

# Saving Money and Reducing Climate Change

*2022 Facility Masters Conference*

*Presented by:*

**alb** Actively  
**Building**  
Competency, Character,  
Culture & Community

OREGON SCHOOL DISTRICT

A photograph of the Forest Edge Elementary building and its courtyard. The building is a modern, single-story structure with large windows and a flat roof. In the foreground, there is a paved courtyard with several young trees planted in concrete planters with wooden slat benches. The sky is clear and blue.

# Agenda

## Forest Edge Elementary

### Agenda

- The OSD story
- Net Zero Strategies
- Saving Money
- Teaching & Learning
- A Carbon Neutral Future?
- Lessons Learned

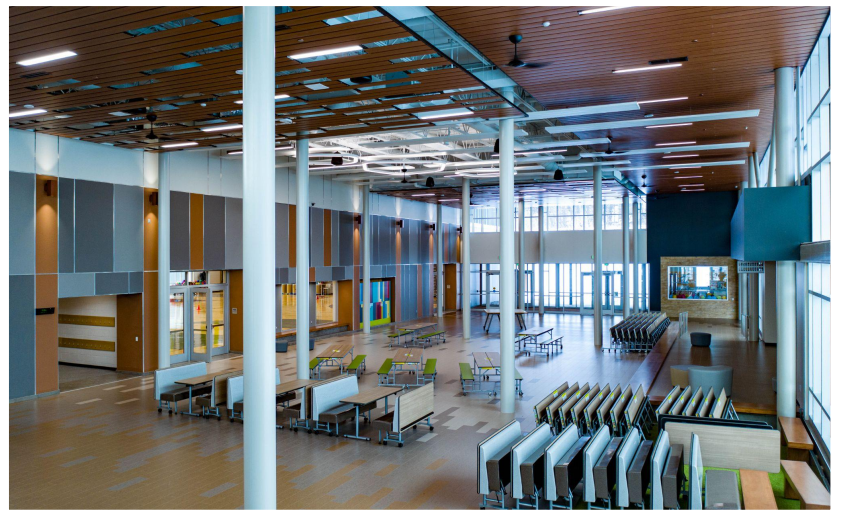
### Q&A

# NET ZERO

Net zero or zero-energy buildings produce at least as much energy as they consume on an annual basis.

They do this by incorporating state-of-the-art energy efficiency and renewable energy technologies.

- *The National Renewable Energy Laboratory*



The background image shows a mechanical room with white cinder block walls and a grey tiled floor. Large yellow pipes are visible, with black pipes running vertically. A white cylindrical tank is mounted on the wall. A central orange box with a white border contains the text 'The OSD Story'.

# The OSD Story

# BOARD POLICY

- Community and staff committee drafted a paper on sustainability in the OSD
- Paper became policy and provided direction
- The policy provides a platform for staff-led environmental initiatives



"The Oregon School District believes it is critical for the future of our planet to **develop learners who are ecologically literate and environmentally responsible citizens and stewards**. We believe it is important to model the District's commitment by establishing these values and developing practices consistent with them:

The District will **continue to develop building and operational practices and procedures** that reflect a commitment to environmental sustainability; and

The District will have an **aligned K-12 curriculum that integrates ecological and environmental sciences and issues into the curriculum**, including socio-economic aspects. This may include, but is not limited to, experiences outside the classroom, project-based learning, and environmental services projects."

**OREGON'S VALUE STATEMENT**

# THE BEGINNING: ENERGY MANAGEMENT

## eGauge Pro

- Cost effective (\$800)
- Easy to use and implement
- Helps to make data driven decisions





