

# Data Driven Energy Management

*Case Study - How a School District used Data to Lower Electricity Bills, Increase Energy Efficiency, and Reduce Carbon Footprint*

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# Topics

- How to read your electric bill
- Electric utility rate increases - 2023
- Electric metering
- Electrical service identification / building partitioning
- HVAC electric footprint
- HVAC optimization
- Energy waste identification

# If you saved 10%, 15%, 20% or more on your school's monthly energy bill...



How much money would that be?



What would you do with that money?

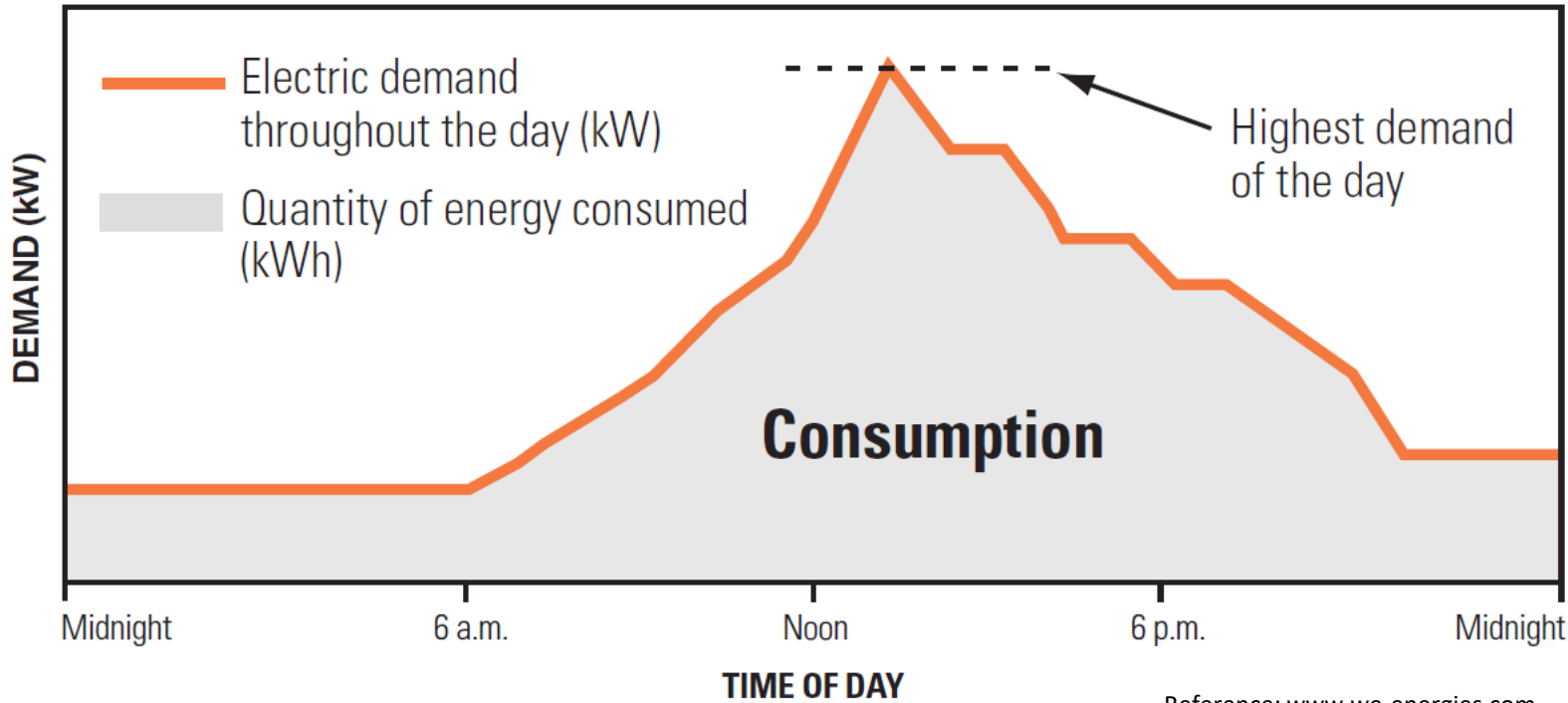


How would you invest that money back into the classroom?

