

ENERGY DEPARTMENT NEWS

(FY 2018-19)

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 (2018-19).

JULY 2018

ENERGY WATCHDOG

Sonia has had all the electric bills imported to the new energy accounting software. We are currently importing water, and next month we will be importing gas bills. As you may have noticed, our charts are a little different (because the information comes out a little differently).

Soon, I will include some water and gas charts.

M&V PLANS

I am working diligently on several M&V plans for CLEAResult/CenterPoint in-order to receive a greater incentive. With M&V (Measurement & Verification), we are measuring the savings, verses using a prescriptive calculator to calculate the utility incentive (which is always still an option). These plans are going to be written for the 2014 Bond projects that were implemented this 2018 summer. Three have been written; five more to go. It pays to write M&V plans when multiple energy conservation measures are implemented (such as chillers, lighting controls). The incentives are approximately \$30,000 per elementary school and \$60,000 per middle school. The drawback is that we need to wait for the actual bills to come in (called the Reporting Period). The Reporting Period for the elementary schools will end Sept. 2019; the middle schools reporting period will end Sept. 2020. The benefit of doing M&V is that the utility (CenterPoint) can pay more incentive (approximately 50% more). I attached the M&V plan for Ault Elementary School.

The reporting period for both Watkins and Holmsley will be ending soon (from 2017 summer bond work), and therefore we will be calculating the incentive for those schools soon and then get paid by CLEAResult.

Centerpoint/CLEAR Result SCORE Incentives (M&V)				
#	Type	Payout	Amount	TOTALS
5	ES	2019	\$30,000.00	\$150,000
3	MS	2020	\$60,000.00	\$180,000
TOTAL (Aprox.)				\$330,000

AUGUST 2018

PORTABLE HEATING SET-POINT SAVINGS

This past summer, the Coordinators and Jay visited all the portables and reprogrammed the unoccupied heating set point. There are 560 thermostats throughout the high, middle, and elementary campuses. The new unoccupied thermostat setting is now 38 deg; it was previously 50 deg. The savings was calculated by using the TMY3 data for Houston (all 8760 hours) accounting for the decreased set-point, fan run-time, and less outside air, and totaled over 1.2 kWh of savings (see fig. 6): which equates to almost \$50,000 annually on electric strip heating costs. At the same time, we reprogrammed the thermostats to an adaptive start, rather than starting two hours early every day; this is likely to save a lot in the Spring, Fall and Winter months (they'll likely only need an hour or less of precool during those months). The fan settings are set to AUTO on holidays and unoccupied periods, not OFF (in past years it was set to OFF and some of the pipes froze in the winter).

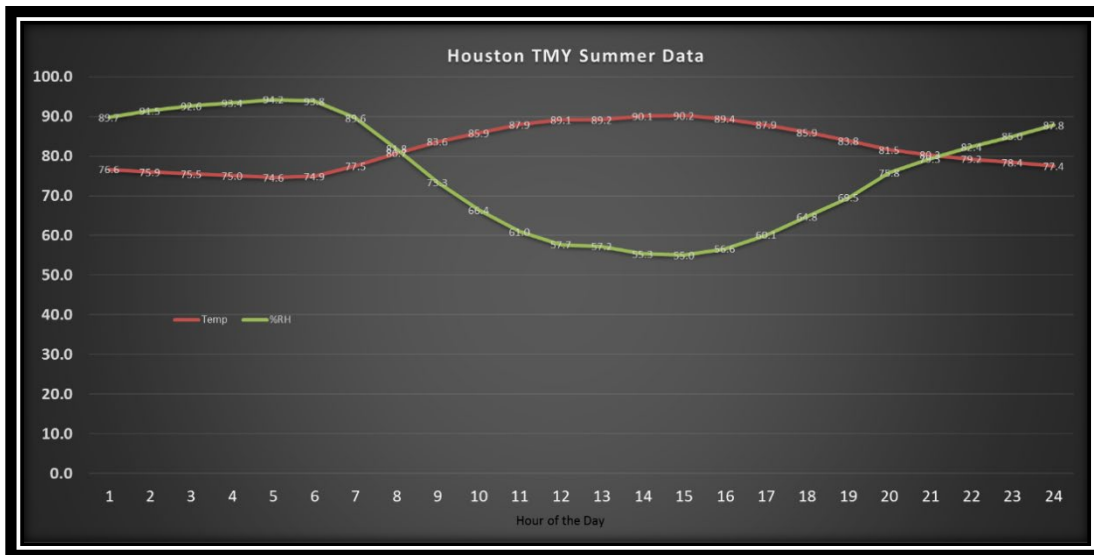
Figure 1: Portable Heating Set-point Savings

	">50,>38"	">38"	fan motor	OA
		1,261,698 kWh		
Btus	963,845,143	450,300,000		
kWh	313,874	146,639	360,772	440,412

TEMPERATURE VS. HUMIDITY

The graph below (Fig. 7) is a daily average of typical Houston weather (Called Typical Meteorological Year data – TMY). This chart proves that Temperature and Humidity act inversely to each other. As the outdoor temperature increases, the relative humidity decreases. In the middle of the day when the temperature is hottest (averaging just over 90 deg. F), the relative humidity is the lowest (55%). At night when the temperature is lowest, the humidity is highest; that's when the dew point is reached. When I worked for Johnson Controls for school districts in S. Florida (where there is actually higher humidity than Houston) they always wanted to have hot buildings at night; as long as the building is tight and there are no fans running (including AHU fans, OA fans, RA fans). In other words, as long as there is low infiltration from the outdoor temperature and outdoor humidity. If we can keep a building tight at night, the temperature can be allowed to get very warm and not have any relative humidity problems. There are a lot of misconceptions regarding temperature and humidity (many think that they are proportional – they aren't). If they were, why would engineers design reheat to lower relative humidity?

Figure 2 Typical Houston Summer Weather Temp/Rh%



M&V REPORTS

See attached Energy Measurement & Verification Report for Watkins MS 2014 Bond Renovations. The energy savings portions of the Bond scope included: Chillers, LED lighting, VRF and VFDs. The report calculated a savings for the school district of \$37,502.00 per year. The incentive from CenterPoint SCORE will likely be approximately \$46,437.00. Doing an M&V Plan & Report allows CFISD to achieve a higher actual incentive; around 75% higher rather than using prescriptive methodology because it measures actual savings.

SEPTEMBER 2018

POTENTIAL BOND PROJECT

Below (Fig. 6) shows the potential savings from removing irrigation lines off the existing water/sewer meter, and transferring to a utility installed irrigation meter, to avoid sewer costs. This will involve installing new meters supplied by the MUDs (paid for by CFISD), plumbing them in (including in some cases, vaults), and additional trenching and piping. This also may involve deposits for new meters, and city inspections. This was calculated by taking the average usage of existing schools with irrigation meters and extrapolating their usage for the schools that didn't already have irrigation meters. The average annual usage for irrigation is around 4.5 gallons per square foot. The average rate savings is \$2.65 per Kgal. If just the top 15 accounts were converted during the next BOND projects, the savings achieved would be approximately \$134,000. When I was with Johnson Controls, we would implement these kinds of irrigation projects on almost all our performance contracts.

The Transportation and the Maintenance buildings are also included; the savings would potentially be achieved in the transportation buildings by putting the hose bibs on the irrigation meter, to avoid sewer costs (assuming that is allowed by code – being that the water used doesn't return to the sewer plant).

PRIORITY	FACILITY	POTENTIAL ANNUAL SAVINGS
1	CY-FAIR HS	\$18,563
2	JERSEY VILLAGE HS	\$16,474
3	BLEYL MS	\$15,678
4	WATKINS MS	\$9,554
5	CAMPBELL MS	\$9,425
6	CY-CREEK HS	\$7,874
7	LABAY MS	\$7,520
8	HOLMSLEY ES	\$7,450
9	PRIDGEON STADIUM	\$7,320
10	FALCON TRANS	\$6,480
11	ARNOLD MS	\$6,274
12	MILLSAP ES	\$5,704
13	LIEDER ES	\$5,477
14	FRAZIER ES	\$5,097
15	THORNTON MS	\$4,950
16	HORNE ES	\$4,886
17	TELGE TRANS	\$4,860
18	TRUITT MS	\$4,823
19	HAMILTON MS	\$4,750
20	EMMOTT ES	\$4,574
21	HAIRGROVE ES	\$4,403
22	LAMKIN ES	\$4,370
23	HANCOCK ES	\$4,366
24	FRANCONE ES	\$4,351
25	CFISD NATATORIUM	\$4,257
26	ADAM ES	\$4,084
27	HAMILTON ES	\$3,793
28	BANG ES	\$3,732
29	COPELAND ES	\$3,504
30	FIEST ES	\$3,404
31	OWENS ES	\$3,285
32	BARKER TRANS	\$3,240
33	AULT ES	\$2,870
34	HOLBROOK ES	\$2,412
35	MATZKE ES	\$1,725
36	WILSON ES	\$1,688
37	WINDFERN HS	\$1,688
38	WILLBERN ES	\$1,110
39	MOORE ES	\$989
40	SHERIDAN ES	\$989
41	POST ES	\$905
42	METCALF ES (OLD)	\$820
43	MAINTENANCE/OPER	\$699
44	FOOD PRODUCTION CENTER	\$603
45	REED ES	\$603
46	ALC/ABC	\$482
47	WINDFERN ANNEX	\$302
48	ISC SW	\$181
TOTAL ANNUAL SAVINGS		\$222,586

Figure 3

CENTERPOINT SCORE INCENTIVES

We just received word that the total CenterPoint SCORE incentive will be \$200,639 (see Fig 7). Several checks came in throughout the 2018 year totaling this large amount. One “Big Check” will be presented during at the January Board meeting on January 14th.