**OREGON MIDDLE SCHOOL** 2014





Original Solar Panel 

**OREGON MIDDLE SCHOOL** *Solar | 62 KWp*



**BROOKLYN ELEMENTARY SCHOOL** *Solar* | 36 KWp



**OREGON HIGH SCHOOL** *Solar* | 136 kWp

# SOLAR PANEL 2014



Oregon Middle School

# SOLAR ARRAYS *and* GEOTHERMAL 2014 Referendum

Oregon  
High  
School



Oregon  
Middle  
School



Brooklyn  
Elementary



# NET ZERO 2018 Referendum



Forest Edge Elementary

**OREGON'S** *Journey*

# THE BEGINNING: ENERGY MANAGEMENT

## eGauge Pro

- Cost effective (\$800)
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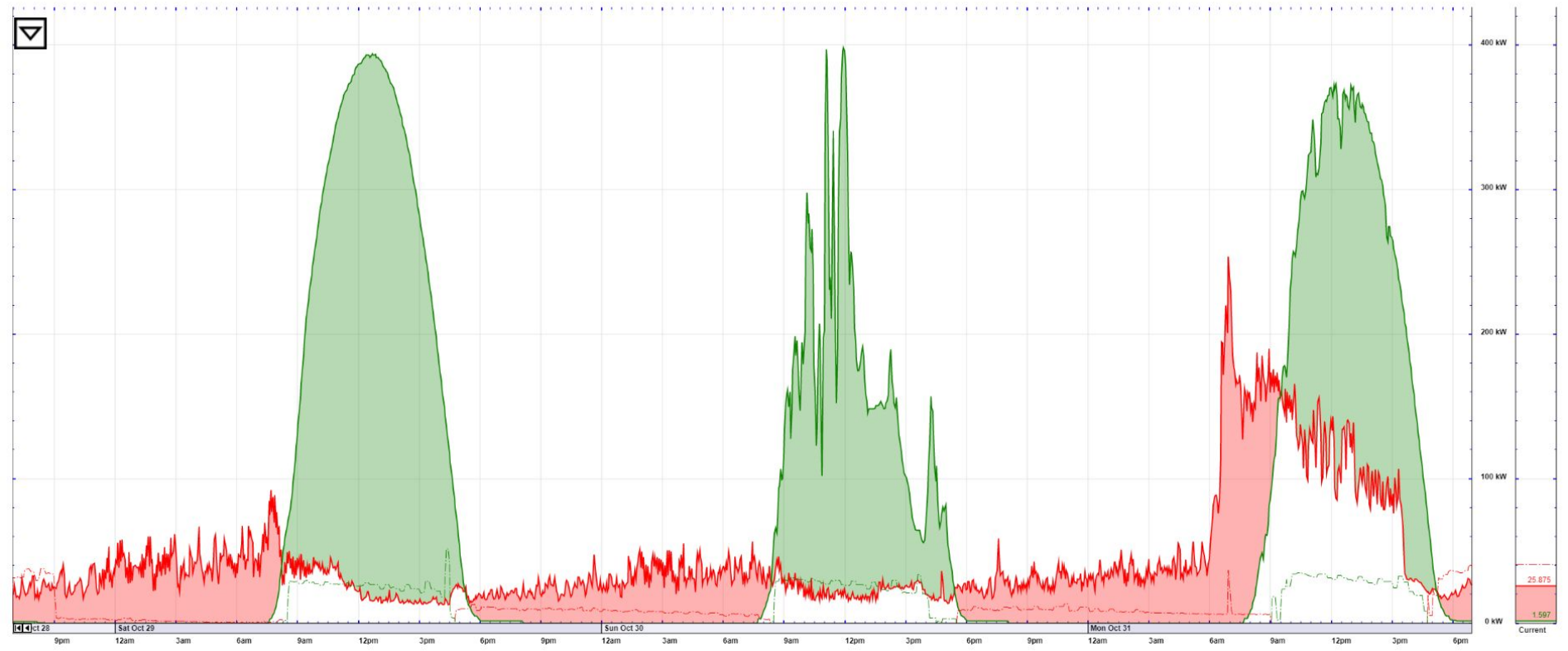
### Summary for time-period shown in graph

Energy Used	3.12 MWh	(approx. \$405.49 used)
Energy Generated	6.07 MWh	(approx. \$789.58 saved)
Net	2.95 MWh sold	(approx. \$384.09 earned)

### Summary over last 30 days

Energy Used	39.5 MWh	(approx. \$5,131.42 used)
Energy Generated	62.6 MWh	(approx. \$8,136.27 saved)
Net	23.1 MWh sold	(approx. \$3,004.84 earned)

- All
- 1y
- 6M
- 3M
- 1M
- 3w
- 1w
- 3d
- 1d
- 12h
- 6h
- 3h
- 1h
- 10m
- Auto
- 500kW
- 100kW
- 50kW
- 10kW
- 5kW
- 1kW
- 500W
- 100W
- 50W



An aerial photograph of a large, multi-story building with a flat roof covered in solar panels. The building is surrounded by a parking lot with yellow markings and a paved road. The background shows a grassy area and a concrete path.

# **NET ZERO STRATEGIES**

# LARGEST VERIFIED

NET ZERO K-12 SCHOOL  
IN THE U.S.

# 1,704

SOLAR PANELS

# PROJECT TEAM



HGA



# FIRST NET ZERO SCHOOL

IN WISCONSIN

# 99

GEOHERMAL WELLS  
THAT ARE  
406 FEET DEEP

**ABOUT FOREST EDGE**



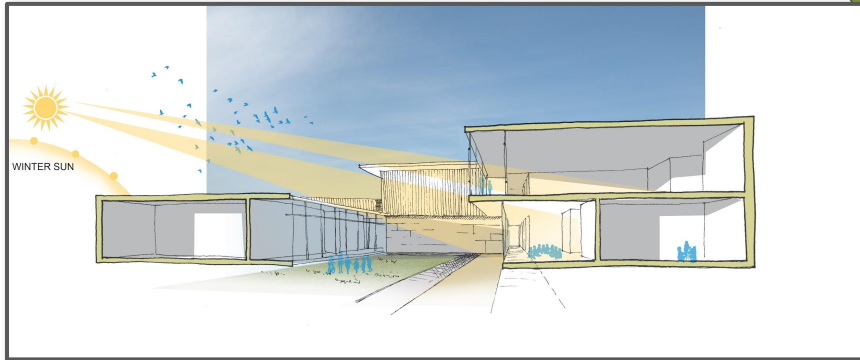
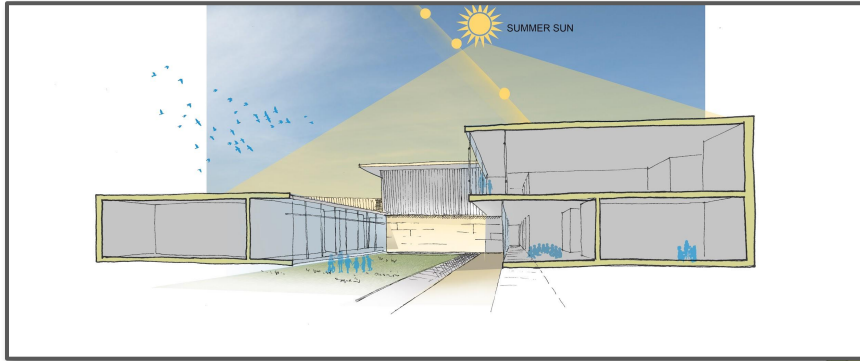
# PROJECT GOALS

- Address enrollment growth
- Exceptional learning spaces
- An abundance of Natural Light
- Safety and security
- Sustainable elements