Knowing how your electric use is billed and how your demand and energy charges are calculated will help you understand and manage your total energy costs.

The electricity use diagram below shows the difference between *energy* and *demand*:

### Electricity Use Profile (sample)



Reference: [www.we-energies.com](http://www.we-energies.com)

The goal is to flatten the curve in peak time energy use to lower your bill.

## Rate Cg3:

### Understanding the demand charges on your bill

You will see demand charges appear as two separate charges on your bill.

***Power supply on-peak demand charge***— This charge is for the 15-minute interval when you use the most electric power to run your equipment, lights, etc. during the on-peak time period (9 a.m. to 9 p.m. weekdays) for the current bill.

***Delivery customer maximum demand charge***— This charge is for the 15-minute interval when you use the most electric power to run your equipment, lights, etc. during any time of the day for the current or previous 11 months of bills.

Reference: [www.we-energies.com](http://www.we-energies.com)

# Typical School Electric Bill

## Total Usage Period : 09/25/20 to 10/26/20

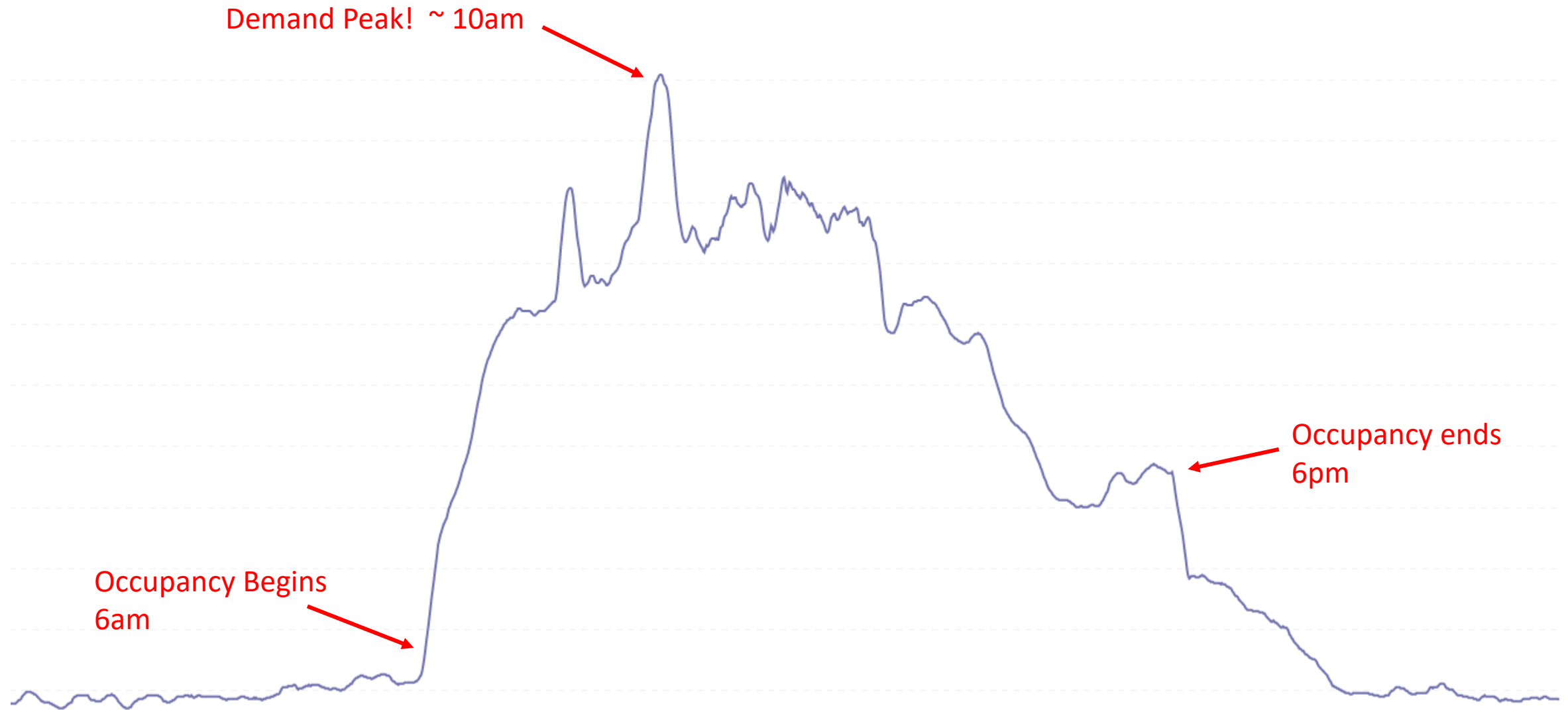
Billed On-Peak Demand		324.000 kw
Customer Demand 11/22/19 - 12/27/19		378.000 kw
<b>Total Consumption</b>	<b>79,200</b>	
<b>Total On-Peak Consumption</b>	<b>45,000</b>	
<b>Total Off-Peak Consumption</b>	<b>34,200</b>	