Below shows the individual breakdown from the projects that contributed to the total amount. This incentive is the result of a lot of hard work: obtaining submittals, drawings, pre-inspections, post inspections, and in some cases writing M&V plans and reports (calculating the actual savings).

Figure 4

Project Name	Rebate ID	Total Incentive Amount (Created Project)
Cypress Fairbanks ISD-ALC West Gym INT LTG RTR	RBT-1568549	706.13
Cypress Fairbanks ISD - Francone Gym LTG RTR	RBT-1568741	980.39
Cypress Fairbanks-Windfern Annex	RBT-1686189	22,868.92
Cypress Fairbanks ISD - Cy Springs HS HVAC RTR	RBT-1273668	22,214.50
Cypress Fairbanks ISD - Emmott ES INT LTG RTR	RBT-1540262	5,655.41
Cypress Fairbanks ISD- Emmott ES HVAC RTR	RBT-1721370	1,230.95
Cypress Fairbanks ISD - Arnold MS LTG RTR	RBT-1782755	5,510.40
Cypress Fairbanks ISD - Campbell MS LTG RTR	RBT-1782761	709.29
Cypress Fairbanks ISD - Millsap Gym LTG RTR	RBT-1782767	460.25
Cypress Fairbanks-Owens ES HVC RTR	RBT-1794163	1,250.60
Cypress Fairbanks ISD - Cy Falls HS LTG RTR	RBT-1273653	38,897.47
Cypress Fairbanks ISD - Watkins RTR (M&V 60%)	RBT-1286728	20,536.79
Cypress Fairbanks ISD- Hancock ES INT LTG RTR	RBT-1540254	7,017.24
Cypress Fairbanks ISD- Berry Center INT EXT LTG RTR	RBT-1608620	9,164.03
Cypress Fairbanks ISD- Bang ES MV 40%	RBT-1721347	4,480.00
Cypress Fairbanks ISD - Hamilton ES M&V 40%	RBT-1721380	16,260.00
Cypress Fairbanks ISD - Cypress Creek HS LTG RTR	RBT-1782765	5,948.58
Cypress Fairbanks ISD - Salyards MS LTG RTR	RBT-1782774	400.35
Cypress Fairbanks ISD - Ault ES M&V 40%	RBT-1792968	18,010.00
Cypress Fairbanks ISD - Hancock ES HVAC RTR	RBT-1792974	770.35
Cypress Fairbanks ISD - Owens ES LTG RTR	RBT-1794192	5,289.73
Cypress Fairbanks ISD - Reed ES LTG RTR	RBT-1794197	7,007.79
Cypress Fairbanks ISD - Cy Woods HS GYM LTG RTR	RBT-1824213	5,270.81
		\$200,639.98

OCTOBER 2018

EXISTING SCHOOLS WITH REFLECTOR KITS

From what we can deduce, the following schools were retrofitted with reflector kits or if they are parabolic fixtures, the lamp and ballast were changed to T-8. Arnold, CyCreek, Lamkin, Jersey Village, ALC/ABC, Post, Bleyl, Campbell, Emmott, Wilson, Dean, Francone, Frazier, Lowery, Windfern HS, Lieder, Emmott, Holbrook, and Labay. We can verify out in the field that they have reflectors. If they do, we might want to consider putting them at the end of our LED retrofit bond schedule. The reason is, is

that reflectors already save 33% energy; going to LED is only going to save about 7% more. Schools without reflectors, on the other hand, will save 40%, when converting to LED (they should be prioritized first).

NOTE: If the schools with reflector kits are at the end of the next bond retrofit schedule (for getting new LED fixtures), we can perhaps still retrofit their florescent lamps with the Phillip Instantfit kits. These kits are likely to save 40 % more in addition to the reflector savings. (<http://www.usa.lighting.philips.com/products/product-highlights/instantfit>). We plan a demo installation of Instantfits this spring.

EXISTING SCHOOLS WITH LEDS IN THE CLASSROOMS

The following schools already have LED fixtures in their classrooms, or will be getting them this summer: 14 Elementary Schools, 4 Middle Schools, and 2 High Schools = 20 Total):

1	Adam	ES
2	Ault	ES
3	Bane	ES
4	Cook	MS
5	CyFalls	HS
6	Emmott	ES
7	Hoover	ES
8	Hamilton	ES
9	Hancock	ES
10	Holmsley	ES
11	Langham	CHS
12	Matzke	ES
13	Metcalf	ES
14	Moore	ES
15	Owens	ES
16	Reed ES	ES
17	Thornton	MS
18	Truitt	MS
19	Watkins	MS
20	Willbern	ES

SOLAR PRESENTATION

Rebecca Koop, Smith MS principal asked me to do a solar presentation to her students. The complete presentation is posted on our intranet site <https://inside.cfid.net/departments/energy-management>

Among other things I compared solar to various other investments. The NPV of the same value kW of gym LEDs for example was compared side by side. At Smith MS, where we converted the gyms to LED in 2016, the net present value is \$149,714 (with a 62% IRR); for solar it is \$24,874 (9%). Classroom LEDs are also a lot better investment than solar, but not as good as gyms. In addition to this, solar is much “greener” when considering the amount of energy, it takes to make the actual panels (as well as the toxins and pollutants that are released into the environment).

Cypress Fairbanks is getting some of its supply from renewables (solar & wind); ten percent this year and 25 % in 2023. Utility scale solar is usually a lot better investment than doing it yourself, plus we have the advantages of letting the utility worry about the fuel mix (especially important for cloudy days and nights).

Gym LEDs vs Solar

	Gym LEDs	Solar
kW	19.4	19.4
kWh	104,782	53,788
Electric Savings	\$7,544.28	\$3,872.73
Maintenance Savings	\$2,934.78	\$0.00
Total Annual Savings	\$10,479.06	\$3,872.73
Total Savings	\$241,018.33	\$116,181.84
Costs	\$22,600.00	\$38,808.00
Rebate	\$5,748.44	\$0.00
Payback (yrs.)	1.61	10.02
Rate of Return	62%	9%
NPV	\$149,714	\$24,874

- Gym LEDs start saving greenhouse gas almost right away. It's actually more green than solar.
- Solar has a carbon debt along with many other harmful toxins and pollutants.
- Gym LEDs also provide light which is a necessity.
- Solar doesn't provide any additional benefit except energy.

RATCHET DEMAND SAVINGS

The Energy Management Department started the HVAC earlier this August and September to avoid setting the kW ratchet. In five months, we have saved over \$175,000, minus the small amount of energy expended from starting early. Hope to save at least \$400,000 for the year using this practice. An additional benefit is that we now have had less early morning temperature complaints.

