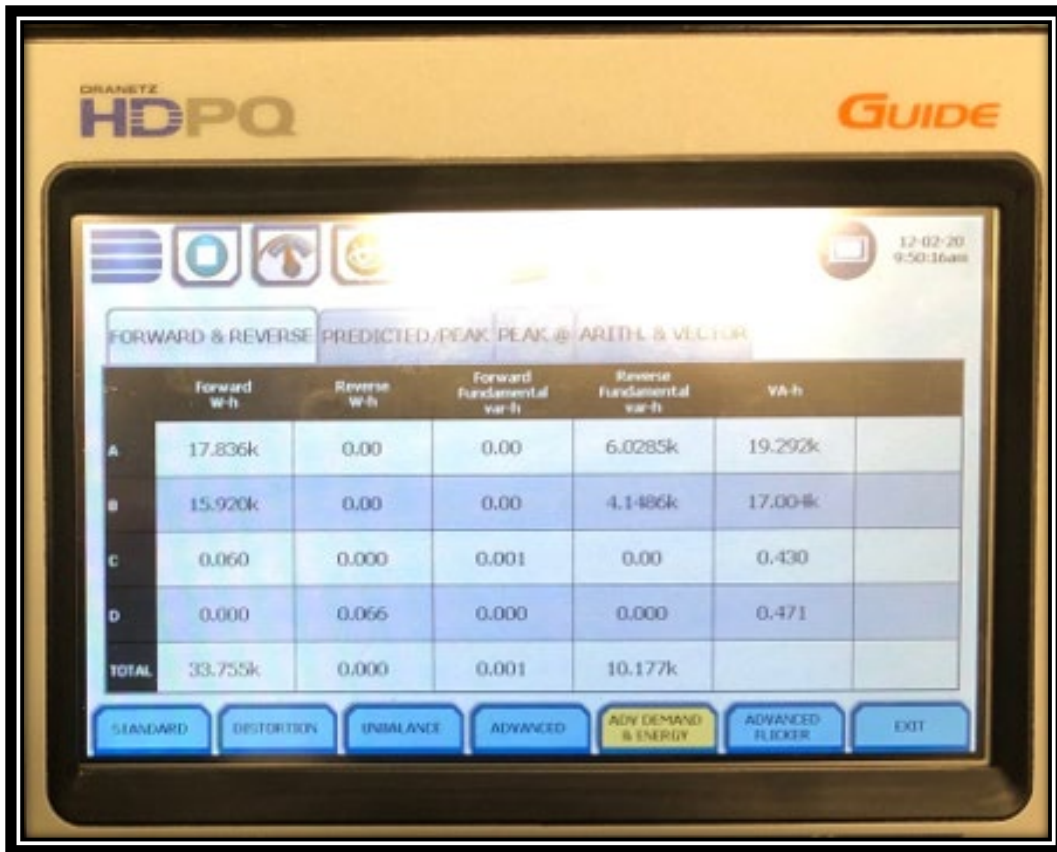


Figure 11 Eaton: Input (Ch A) / Output (Ch B)



Vertiv UPS (2/12 to 2/14/2020)

Figure 12 Vertiv: Input Voltage (Red) Current (Burgundy); Output Voltage (Yellow), Current (Goldenrod)

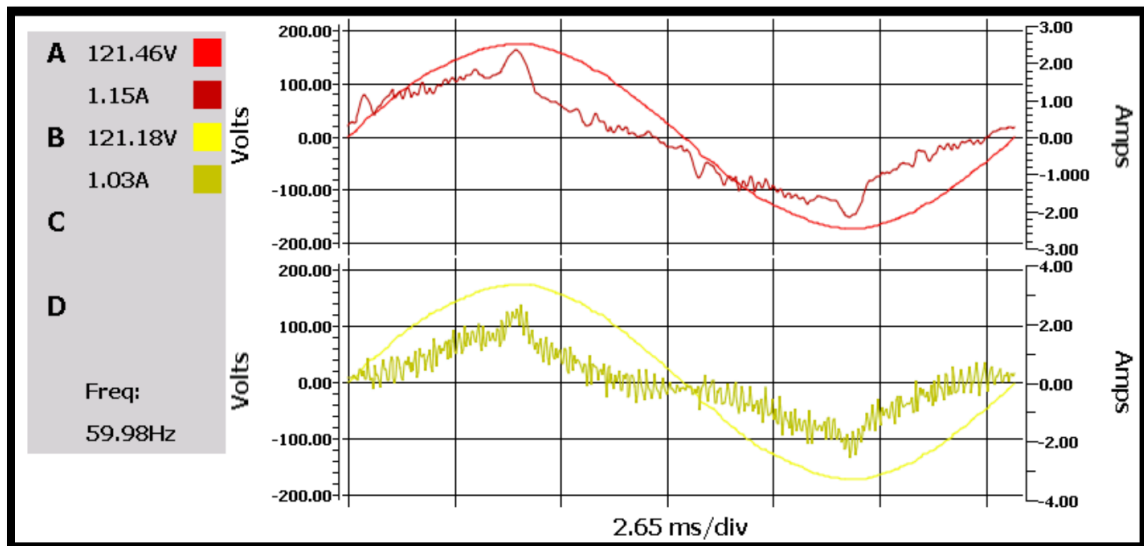
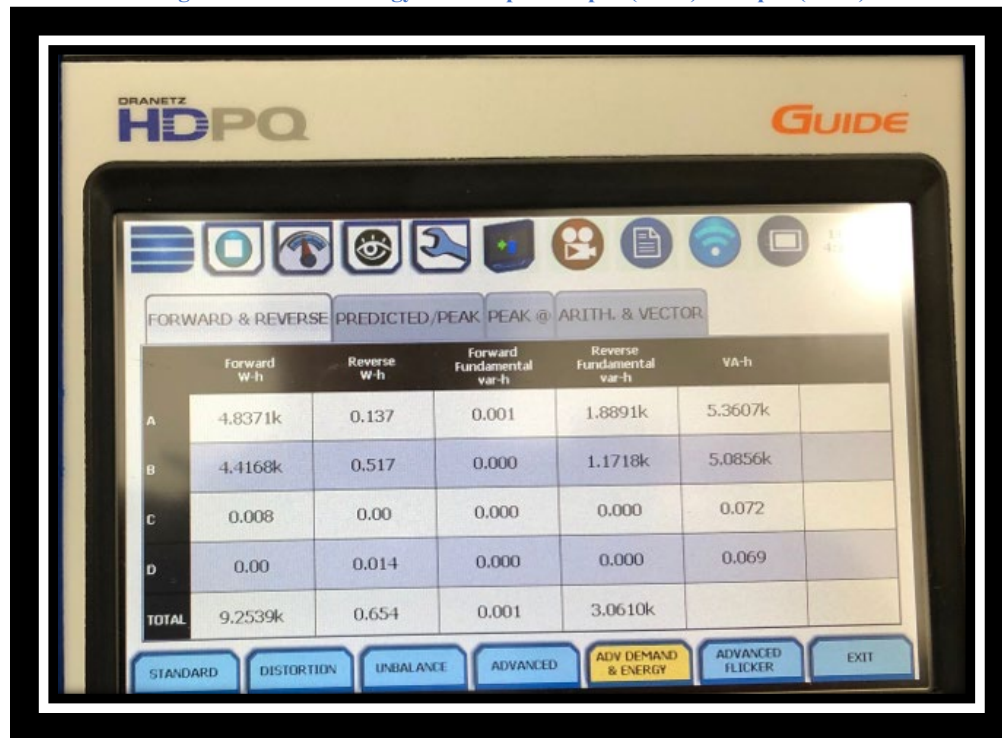