## Electric Charges Period : 09/25/20 to 10/26/20

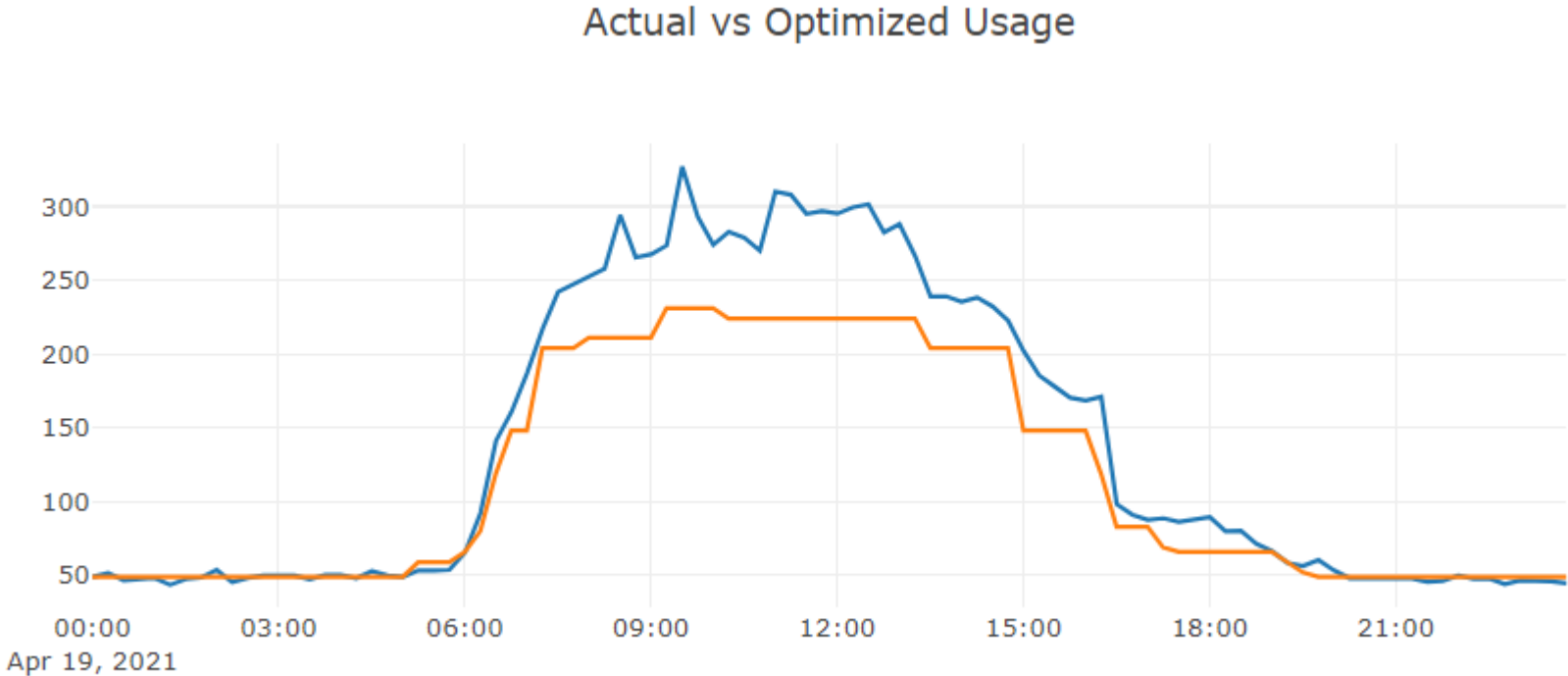
### Gen Secondary Large TOU Demand - CG3 31 Days

