

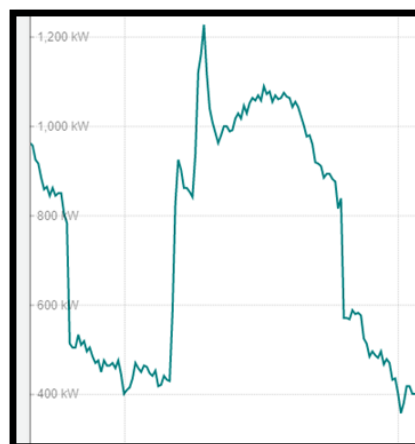
ENERGY DEPARTMENT NEWS (FY 2020-21)

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 (2020-21).

JULY 2020

CY-LAKES CHILLER CONTROLS RETROFIT

The Cy-Lakes Chiller Plant controls retrofit is finishing up. Preliminary savings are 905,993 kWh and approximately 250 kVA. Plus, we will be able to use the new controls for Demand Response. The project costs were \$71,117. Preliminary \$ savings for the project are \$49,739 without counting Demand Response, giving it 1.42 yr. payback. Also, we should eventually be able to receive a rebate from CLEAResult for over \$100,000, after we do a Measurement & Verification report (after 12 months of post monitoring).



CY-RANCH CONTROLS RETROFIT

The Cy-Ranch HS/Smith MS/Warner ES project is finishing up. Preliminary savings are 1,201,712.75 kWhs. The \$ savings should be around \$72,102.77. The cost of the project was \$161,000, making it a 2.3 yr. payback. We should be able to obtain a rebate of up to \$80,000, making the project a 1.12-year payback after rebate.

Cypress Ranch High School Single Zone AHU's							
	AHU's	Return CO2	Return Humidity	Zone Temp	Fan Speed	Supply Temp	
Multi Purpose Gym	SZ AHU A1-01	1996 ppm	60 RH%	73.1 F	30.8 hz	57.6 F	
Auxillary Gym	SZ AHU A2	569 ppm	56 RH%	72.4 F	30.0 hz	63.7 F	
Mall	SZ AHU C2	796 ppm	59 RH%	74.1 F	60.0 hz	58.5 F	
Cafeteria	SZ AHU I4	556 ppm	56 RH%	68.6 F	18.0 hz	57.9 F	
Cafeteria	SZ AHU I6	620 ppm	60 RH%	70.0 F	40.0 hz	58.7 F	
Auditorium	SZ AHU F2	434 ppm	52 RH%	71.5 F	34.0 hz	76.9 F	
Area E&I 2nd Fl	SZ AHU E3	825 ppm	56 RH%	72.7 F	32.0 hz	57.9 F	
Area H&I	SZ AHU H6	702 ppm	56 RH%	73.1 F	18.0 hz	74.0 F	
Performance Gym	SZ AHU J1	585 ppm	59 RH%	71.7 F	30.0 hz	54.4 F	
Gym	SZ AHU J2	597 ppm	100 RH%	71.6 F	30.0 hz	77.6 F	
Main Corridor	SZ AHU J7	871 ppm	55 RH%	70.0 F	32.0 hz	55.3 F	

AUGUST 2020

CENTERPOINT RATE INCREASE

Unfortunately, CenterPoint Energy has increased our TDSP rates over last year by a substantial amount between 15-16%. There are several line items affected; the Ratchet increased in April and the 4CP in September. **The overall effect on the District utility bill will be significant: \$1,315,031.26 a year!** I think CenterPoint normally has a rate case every five-six years with the PUC. I ran the new rates through the following facilities to compare year-over year increase (see figures 6 & 7).

We are working continually on lowering our TDSP KVAs, which amount to approximately 47% of our bill, depending on the month. We are lowering our KVAs through installing power factor capacitors, early starts for the HVAC, combining utility bills, and utilizing thermal storage.