Figure 13 Vertiv: Energy Consumption Input (Ch A) / Output (Ch B)



Miscellaneous Notes

- The Uninterruptible Power Supply (UPS) should be Energy Star stamped for that specific model (not just the family). The Energy Star test is likely rigorous and requires testing the UPS over a long period of time (probably weeks) and over various loads.
- The Maintenance Department should be scheduled to do an emergency generator test at Woodard ES to see how the UPSs perform during an emergency event.
- For Set-Up: When setting up the chosen UPS, make sure that it is set up to run in the ECO mode during normal operation. The UPS shall also have a user customizable requalification time that input power must remain within the ECO mode parameters before transferring back to ECO operation; please make sure the minimum requalification time-period is selected, so it runs in the ECO mode for as long as possible.
- Remember that any inefficiency of the UPS will also have electrical circuit capacity issues, not just increased utility costs. For example, if a UPS is 50% efficient, an extra 50% must be added to the load that is placed on a 20 or 30 circuit. So, an inefficient UPS might require that the electrical circuits be upgraded to handle the extra amps.

TDSP SAVINGS

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											TOTAL TDSP SAVINGS	-\$743,574

DECEMBER 2019

POWER FACTOR CORRECTION AND M&V FOR FOOD PRODUCTION

CLEARResult approved a baseline for “M&Ving” the Food Production 2014 Bond Renovation. We already got paid deemed savings for the project, but since the actual savings are significantly greater than what was anticipated, and what CLEARResult already paid out on, I asked CLEARResult if we can calculate the actual savings (using Measurement & Verification protocols); they said yes, if I could get a good baseline using Metrix 4 (which I did).

The retrofits installed at Food Production included: compressed air (compressor and dryer), air cooled chiller, other AC mechanical, HVAC controls, LED lighting, air curtains, and fast roll-up doors. Compressed air retrofits can save a lot also when they fix all the air leaks (which I suspect they did while they were installing the new equipment). I would also like to install power factor correction to boost our savings and incentive if Carey is okay with it (see financials below).

I calculate that we should be able to receive around \$100,000 extra dollars (above the \$25,000 they already paid out in incentives for this bond project).

Figure 2 Power Factor Financials

Food Production					
Old	New				
818	818				
0.86	0.99				
951.2	826.3				
Diff		124.9		Turnkey Cost	\$30,000.00
Rebate		\$18,735.02		Rebate	\$18,735.02
Monthly KVA		124.9		SubTotal	\$11,264.98
Monthly Savings		\$ 780.63		Annual Savings	\$ 9,367.51
Annual Savings		\$ 9,367.51		Payback Yrs.	1.2

CFISD NATATORIUM

The CFISD Natatorium electric bill is a lot higher this year than last year (between 25-40%). I'm going to investigate the costs of recommissioning the building. Noresco (who works with ALC) has a recommissioning division; I'm going to have them quote a price (it'll be on ALC's Co-Op) Unfortunately, the CenterPoint Recommissioning Program that we have been using has been changed a lot (adverse changes), and I'm reluctant to start any new projects with them (though we are finishing up on the ones we already started) Whatever the costs are with Noresco, I'm anticipating a quick payback once their report is implemented and possibly will receive an incentive from CLEAResult as well (that may cover the costs of the RCX completely).

Figure 3 CenterPoint RCx Projects

School	Co.	Walk-Thru	Report	Implementation
Langham Creek HS	ESA	Y	Y	Finished
Campbell MS	ESA	Y	Y	Finished
Rennell ES	ESA	Y	Y	Finished
Cy-Ranch HS	Enhanced	Y	Y	Sep-20
Smith MS	Enhanced	Y	Y	Sep-20
Warner ES	Enhanced	Y	Y	Sep-20
Cy-Woods HS	ESA	Y	Y	Sep-20
Spillane MS	ESA	Y	Y	Sep-20
Robison ES	ESA	Y	Y	Sep-20
Cy-Fair HS	Rice	Y	N	Dec-20
Cy-Springs HS	Enhanced	N	N	Dec-20
Cy-Lakes HS	Rice	Y	N	Dec-20
Arnold MS	Rice	Y	N	Dec-20

TDSP SAVINGS

CFISD has been reducing our kW charges (both Ratchet & 4CP). We are starting the HVAC earlier in the morning, running the HVAC on Memorial and Labor Day, and have been dropping load during 4CP warnings that we get from TXU. Our efforts have paid off; our savings are **\$55,682** for December 2019 (over the base month – December 2017). Total TDSP savings are \$799,256 since we started our reduction methods (16 months ago). Regarding that Ratchet Kw, *there is a small kWh penalty for starting the chiller plant early* and running the HVAC on Memorial Day/Labor Day. We can improve on these savings by starting even earlier on Monday mornings to avoid all the chiller stages from coming ON while the school is occupied; this occurs because the chiller plant decrements before the students arrive (because of the building being pre-cooled).

2018-19												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,500,069	\$1,557,089	\$1,566,161	\$1,335,834	\$1,216,982	\$1,162,554	\$1,343,566	\$1,222,901	\$1,343,573	\$1,470,003	\$1,243,340	\$1,146,081
TDSP Rate Red.	-0.29%	-4.14%	0.79%	-0.74%	-3.65%	-5.30%	-2.87%	-1.14%	-4.19%	-2.55%	-4.90%	-5.10%
Savings	-\$4,352.18	-\$64,531.87	\$12,433.43	-\$9,867.65	-\$44,426.71	-\$61,607.35	-\$38,529.95	-\$13,922.58	-\$56,254.92	-\$37,526.85	-\$60,923.65	-\$58,450.12
2019-2020												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,288,264	\$1,391,388	\$1,241,799	\$1,114,880	\$1,001,155							
TDSP Rate Red.	-8.35%	-2.78%	-4.05%	-3.83%	-1.12%							
Savings	-\$107,555.21	-\$38,679.03	-\$50,326.37	-\$42,734.80	-\$11,255.03							
Combined Savings (They are Cumulative)												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Combined Sav	-\$111,907	-\$103,211	-\$37,893	-\$52,602	-\$55,682							
											TOTAL TDSP SAVINGS	-\$799,256

JANUARY 2020

CY-SPRINGS LED LAMPS

I got the following quote from Voss lighting for LED lamps at Cy-Springs (material only). His quote was based off the drawings I gave them. The first table and the third table are all CFISD is interested in. The first table is LED lamps only using the Phillips Instafit bulbs (which work with existing ballasts). The second table is direct wiring to lamps – which have drivers in them. The third table is new drivers to be in place of existing ballasts, and with new LED lamps. Unfortunately, I received an email from Carey today who said he would rather change-out complete fixtures, and that their summer project list is full. New fixtures would cost around \$250,000 just for the fixtures instead of the \$54,000 that I was prepared to spend for LED lamps. Also, with new LED fixtures, you lose your inboard/outboard dimming! Still I worked out the financials for lamps only they are listed below the quote from Voss Lighting. I could get a quote from an outside contractor to do the labor (which of course would change the financials some). I would be looking for a labor cost of around \$20,000.