# BUILDING ORIENTATION

## SITE & SECTION



# GEOHERMAL HEATING/COOLING

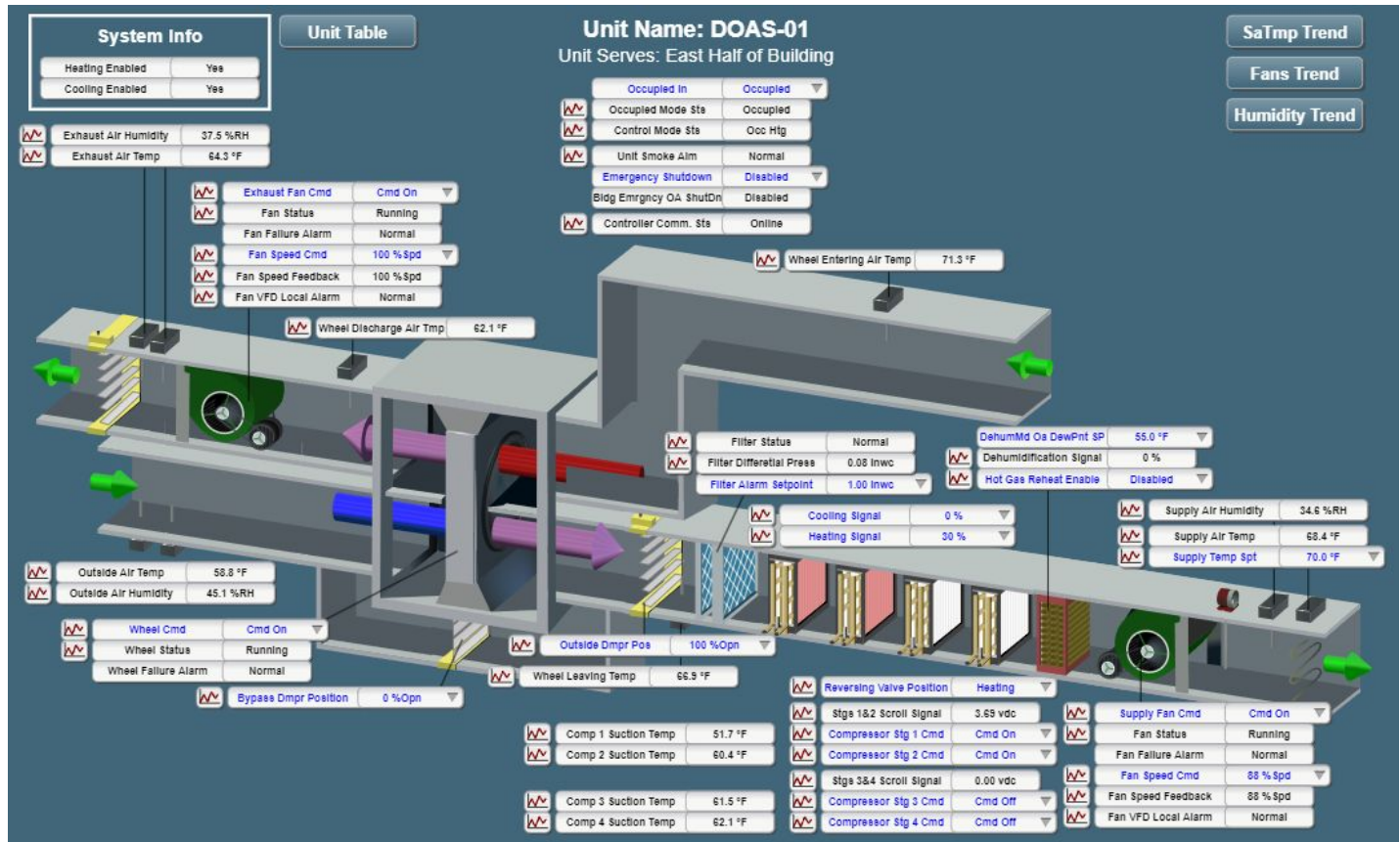


# ROOFTOP SOLAR PHOTOVOLTAICS

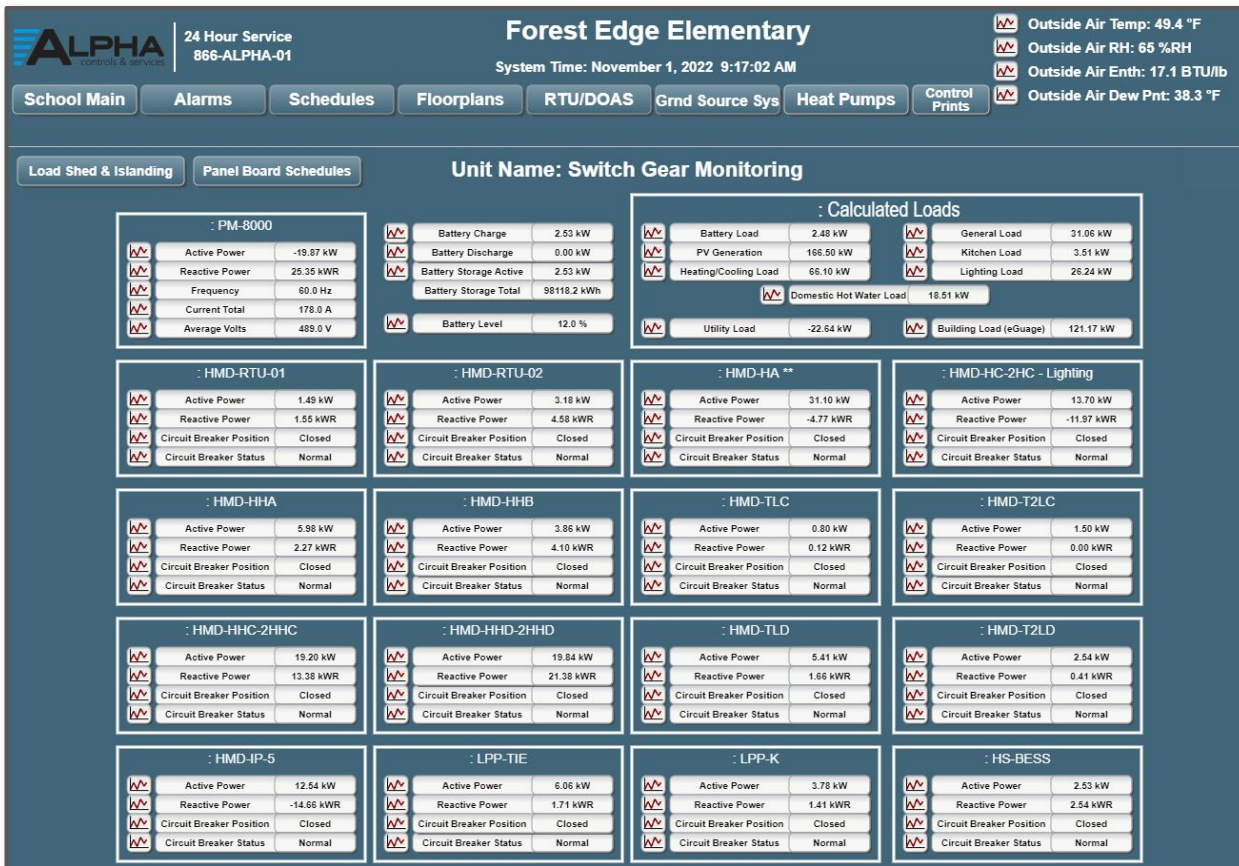


# DOAS Units

## Dedicated Outside Air Systems



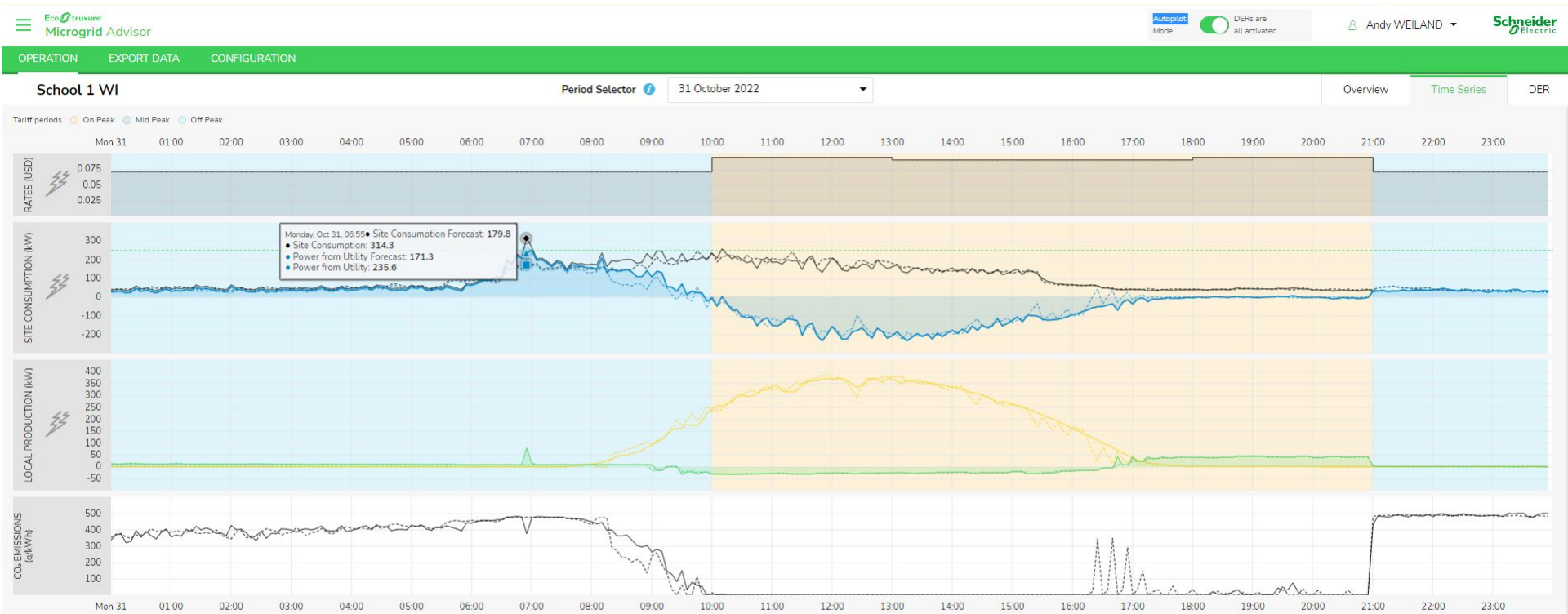
# Monitoring At the Switchgear Level



# BATTERY STORAGE SYSTEM



# MicroGrid Advisor Dashboard





# MicroGrid Advisor Dashboard

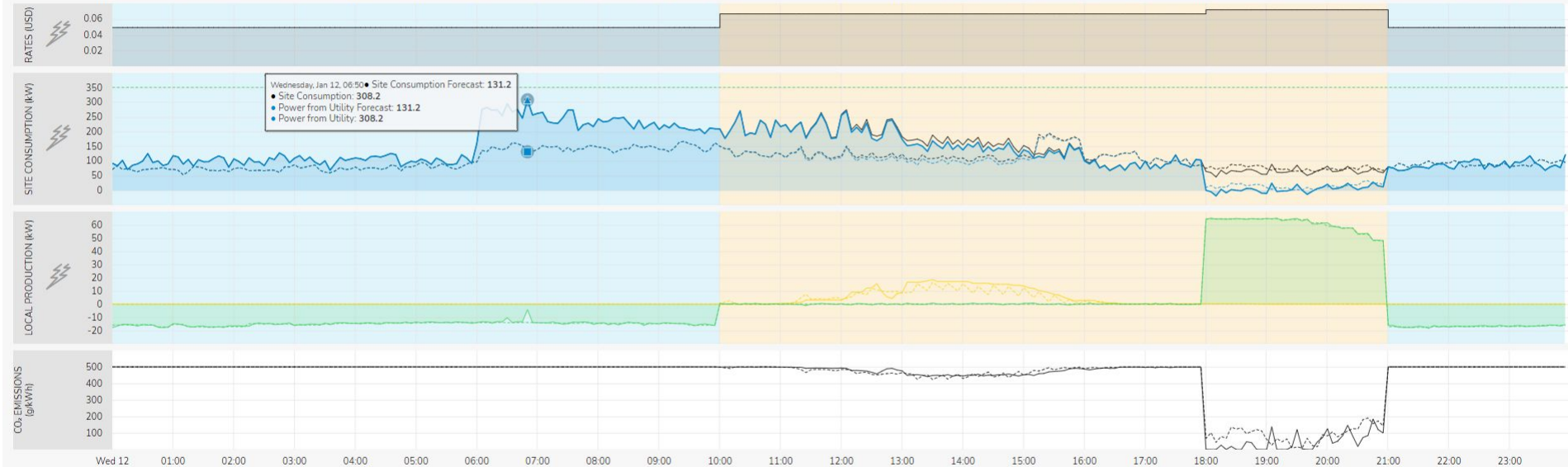