Aug	Sep	Oct	Nov	Dec
\$1,500,069	\$1,557,089	\$1,566,161	\$1,339,354	\$1,216,982
-\$17,927.65	-\$78,623.37	-\$1,740.18	-\$22,014.67	-\$55,440.28
				-\$175,746

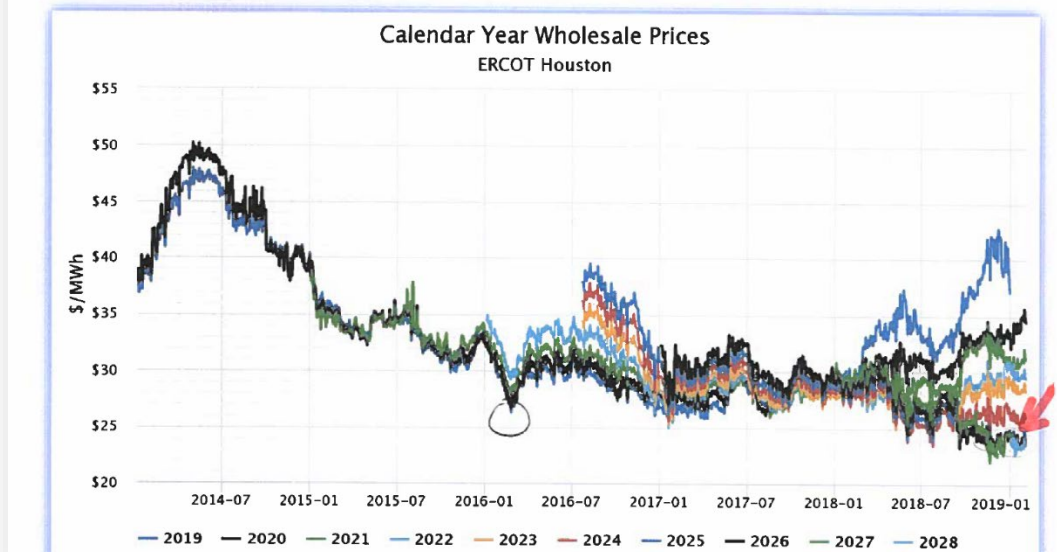
ENERGY BY 5

EnergyBy5 is an energy consulting and procurement group from the Dallas area that spoke to our local TEMA meeting this past month. They went through all our accounts and gave us some good advice:

- Retail electric prices past 2025 are at 3 cents or less (see red arrow on chart below). This would mean over 1.5-million-dollar savings for our District if we were to lock in now.
- Solar Farms are being allocated to load; a school district can be allocated to a percentage of the output.
- CFISD pays over \$345,000 per year on power factor. Correcting it would be approximately a two-year payback.
- CFISD has the capability of saving over \$500,000 a year on 4CP charges. Through programming and operational changes.

EnergyBy5 is invited back to speak at our Energy Committee meeting on March 20th.

Markets - Electricity



DECEMBER 2018

WATTSTOPPER SINGLE-SOURCING

Lighting contractors are frustrated because only one contractor is getting most of the lighting business (both lighting fixtures and lighting controls). They claim that the price they're getting from Wattstopper for controls (which they are required to put in their own package) is inflated over the winning contractor's price; this makes their lighting package uncompetitive. Right now, they have no choice but to use WattStopper controls because it's single-sourced in our district. They also claim if they were able to use their own lighting controls and then package their own light fixtures, that they would come in at a much lower price than the winning bid. Eaton says they have the equivalent controller as Wattstopper (but not in our spec), and they have the Metalux fixtures (already on the CFISD spec); by the way, the Eaton controller is in HISD spec and some other local district's specs.

The CREE lighting contractor SLC is also saying the same thing; CREE fixtures are on CFISD spec), they say that have a room controller that is equivalent also (but not on the CFISD spec).

The Eaton rep said he could've given us the equivalent lighting and controls for Hamilton Elementary School (which was just bid), for approximately hundred thousand dollars less than the winning bid, had they been able to use their own controller. He said he could potentially arrange an \$80,000 deduct for Hamilton Elementary lighting and controls. If that is true regarding the Hamilton price, it could mean millions of dollars savings for CFISD, if extrapolated across the district, if the same package was used in the upcoming bond projects. If we have other controllers on our spec (as we already have in HVAC), Wattstopper will have to be more competitive (even if they still do win the final bid).

Both lighting contractors claim CFISD has two issues that are hurting the bid process:

1. Single-source lighting controls.
2. Bundling of lighting and controls (they claim it should be broken out into separate bids so at least they could competitively bid on the lighting).

The way the lighting is going to bid may be causing CFISD to be paying too much for our lighting and controls. We are going to have a meeting to discuss the single-sourcing and perhaps the bundling. If the DLM (Digital Lighting Management) Wattstopper we are currently specifying, doesn't have a clear competitive advantage, then other controllers should then be considered. We can establish criteria (i.e. Cat 5 from the Occ sensor, Cat 5 from the dimmer, 0-10v to each of the fixture). Also, the size of the company may also enter into the decision of whether to include another company on the spec; we want to be sure we can replace failed parts in the future (something that WattStopper has not been too stellar at servicing their old stuff). They would also have to meet the current energy code IECC.

It used to be that the old Wattstopper was networked back to a District server, and it made sense to use one company. The new DLM controllers are unitary, and we have chosen as a District not to network them together. Since they are not networked, it doesn't make sense anymore to go with one company.

RATCHET DEMAND SAVINGS

The Energy Management Department started the HVAC earlier this August and September to avoid setting the kW ratchet. In six months, we have saved over \$247,875 minus the small amount of energy expended from starting early. Hope to save at least \$400,000 for the year using this practice. An additional benefit is that we now have had less early morning temperature complaints.

Aug	Sep	Oct	Nov	Dec	Jan
\$1,500,069	\$1,557,089	\$1,566,161	\$1,339,354	\$1,216,982	\$1,162,554
-\$17,928	-\$78,623	-\$1,740	-\$22,015	-\$55,440	-\$72,128
					-\$247,875

JANUARY 2019

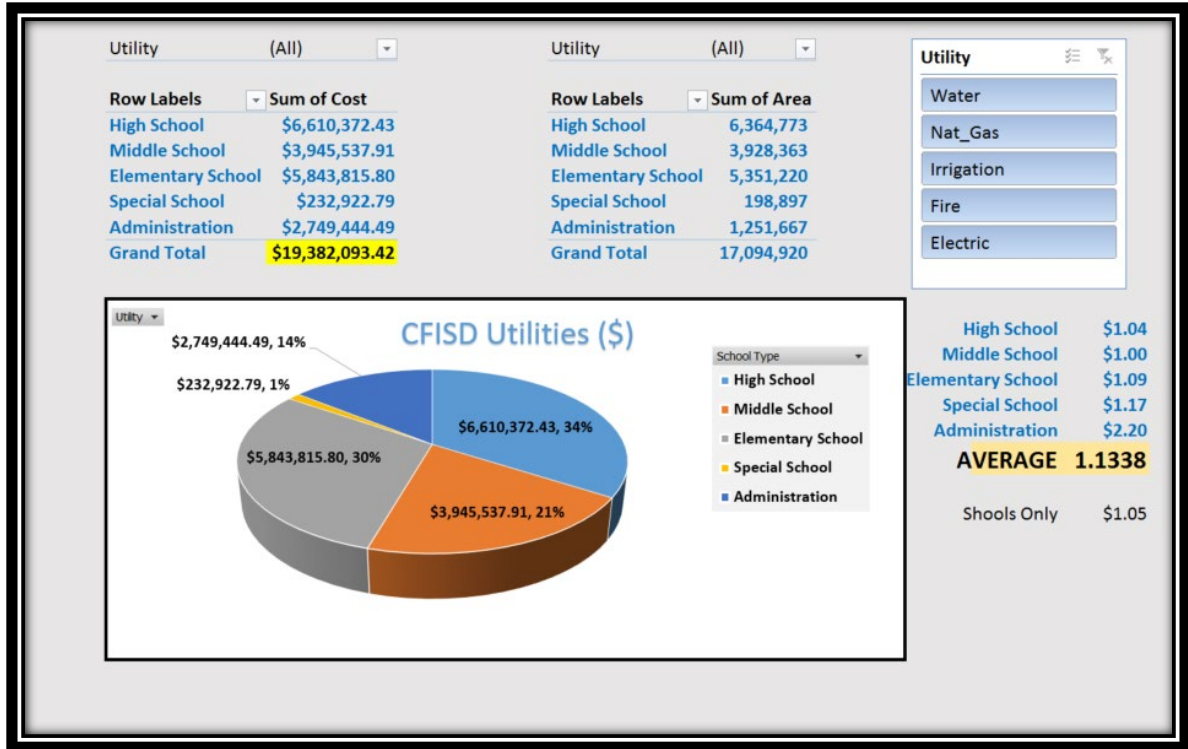
CFISD UTILITIES DASHBOARD

I posted a 2018 calendar year dashboard for CFISD utilities on the Energy Management website. The yellow shaded number shows the total amount paid in utilities for calendar year 2018. If you want to look at just the electricity costs, click the slicer button on the right. Same goes for all utilities, but for water you must click the control key and hit Water, Irrigation and Fire to get the total water costs. To select all utilities again, choose the filter in the right-hand corner. Here is the link:

https://www.cfisd.net/files/1915/5448/0961/Energy_Management_Utilities.xlsx

The pie chart below breaks the costs down for facility type. The numbers on the right show per Sq.Ft. (using air-conditioned square feet). I'll be updating the CFISD Utilities Dashboard every six months (for Fiscal Year and Calendar Year). Please let me know if there is any other information you'd like to see in future dashboards. For schools only, the costs per Sq.Ft is \$1.05/SF for all utilities.