Quotes from Voss Lighting (Material Only)

	Fixtures	Lamps & Drivers	Product	UPC	QTY	CYFAIR	
2x4 Three Lamp Fixtures	3109	3	10T8/COR/48-840/IF	54323	9327	\$5.04	\$47,008.08
1x4 Two Lamp Fixtures	704	2	10T8/COR/48-840/IF	54323	1408	\$5.04	\$7,096.32
					10735		\$54,104.40

	Fixtures	Lamps & Drivers	Product	UPC	QTY	CYFAIR	
2x4 Three Lamp Fixtures	3109	3	10T8/COR/48-840/IF	54323	9327	\$5.04	\$47,008.08
Two Lamp Drivers	3109	2	ICN2P16TLEDN	14089	6218	\$11.05	\$68,708.90
1x4 Two Lamp Fixtures	704	2	10T8/COR/48-840/IF	54323	1408	\$5.04	\$7,096.32
Two Lamp Drivers	704	1	ICN2P16TLEDN	14089	704	\$11.05	\$7,779.20
							\$130,592.50

	Fixtures	Lamps & Drivers	Product	UPC	QTY	CYFAIR	
2x4 Three Lamp Fixtures	3109	3	10T8/48-4000K	47399	9327	\$6.98	\$65,102.46
Two Lamp Drivers	3109	2	ICN2P16TLEDN	14089	6218	\$11.05	\$68,708.90
1x4 Two Lamp Fixtures	704	2	10T8/48-4000K	47399	1408	\$6.98	\$9,827.84
Two Lamp Drivers	704	1	ICN2P16TLEDN	14089	704	\$11.05	\$7,779.20
							\$151,418.40

Financials for New Lamps Only

10,735	lamps	
25	Pre W	
13	Post W	
12	Diff W	
161.025	Total kW Saved	
3000	Hours	
483,075	kWh Saved per Year	
\$0.0740	Electric Rate	
\$ 35,747.55	Savings per year	
\$54,104	Cost	
1.5	Payback Yrs.	

CY-RANCH RECOMMISSIONING

We finally got a quote from ALC for Cy-Ranch recommissioning (along with Smith MS & Warner ES). The cost will be \$161,333 and includes the following new devices along with energy efficient programming:

Cy-Ranch		Smith		Warner	
Devices	#	Devices	#	Devices	#
VFD	7	VFD	4	CO2 Senso	2
CO2 Sensors	11	CO2 Sensors	2		
Rh% Sensors	7	Rh% Sensors	2		
SA Sensors	6	SA Sensors	0		
Notes:					

Normally recommissioning projects have a payback of 1-2 years, giving them the quickest return on investment of any energy conservation measure. Using the Langham Creek RCx Project as an example, I calculate our savings to be \$79,000 per year if we perform in a similar manner. This gives the project a two-year payback and a 48% return on investment based on a life of ten years, and a net present value of \$512,886.

\$ 79,000.00	Savings per year	
\$161,333	Cost	
2.0	Payback Yrs.	
48%	IRR (based on 10Yr)	
\$512,886	NPV	

TDSP SAVINGS

CFISD has been reducing our kW charges (both Ratchet & 4CP). We are starting the HVAC earlier in the morning, running the HVAC on Memorial and Labor Day, and have been dropping load during 4CP warnings that we get from TXU. Our efforts have paid off; our savings are **\$85,284** for January 2020 (over the base month – January 2017). Total TDSP savings are \$884,540 since we started our reduction methods (17 months ago). Regarding that Ratchet Kw, there is a small kWh penalty for starting the chiller plant early and running the HVAC on Memorial Day/Labor Day. We can improve on these savings by starting even earlier on Monday mornings to avoid all the chiller stages from coming ON while the school is occupied; this occurs because the chiller plant decrements before the students arrive (because of the building being pre-cooled).

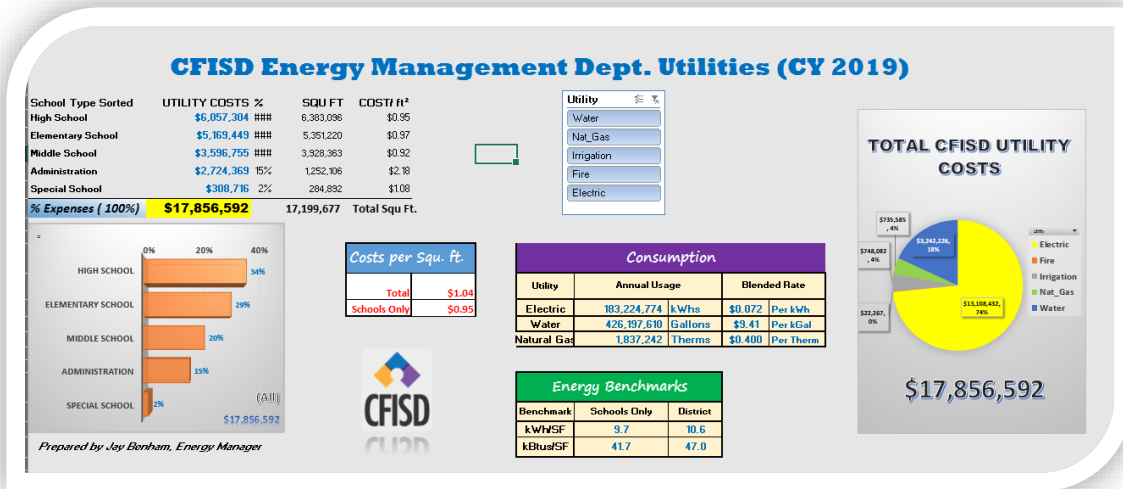
2018-19												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,500,069	\$1,557,089	\$1,566,161	\$1,335,834	\$1,216,982	\$1,162,554	\$1,343,566	\$1,222,901	\$1,343,573	\$1,470,003	\$1,243,340	\$1,146,081
TDSP Rate Red.	-0.29%	-4.14%	0.79%	-0.74%	-3.65%	-5.30%	-2.87%	-1.14%	-4.19%	-2.55%	-4.90%	-5.10%
Savings	-\$4,352.18	-\$64,531.87	\$12,433.43	-\$9,867.65	-\$44,426.71	-\$61,607.35	-\$38,529.95	-\$13,922.58	-\$56,254.92	-\$37,526.85	-\$60,923.65	-\$58,450.12
2019-2020												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,288,264	\$1,391,388	\$1,241,799	\$1,114,880	\$1,001,155	\$968,150						
TDSP Rate Red.	-8.35%	-2.78%	-4.05%	-3.83%	-1.12%	-2.45%						
Savings	-\$107,555.21	-\$38,679.03	-\$50,326.37	-\$42,734.80	-\$11,255.03	-\$23,676.53						
Combined Savings (They are Cumulative)												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Combined Sav	-\$111,907	-\$103,211	-\$37,893	-\$52,602	-\$55,682	-\$85,284						
											TOTAL TDSP SAVINGS	-\$884,540

