



# Nogales Unified School District



## ENERGY UPDATE – Q1 FY20

December 4, 2019

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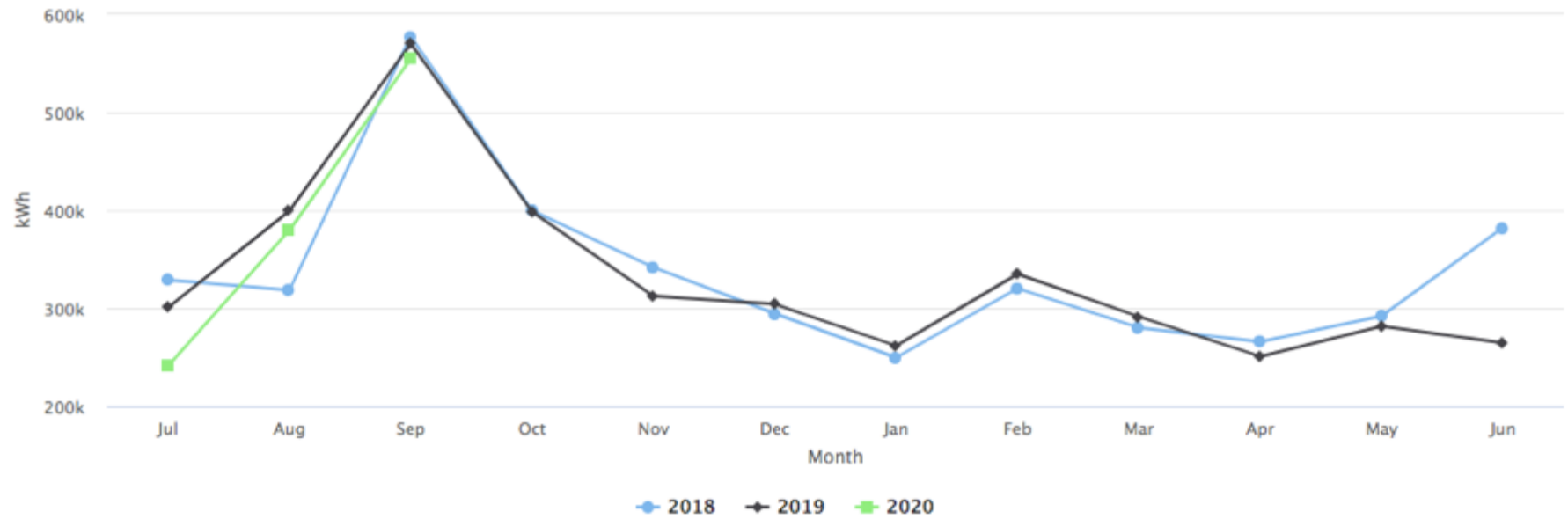
# Summary of Electric





# Annual Electric (kWh) Compared

FY 18-20





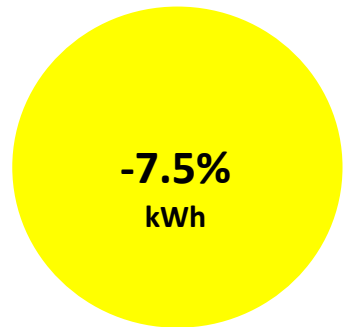
- NUSD decreased 95,418 kWh (8%) and decreased \$16,324 (8%) in Q1 FY20 compared to Q1 FY19

## Electric Usage and Cost

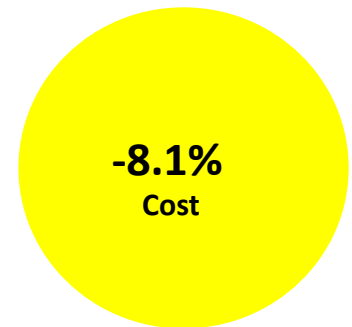
Q1 FY20 vs.  
Q1 FY19

Organizational YTD	2020 / First	2019 / First
Total Usage (kWh)	1,175,017	1,270,435
Total Cost	\$184,939	\$201,263
% Change Usage		-7.5% ↓
% Change Cost		-8.1% ↓

Percentage Change Usage



Percentage Change Cost





# Electric Comparison

Q1 FY20 vs.  
Q1 FY19

Location	2020 / First		2019 / First		Percentage Change	
	Usage (kWh)	Cost (\$)	Usage (kWh)	Cost (\$)	Usage	Cost
A.J. Mitchell Elementary	64,020	14,214.55	76,495	16,521.02	-16.31 ↓	-13.96 ↓
Nogales High School	416,952	57,210.36	472,384	65,658.58	-11.73 ↓	-12.87 ↓
Desert Shadows Middle School	97,760	15,503.60	110,240	16,669.46	-11.32 ↓	-6.99 ↓
Wade Carpenter Middle School	66,989	11,923.88	72,031	12,852.96	-7.00 ↓	-7.23 ↓
Challenger Elementary	98,129	14,993.69	104,083	15,678.34	-5.72 ↓	-4.37 ↓
Lincoln Elementary School	64,991	13,575.17	68,054	13,836.72	-4.50 ↓	-1.89 ↓
Francisco Vasquez de Coronado Elementary School	83,634	15,164.55	86,925	16,112.58	-3.79 ↓	-5.88 ↓
District Office	50,000	5,979.59	51,360	6,771.86	-2.65 ↓	-11.70 ↓
Pierson High School	81,821	15,278.07	83,016	15,702.27	-1.44 ↓	-2.70 ↓
Robert M. Bracker Elementary School	68,760	9,626.00	68,520	10,338.38	0.35 ↑	-6.89 ↓
District Support Services	19,824	2,124.78	19,349	2,476.71	2.45 ↑	-14.21 ↓
Mary Welty Elementary	62,137	9,344.81	57,978	8,643.91	7.17 ↑	8.11 ↑