Calendar Year 2018 CFISD Utilities Dashboard



RATCHET DEMAND SAVINGS

The Energy Management Department started the HVAC earlier this August and September to avoid setting the kW ratchet. In seven months, we have saved the District over \$298,506, minus the kWh charges expended from starting early. Hope to save at least \$400,000 net for the year using this practice. An additional benefit is that we now have had less early morning temperature complaints.

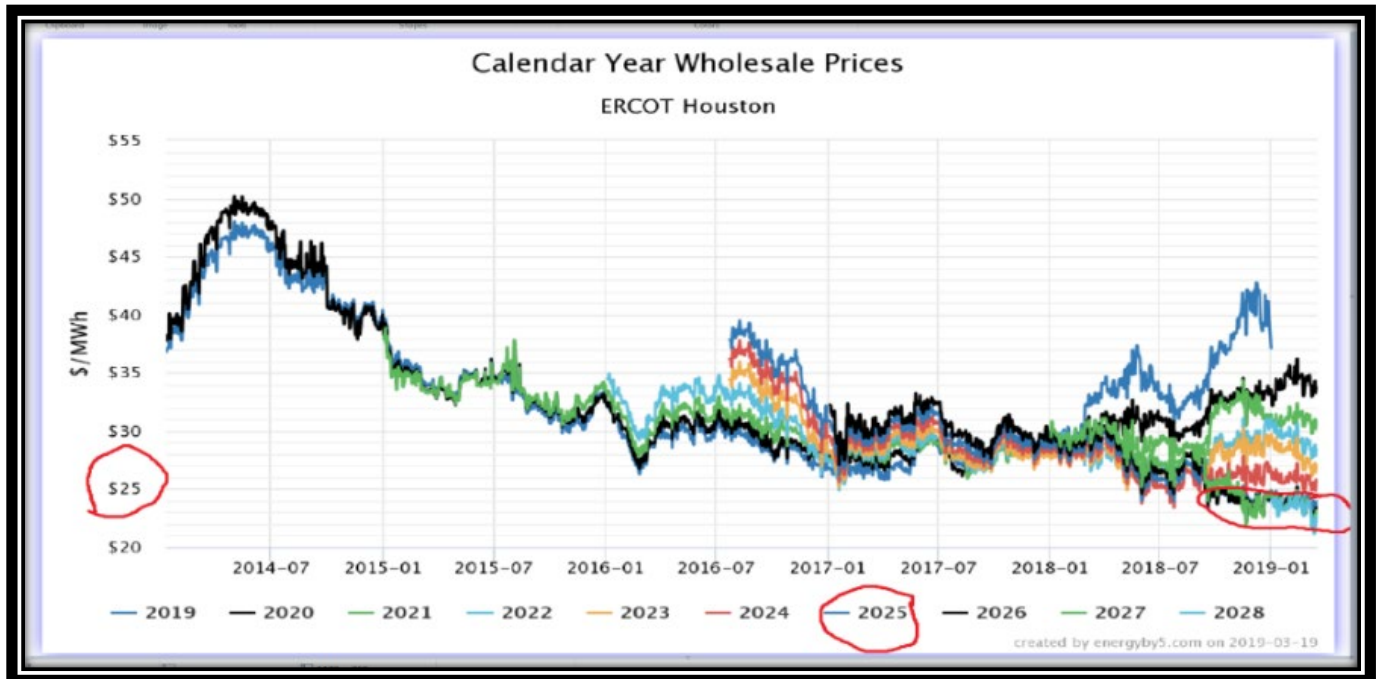
kW Ratchet Demand Savings

Aug	Sep	Oct	Nov	Dec	Jan	Feb
\$1,500,069	\$1,557,089	\$1,566,161	\$1,335,834	\$1,216,982	\$1,162,554	\$1,343,566
-\$17,928	-\$78,623	-\$1,740	-\$21,957	-\$55,440	-\$72,128	-\$50,689
						-\$298,506

OBTAINING FUTURE ELECTRICITY CONTRACTS

It might make sense to purchase at least a couple more future years (past May of 2025) of electricity this year. Hypothetically, if we only saved just 0.2 of a cent, over two years, it would save us around \$760K (by staying a step ahead of rising prices). Each year that we wait (on the current trend), causes us to pay around 10 % more (which is only 5 % when TDSP charges are factored in). I think we can do even better than .2 cents by acting now, rather than waiting even just one more year (See the difference between 2024 and 2025 on the chart below). We could still use our existing agreement with the board of trustees or use a broker this time (i.e. “Energy by 5” brokers). The thing about hiring a broker is they can wait and look at the gas and electric futures, and “strike” at the right time (of course they don’t know the exact bottom either). Keep in mind that natural gas prices may have upward pressures because of all the LNG terminals opening in Texas and with all the coal plants retiring. Also, the solar tax credit (30 %) is set to expire gradually starting in 2020 – that will reduce the subsidy for solar (in steps). There is more upside pressure on electricity in my opinion than hoping it’ll go lower. I think a price of 3.4 cents per kWh or less, should be easily obtainable (I would go for 3.0 cents if a broker was taking over the buying).

Electricity Price Futures



C-POWER ERCOT TEST

A successful test was conducted this past week by C-Power. They installed Start/Stop controls for ERCOT demand response purposes on four generators at Food Production and also at Satellite Cold Storage. The controls work off a cell-phone signal. Once the ON command is received, generator sequence is initiated. When the generator is up to speed, the existing automated transfer switch engages and transfers the emergency load over to the generator. When the DR event or test is finished, an OFF command is then sent to the automatic transfer switch engages and puts the load back on the utility.

The test was successful at Food Production and Satellite Cold Storage. The demand response savings for Food Production and Satellite Cold Storage is roughly \$15K- \$18K annually. Similar installations could be set up at schools across the District saving around \$4000 per HS and \$2,000 per MS annually.

C-Power Controls



FEBRUARY 2019

FRAZIER ELEMENTARY SCHOOL - VRF

Frazier ES is one of CFISD's least efficient schools (see page 14). Frazier ES HVAC shuts down better than the average elementary school (based on observing its load factor), so efficient HVAC shutdown is not an issue. The issue is that Frazier ES has

electric heating (which is terribly inefficient) and its chiller is air-cooled (also very inefficient). Normally an air-cooled chiller has an EER of 12 or probably worse.

At the TEMA conference several districts are retrofitting their entire schools to VRF. The EER on VRF is at least twice as efficient as an air-cooled chiller (24 EER or higher). Also, being that a VRF system is essentially also a heat pump means that heating the school will be at least three times cheaper (COP>3) than electric strip. Each room would have its own cassette which may also help with temperature complaints.

The Maintenance Building would also be a good candidate for VRF for the same reasons as Frazier ES (removing an inefficient air-cooled chiller, removing electric strip heat, and obtaining better temperature control).