FEBRUARY 2020

2019 CALANDAR YEAR DASHBOARD

Please see dashboard that summarizes CFISD utilities for 2019 calendar year on the Energy Management webpage <https://www.cfisd.net/en/energy-management/utility-costs>; the label for this dashboard is CFISD Utility Dashboard CY 2019 (.xls). The dashboard has slicer buttons to drill down on each utility. If more than one utility needs to be looked at the same time (such as water, irrigation, and fire), hit the control key as each button is selected. Here is a summary of the 2019 calendar year:

- The annual costs for all CFISD utilities are \$17,856,592; \$1.04 per Sq.Ft. for the District, \$0.095 per Sq.Ft. for schools only. This includes Electricity, Water and Natural Gas.
- The annual costs to the District for Electricity only, was \$13,108,432 (73.4 % of the total utility expenses); \$0.076 per Sq.Ft. for the District, \$0.070 per Sq.Ft. for schools only. Consumption was 10.6 kWh/Sq. Ft. for the District, 9.7 kWh/Sq. for schools only. The total electric consumption was 183,224,774 kWhs (increased 2,271,742 kWhs due to Brautigam and the result of having three extra move-in days in heat of the summer).
- The annual costs for Water (including Irrigation and Fire) is \$4,012,575 (22.5 % of the total utility expenses); \$.021 per Sq.Ft. for the District and \$.019 per Sq. Ft. for schools only. The total consumption was 426 Kgal (426 million gallons). The average rate for water was 9.41 per Kgal, up from 8.01 (17.4 % increase, which comes out to a \$624,823 increase due to increased rates)!!
- The annual costs for Natural Gas are \$735,585 (4.1 % of the total); \$0.04 per Sq.Ft. for the District and \$0.03 for schools only.



CY-LAKES HS CHILLER PLANT UPGRADE

We purchased a chiller plant upgrade for Cy-Lakes HS. It involves a controller upgrade just at the chiller plant, along with programming. This upgrade will save energy in three or more areas:

1. Running the condenser water temperature at the optimal set-point (lowering it whenever it is practical). The chillers save approximately 1% per degree that the condenser water temperature is lowered.
2. Fixing whatever is making the chilled water pump to run at 60Hz. It's likely a bypass valve located in the school (there are 5 in the school). In addition, installing a chilled water pressure reset, to lower the pump speed whenever practical.
3. Fixing whatever is telling the VAV boxes that are telling various AHUs to come ON and run all night – which thereby makes the chiller plant run all night. Changing the number of cooling requests that “call” for an AHU.

There is a lot of “low lying fruit” in this proposal that will pay for itself very quickly. David Tooker reviewed and approved the proposal. We can also apply for an energy rebate from either one of the following (SCORE or the RCx program). The following great financials apply for this project, not including the rebates (see below):

\$48,878.37	Savings per year	
\$62,616	Cost	
1.3	Payback Yrs.	
78%	IRR (based on 10Yr)	
\$354,326	NPV	

PF CORRECTION CAPACITORS (MAINT/OP & FOOD PRODUCTION)

We purchased power factor correction capacitors at our building (Maintenance & Operations) and Food Production. As we are doing whole-building M&V at both facilities for SCORE, any conservation measure that add to those buildings will also be captured by the M&V. At Maintenance, we can save 60 KVA, and at Food Production 124 KVA. SCORE pays \$200 per KVA making the rebate \$29,541.90, which makes our costs after rebates only \$10,571. I calculated the annual savings and financials for both facilities combined – see financials below:

\$9,336.72	Savings per year
\$ 10,571.46	Cost (after Rebate)
1.1	Payback Yrs.
88%	IRR (based on 10Yr)
\$69,073	NPV

MARCH 2020

CY-FAIR HS CHILLER PLANT UPGRADE

ALC was issued a PO for the first phase in Cy-Fair HS chiller plant controls overhaul (\$39,650.00). The second Phase (after the new Fiscal Year) should be around \$35,000 (plus or minus); the project is being funded by the Energy Rebate Account. These upgrades include new controls that will utilize the most efficient condenser water temperature, lower the amount of outside air being blown into vacant spaces, optimize the chilled water differential pressure setting controlling the chilled water pumps, optimizing chiller plant efficiency, and have demand response capability (especially utilizing the thermal storage tanks). The project is projected to save \$55,583.52 a year after taking everything into account.

\$55,583.52	Savings per year
\$75,000	Cost
1.3	Payback Yrs.
74%	IRR (based on 10Yr)
\$399,139	NPV

LED RETROFITS

The Energy Department is funding more LED retrofits this summer. Carey Ramsey, Shawn Grimm, and their team are doing the labor. The metal halides are being replaced in cafeterias, hallways, libraries, teaching theaters, practice gyms, and pools. The schools affected are CySprings HS, CyRidge HS, and CyWoods HS. There are maintenance savings as well as energy savings because the lamps should work for up to twenty years. We'll also receive a rebate from CLEAResult as well. See financials below, which includes the rebate:

\$34,931.08	Savings per year	
\$36,000	Cost	
1.0	Payback Yrs.	
97%	IRR (based on 15yr)	
\$381,005	NPV	