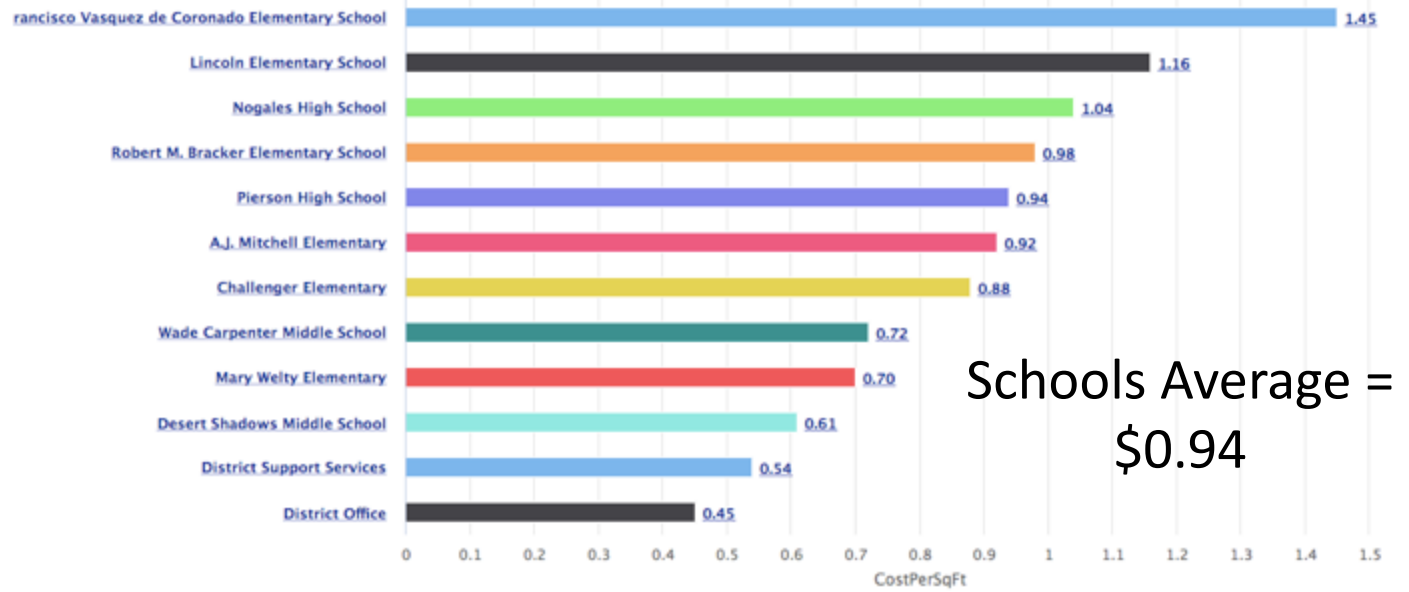
# Electric Comparison

## Cost/Sqft

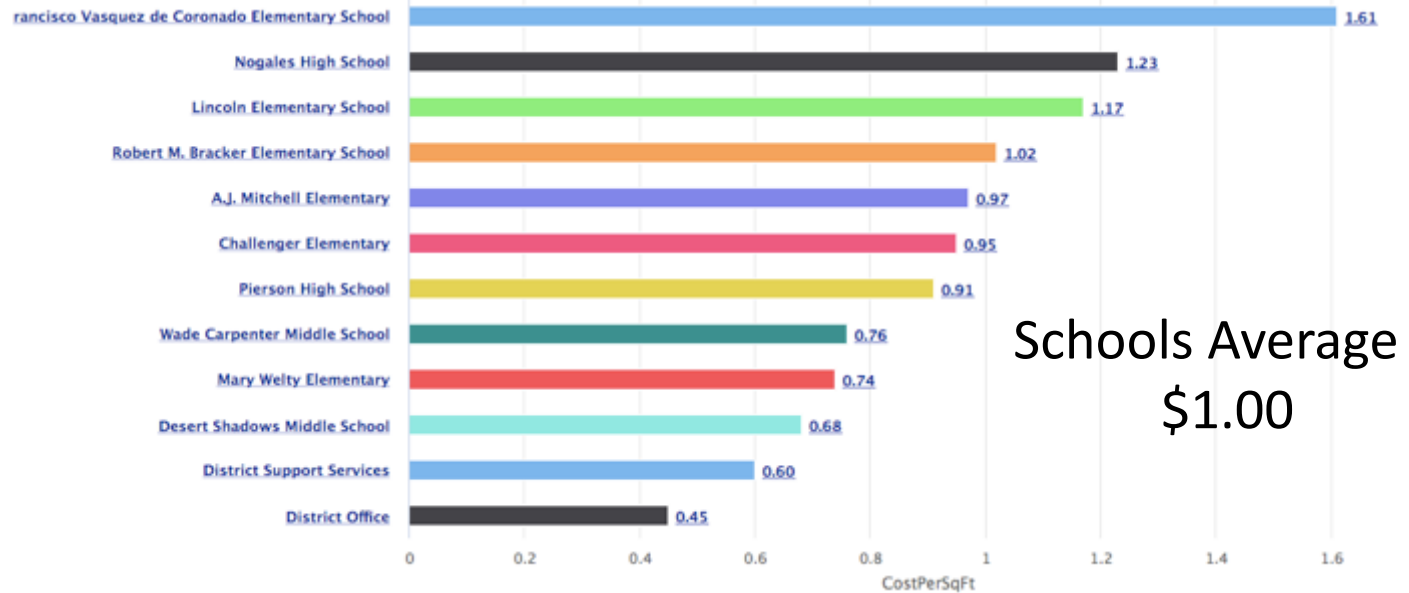
\$0.80 is the PEP recommended cost/sq. ft. for southern AZ schools



October 2018 –  
September 2019



October 2017 –  
September 2018



Tables in this report display data from ALL electric and solar bills, and reflects ALL electric usage of all meters at campuses.

# Maximum Monthly Demand



# Maximum Monthly Demand July – September

School	Jul (KW)		Aug (KW)		Sep (KW)	
	2018	2019	2018	2019	2018	2019
A.J. Mitchell Elementary	116	79	155	152	180	150
Challenger Elementary	122	<b>128</b>	187	<b>196</b>	182	<b>204</b>
Desert Shadows MS	74	50	225	<b>225</b>	234	<b>237</b>
District Office	53	52	62	61	69	<b>71</b>
Francisco Vasquez de Coronado Elementary School	42	<b>42</b>	175	142	147	<b>157</b>
Lincoln Elementary School	70	52	93	<b>116</b>	111	<b>132</b>
Mary Welty Elementary	51	<b>54</b>	94	89	85	<b>90</b>
Nogales High School	303	237	506	454	506	500
Pierson High School	56	47	79	65	120	<b>136</b>
Robert M. Bracker Elementary School	59	<b>85</b>	140	122	136	133
Wade Carpenter MS	54	38	75	<b>83</b>	109	<b>117</b>

Caution > 350 KW

Demand over 400 KW

KW higher than last year





# Historic Water





# Project Overview

## Water Meter Data Management

- 12 locations
- City of Nogales Water provides water, sewer, and refuse
- Valle Verde Water provides water only to Desert Shadows Middle School & Robert M. Bracker Elementary
- City of Nogales Water provides sewer/refuse only to Desert Shadows Middle School & Robert M. Bracker Elementary
- Managing 53 meters
- \_\_\_\_\_

## Fusebox Scope:

- Fusebox Software, Data Set-up, On-going Data Management
  - Contract Date – July 2019
-





# Deliverable Expectations

Historical Water Data Report | Fusebox Software |  
Water Conservation Strategy Recommendations

## Identified Utility Meters (No Online Access)

- Identified 56 meters – managing 53 water meters

## Added Water Accounts to the Master Meter List

- Added City of Nogales Water & Valle Verde Water Accounts

## Gathered and Analyzed Historical Data

- Gathered 27 Months of Historical Use & Cost Data for Each Meter

## Fusebox Data Access

- Uploaded all water data into Fusebox

<i>Provider</i>	<i>Meter Count</i>	<i>Data Access</i>
<b>City of Nogales Water</b>	<b>45</b>	<b>Client uploads monthly data to a Dropbox account</b>
<b>Valle Verde Water</b>	<b>8</b>	<b>Client uploads monthly data to a Dropbox account</b>

<b>Total Meter Count</b>	<b>53</b>
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# Comments/Questions

- This meter had zero usage since August 2018.
- The District was charged \$184.95/month, totaling \$2,774 between August 2018 and October 2019.
- If this meter is not being used, it can be closed.
- The District can call Valle Verde Water and put in an 'end of service' request.