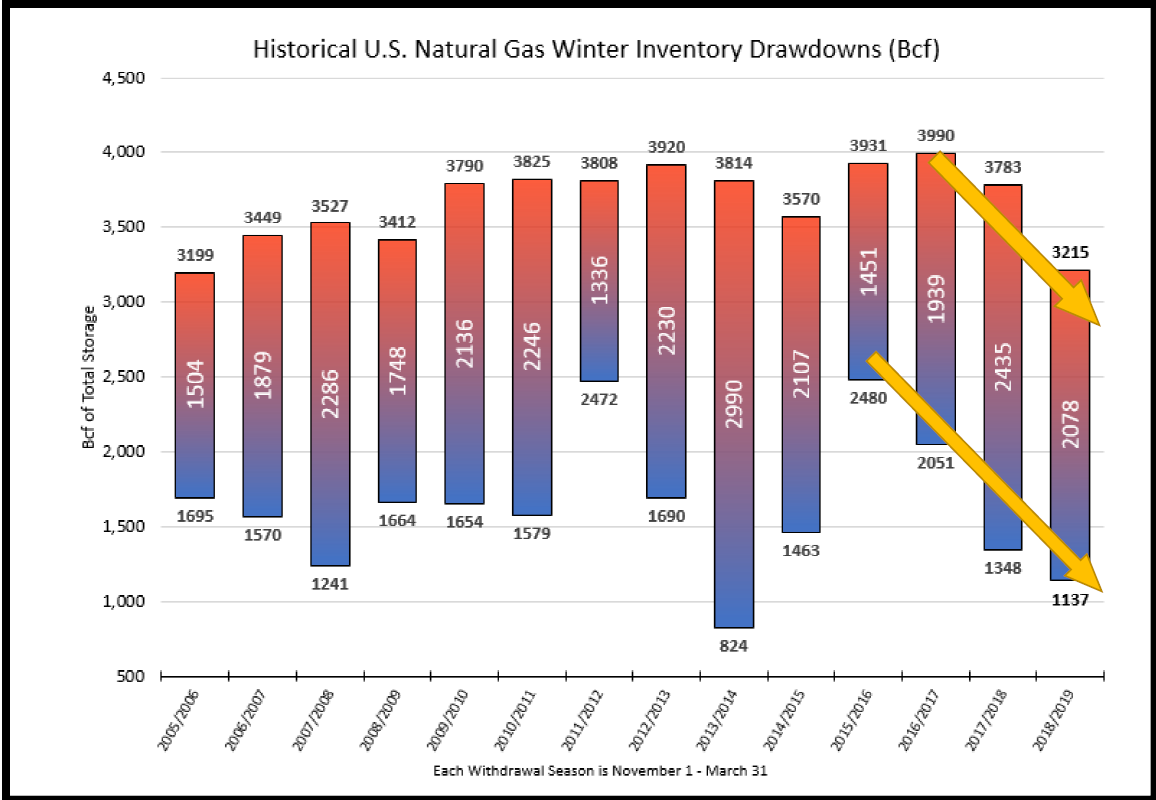
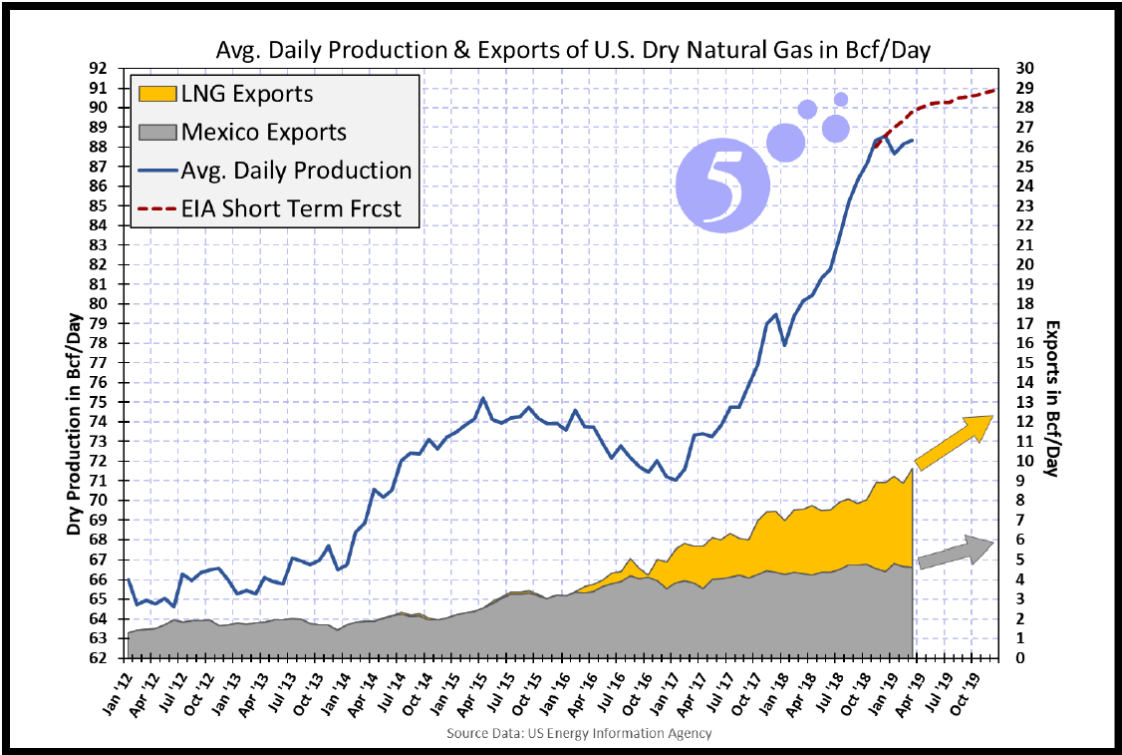
The TEMA speakers stressed that installation needs to be done by certified mechanics (they couldn't stress that enough). Also being that we are in a humid climate would require pre-treated outside air.

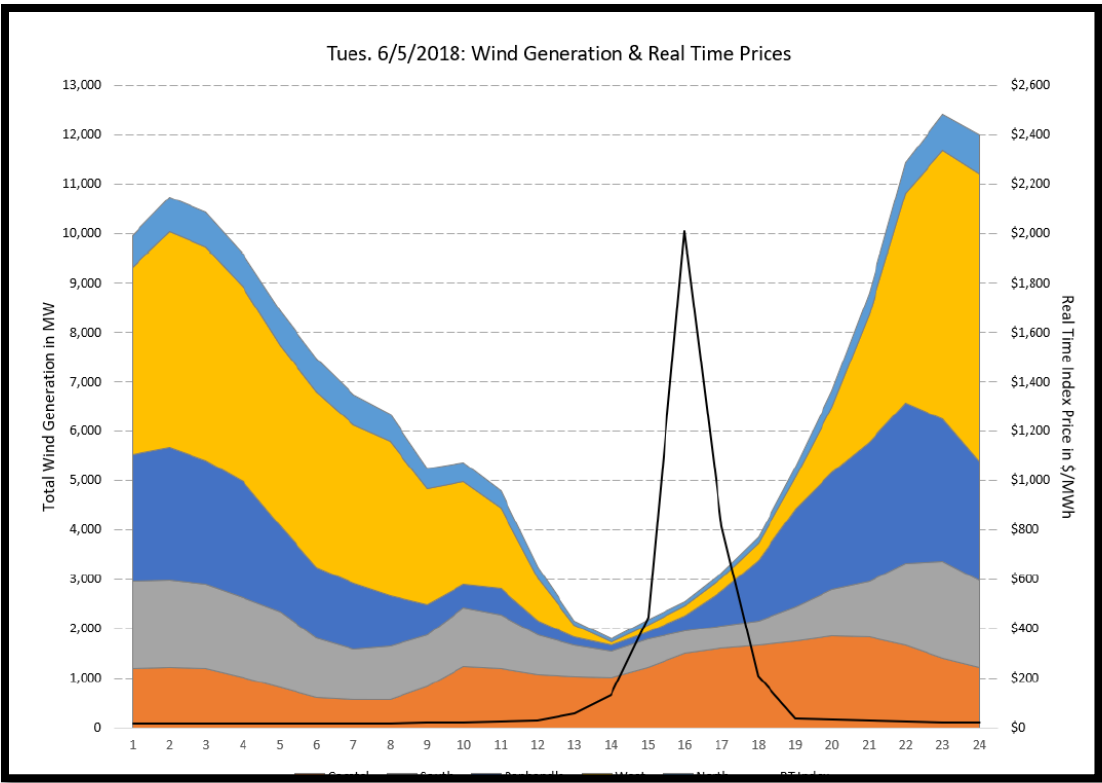
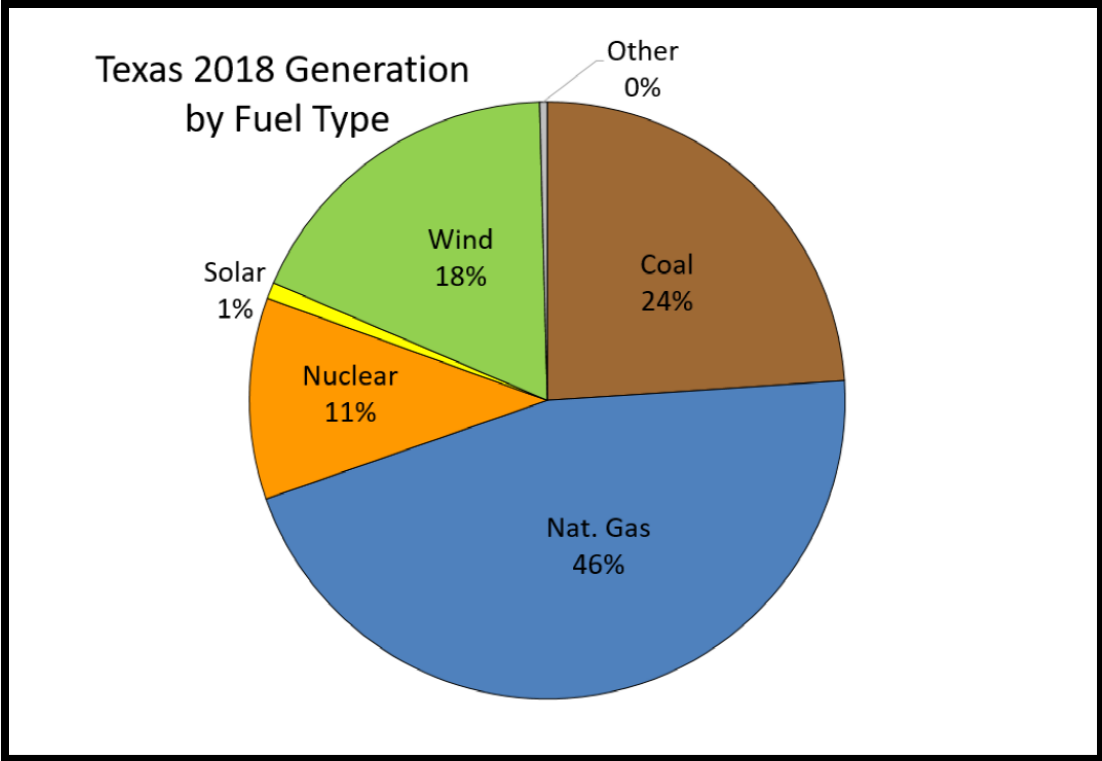
OBTAINING FUTURE ELECTRICITY CONTRACTS