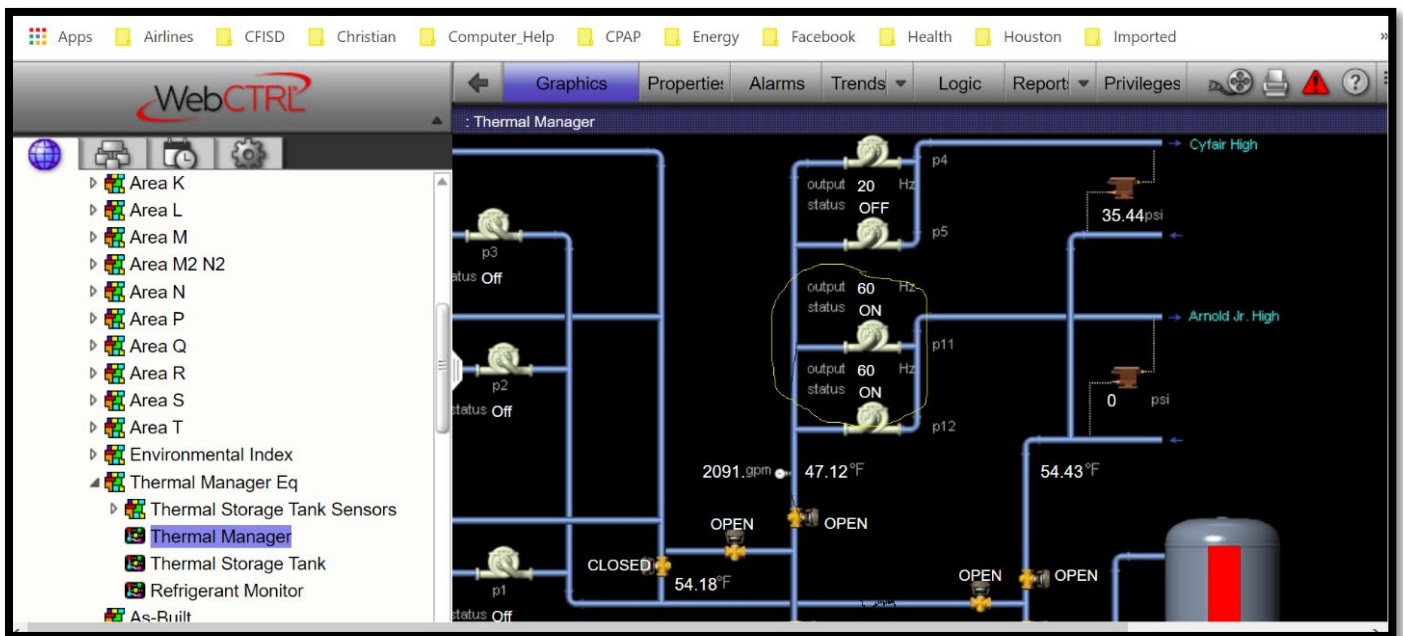
TDSP SAVINGS

CFISD has been reducing our kW charges (both Ratchet & 4CP). We are starting the HVAC earlier in the morning, running the HVAC on Memorial and Labor Day, and have been dropping load during 4CP warnings that we get from TXU. Our efforts have paid off; our savings are **\$22,756** for March 2020 (over the base month – March 2017). Total TDSP savings are **\$971,478** since we started our reduction methods (20 months ago). Regarding that Ratchet Kw, there is a small kWh penalty for starting the chiller plant early and running the HVAC on Memorial Day/Labor Day. We can improve on these savings by starting even earlier on Monday mornings to avoid all the chiller stages from coming ON while the school is occupied; this occurs because the chiller plant decrements before the students arrive (because of the building being pre-cooled).

2018-19												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,500,069	\$1,557,089	\$1,566,161	\$1,335,834	\$1,216,982	\$1,162,554	\$1,343,566	\$1,222,901	\$1,343,573	\$1,470,003	\$1,243,340	\$1,146,081
TDSP Rate Red.	-0.29%	-4.14%	0.79%	-0.74%	-3.65%	-5.30%	-2.87%	-1.14%	-4.19%	-2.55%	-4.90%	-5.10%
Savings	-\$4,352.18	-\$64,531.87	\$12,433.43	-\$9,867.65	-\$44,426.71	-\$61,607.35	-\$38,529.95	-\$13,922.58	-\$56,254.92	-\$37,526.85	-\$60,923.65	-\$58,450.12
2019-2020												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,288,264	\$1,391,388	\$1,241,799	\$1,114,880	\$1,001,155	\$968,150	\$1,020,920	\$960,509				
TDSP Rate Red.	-8.35%	-2.78%	-4.05%	-3.83%	-1.12%	-2.45%	-2.51%	-0.9%				
Savings	-\$107,555.21	-\$38,679.03	-\$50,326.37	-\$42,734.80	-\$11,255.03	-\$23,676.53	-\$25,652.66	-\$8,832.95				
Combined Savings (They are Cumulative)												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Combined Sav	-\$111,907	-\$103,211	-\$37,893	-\$52,602	-\$55,682	-\$85,284	-\$64,183	-\$22,756				
TOTAL TDSP SAVINGS												-\$971,478

ARNOLD MS

At Arnold MS, there is a pressure transducer that is not working and causing both 60HP ChW pumps to operate 60 Hz continually. We were going to fix it alongside of all the other energy conservation measures were implementing at the CyFair Chiller Plant. I'm going to try to fix it on a service call instead of waiting for a project to start and finish. I had Shawn put kWh loggers on it to measure a kWh baseline and we will re-log when it's through to calculate the savings and get reimbursed from CenterPoint under their RCx program (in the end it won't cost us anything). Once it's fixed, the savings should be over \$12,500 per year (See financials below):

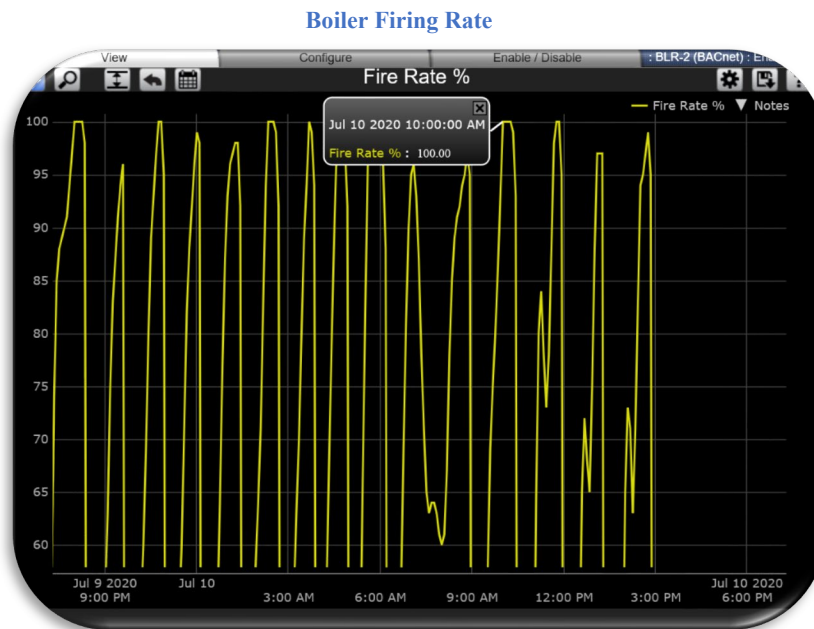


\$12,587.49	Savings per year	
\$0	Cost (including Rebate)	
0.0	Payback Yrs.	
	IRR (based on 10Yr)	
\$107,373	NPV	