Desert Shadows Middle School		Valle Verde Water	Account/Meter Number 180015809/VVW809
Bill Date	Water Usage	Total Monthly Cost	
8/2/2018	0	184.95	
9/1/2018	0	184.95	
10/1/2018	0	184.95	
11/5/2018	0	184.95	
12/5/2018	0	184.95	
1/6/2019	0	184.95	
2/4/2019	0	184.95	
3/4/2019	0	184.95	
4/2/2019	0	184.95	
5/2/2019	0	184.95	
6/5/2019	0	184.95	
7/4/2019	0	184.97	
8/5/2019	0	184.97	
9/5/2019	0	184.97	
10/3/2019	0	184.97	
<b>Total</b>		<b>\$2,774.33</b>	

# Comments/Questions

- This meter is supplying water to the school.
- The August 2019 bill (cost & usage) is near double the previous month's charges.
- The September 2019 bill (cost & usage) is one of the lowest monthly charges in the past 2 years.
- What caused the excessively high usage & cost in August 2019?

Challenger Elementary		Account/Meter Number 25-0300-00_84060950	
Bill Date	Water Usage	Total Monthly Cost	
9/30/2019	600	1336.9	
<b>8/30/2019</b>	<b>1460900</b>	<b>8425.17</b>	
7/30/2019	717000	4814.29	
6/28/2019	561000	4057.07	
5/30/2019	600600	4249.29	
4/30/2019	456800	3551.28	
3/29/2019	220900	2406.24	
2/28/2019	244000	2319.6	
1/31/2019	565500	3880.16	
12/31/2018	384100	2999.64	
11/30/2018	398200	3068.08	
10/30/2018	825500	5142.19	
9/28/2018	612600	4108.78	
8/30/2018	395400	2767.45	
7/31/2018	984700	5256.39	
6/29/2018	647300	3831.36	
5/30/2018	764500	4326.36	
4/30/2018	383500	2717.19	
3/30/2018	307600	2396.63	
2/28/2018	174300	1945.2	
1/31/2018	0	1209.03	
12/29/2017	541800	3497.36	
11/30/2017	614800	3805.67	
10/30/2017	531100	3452.17	
9/29/2017	540200	3330.52	
8/30/2017	192200	1941.55	
7/31/2017	423600	2865.13	

# Data Overview

- This meter had zero usage for over two years but still incurs a monthly base water fee, sewer usage, and sewer charge
- According to the District this City of Nogales water meter is closed
- According to the City of Nogales Water Department the meter is not closed
- Further investigation of this meter is needed:
  - Is the meter broken?
  - Why is there sewer usage and a sewer charge?
  - Should the meter be formally closed?

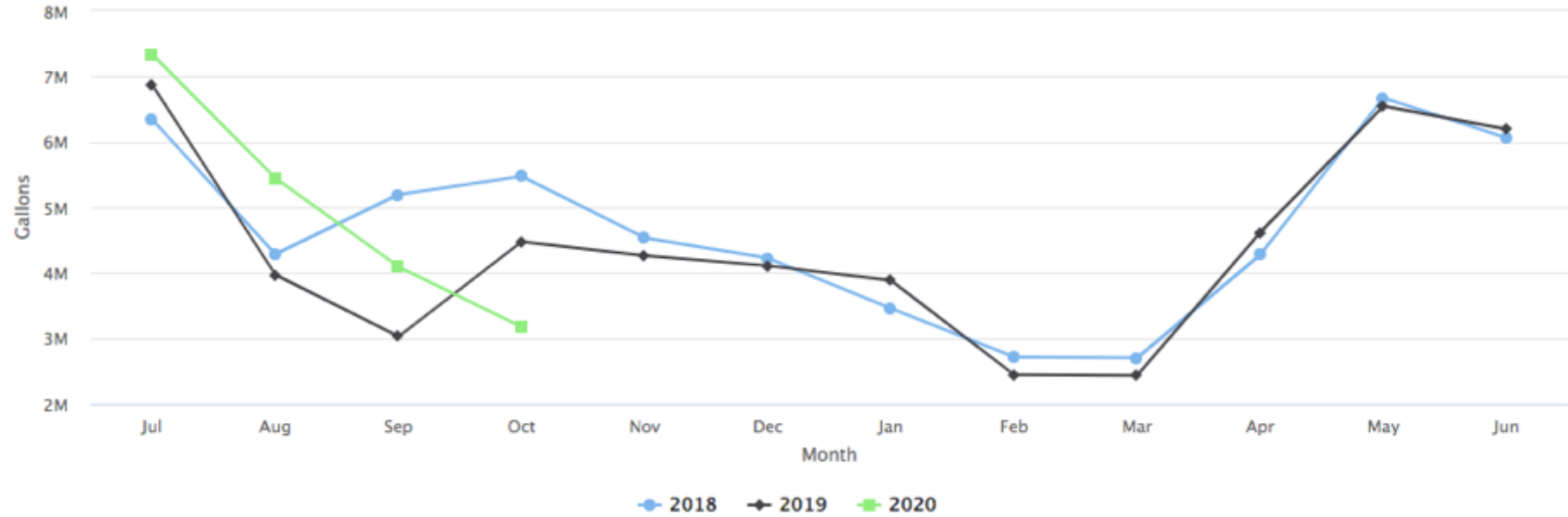
Account/Meter Number 25-0220-00_91020610					
Bill Date	Water Usage	Water Use Cost \$	Sewer Cost \$	Sewer Usage	Total Monthly Cost
9/30/2019	0	31.02	232.48	55000 gal	288.95
8/30/2019	0	31.02	232.48	55000 gal	288.95
7/30/2019	0	31.02	232.48	55000 gal	288.95
6/28/2019	0	31.02	232.48	55000 gal	288.95
5/30/2019	0	31.02	232.48	55000 gal	288.95
4/30/2019	0	31.02	232.48	55000 gal	288.95
3/29/2019	0	31.02	232.48	55000 gal	288.95
2/28/2019	0	31.02	218.42	50200 gal	274.33
1/31/2019	0	31.02	218.42	50200 gal	274.33
12/31/2018	0	31.02	218.42	50200 gal	274.33
11/30/2018	0	31.02	218.42	50200 gal	274.33
10/30/2018	0	31.02	218.42	50200 gal	274.33
9/28/2018	0	26.98	211.82	50200 gal	274.33
8/30/2018	0	26.98	211.82	50200 gal	263
7/31/2018	0	26.98	211.82	50200 gal	263
6/29/2018	0	26.98	211.82	50200 gal	263
5/30/2018	0	26.98	211.82	50200 gal	263
4/30/2018	0	26.98	211.82	50200 gal	263
3/30/2018	0	26.98	211.82	50200 gal	263
2/28/2018	0	26.98	206.42	48300 gal	257.38
1/31/2018	0	26.98	206.42	48300 gal	257.38
12/29/2017	0	26.98	206.42	48300 gal	257.38
11/30/2017	0	26.98	206.42	48300 gal	257.38
10/30/2017	0	26.98	206.42	48300 gal	257.38
9/29/2017	0	25.45	200.55	48300 gal	249.58
8/30/2017	0	25.45	200.55	48300 gal	249.58
7/31/2017	0	25.45	200.55	48300 gal	249.58
<b>Total</b>					<b>\$7,282.27</b>