Customer Demand Charge	378.0 kw @	\$2.550000	<b>Demand</b>	\$963.90
On-Peak Demand Charge	324.0 kw @	\$15.184000	<b>Charges</b>	\$4,919.62
Facilities	31 days @	\$2.000000	<b>55% !!!</b>	\$62.00
State Low-Income Assistance Fee				\$31.59
Energy - Off Peak	34,200 kWh @	\$0.050880	<b>Energy</b>	\$1,740.10
Energy - On Peak	45,000 kWh @	\$0.071350	<b>Charges</b>	\$3,210.75
2017 Tax Cut-Deferred Tax Credit	79,200 kWh @	\$0.001870-	<b>45 %</b>	\$148.10 CR
<b>Total Amount</b>				<b>\$10,779.86</b>

# Example School Electricity Profile



# Example of Demand Charge Reduction



With Energy Data, Facility Operators can identify causes of demand peaks and reduce both consumption and peak demands.



# Electric Utility Rate Increases 2023

## Our overall request

- \$260.5 million (8.4%) for electric rates (including changes in fuel costs).
- \$60.1 million (8.3%) increase for Wisconsin Gas LLC rates.
- \$50.7 million (10.7%) increase for Wisconsin Electric Gas Operations rates.
- \$3.3 million (15.5%) increase for steam rates.

The impact of the requested increase on your bill will vary depending on your rate class and amount of electricity, natural gas and/or steam you use.

## What this means for you

### Electric »

Reference: [www.we-energies.com](http://www.we-energies.com)

Customer class	2023 increase
Residential*	\$6.00 or 5.45% per month
Small commercial/industrial**	\$28.62 or 9.68% per month
Large commercial/industrial***	11.68% annually

\* Assumes customer using 660 kilowatt-hours (kWh) per month.

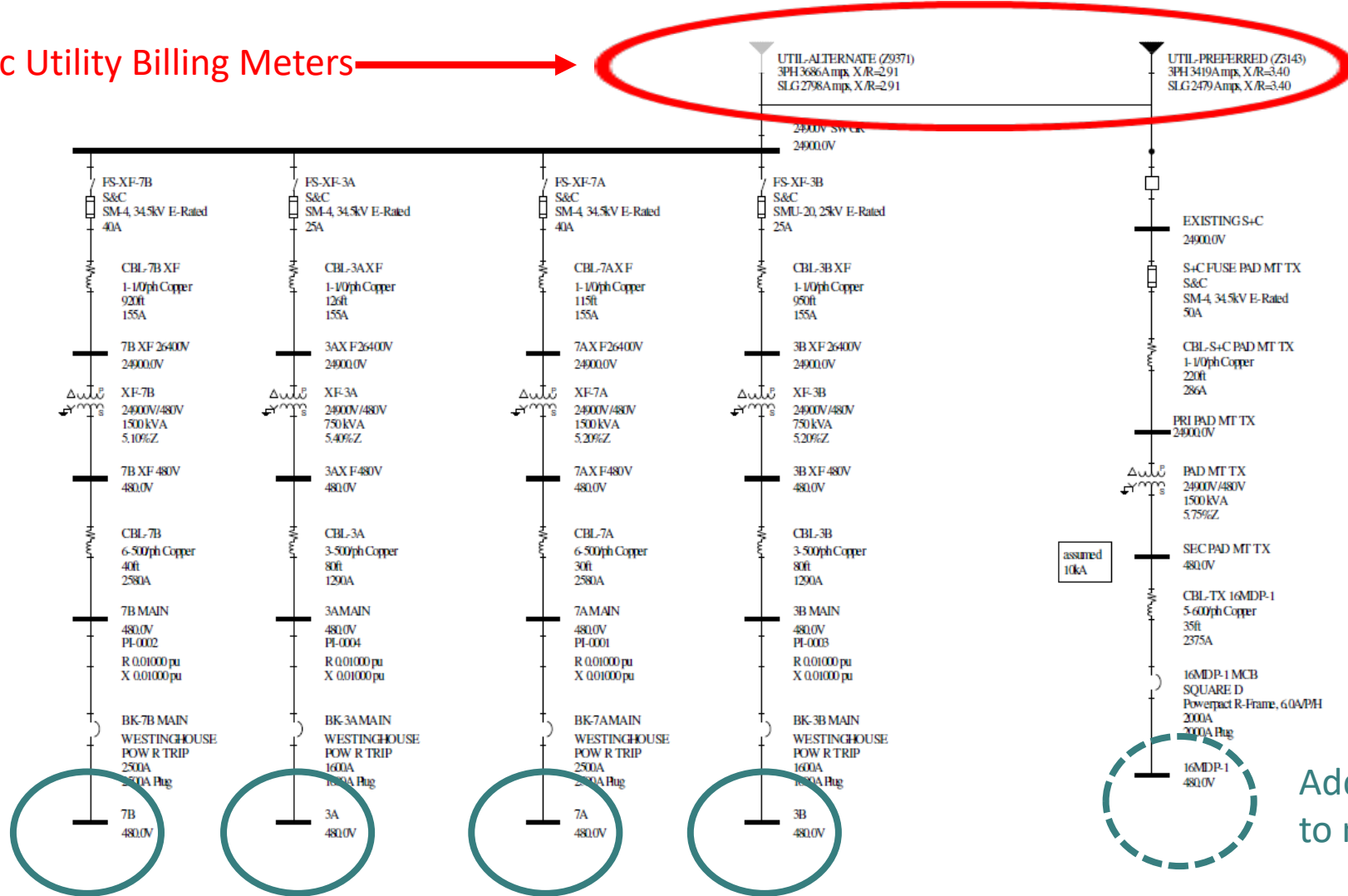
\*\* Assumes customer using 2,000 kWh per month.