NATATORIUM

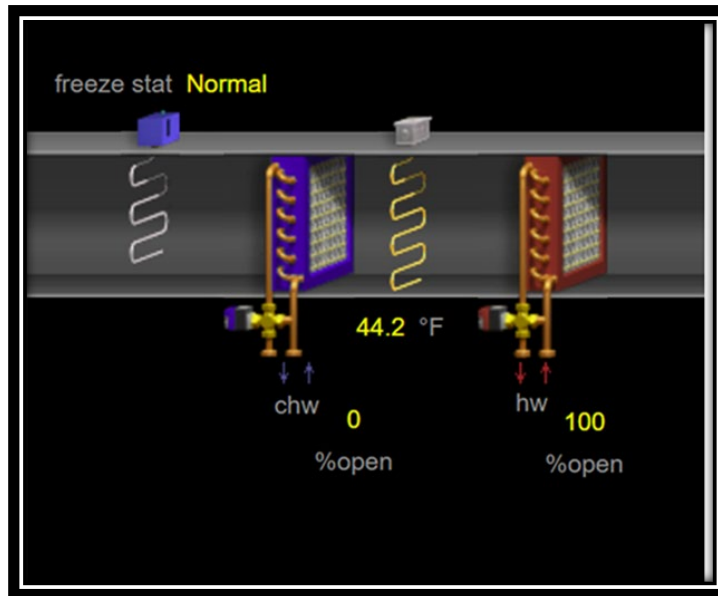
ALC started their recommissioning study at the Natatorium (CFISD's biggest energy hog). I've spent two days with them. So far, it looks like we're way overcooling the pool area and then heating it back up; it's basically a tug-of-war going on 24/7 (cooling vs. heating). When the boilers come ON, they don't stay ON for very long because they are heating water to a min of 140 degrees (max 180) and there is basically no throttling (the firing rate is 100%) so there are wild swings going on, as it heats up and then cools down; there are programming modes of operation (heating/cooling/dehumid) that have completely different programming logic. They will issue a report soon, and there will likely be a PO needed to implement the fixes and perhaps redo a start-up on the boilers, and perhaps install better boiler controllers, that can throttle down.

Six Most Inefficient Support Buildings	
CFISD NATATORIUM	6.18
SATELLITE COLD FOOD WAREHOUSE	6.00
FOOD PRODUCTION CENTER	4.69



It looks like the chilled water valves are diverting water through the coils even when they are supposed to be closed.

AHU diverting Chilled Water at 0%



CAPACITORS AT CYFAIR HS & FOOD PRODUCTION

We are looking into installing capacitors at CyFair HS; they currently have poor power factor. See financials below (\$14,600 in savings per year). Also, we have a small PO issued to fix the capacitors at Food Production, if it works it should save around \$17,000 a year.

Capacitors at Cy-Fair HS

\$14,664.82	Savings per year
\$45,000.00	Cost (No Rebate)
3.1	Payback Yrs.
30%	IRR (based on 10Yr)
\$80,094	NPV (10 Yr)

CONDENSATE CAPTURE

I asked Sean Holder to look into condensate capture for the new Performing Arts Center and the new ISC Building. A company that specializes in this, took our water rates, and did a ballpark analysis on it. Unfortunately, even though our rates are growing; it doesn't look like it's going to be a feasible project (with our water rates we'll save around \$3,700 per year (about a 16 yr. payback). The costs are listed below:

Wahaso Summary

Project: Cyfair ISD
Location: Houston, TX
Project Number: 01437
Water Sources: Rainwater / Condensate
Water Uses: Cooling Tower Make-Up
Analysis Date: July 9, 2020

	Rainwater Only	Condensate Only	Rainwater & Condensate
Cistern Size	20,000 gallons	500 gallons	20,000 gallons
System Efficiency	40.8% of demand met	21% of demand met	57.8% of demand met
Annual Water Savings	708,000 gallons	374,000 gallons	1 million gallons
Budget Estimate - System	\$100,000 - \$120,000	\$50,000 - \$70,000	\$100,000 - \$120,000
Budget Estimate - Storage	\$60,000 - \$80,000	Included in system	\$60,000 - \$80,000

TDSP SAVINGS

CFISD has been reducing our kW charges (both Ratchet & 4CP). We are starting the HVAC earlier in the morning, running the HVAC on Memorial and Labor Day, and have been dropping load during 4CP warnings that we get from TXU. Our efforts have paid off; our savings are **\$48,417** for April 2020 (over the base month – April 2017). Total TDSP savings are \$1,076,150 since we started our reduction methods (21 months ago). Regarding that Ratchet Kw, *there is a small kWh penalty for starting the chiller plant early* and running the HVAC on Memorial Day/Labor Day. We can improve on these savings by starting even earlier on Monday mornings to avoid all the chiller stages from coming ON while the school is occupied; this occurs because the chiller plant decrements before the students arrive (because of the building being pre-cooled).

2018-19												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,500,069	\$1,557,089	\$1,566,161	\$1,335,834	\$1,216,982	\$1,162,554	\$1,343,566	\$1,222,901	\$1,343,573	\$1,470,003	\$1,243,340	\$1,146,081
TDSP Rate Red.	-0.29%	-4.14%	0.79%	-0.74%	-3.65%	-5.30%	-2.87%	-1.14%	-4.19%	-2.55%	-4.90%	-5.10%
Savings	-\$4,352.18	-\$64,531.87	\$12,433.43	-\$9,867.65	-\$44,426.71	-\$61,607.35	-\$38,529.95	-\$13,922.58	-\$56,254.92	-\$37,526.85	-\$60,923.65	-\$58,450.12
2019-2020												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Prev Yrs. Costs	\$1,288,264	\$1,391,388	\$1,241,799	\$1,114,880	\$1,001,155	\$968,150	\$1,020,920	\$960,509	\$1,103,499			
TDSP Rate Red.	-8.35%	-2.78%	-4.05%	-3.83%	-1.12%	-2.45%	-2.51%	-0.9%	-4.39%			
Savings	-\$107,555.21	-\$38,679.03	-\$50,326.37	-\$42,734.80	-\$11,255.03	-\$23,676.53	-\$25,652.66	-\$8,832.95	-\$48,417.67			
Combined Savings (They are Cumulative)												
Month	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July
Combined Sav	-\$111,907	-\$103,211	-\$37,893	-\$52,602	-\$55,682	-\$85,284	-\$64,183	-\$22,756	-\$104,673			
											TOTAL TDSP SAVINGS	-\$1,076,150