# Data Overview

## Annual Water Usage All Water Types & All Buildings

- Highest usage July & August 2019



# Data Overview

## Comparison 1<sup>st</sup> Quarter 2019 and 1<sup>st</sup> Quarter 2020

- Water use has varied considerably during this period
- Highest Increase Meters
  - Mitchell 25-0080-00
  - Coronado 25-0280-00
  - Lincoln 25-0330-00, 25-0350-00, & 25-0360-00
  - Pierson 25-0020-00

<b>Nogales Unified School District</b>		<b>2020 1st Qtr</b>	<b>2020 1st Qtr</b>	<b>2019 1st Qtr</b>	<b>2019 1st Qtr</b>	<b>% Change</b>	<b>% Change</b>
<b>Location</b>	<b>Usage</b>	<b>Cost</b>	<b>Usage</b>	<b>Cost</b>	<b>Usage</b>	<b>Cost</b>	
Mary Welty Elementary	35600	774.38	154200	1606.55	-76.91	-51.8	
District Support Services	18700	675.92	69200	1001.75	-72.98	-32.53	
Wade Carpenter Middle School	261100	2312.85	321100	2459.08	-18.69	-5.95	
District Office	65100	1583.46	79900	1569.47	-18.52	0.89	
Nogales High School	4161700	28993.66	3813900	25225.76	9.12	14.94	
Challenger Elementary	2314700	16447.8	2086000	13865.25	10.96	18.63	
Desert Shadows Middle School	3962300	36148.43	3526500	33522.84	12.36	7.83	
Robert M. Bracker Elementary School	2017199	16020.52	1544899	13349.53	30.57	20.01	
A.J. Mitchell Elementary	614300	5404.59	367100	3506.51	67.34	54.13	
Francisco Vasquez de Coronado Elementary School	2375400	15210.81	1407000	8636.01	68.83	76.13	
Lincoln Elementary School	752703	7192.62	390700	4561.77	92.65	57.67	
Pierson High School	295400	2549.09	107500	1504.08	174.79	69.48	

# Data Overview

## Refuse Charges

- September 2019 the District paid over \$10,000 in refuse charges to the City of Nogales
- From July 2017 to September 2019 the District has paid over \$155,000 in refuse charges

Nogales Unified School District	Account/Meter	Date	Refuse Charge	Total Monthly Bill
Mary Welty Elementary	25-0120-00	9/30/2019	\$916.80	\$1,189.16
Nogales High School	25-0230-00_16078402	9/30/2019	\$1,833.60	\$2,579.39
Nogales High School	25-0260-00_13207536	9/30/2019	\$2,444.80	\$2,626.04
Francisco Vasquez de Coronado Elementary School	25-0280-00_1266140	9/30/2019	\$916.80	\$3,474.68
Challenger Elementary	25-0290-00	9/30/2019	\$1,069.60	\$1,358.55
Lincoln Elementary School	25-0340-00_99830227	9/30/2019	\$1,222.40	\$1,351.12
Lincoln Elementary School	25-0350-00_69284313	9/30/2019	\$346.20	\$925.53
Robert M. Bracker Elementary School	25-0380-00	9/30/2019	\$916.80	\$1,666.49
Desert Shadows Middle School	25-0390-00	9/30/2019	\$1,222.40	\$2,480.14
<b>TOTAL</b>			<b>\$10,889.40</b>	

# October Data





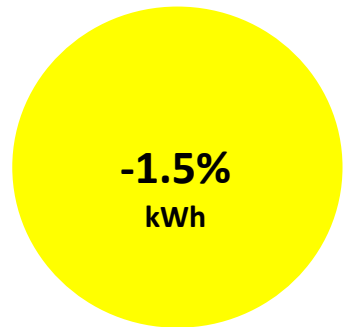
- NUSD decreased 5,967 kWh (2%) and decreased \$3,012 (5%) in October FY20 compared to October FY19

## Electric Usage and Cost

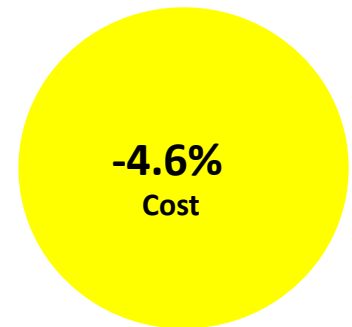
Oct FY20 vs.  
Oct FY19

Organizational YTD	2019 / October	2018 / October
Total Usage (kWh)	392,794	398,761
Total Cost	\$63,138	\$66,150
% Change Usage		-1.5% ↓
% Change Cost		-4.6% ↓

Percentage Change Usage



Percentage Change Cost





# Electric Comparison

Oct FY20 vs.  
Oct FY19

Location	2019 / October		2018 / October		Percentage Change	
	Usage (kWh)	Cost (\$)	Usage (kWh)	Cost (\$)	Usage	Cost
District Support Services	4,284	565.27	5,725	728.50	-25.17 ↓	-22.41 ↓
A.J. Mitchell Elementary	22,610	4,968.92	28,120	5,408.85	-19.59 ↓	-8.13 ↓
Lincoln Elementary School	24,818	4,883.67	29,623	5,199.47	-16.22 ↓	-6.07 ↓
Challenger Elementary	29,955	4,758.46	34,981	5,356.37	-14.37 ↓	-11.16 ↓
Mary Welty Elementary	18,092	2,748.97	20,156	3,217.05	-10.24 ↓	-14.55 ↓
Wade Carpenter Middle School	26,843	4,821.23	28,908	4,913.86	-7.14 ↓	-1.89 ↓
District Office	13,200	1,933.92	13,440	1,970.40	-1.79 ↓	-1.85 ↓
Pierson High School	25,522	5,249.63	25,798	5,135.45	-1.07 ↓	2.22 ↑
Robert M. Bracker Elementary School	15,240	2,630.86	14,880	2,732.15	2.42 ↑	-3.71 ↓
Nogales High School	139,549	19,723.61	133,571	20,917.29	4.48 ↑	-5.71 ↓
Francisco Vasquez de Coronado Elementary School	35,081	5,809.32	33,159	5,766.99	5.80 ↑	0.73 ↑
Desert Shadows Middle School	37,600	5,044.23	30,400	4,803.21	23.68 ↑	5.02 ↑

- Desert Shadow Middle School: The LFCR EE (List Fixed Cost Recovery Energy Efficiency) credit decreased from 1.1042% to .6676%, decreasing the cost from \$46.41 dollars to \$29.59.
- Nogales High School: Usage is up and cost is down because Oct 2019 has higher Tax Adjustment, Transmission Cost Adjustor, and PPFAC credits.