\*\*\* Assumes large commercial and industrial firm electric customer.

**Most Electric Utilities in the Midwest are increasing their rates > 10% in 2023**

# Step 1: Metering – Capture Energy Data

Electric Utility Billing Meters



Additional Meter to monitor solar / generators

Install Meters to Capture Energy Data – behind utility billing meters

# Northern Ozaukee School Building

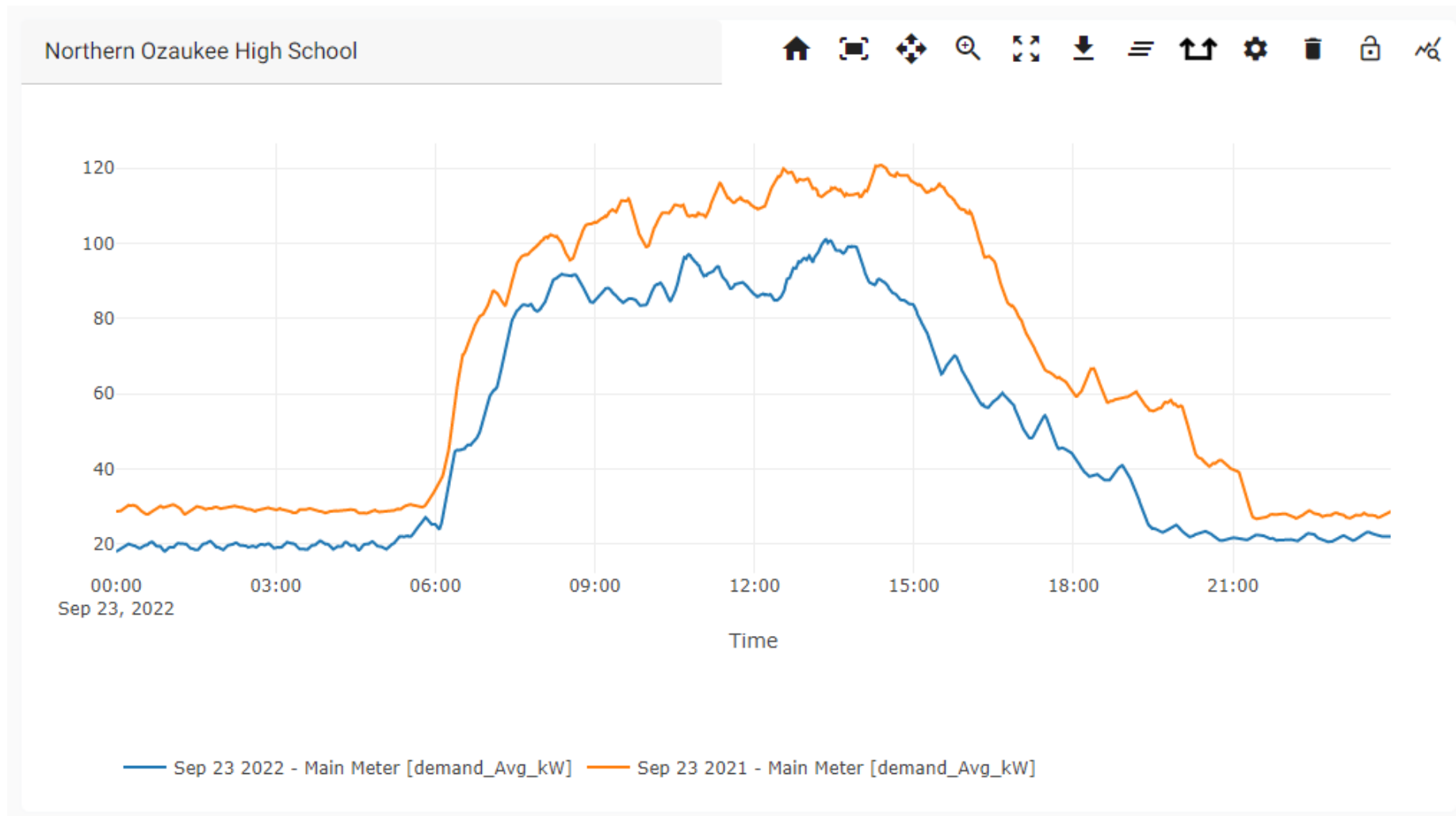
- 3 Electrical Services
  - Common for many schools
  - Original electrical service when school built
  - New services added with school additions / renovations
- Metered all 3 services
  - Match demand peaks and energy use on all 3 services vs. Utility Bills

# Determine Electrical Footprint

- Set HVAC schedule to run over the weekend
- Mapped out HVAC Electrical footprint across all 3 meters
- Also mapped lighting, kitchen, and other large electrical equipment
- Enabled optimization and demand reduction on each service

HVAC section	Time on / off	Usage (kW)	Meter