## School 1 WI

Period Selector 12 January 2022

Overview Time Series DER

Tariff periods On Peak Mid Peak Off Peak

Wed 12 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00

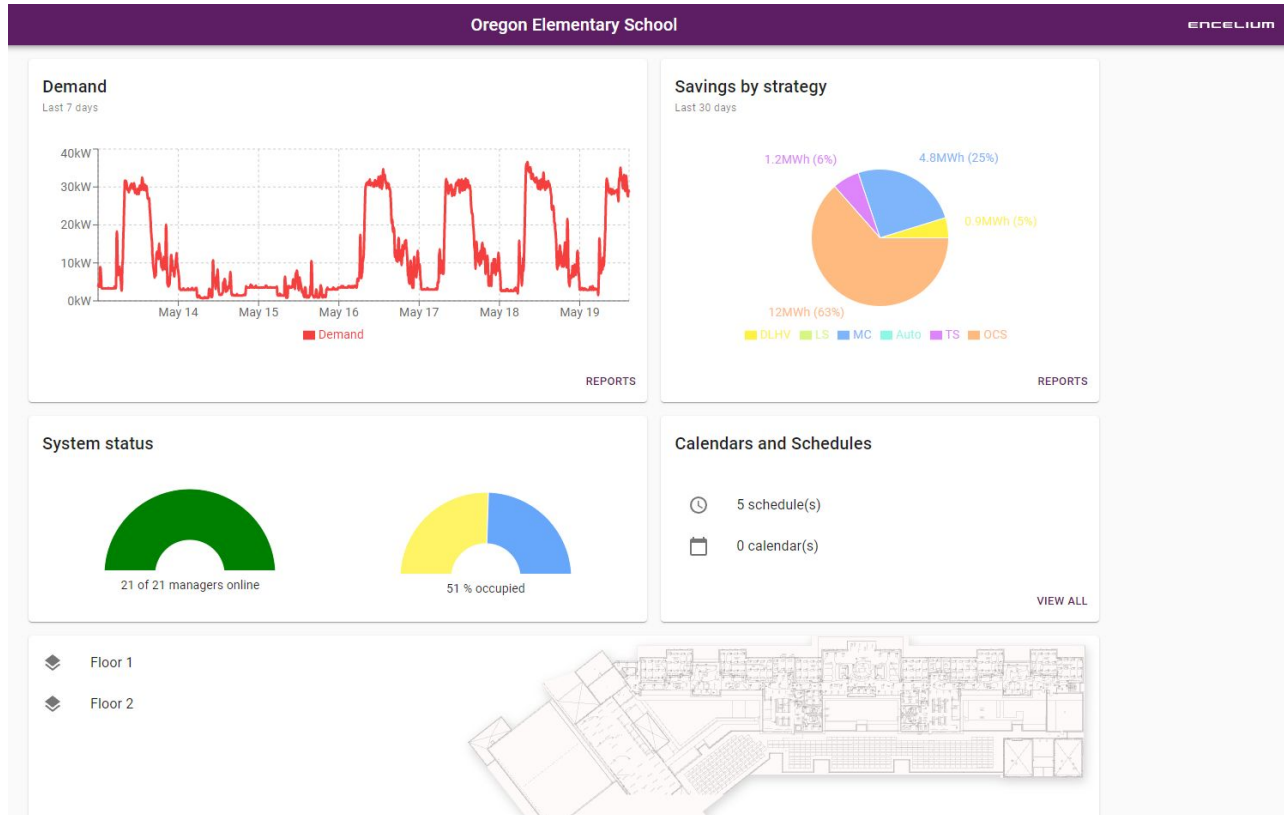


# MINIMIZE ELECTRIC USE **ELECTROCHROMIC GLASS**



# MINIMIZE ELECTRIC USE

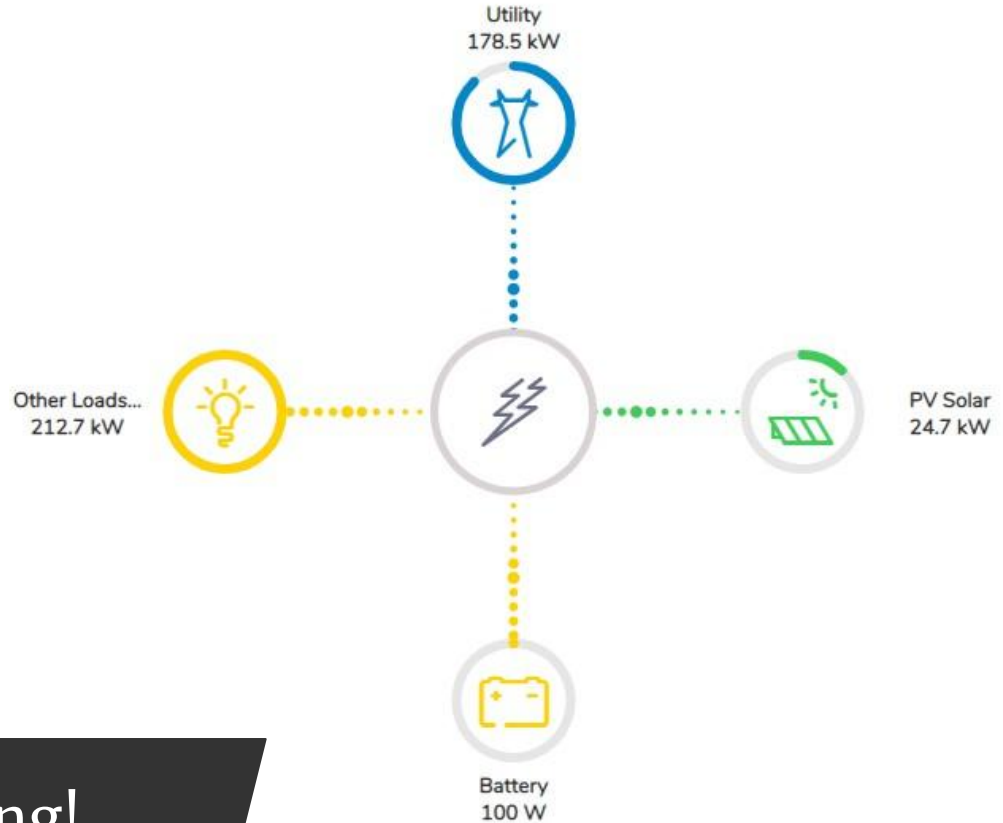