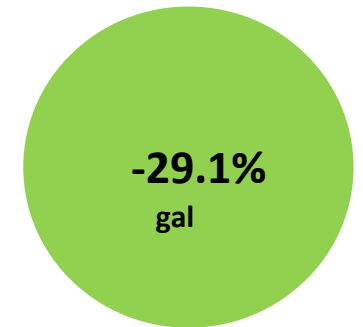
## Water Usage and Cost

Oct FY20 vs.  
Oct FY19

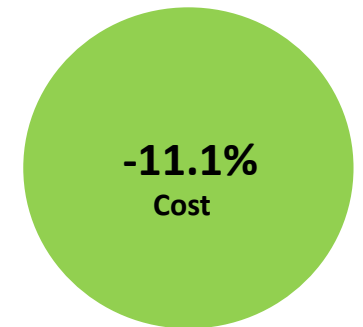
- In October FY20 compared to October FY19, NUSD **used 1,303,735 (29%) less gallons** and spent **\$4,271 (11%) less on water**

Organizational YTD	2019 / October	2018 / October
Total Usage	3,172,595	4,476,330
Total Cost	\$34,275	\$38,546
% Change Usage		-29.1% ↓
% Change Cost		-11.1% ↓

Percentage Change Usage



Percentage Change Cost





# Water Comparison

Oct FY20 vs.  
Oct FY19

Location	2019 / October		2018 / October		Percentage Change	
	Usage (gals)	Cost (\$)	Usage (gals)	Cost (\$)	Usage	Cost
Challenger Elementary	45,700	2,062.02	886,000	5,884.46	-94.84 ↓	-64.96 ↓
Mary Welty Elementary	22,700	323.13	92,900	767.18	-75.57 ↓	-57.88 ↓
Robert M. Bracker Elementary School	298,195	3,298.67	719,230	5,588.84	-58.54 ↓	-40.98 ↓
District Support Services	6,500	234.36	11,300	285.93	-42.48 ↓	-18.04 ↓
Desert Shadows Middle School	611,000	8,274.95	917,800	9,764.77	-33.43 ↓	-15.26 ↓
Francisco Vasquez de Coronado Elementary School	316,300	2,628.21	349,400	2,527.18	-9.47 ↓	4.00 ↑
A.J. Mitchell Elementary	130,300	1,503.77	124,400	1,276.85	4.74 ↑	17.77 ↑
Lincoln Elementary School	203,600	2,257.41	188,700	1,883.19	7.90 ↑	19.87 ↑
District Office	20,400	544.32	17,000	502.50	20.00 ↑	8.32 ↑
Nogales High School	1,315,900	9,680.29	1,074,800	8,314.16	22.43 ↑	16.43 ↑
Wade Carpenter Middle School	108,100	908.76	51,200	639.35	111.13 ↑	42.14 ↑
Pierson High School	93,900	859.50	43,600	563.35	115.37 ↑	52.57 ↑

- Nogales High School: Building meter 25-016-00 increased from 18,500 gal to 131,200 gal.
- Challenger: Building meter 25-0300-00 decreased from 825,500 gal to 2,100 gal this year.
- Pierson: Building meter 25-0020-00 increased from 41,700 gal to 93,600 gal.
- Wade Carpenter: Irrigation meter 25-0140-00 increased from 8,900 gal to 40,300 gal, with increases happening all months Aug-Oct.