MAY 2020

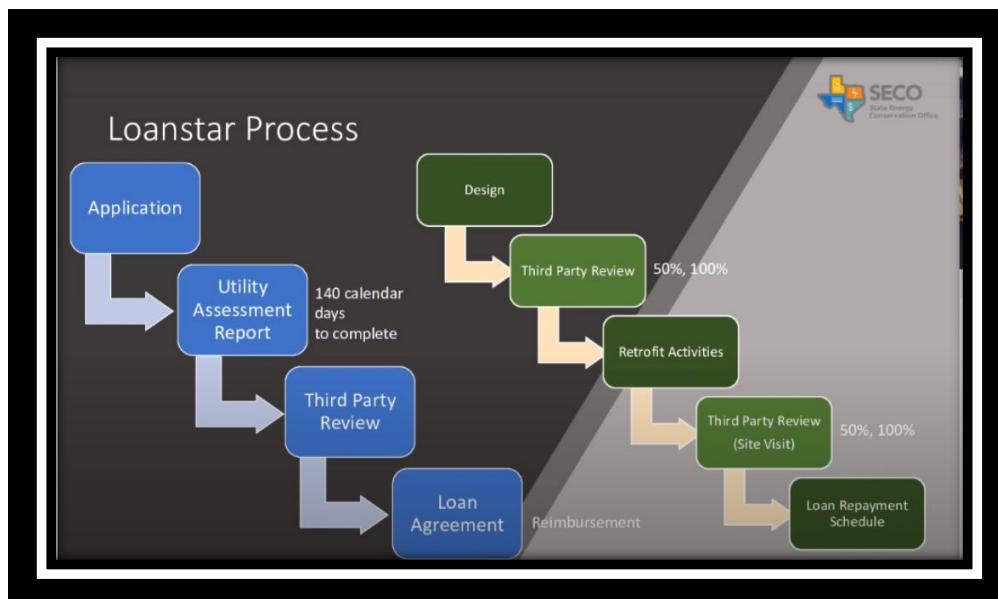
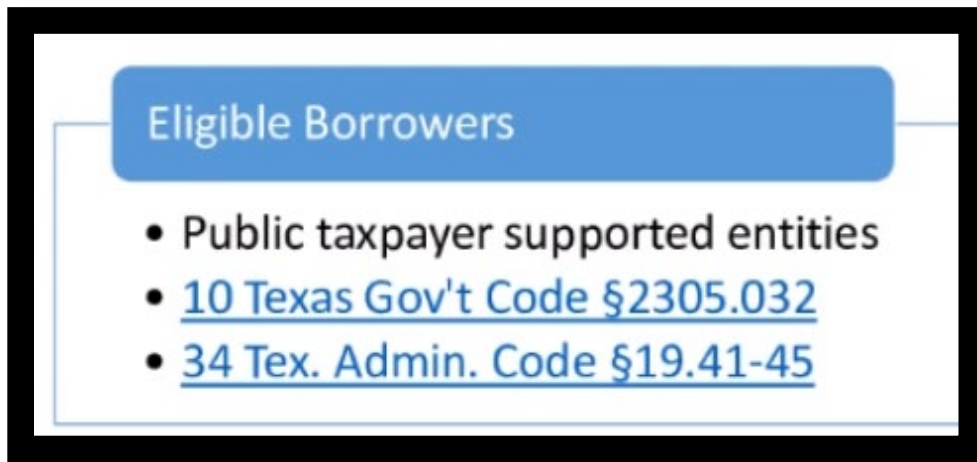
LOANSTAR NOTES FOR PURCHASING UV-C:

Met with the LOANSTAR representatives from SECO (State Energy Conservation Office) on the possibility of getting 2% loan (s) for purchasing UV-C for CyFair School District. UV-C would kill 98% of all viruses and bacteria, plus there is the added benefits of clean coils along with energy savings (see presentation: <https://www.texasema.org/tema-can-help.aspx>; Unfortunately, there were technical difficulties in the beginning of the presentation, but it was very good).

SECO said it's possible if the payback is not too long. I took the following notes:

1. Lowest interest money available to public entities (2%).
2. There is a Notice of Loan Fund Availability.
3. Loan payback period up to 10 years; 15 years if more than 50% is HVAC related.
4. **Loan size available is \$8 million per loan; also, can have up to three at the same time for a total of \$24 million.**
5. You must prove that your energy savings will be enough for there to pay back the loan.
6. Can combine multiple energy conservation measures (i.e. UV, LEDs, recommissioning).
7. Loan cannot go beyond the Useful Equipment Life.
8. Applications are reviewed on a first-come first-serve basis.
9. There will be money available for the October application.

10. Whose is available? State Agencies, K-12 Schools, Local and County Governments, Hospitals Districts, and higher education.
11. Must be for equipment that is permanently affixed.
12. LoanSTAR history: 306 loans, \$532 million borrowed, \$647 million saved.
13. <https://comptroller.texas.gov/programs/seco/funding/loanstar/>



STEPS:

1. Do a preliminary calculation of Energy Savings (Can include hard-maintenance savings, not in-house).
2. Fill out the 2page application.
3. SECO (State Energy Conservation Office) will issue a Memorandum of Understanding where they can hold the money.
4. Then you have 140 days to do a Utility Assessment Report (UAR) – which is a detailed audit.
5. After the UAR is turned in, it will be reviewed by a third party – that SECO hires
6. Then the Loan Agreement is signed.
 - a. Don't do any work before this is signed – won't be reimbursed.
 - b. Except for the Utility Assessment Report.
 - c. Once the contract is signed you will be reimbursed
7. Design Stage (third party review – 50 100%)
 - a. Then Retrofit Activities take place
 - b. A Final Inspection is made by the SECO Third Party Reviewer
 - c. Then you start paying it back
8. Two SECO guidebooks Vol 1 (Guidelines) & 2 (Calculations)
9. Who can develop the UAR?
 - a. Licensed PE in the State of Texas
 - b. Can use “hard” maintenance savings – allows you to meet the required payback.

RECENT REVISIONS:

Maintenance & Operations (Hard Cost) Savings:

- Use a reasonableness test on O&M hard cost savings. Either provide copies of Work Orders (12 to 24 months) illustrating actual maintenance costs for the equipment being replaced, or use industry acceptable maintenance cost estimations such as R.S. Means “Facilities Maintenance & Repair Cost Data” to document estimated savings. If the service has been provided on a contract basis, provide contract cost documentation to document estimated savings.
- O&M hard cost savings should be secondary and not primary. Annual O&M hard cost savings should never exceed the annual energy dollar savings for the measure associated with the O&M costs.
- The duration of operational savings should not exceed the remaining average useful life of the equipment in place.
- Operational savings costs used in the baseline year will remain in place for the duration of the savings. No inflation factors will be included in the costs.
- The Operational Savings will not be reduced by upcoming operational costs associated with the newly installed equipment.

POWER FACTOR CORRECTION CAPACITORS

We are looking to install power factor correction capacitors at the following elementary school campuses. Please see financials below:

Facility	Address	Savings	Power Factor
Frazier ES	8300 Little River Rd,	\$5,823.33	0.81
Hairgrove	7120 N. Eldridge Pkv	\$5,867.28	0.88
Horne	14950 W. Little York	\$4,713.34	0.85
Lowery	15950 Ridge Park Dr	\$6,255.85	0.79
Wilson	18015 Kieth Harrow	\$4,563.35	0.88
TOTALS		\$ 27,223.14	

\$27,223.14	Savings per year
\$57,500.00	Costs
2.1	Payback Yrs.
46%	IRR (based on 10Yr)
\$174,719	NPV (10 Yr)

JUNE 2020

MITIGATING DISEASES TRANSMISSIONS WITH GERMICIDAL UV-C

Michael Langton gave us a quote for installing UV in the District (\$30 million). UV kills 90-99% of all viruses and bacteria, depending on how much you install (there are many factors that determine how much the viruses are mitigated, including: airflow rate (fpm), temperature, humidity, exposer time, duct reactivity and lamp output).