## NETWORKED LIGHTING SYSTEM



# AN ELECTRIC FUTURE

## All Electrical Energy

- Heating / cooling
- Hot water
- Renewable energy
- Battery storage



*Zero* natural gas to the building!

...ain source of light is  
...res and even fireflies  
...in the sun and use it  
...ynthesis. Almost all  
...energy needs.

LIGHT

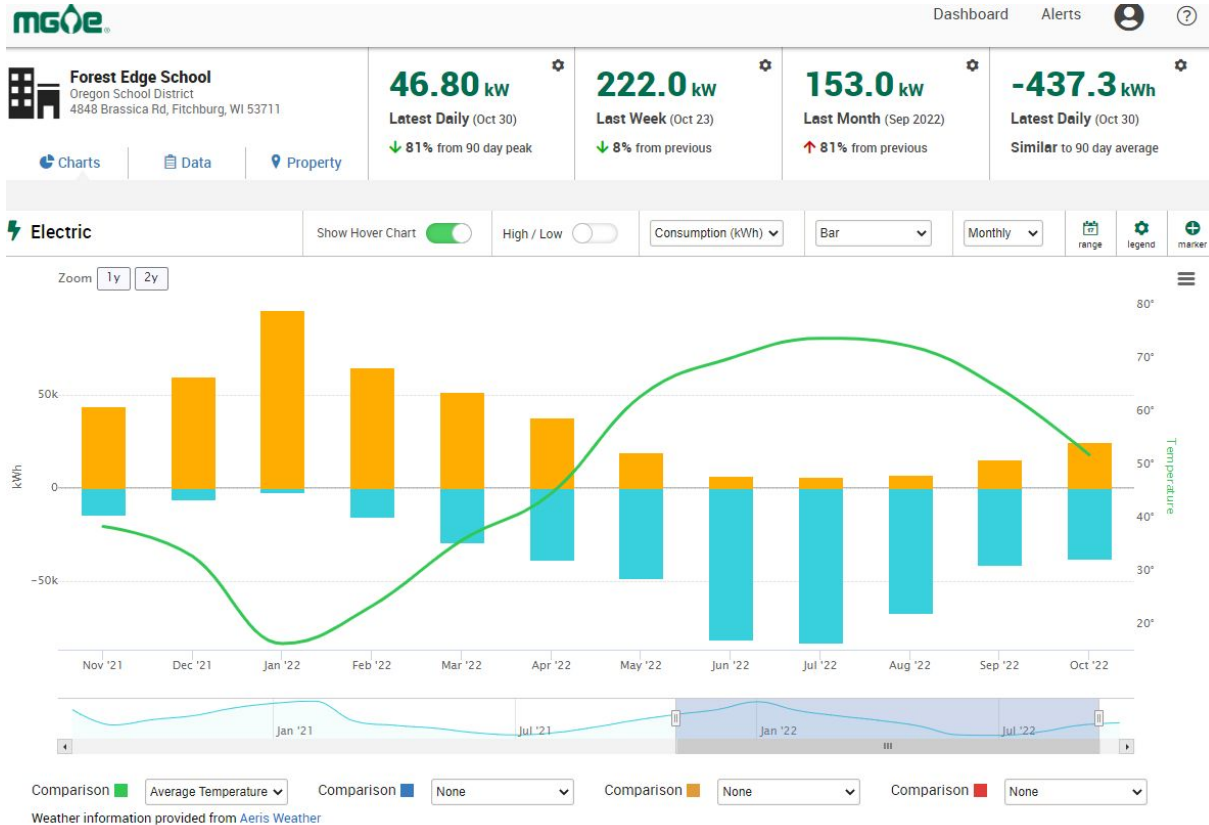


# OPERATIONAL IMPACT



# NET ZERO TRACKING

## MONTH-BY-MONTH



# ENERGY USAGE COMPARISON - 9/2020 to 8/2021

Building	Square Footage	Utility	Total by Utility	Total Energy Cost by Building	Cost sq/ft
Rome Corners Intermediate	110,000	Gas	\$24,930	114,547	\$1.04
		Electric	\$89,617		
Forest Edge Elementary	126,000	Gas	N/A	\$56,873	\$0.45
		Electric	\$56,873		
Oregon Middle School*	132,000	Gas	\$32,063	\$122,131	\$0.93
		Electric	\$89,617		