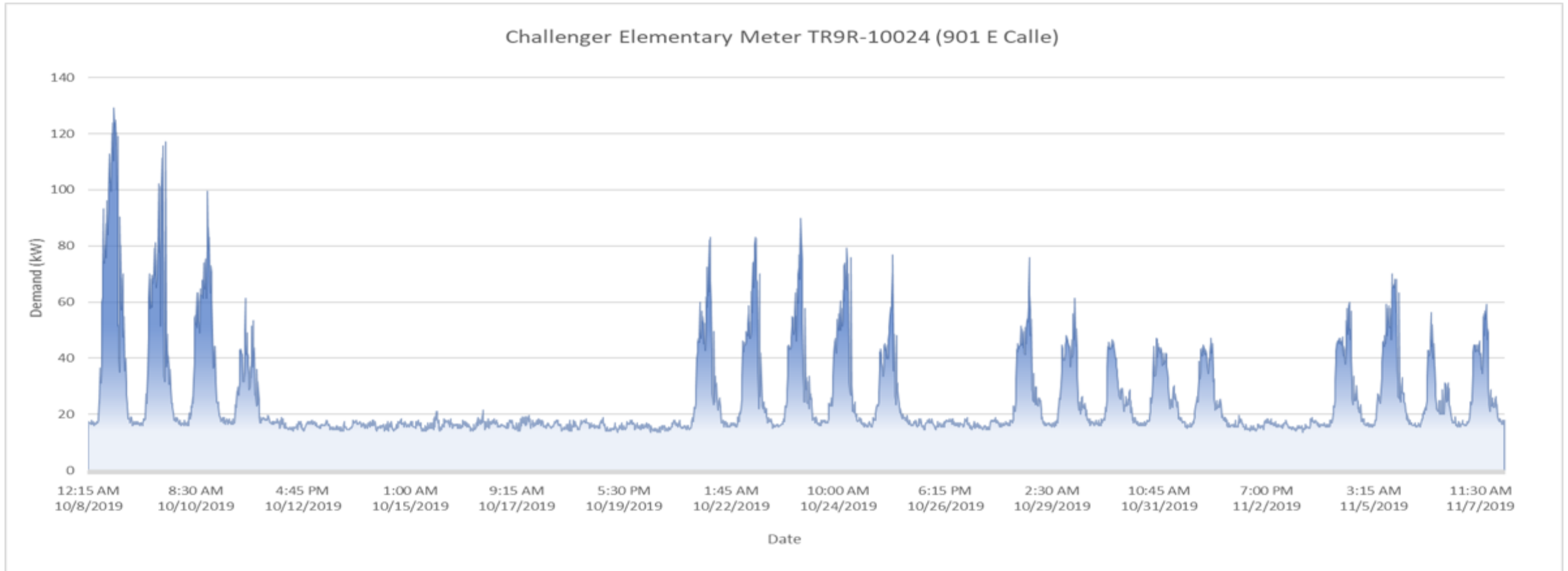




# Interval Demand



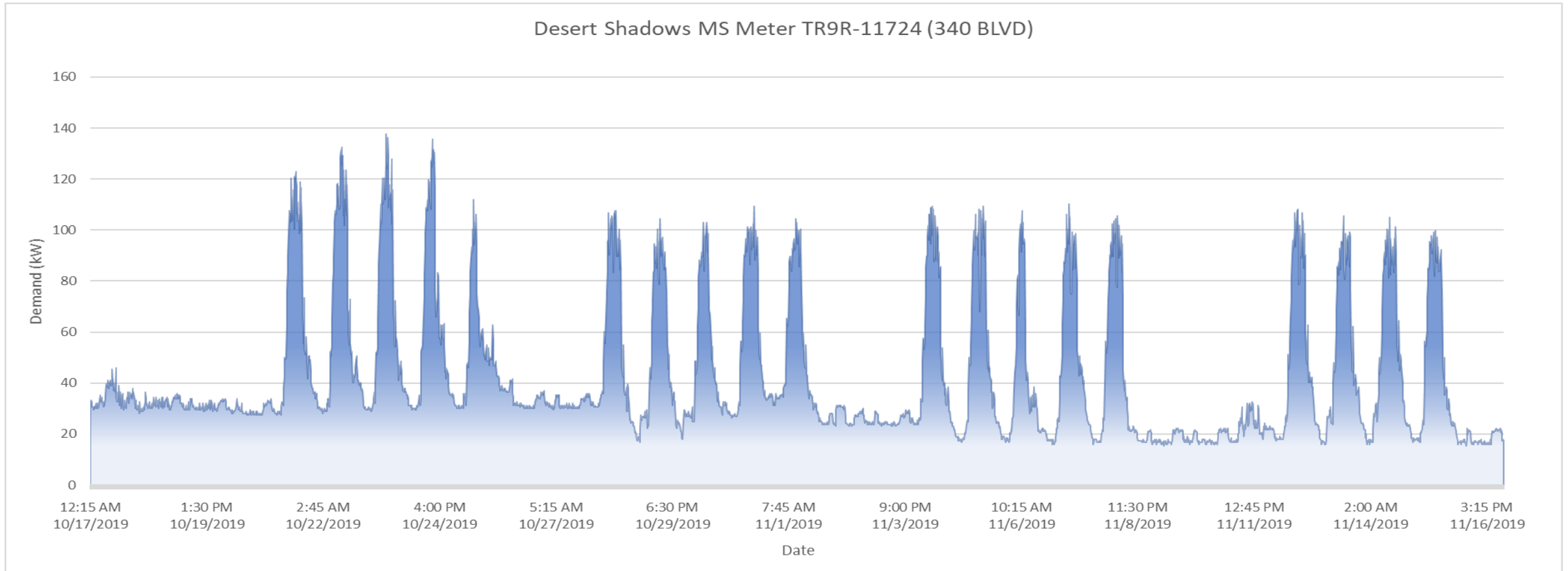
# Challenger



Some afternoon spikes  
Placed in unoccupied on weekends



# Desert Shadows

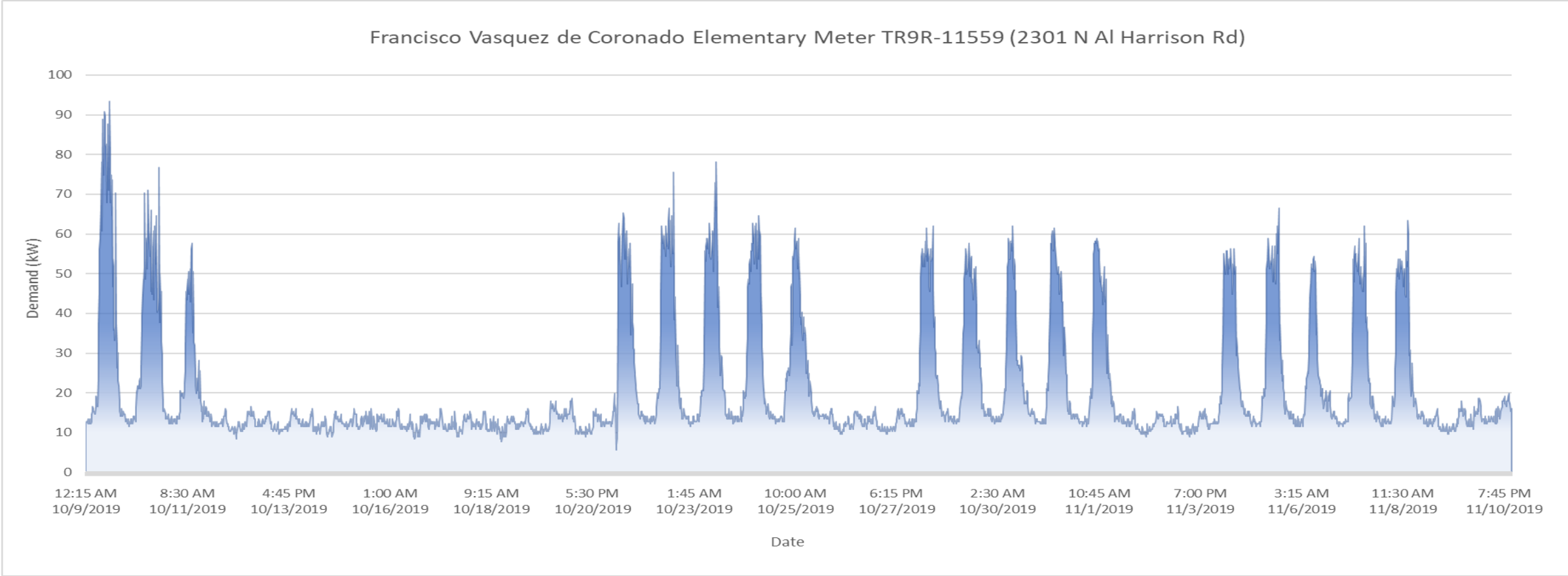


Reduced unoccupied demand  
Placed in unoccupied on weekends and November 11<sup>th</sup>



# Coronado – 11559

Francisco Vasquez de Coronado Elementary Meter TR9R-11559 (2301 N Al Harrison Rd)