Figure 1 NON IDR Rate Comparisons

		2019	2020
1	Post	\$ 3,256.70	\$ 3,705.83
2	Bane	\$ 3,650.57	\$ 4,405.93
3	Reed	\$ 3,568.22	\$ 4,277.62
4	Hairgrove	\$ 2,773.35	\$ 3,248.00
5	Wilbern	\$ 2,528.64	\$ 2,998.16
6	Francone	\$ 3,072.11	\$ 3,671.09
7	Maint/Op	\$ 1,496.53	\$ 1,695.69
8	Gleason	\$ 2,877.96	\$ 3,321.31
9	ALC/ABC	\$ 2,171.60	\$ 2,504.63
10	Hancock	\$ 3,086.99	\$ 3,683.11
		\$28,482.67	\$33,511.37
		% Increase	18%

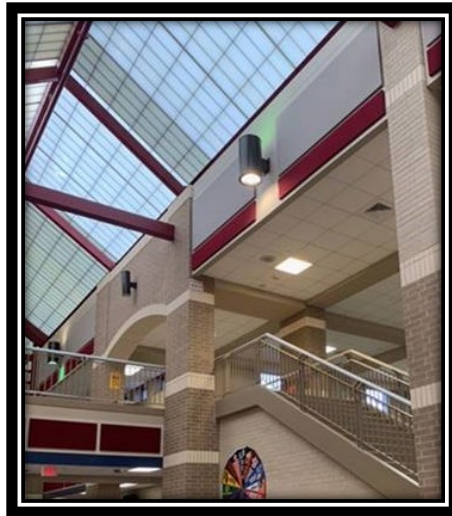
Figure 2 IDR Rate Comparisons

		Old	New
1	Cy-Creek HS	\$11,815.34	\$ 14,123.47
2	JVHS	\$12,085.94	\$ 13,930.65
3	LCHS	\$ 9,881.64	\$ 11,403.40
4	Cy-Ridge HS	\$12,111.62	\$ 13,954.05
5	Cy-Fair HS	\$16,678.26	\$ 18,515.74
6	Cy-Lakes HS	\$12,514.99	\$ 14,267.95
7	Anthony MS	\$ 5,563.64	\$ 6,176.50
8	Labay MS	\$ 4,558.76	\$ 5,050.01
9	Cook MS	\$ 4,774.58	\$ 5,530.81
10	Truitt MS	\$ 4,131.93	\$ 4,517.39
		\$94,116.69	\$107,469.97
			14%

SCONCE LIGHTING

We are looking into retrofitting the sconce lamps at Cy-Lakes and Cy-Fair High Schools with LEDs (lamps only) to replace the existing metal halide lamps; the new lamps will use about ¼ of the energy and last about five times longer, which is nice because it takes a scissors-lift to replace them if they burn out. I'll have a contractor provide a quote for this project (material & labor).

At the same time, I'm having them quote on installing LED wall-packs. Tom Draper and Shawn Grimm have decided on a fixture for the District that I'll standardize on. We'll be using rebate money of course. We're already doing chiller plant projects at both schools and would like to increase the rebate to a larger amount.



SEPTEMBER 2020

NATATORIUM

The Energy Management Department participated in a recommissioning study for the CFISD Natatorium. David Tooker, HVAC consultant, Automated Logic and Noresco all contributed in the study. The Natatorium was CFISDs greatest energy hog per square foot. We found that the high usage was due to over-cooling the facility then reheating it. All the major chilled water valves and actuators were malfunctioning (either stripped

or not set correctly); David Tooker and his team fixed all of them. Other set-points were adjusted, such as the cold deck temperatures and VFD speeds. After three months, we've achieved a reduction of 36% in electricity and 50% in natural gas! This will save the District a projected \$112,000 a year in our electricity and natural gas costs. It also qualifies for a CenterPoint rebate of over \$100,000!