AHU 1 Lobby	10am – 1pm	2	HS
AHU 2 Cafe	10:15am – 1:15pm	5	HS
AHU 3 Office Back	10:30am – 1:30pm	2	HS
AHU 4 Classrooms	10:45am – 1:45pm	2	HS
AHU 5 Gym	11am – 2pm	13	HS
AHU 11 Multipurpose	11:15am – 2:15pm	4	HS
AHU 12 Choir	11:30am – 2:30pm	1	HS
AHU 13 Auditorium	11:45am – 2:45pm	5	HS
AHU 18 Office Front	12pm – 3pm	4	HS
BCU 1 Kitchen	12:15pm – 3:15pm	1	HS
Chiller (HS)	12:30pm – 3:30pm	10	HS
AHU 14 Library	3:45pm – 5:30pm	2.5	Elem
AHU 15 Classrooms East	4pm – 5:45pm	3	Elem
AHU 16 Gym	4:15pm – 6pm	4	Elem
AHU 19 Classrooms West	4:30pm – 6:15pm	3	Elem
RTU 1 Office	4:45pm – 6:30pm	3	Elem
Chiller (MS)	5pm – 6:45pm	20	HVAC
RTU MS Band	5:15pm – 7pm	1	Elem
Sunday 9/19			
AHU 6 Classrooms North	12pm-2pm	3	Elem
AHU 7 Classrooms South	12:15pm-2:15pm	3	Elem
AHU 8 Offices	12:30pm-2:30pm	2	Elem
AHU 9 Gym	12:45pm-2:45pm	9/7	Elem/HVAC
AHU 17 Classrooms East	1pm-3pm	5	Elem
RTU 2 Classrooms	1:15pm-3:15pm	8	Elem
Chiller (Elementary)	1:30pm-3:30pm	18	HVAC
HS Total		49	HS
Elem Total		46.5	Elem
HVAC Total		45	HVAC