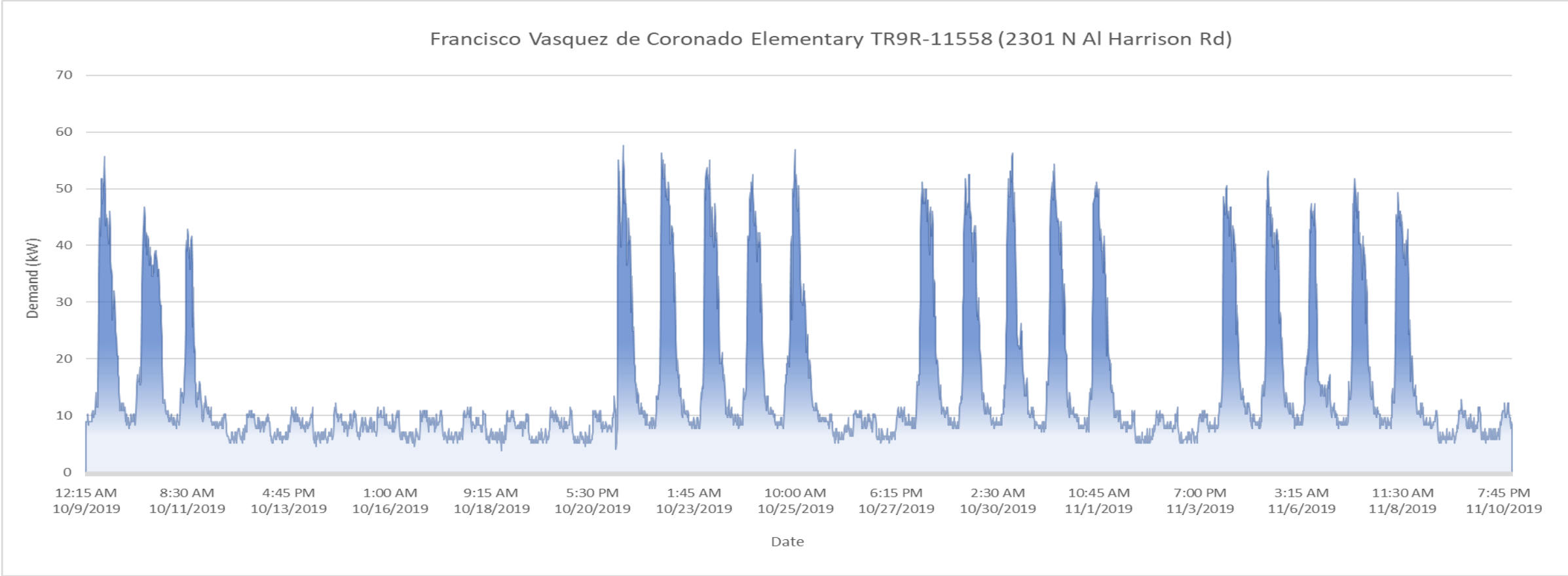


Placed in unoccupied on weekends



# Coronado – 11558

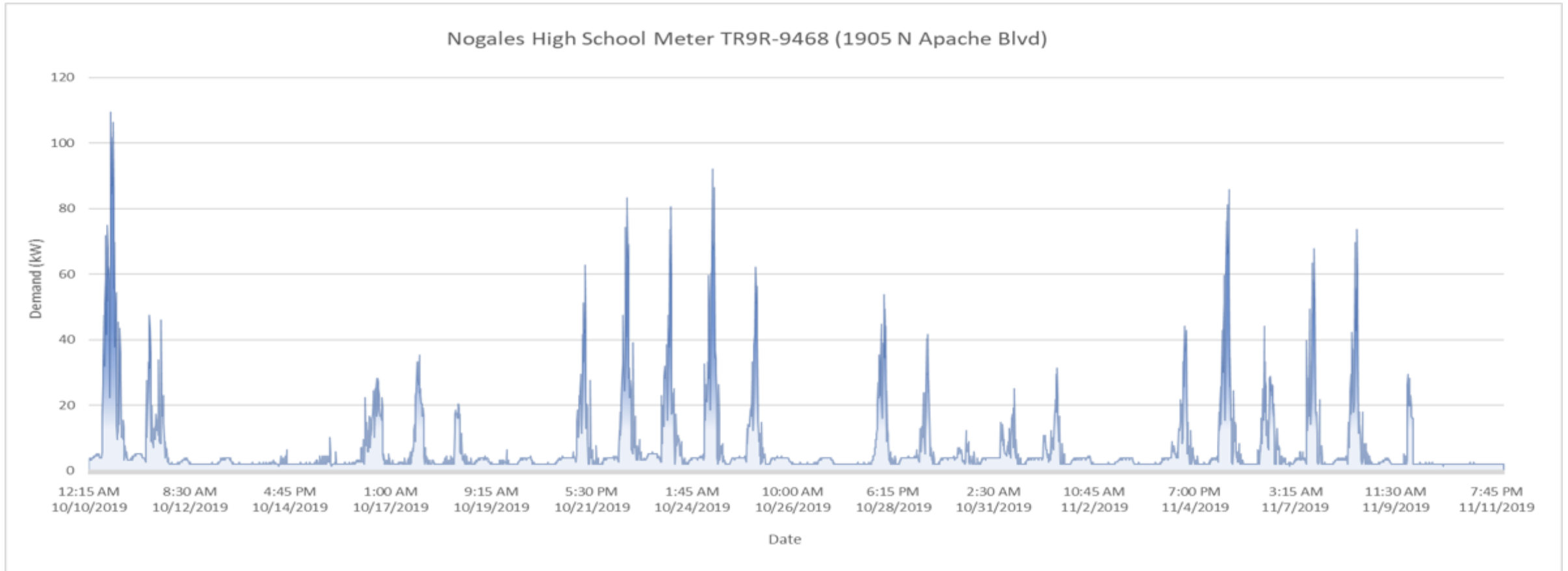
Francisco Vasquez de Coronado Elementary TR9R-11558 (2301 N Al Harrison Rd)