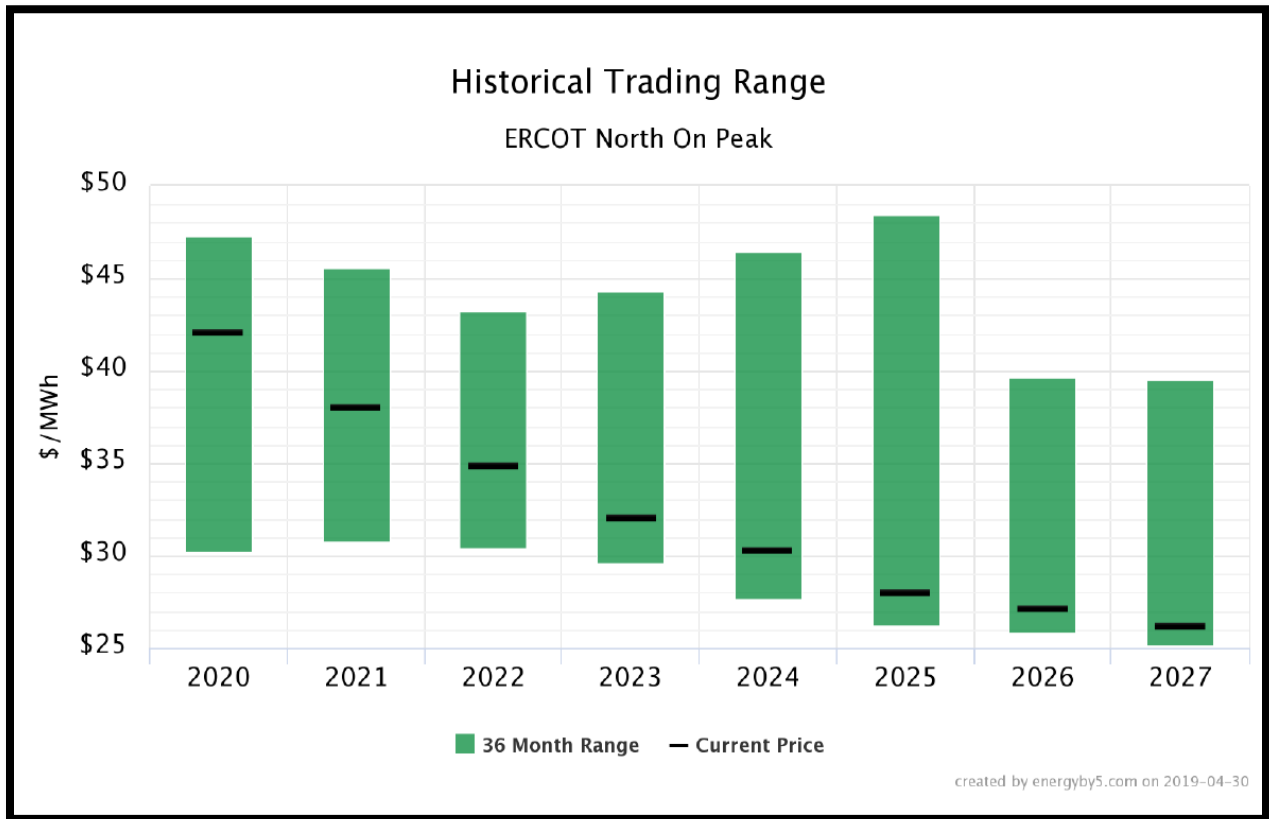
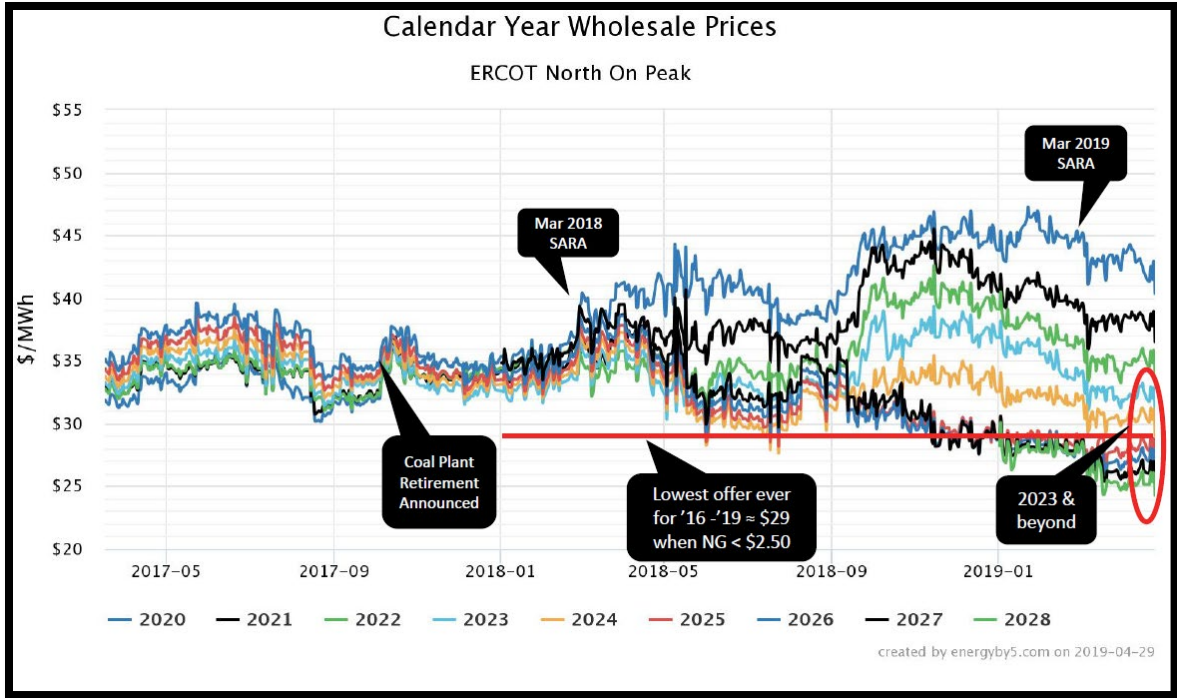
Please see the following charts. The following important points should be considered when considering purchasing future electric contracts:

- Natural gas is still a big part of ERCOT's fuel mix (which affects electricity prices).
- Natural gas exports are dramatically increasing – especially LNG (see below).
- Natural gas winter drawdowns have been increasing the past few years.
- Most of ERCOT's new generation is wind power. Unfortunately, the wind energy peaks in the evening and morning and is mostly on the west side of Texas (See chart below).
- Solar credits are set to expire gradually starting in 2020.
- Only a few natural gas plants are scheduled to go on-line (only 9% of new generation; also 0% coal, 0% nuclear). ERCOT is relying on renewable generation.
- There are a lot of upward pressures on future electric prices, and very few downward pressures.
- For the current trend, every year that we delay purchasing future electricity prices will cost CFISD around 4% more per year (approximately \$300,000 more each year).

Also, another thing to consider: if we have a hot summer, the short-term prices can spike (which will likely make the future prices spike as well). CFISD is positioned perfectly right now to take advantage of being able to buy the cheapest years in the market which are lower than any other year has ever traded. I would recommend we go ahead and act now and purchase a few years more of electricity contracts. It's one of those "Buy now or pay more later" scenario scenarios.







ELECTRICITY PROCUREMENT

According to “The 5” they said they are willing to work with us and would offer to obtain prices for CFISD before they had a contract. If we agreed to go with the price that “5” could broker for us, we would only then pay the retainer fee until the contract begins in 2025. They are part of the TIPs Co-Op, so we shouldn’t have to have an RFP if we go with them. They would assist us in Power Factor correction until then (which should more than cover the costs of the retainer fee). They are thinking we should be able to obtain prices in the 3.0 – 3.4 cents per kWh range if we went for a 4-5 yr contract.