COMBINING ELECTRIC METERS

The department is also working on combining electric utility meters to better diversify the kW demand. These have had to be approved by CenterPoint's Regulatory Department. We've been approved to combine the kW meters at Cy-Ranch HS and Jarvis Chiller Plant so far. The projected savings for both facilities is approximately \$144,000 a year. We're looking into combining meters at other facilities as well. The biggest savings is where there are multiple kW meters for one chiller plant. We'll be making recommendations to combine these kW meters in the CFISD building specification.

OCTOBER 2020

ELEMENTARY SCHOOL CAPACITORS PHASE 3

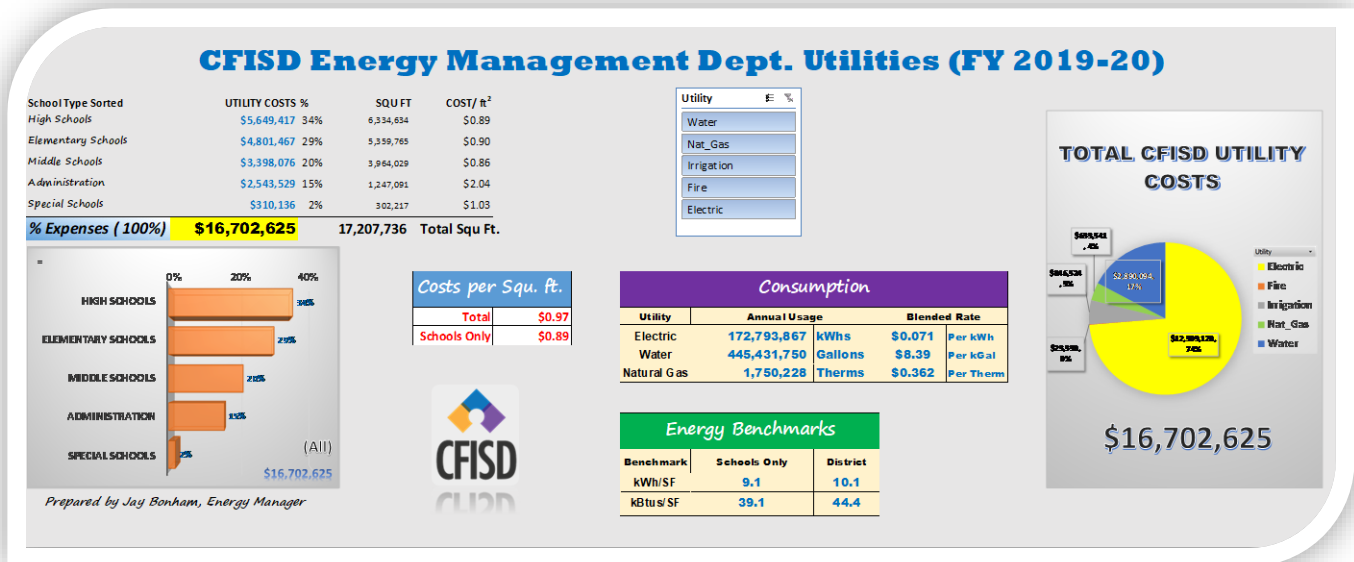
A PO will be issued to install power factor capacitors in the following schools. Eventually we will receive a rebate for them once the M&V review period has ended (almost completely paying for the costs). The capacitors help us lower our demand costs (both Ratchet & 4CP).

McFee	0.85	\$ 4,743.15	19315 Plantation Cove Ln.	1008901022900016180107
Andre	0.850946	\$ 4,807.55	8111 Fry Rd.	1008901023816528600105
Birkes	0.849778	\$ 5,061.25	8500 Queenston Blvd.	1008901023812461130102
Hemmingway	0.850989	\$5,000.21	20400 W Little York Rd.	1008901001900084210107
Holbrook	0.790254	\$ 6,197.34	6402 Langfield Rd.	1008901008185284500100
		\$25,809.50		

\$25,809.50	Savings per year
\$55,000.00	Costs
2.1	Payback Yrs.
46%	IRR (based on 10Yr)
\$165,160	NPV (10 Yr)

COMBINING ELECTRIC METERS

The CFISD Utility dashboard for FY 2019- 20 has been completed and will be posted on the Energy Management Website. Matt, your breakdowns for your annual report are calculated – see individual tabs (in attached dashboard).