Placed in unoccupied on weekends



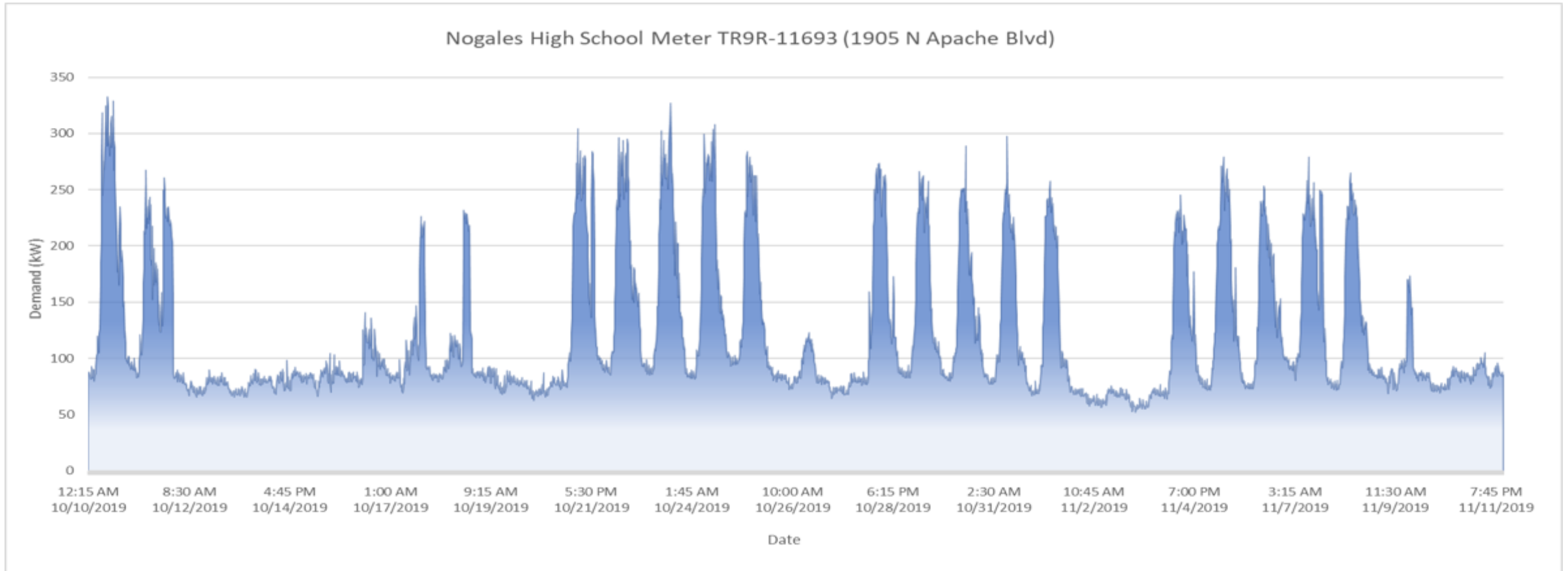
# NHS – 9468



Placed in unoccupied on weekends and November 11<sup>th</sup>



# NHS – 11693



Placed in unoccupied mode on weekends and November 11<sup>th</sup>  
Some weekend use



# FY20 Opportunities







# Energy Saving

# Opportunities



## Winter Electric Saving Strategies for Arizona Schools

Winter months in Arizona (November – April) call for implementation of different energy saving strategies. Here are some **best practices for energy savings** during these months. Please use this check list to help **prepare your school building(s)** for winter electric savings. Let's set ourselves up to save BIG!

### Winter Electric Best Practices:

- Peak and shoulder peak times shift from November – April for most electric utility companies in Arizona.
- APS peak times are: On-Peak hours: 5:00 a.m. to 11:00 a.m. Monday through Friday and Shoulder-Peak hours: 3:00 p.m. to 8:00 p.m. Monday through Friday. Off-Peak hours: All remaining hours.
- SRP peak times are: On-Peak hours: 5:00 a.m. to 9:00 a.m. Monday through Friday and Shoulder-Peak hours: 5:00 p.m. to 9:00 p.m. Monday through Friday. Off-Peak hours: All remaining hours.
- Arizona recommended winter set-points are an occupied set-point of 65 – 68 degrees and an unoccupied set-point of 60 degrees. For each degree you lower your thermostat, you can save 2-3% on heating costs.
- Stagger the start-up of HVAC units (20 minutes for APS and 35 minutes for SRP).
- Consider setting EMS to pre-heat during off-peak hours (prior to 5 a.m.) taking advantage of the thermal inertia of the building. This is especially important to do at the end of a break or week-end when buildings have been in unoccupied mode for 2 or more days and the envelop has cooled down.
- Due to the thermal inertia of the building, put buildings into unoccupied mode by 3 p.m. and allow the energy absorbed by the building throughout the day and generated by copiers, equipment and people to sustain a comfortable set-point until they are vacated.
- Make sure all **doors and windows are closed** and secured. Eliminate drafts and gaps.
- Leverage solar heat during the day. Open curtains/shades on your south-facing windows during the day to allow sunlight to naturally heat spaces, and close them at night to reduce the chill from cold windows.
- Establish a preventative maintenance program for your heating, venting and air conditioning (HVAC) equipment and systems. Ensure that you regularly:
  - Change or clean all air filters, preferably every month.
  - Clean all heat exchanger surfaces, water and refrigerant coils, condensers and evaporators.
  - Repair leaks in piping, air ducts, coils, fittings and at the unit(s).
  - Replace defective equipment insulation, ducting and piping.

Let's save BIG this winter and continue 2019-2020 with some great energy and cost savings!

**THANK YOU!!**





## Energy Saving

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## Opportunities

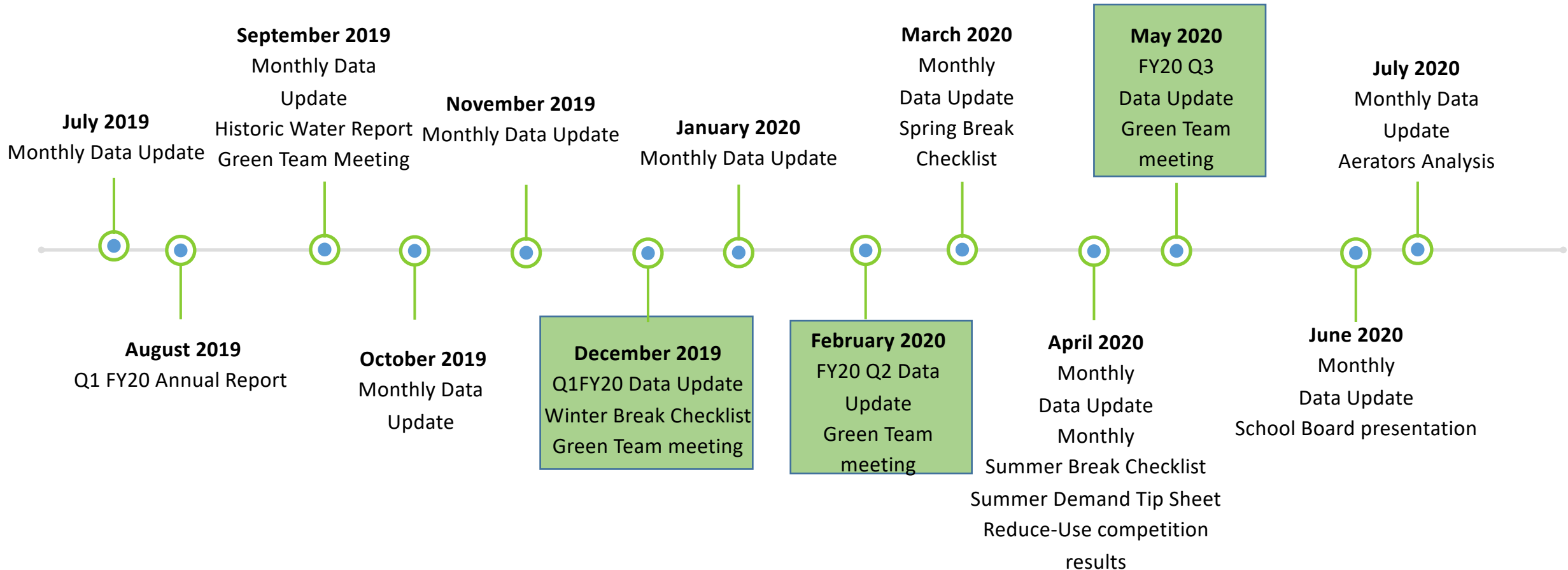
- Enforce setpoints
- Adjust setpoints for optimal savings
- Ensure occupied and unoccupied setpoints are set
- Support Green Teams at all schools
  - Refocus on electricity and water savings
- Please create online access for water data
- Track water and provide strategies
- Install all faucet aerators
  - Track impact of aerators



# Nogales Unified School District Deliverable Roadmap



PIERCE ENERGY PLANNING  
HELPING SAVE ENERGY DOLLARS





## Project Team

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