One of the biggest dangers of staying with TXU for a long-term contract, is that their contracts have a 20% swing along with other strict language. If our volumes go outside of this 20% swing, we’ll have to pay penalties. I’ve heard of other Energy Managers getting hit by this swing, as well as Material Adverse Change (MAC charges) and gross Add/Delete clauses. It’s important in long term contracts that we have maximum flexibility for predicting our load (there are a lot of variables). The LED revolution and the Mag Bearing chiller revolution (and other new chillers) are game-changing technologies that might affect the future load more than 20%. It would be a shame to have to pay a penalty for being too efficient!

CENTERPOINT RECOMISIONING PROGRAM

ESA and Enhanced Service are working on recommissioning projects for CFISD. This is a free service paid for by CenterPoint and we can add schools, as long as we implement the recommendations. If we don’t implement the recommendations, they’ll likely not give us anymore. The projects involve walk-thrus:

- Demand Control Ventilation – controlling the outside air with CO2 sensors.
- Single zone VAV conversion (from constant volume).
- Wet-bulb control of CT fans / synchronizing CT fans.
- Making sure any failed sensors/dampers/actuators are repaired.
- Finding programming errors / faulty control logic.

So far, we have used ALC for all our control work. Before I issue any POs, I always run the recommendations by David Tooker. Here is the approximate schedule of completed walk-thrus, reports and implementation.

School	Co.	Walk-Thru	Report	Implementation
Langham Creek HS	ESA	Y	Y	Sep-19
Campbell MS	ESA	Y	Y	Sep-19
Rennell ES	ESA	Y	Y	Sep-19
Cy-Ranch HS	Enhanced	Y	N	Dec-19
Smith MS	Enhanced	Y	N	Dec-19
Warner ES	Enhanced	Y	N	Dec-19
Cy-Woods HS	ESA	Y	N	Mar-20
Spillane MS	ESA	Y	N	Apr-20
Robison ES	ESA	Y	N	May-20
Cy-Fair HS	Enhanced	N	N	Dec-20
Cy-Springs HS	Enhanced	N	N	Dec-20
Cy-Ridge HS	Enhanced	N	N	Dec-20
Arnold MS	Enhanced	N	N	Dec-20

APRIL 2019

EXTENEDED HOURS

This past month, the Operations Dept. requested that the HVAC be extended for 3 additional hours and continuous air in the safe zone until 10 pm at summer school locations. This request was made on a day when the actual temperature was 95 degrees, which for Houston is very typical in the summer. The reason for the request was that the heat index was expected to reach between 108 to 110. Thankfully this request was not granted and would have been a terrible precedent; if we granted extended air on that day, it would probably have to be extended for at least 15-20 more similar days this summer. Some things to consider:

- Cypress Fairbanks already runs the HVAC for at least six hours for elementary schools and seven hours for high schools. No other district I'm in contact with at TEMA runs their HVAC as long, as CFISD does.
- In addition to those hours, are probably five hours of precool time, and then another hour of shutdown time. In addition to that, the gyms in the middle/high schools are usually ON until the early evening. Also, the Admin Area is ON until 5:00 PM. So, in some schools the HVAC is already ON (5+7+1+gym and admin hours). As one can see, we already run a lot of hours!
- Most importantly: the heat index does not apply to the indoors. The humidity indoors is at or below 60% Rh and is often down around 50% Rh. As long, as the custodians remain indoors, the heat index won't bother them.

Options to consider in the future:

1. Start the day one or two hours earlier and end earlier (6: 00 AM instead of 7:00 AM). If Operations tried this, they would be starting their day during our precool time – but the building is likely not very hot then. So, they could start sooner, then end sooner.
2. Utilize the Admin Safe zone if they get over-heated (which stays ON until 5:00). Any portable could also be overridden ON as well; normally they turn OFF at 11:00 AM. The overrides have to be redone every hour (just hit the down arrow). If Operations contacts us before-hand, we could change that portable override period, and extend it to any amount of time they want (for a portable).

RATCHET AND 4 CP KW SAVINGS

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
\$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
-\$14,605.34	-\$75,174.77	\$1,728.52	-\$18,998.25	-\$52,744.94	-\$69,553.56	-\$47,713.40	-\$22,281.26	-\$49,995.04
								-\$349,338

The ratchet demand/4CP savings are up to \$349,000 in April. We have achieved this by starting HVAC early and allowing the chillers to decrement before the teachers turn their lights ON. The 4CP (4 coincident peak average) is another demand charge we pay based on June/July/Aug/Sep demand. Also, we have been closing off the outside air in occupied spaces during the summer (when the HVAC peaks) – which helps lower our 4CP costs.

We had the ALC program put in last year that covered Jersey Village High School and Bleyl Middle School as well as 15 elementary schools. We already had four Trane schools that closed off the summer outside air (only if there was no summer school). This year, we gave ALC a PO# to do 31 more schools; the high schools and middle schools have been completed – the elementary schools still must be finished. Also, Unify is already able to accomplish the same thing - close off the OA for its 20 CFISD schools. So altogether, we'll have over seventy schools where we can limit the OA during unoccupied periods (like summer dehumid.). This will further add to our ratchet and 4CP kW savings as well as save energy (kWh). If the custodial crews are refinishing the gym floors, we reopen up the dampers for that week (then reengage the program when they're finished). It seems to be paying off for the District, and we will see even more savings next year. Some other ways we can do reduce our TDSP charges (which is almost half of our electric bill) is to install LEDs and new energy efficient chillers (staying away from air-cooled), and also putting in capacitors in any school not receiving new chillers in this upcoming bond.

M&V PLANS/REPORTS

Working on M&V (Measurement and Verification) Plans for Cook MS, Truitt MS, Thornton MS, and Langham Creek HS. The total incentive money these plans will bring in, will be approximately \$341,000 into our Rebate Account. The money in the rebate account is always reinvested back into the District – it is important that the Finance Department is aware of this. The only reason it grew so large last year is that a major project was cancelled (converting the ISC to LED). The Energy Management Department spent \$500K of rebate money renovating all middle and high school gym fixtures (to LED); this is saving the District \$200K a year, and approximately another \$77K a year for maintenance savings. We’ve also invested in a lot of controls work (DR programming, wet-bulb control for condenser water and boiler controllers).

Each M&V Plan (Pre) and then M&V Report (Post) takes approximately 40 hours (which works out to \$4,262 per hr for writing both a M&V Plan & Report). CFISD will get paid 40% up front once the M&V Plan is written. After a performance period of at least nine months, a M&V Report will be written. Also, to obtain the incentives, Pre-Retrofit and Post-Retrofit site visits need to be made along with gathering all the submittals and drawings.

Facility	ECMs	Projected kwh	Projected kw	Incentive \$
Thornton MS	LED, WC Chillers, VRF	558,670	312	\$ 88,038.41
Cook MS	LED, Mech, AC Chiller, WC Chiller, VAV	253,152	177	\$ 46,215.82
Truitt MS	LED, Mech, AC Chiller, WC Chillers, VAV	599,274	334	\$ 94,437.02
LCHS	LED, Mech, RTU	661,478	417	\$ 112,653.29
			TOTAL	\$341,344.54
			2019	\$136,537.82
			2020	\$204,806.73