\*Oregon Middle School has a 22,000 sqft geothermal wing

# ENERGY USAGE COMPARISON - 9/2021 to 8/2022

Building	Square Footage	Utility	Total by Utility	Total Energy Cost by Building	Cost sq/ft
Rome Corners Intermediate	110,000	Gas	\$24,417	\$145,692	\$1.15
		Electric	\$102,190		
Forest Edge Elementary	126,000	Gas	N/A	\$60,974**	\$0.48
		Electric	\$60,974		
Oregon Middle School*	132,000	Gas	\$31,047	\$131,132	\$1.04
		Electric	\$105,698		

\*Oregon Middle School has a geothermal wing

\*\* 69% of this cost was related to demand charges....not energy or transmission costs.



# ENERGY USAGE COMPARISON - 2020-21 to 2021-22

Building	20-21 Cost Sq/Ft	21-22 Cost Sq/Ft	% Chg
Rome Corners Intermediate	\$1.04	\$1.15	10.53%
Forest Edge Elementary	\$0.45	\$0.48	7.21%
Oregon Middle School*	\$0.93	\$1.04	11.97%

- 4% to 5% less of an increase than the other two buildings in one year
- What do you think happens for 22-23?

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\*Oregon Middle School has a geothermal wing

# MAINTAINING A NET ZERO BUILDING

- Needs a willing advocate with some passion for sustainability
- Requires time to learn and trust the technology
- Include internal, building-level staff who have passion for sustainability



# MAINTAINING A NET ZERO BUILDING

- Needs minimal systems maintenance
  - Have not needed to add FTE
- Need a watchful eye - Share & Recruit?



# SUSTAINABILITY GRANTS & INCENTIVES

- Focus on Energy Design Assistance - \$69,619.81
- Focus on Energy Prescriptive Solar Incentive - \$60,000
- Couillard Solar Foundation Solar for Schools - \$20,000

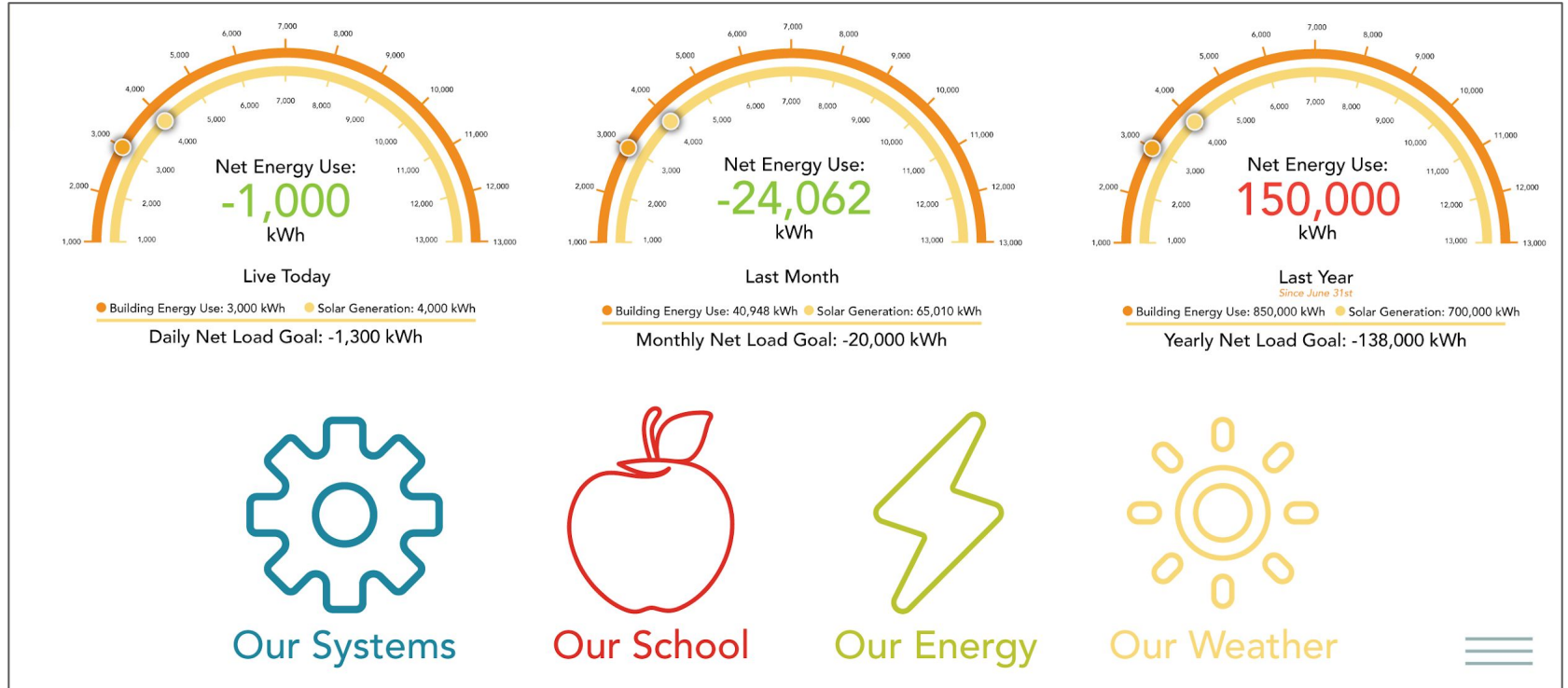
***\$149,619.81*** in grants & incentives!