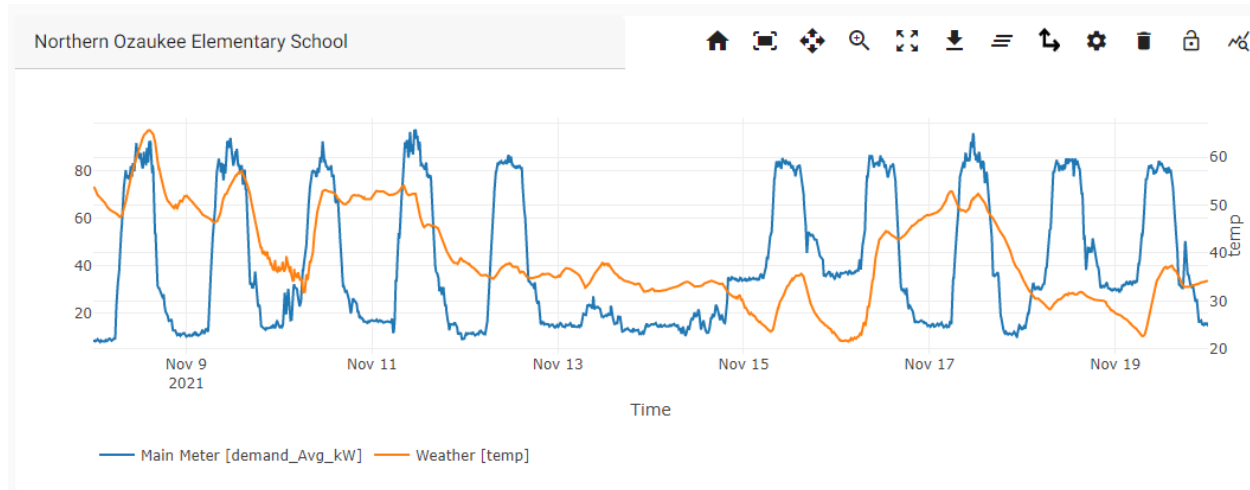
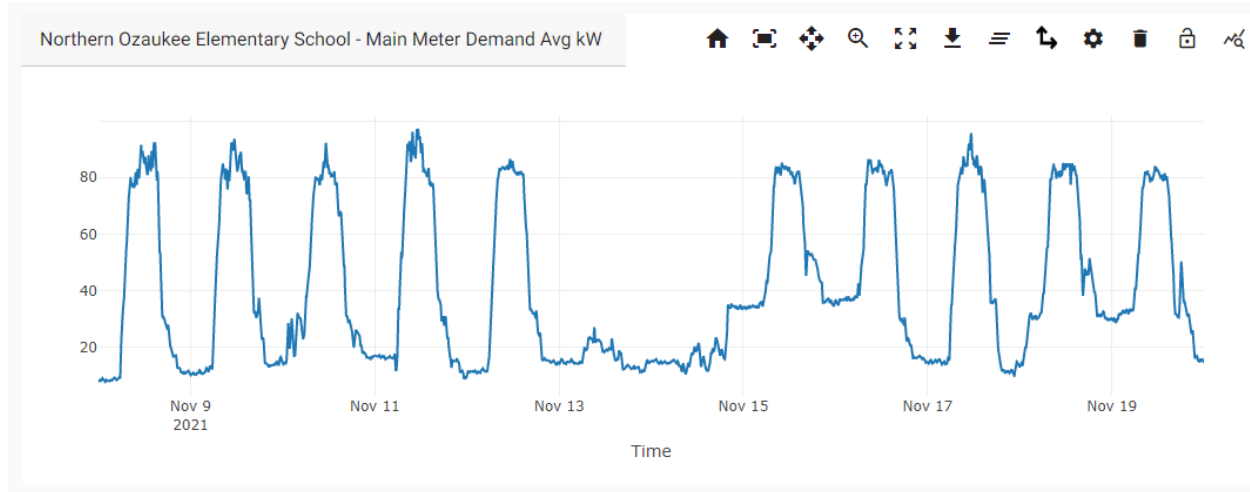
# HVAC Optimization ~ 15% Monthly Savings > \$1,000