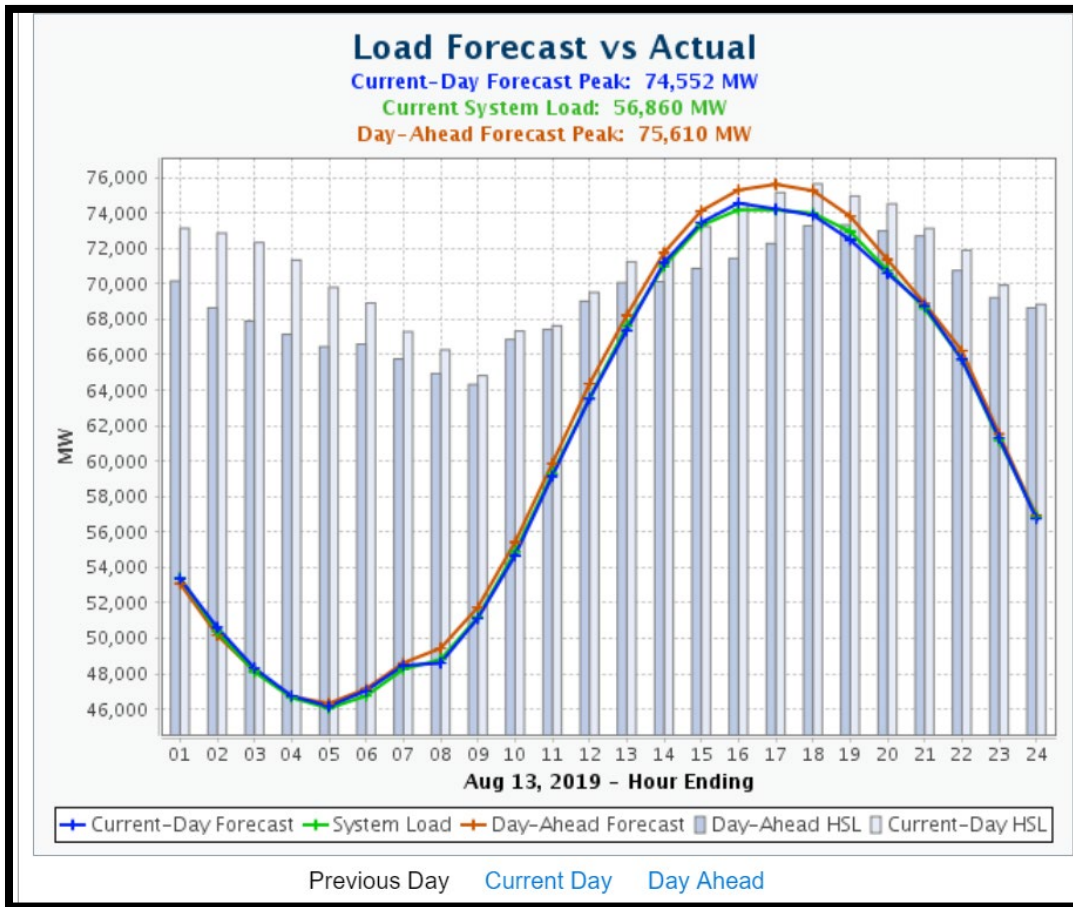
DEMAND EVENT

A Demand Event occurred on 8/12/2019 and 8/13/2019. On 8/12/2019, TXU asked CFISD to voluntarily cut its load from 3:00 PM to 5:00 PM; they would pay us \$0.20 per kWh for us participating. Then on 8/13/2019 we were again asked by TXU to shed load; this time the offer was .75 per kWh for two hours. On top of that, they were 4CP (Coincident Peak) days; if these two days were the only 4CP days in August, the kW we cut will be cut from our electric bill the 12 months (starting in January) at around \$4.23 per kW. August is only one of four months that is used to calculate 4CP (June, July and September are as well). On top of that, ERCOT was under 2% from their operating reserves so they had to call a ERS (Emergency Response) event as well. The potential savings of these two days is shown below. We'll need to be vigilant on the other 4CP days to obtain the total savings. Good thing about 4CP is that it's very late in the day, after 3:30 PM.

DATE	kW cut	Hrs	kWhs Cut	TXU RR Offer	Total TXU Payout	Potential 4CP Savings
8/12/2019	6000	2	12,000	\$ 0.20	\$2,400.00	\$76,140.00
8/13/2019	7000	3	21,000	\$ 0.75	\$15,750.00	N/A
					\$18,150.00	\$76,140.00
					\$94,290.00	

ELECTRICITY PROCUREMENT

CFISD is thinking about purchasing electricity prices out 4-6 years from 2025. The futures markets are very favorable right now and millions of \$ can be saved. In my opinion, it is important to purchase prices with an unlimited swing, when going that far in the future; future load (called volumes) are very hard to predict that far out. Any deviation outside the swing will result in penalties. With our District going to LEDs and mag-bearing chillers along with our other energy efficiency efforts, it is possible for us to drop below 20%. It is important to note that with some suppliers, there is a premium for going to unlimited swing (in the neighborhood of \$75,000 a year – depending on the volumes purchased).



JUNE 2019

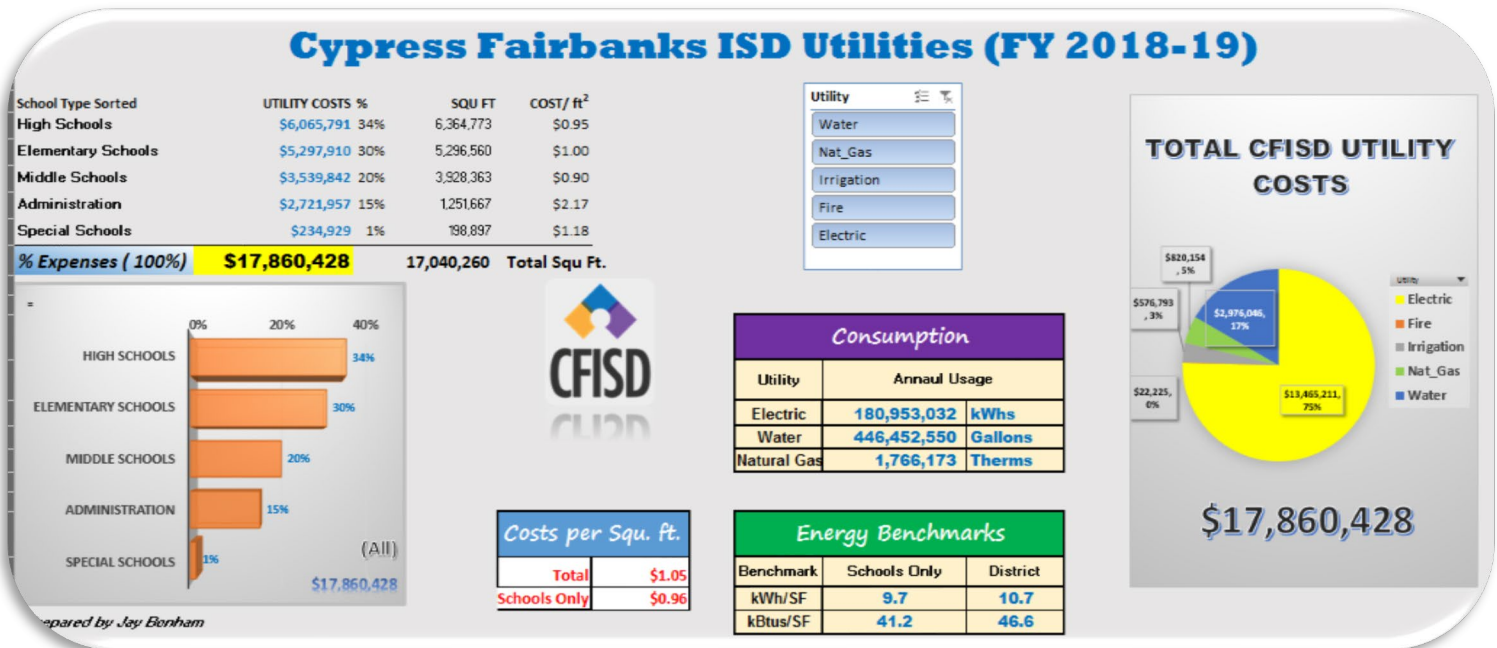
2018 -19 FISCAL YEAR DASHBOARD

Please see the attached dashboard that summaries CFISD utilities for 2018-19. 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 2018-19 year:

- The annual costs for all CFISD utilities are \$17,860,428; \$1.05 per Sq.Ft. for the District, \$0.096 per Sq.Ft. for schools only.
- The annual costs for Electricity was \$13,468,211 (75.4% of the total utility expenses); \$0.079 per Sq.Ft. for the District, \$0.073 per Sq.Ft. for schools only. Consumption

was 10.7 kWh/Sq. Ft. for the District, 9.7 kWh/Sq. for schools only. The total electric consumption was 180,953,032 kWhs.

- The annual costs for Water (including Irrigation and Fire) is \$3,575,063 (20.0% of the total); \$.021 per Sq.Ft. for the District and \$.019 per Sq. Ft. for schools only. The total consumption was 446 Kgals (446 million gallons).
- The annual costs for Natural Gas are \$820,154 (4.6% of the total); \$0.05 per Sq.Ft. for the District and \$0.04 for schools only.



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 and 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.

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.

4CP Advisory Update ERCOT

Right-click or tap and hold here to download pictures. To help protect your privacy, Outlook prevented automatic download of this picture from the Internet.

Friday, September 6, 2019

TODAY'S FORECAST

Right-click or tap and hold here to download pictures. To help protect your privacy, Outlook prevented automatic download of this picture from the Internet.

4CP Probability

HIGH

Projected Peak

69,811 MW

Curtailment Window

3:00 - 5:30 pm

Established Monthly
Peak

68,733 MW
September 3

Average High
Temperature

97.5