FOOD SERVICE

The line item for replacing the steam boilers was taken out of the 2019 bond since the boilers are only eleven years old – per design review meeting; the extra funds will be spent for other improvements such as automatic roll-up doors. The current steam boiler nameplate efficiency is 80%; however, that is only for the combustion cycle (not the steam cycle). The actual efficiency of the steam loop is probably less than 60%, when accounting for steam-trap losses, insulation losses, etc. The Food Production is the Districts' highest energy user per square feet for obvious reasons; it runs 24/7 and is energy intensive. Currently, the boilers are both ON all year in standby (which uses a lot of energy); then ON in production mode at a high firing rate (about 11 hours per day). For future Bond: as the 2 Sellers boilers come to the end of their life (they were installed in 2009), they should be replaced with 3-4 small Muira modular **water-tube** steam boilers; making a N+1 redundancy, rotating the lead. Have one or two ON and one in standby and the other OFF (in the winter). Eight months out of the year, you'll only need one ON, and one in standby (the other two can be OFF). The water tube boilers can come up to steam pressure in about 15 min (verses the fire-tube, which takes about 4 hours. The new steam boilers can be high efficient with O2 trim and have a good turn-down capability (at least 5% increments).

Continue to take loads off steam if they don't need steam (where we are presently converting to hot water through heat exchangers). Like the hot water heater, instead of using steam (and a heat exchanger) just use another hot water boiler (which are about 95.6% efficient now); there currently is a hot water boiler in the maintenance room. The air handler space-heating coils that are steam should be converted to hot water coils. Anywhere there is a heat exchanger, that load can be converted to hot water instead of steam (saving at least 25% energy). After converting all as much as we can to hot water (instead of steam), one less modular boiler could be purchased.

Implementing the following strategy should reduce natural gas usage by 50% in the Food Production Building.

DEMAND RESPONSE

The Energy Management Department received the following checks for participating in Demand Response last summer. Jay agreed to run any future curtailment by Matt for the next year. Our next series of tests will likely not come until June 2021. In addition, we also received another \$4,400 check for participating in the CenterPoint's RCx program for Arnold MS.

ERS	Cpower	\$ 12,280.00
ERS	MP2	\$ 10,656.00
SOP - Centerpoint	Voltus	\$ 15,388.00
SOP - Centerpoint	Cpowr	\$ 4,134.00
		\$ 42,458.00

DECEMBER 2020

SCORE CHECK

We just received an energy rebate check from CenterPoint for \$107K for energy efficiency projects we did at Truitt, Labay, and Hamilton Middle Schools. These were all bond projects involving energy efficient chillers and LED lighting. We have several other big checks coming in the near future for Cy-Falls HS, Langham Creek HS, Rowe MS, and other cafeteria lighting projects we did last summer. Our total SCORE checks for the 2020-21 fiscal year should be over \$450K. These will be spent and encumbered before the end of the fiscal year on very high ROI energy projects. Some of the projects include power factor correction capacitors, high efficiency chiller plant controls, recommissioning projects, wall-pack LEDs and sconce LEDs. We've also purchased several service contracts with ALC to assist us with energy efficient programming. I've told the HVAC department they are also able to use these service contracts if they're in a jam (we're all one team)!

PF CORRECTION CAPACITORS

The Energy Management Department is purchasing five more 140 KVAR power factor correction capacitors for five more elementary schools. These projects are turn-key, though Shawn or Carey must instruct them on the best locations for installation.