A modern office lounge area with a large window overlooking a cityscape. The room features a long, low-profile sofa with light wood-grain backrests and yellow and grey cushions. A wooden table with open shelving is in the foreground. A central orange graphic with white text is overlaid on the image. The background shows glass-walled offices and a green wall.

# TEACHING & LEARNING

# TEACHING TOOLS

## INTERACTIVE INTERFACE



# TEACHING TOOLS

## WALL/WINDOW GRAPHICS



# TEACHING TOOLS LEARNING OPPORTUNITIES





# EDUCATIONAL ENVIRONMENT

## NATURAL LIGHT



# EDUCATIONAL ENVIRONMENT

## OUTDOOR CLASSROOMS



# There is “something” in the Room

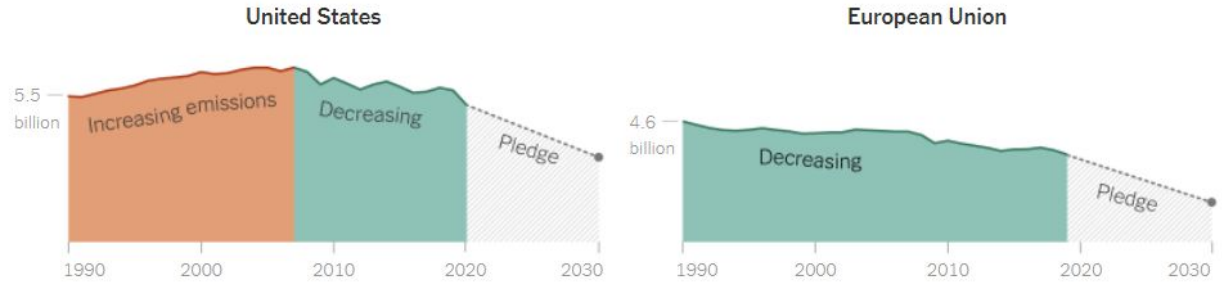
- It is past time to start talking about it
- There are things everyone can do
- It is not all or nothing...
- Our kids want us to lead in this area
- [What is the cost of doing nothing?](#)



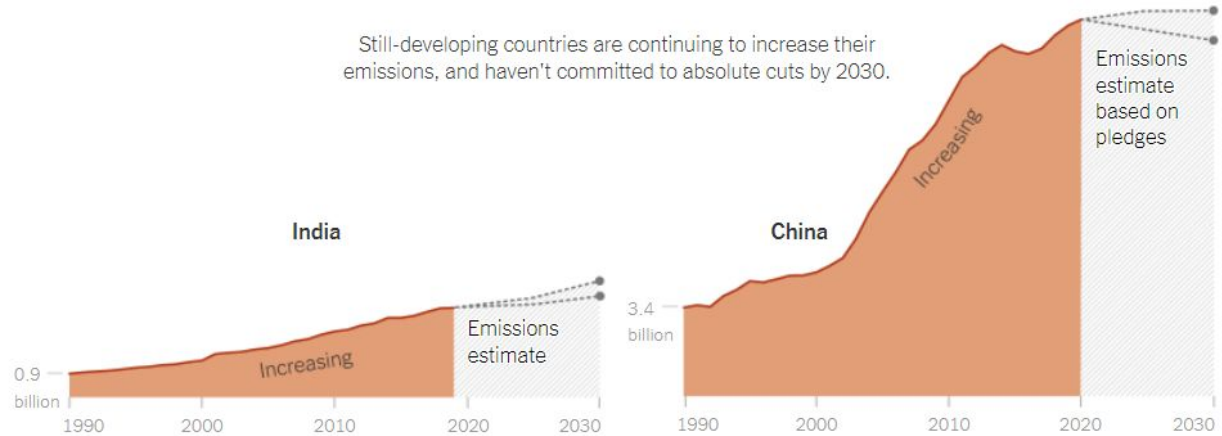
## Trajectories for the World's Largest Emitters

The United States was still increasing emissions until the mid-2000s, while Europe took earlier action.

In metric tons CO<sub>2</sub>



Still-developing countries are continuing to increase their emissions, and haven't committed to absolute cuts by 2030.



New York Times, April 22, 2022

Source: Rhodium Group

## The U.S. Still Had the Highest Per-person Emissions in 2019



Sources: Rhodium Group, World Bank

The U.S. Has a New Climate Goal. How Does It Stack Up Globally?

New York Times, April 22, 2022

# The “Plan”

- What is the 2030 climate target?
- To keep global warming to **no more than 1.5°C** – as called for in the Paris Agreement – emissions need to be reduced by 45% by 2030 and reach net zero by 2050.
- Buildings are responsible for 40% of global energy consumption and 33% of greenhouse gas emissions.
- 2030 is only 7 years away
- 2050 only 27 years away.....how long do schools last?



# Some Lessons Learned

- Be intentional about this work. Everyone on the team needs to know the importance of your sustainability goals upfront.
- Take steps to get familiar with these technologies
- There are people there to help if you ask
- There is more support in your community than you may think
- Some ROI is better than none & What is the cost of doing nothing?
- Net Zero is great but.....the journey is as important as the goal and....
- Electrification is most important!

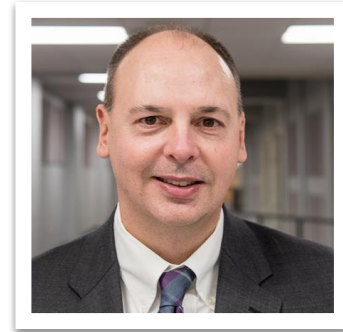
# WHAT CAN WE DO?

- Measure Energy Usage
- New School/Additions - Assess Geothermal Possibilities at beginning
- Investigate Heat Pump Technologies
- Electrification & Stop Burning
- Purchase electric vehicles & charging infrastructure
- Empower future sustainability champions





**THANK**  
*You!*



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