# Chiller Optimization > 25% bill savings



# Identified Air Handler Issue with Energy Data



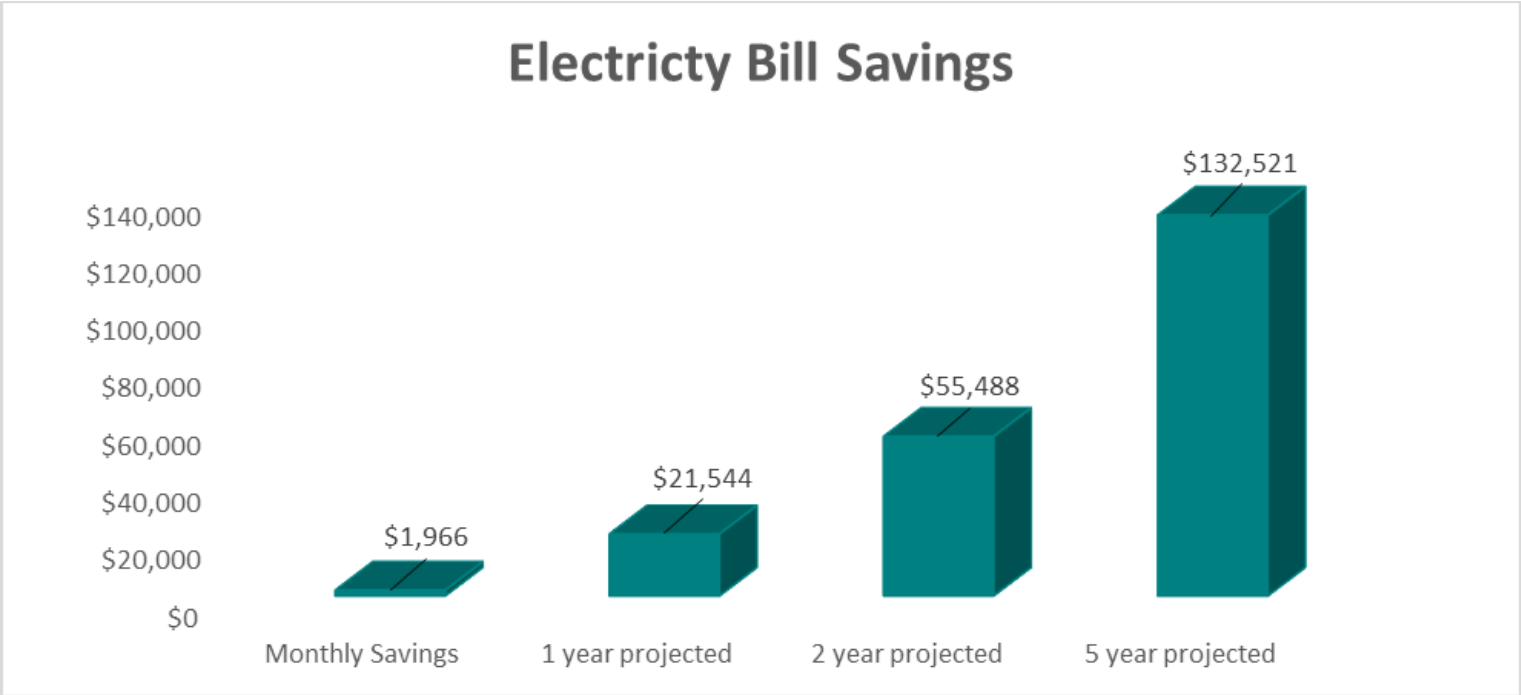
Winter savings opportunity on 2 meters

Air handlers running 24 x 7 in winter, huge unnecessary energy usage

Winter Energy Savings > \$10,000


# Northern Ozaukee School District

> \$21,000 Electricity Savings in first year of the program



18% Monthly Energy Bill Savings





**dataWrangler**

Energy Data-as-a-Service from CLOCworks, Inc.  
*“Our Knowledge Will Save You Power!”*  
**[www.dataWrangler.us](http://www.dataWrangler.us)**

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