School Type Sorted	SQU FT	COST/ ft ²	
High School	6,383,096	\$1.38	\$8,800,000
Elementary School	5,351,220	\$2.48	\$13,250,000
Middle School	3,928,363	\$2.02	\$7,950,000
Administration	1,252,106	\$	
Special School	284,892	\$	
Total Sq.Ft.			\$30,000,000

An extra benefit of UV-C is coil cleaning – which saves fan energy because of reducing pressure drop. This helps cut fan energy consumption by up to 25%.

Please see this very good TEMA presentation to view on-line; there was some technical difficulty in the beginning of the presentation; so, you can skip to 11:00 minutes in. There are also slides with the presentation (see attached). There is a comparison between UV-C and Bi-polar unionization at the end of the presentation. If you would like to view, go to

<https://www.texasema.org/tema-can-help.aspx> Click on *Mitigating Diseases Transmissions with Germicidal UVC*. Start at 11:00. I also attached the presentation slides to this email.

If CFISD chose to put in UV-C, we could start at the middle and high schools. The financials then would be something like this (see below): There are a lot of studies that show that COVID-19 doesn't have much effect on young children under 10; nor are they of high transmissivity of the virus if they do get it.

\$ 16,750,000.00	Loan
3.8%	Rate
7	Term (yrs)
(\$2,770,277.13)	Annual Payment

Here is a rough savings (estimate); We can refine this estimate after doing a thorough study. Also, if CFISD used it in a PR campaign it might get a higher percent of students back in the classroom. If 10% more students came back for example, it might benefit the District financially; this is not reflected in the financials below, nor is the maintenance costs of UV. The lamps would need to be changed around every two years as they approach the end of their lamp life; if CFISD were to pursue UV installation in the District, a thorough estimate of all costs and savings could be done.

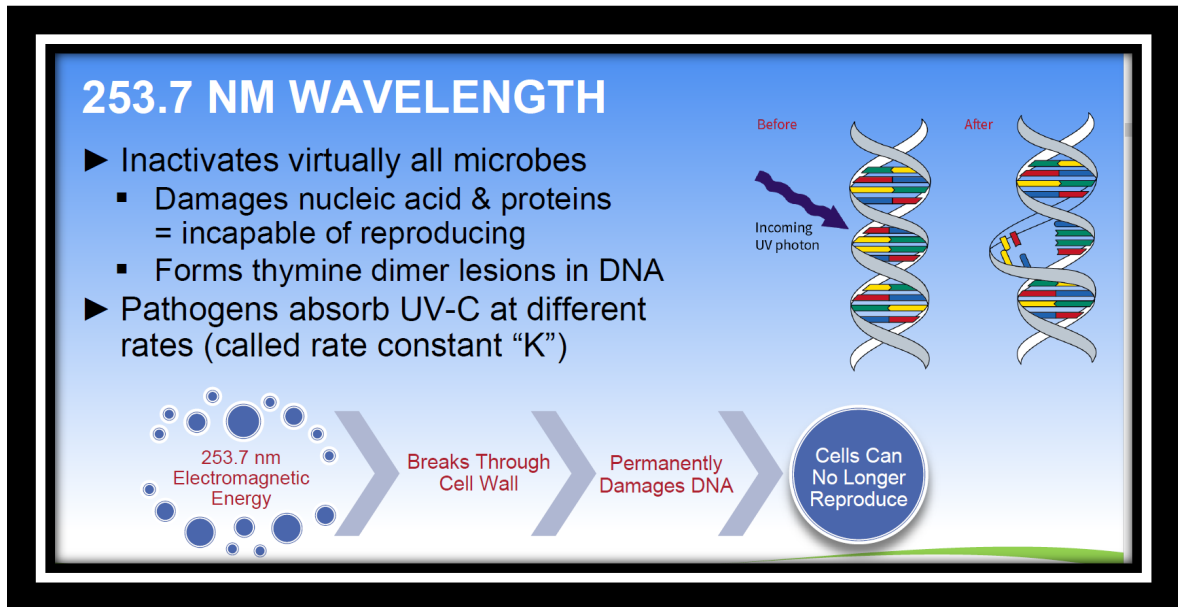
\$1,005,631.12	Run Hour Savings
\$482,702.94	Fan Energy Savings
\$70,000.00	Filter Savings
\$0.00	Coil Clean Savings
\$1,558,334.06	TOTAL SAVINGS
\$6,246,675.47	20 Yr NPV

UV has been used in HVAC systems for 40 years for eliminating infectious diseases, air disinfection. UV-C has been used in the upper rooms (of hospitals) for eighty years! UV is ASHRAE certified, whereas other technologies are not.

SUMMARY

- ▶ UV-C proven
 - 80+ years of Upper Room (1940s)
 - 30+ years of proven "in-duct" applications
- ▶ ASHRAE recognized
 - 2 Handbook Chapters (Applications and Fundamentals)
 - 2 Test Standards (ANSI/ ASHRAE 185.1 and 185.2)
 - 3 Position Documents (Airborne Infectious Diseases; Infectious Aerosols; Filtration & Air Cleaning)
- ▶ Extensively peer reviewed
- ▶ Other "disinfection" technologies are not well researched and validated (ASHRAE 2020)

How it works: UV-C energy at 253.7 NM permanently damages the nucleic acids & proteins and makes the viruses and bacteria incapable of reproducing; it breaks apart the DNA strands (see below).



CENTERPOINT TDSP SAVINGS (CY-RANCH)

CenterPoint has agreed to combine the three meters at Cy-Ranch HS into one ESI ID. I estimate that this will save the District around \$50,000 a year on our TDSP charges for that school! The reason for the savings is that the chiller plant has each of its large chillers on the three different utility meters/transformers for Cy-Ranch; therefore, the KVA demand for each chiller “stacks” on top of each other, and is not diversified (like it would be if they were on one meter). Cy-Ranch TDSP charges are by far the most of all the high schools, which makes their total electric bill much higher. Scott Harrison from TXU has helped us with this process as well as Kristi Hardy from CenterPoint. I told CenterPoint if they want to charge us for their metering costs (to combine all three meters) that we could pay that bill; since we are losing \$50K a year, it’ll be a quick payback. I attached a one-line diagram; as you can see, we have a chiller on each of the three services (these are huge 1100 ton chillers), they end up adding/stacking the KVA because they’re rotated in their use. Having one meter will diversify this kVA. CFISD presently has five other schools where we have their metering combined, they are: Cy-Springs HS, Jersey Village HS, Cy-Fair HS, Cy-Lakes HS, and Kahla MS. Once they finish with this school, we might also look at Bridgeland HS to see if we can combine their four meters.