School	Address	pf	Costs	Savings	PayBack
Robison ES	17100 Robison Woods Rd. Cypress, TX	0.776	\$9,900.00	\$5,360.99	1.85
Swenke ES	22400 Fairfield Place Dr. Cypress, TX	0.886	\$9,900.00	\$4,610.00	2.15
Tipps ES	5611 Queenston Blvd. Houston, TX	0.840	\$9,900.00	\$7,157.23	1.38
Black ES	14155 Grant Rd. Cypress, TX	0.886	\$9,900.00	\$4,473.80	2.21
Danish ES	11850 Fallbrook Dr. Houston, TTX	0.840	\$9,900.00	\$7,009.48	1.41
			\$49,500.00	\$28,611.50	1.73
			Turnkey Cost	\$49,500.00	
			Annual Savings	\$28,611.50	
			Payback Yrs.	1.73	
			NPV	\$188,895	
			IRR	57%	

JANUARY 2021

TEKWORX/DAIKIN:

CFISD is going to put TekWorx Controls into the Cook MS chiller plant to run in synch with the existing Unify controls. David Tooker looked it over and gave us the okay to proceed. TekWorx is going to be working with Daikin on a Buy-board Contract; Daikin is going to install all the devices (see below). TekWorx will monitor the performance of each chiller to generate performance curves; these performance curves will be used to sequence the most efficient chiller for the given parameters (building load & entering condenser water). They will also do the same thing for the primary and secondary pumps (run the most efficient sequence). I have used TekWorx at Johnson Controls and they worked well (saved us 20%); Cook MS will be a pilot school to see how well they can do for CFISD.

The costs (after rebate in Year 2) will be \$45,252. The savings will be approximately \$23,768 a year, giving us a 1.9 year payback (using the rebate). Please see financials below:

Costs (w Rebate)	\$45,252
Savings (Adj)	\$23,768
Payback	1.9
NPV (10 Yr)	\$155,645
IRR (10Yr)	38%

Energy Conservation Measures (ECM)

*Assumes \$0.075 per kW saved

- ECM # 1: Installation of modulating actuator on existing Chilled Water Bypass valve.
- ECM # 2: Update BAS to accept all optimization algorithms and provide on-site commissioning.
- ECM # 3: Incorporate tekWorx Xpress Chiller Plant Optimization algorithms as follows:
 - Efficiency Based Chiller Sequencing
 - CHW Differential Pressure Setpoint Reset
 - CHW Supply Temperature Reset
 - Condenser Entering Water Temperature Reset
 - Adaptive Cooling Tower Cell & Fan Sequencing
 - Adaptive Pump Sequencing

Disclaimer - This report is based on generally accepted industry standards, practices and engineering principles. Further, the report is based on limited information and no guarantee is given. The recommendations and conclusions contained herein are considered preliminary and subject to revision if additional data becomes available.



- Provide and install (1) modulating actuator on existing Chill Water Bypass valve
- Installation of (1) integration module
- Update BAS to accept all optimization algorithms
- Provide on-site tekWorx commissioning
- Incorporate tekWorx Xpress Chiller Plant Optimization algorithms as follows:
 - Efficiency based chiller sequencing
 - Chill water differential pressure set point reset
 - Chill water supply temperature reset
 - Condenser entering water temperature reset
 - Adaptive cooling tower cell & fan sequencing
 - Adaptive pump sequencing

HOPPER CHILLER PLANT

The Energy Management Department is going to make the same improvements at Hopper Middle School that we made at Cy-Lakes HS. It looks like the Cy-Lakes improvements are on track to save 20% at the school. Hopper MS doesn't have as much room for improvement as Cy-Lakes, though we're hoping for 10%. This will be done through the following: better sequencing of chillers, condenser water reset, better pump control, ChW reset in the winter, AHU static pressure reset. We also plan on putting a demand response dashboard like we did at Cy-Lakes HS. The cost for the project is \$55,000. The savings (including demand response) are estimated to be \$19,500 per year. In year two, we should get a SCORE Rebate of \$20,500, which gives an estimated payback of 1.8 years. Please see financials below:

Costs	\$55,300
Savings+DR	\$ 19,500.00
Rebate	\$20,500
Payback	1.8
NPV	\$185,662
IRR%	42%