



Cost Savings through Data-Driven Building Assessment for Healthy & Efficient Schools

Virginia School Plant Management Association

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Presenters



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Attune



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Prince William County Schools



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CMTA, Inc.

Agenda

- IAQ Monitoring & Management
- Prince William County Schools - How we Monitor and Manage IAQ
- Case Study: Bel Air Elementary School
- Q&A

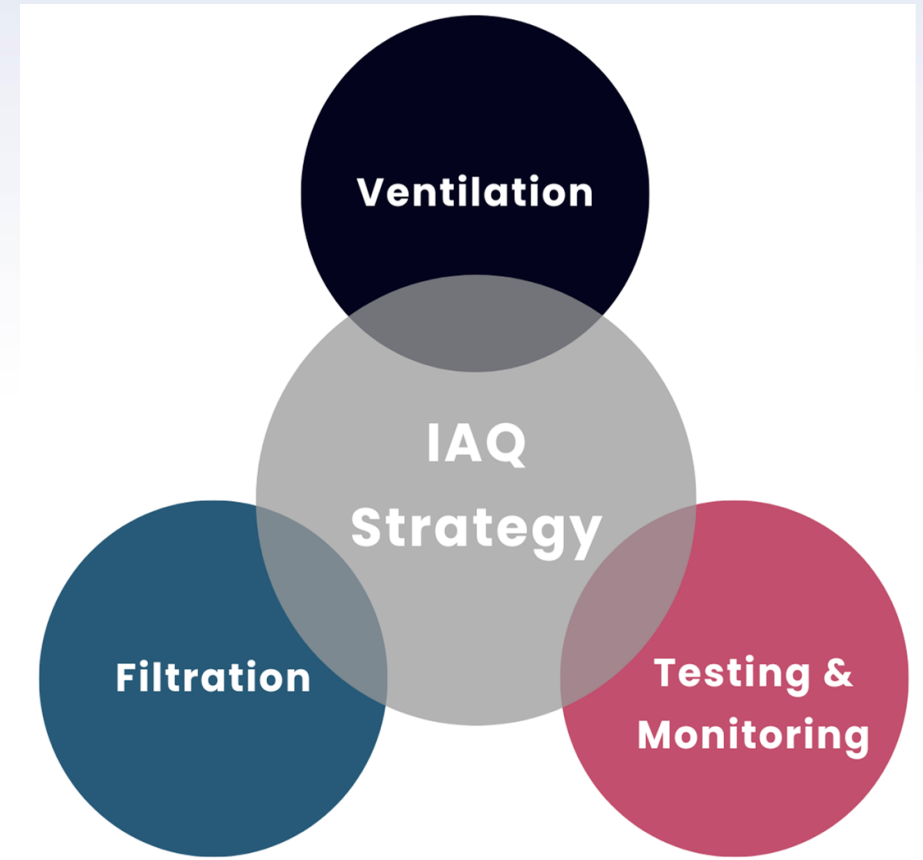


IAQ Monitoring & Management

TM

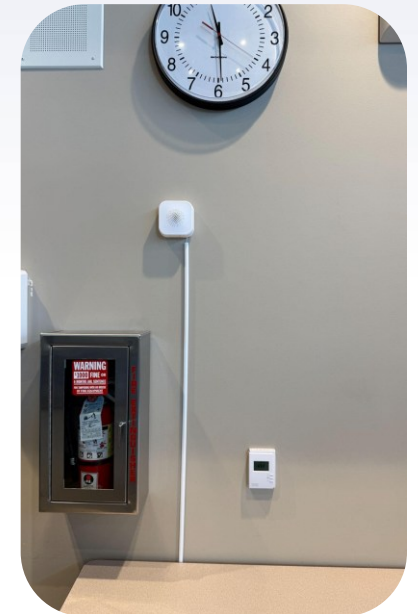
Benefits of Healthy Schools & Good IAQ

- Reduce costs
- Minimize risk
- Increase attendance
- Improve academic outcomes
- Build trust through transparency



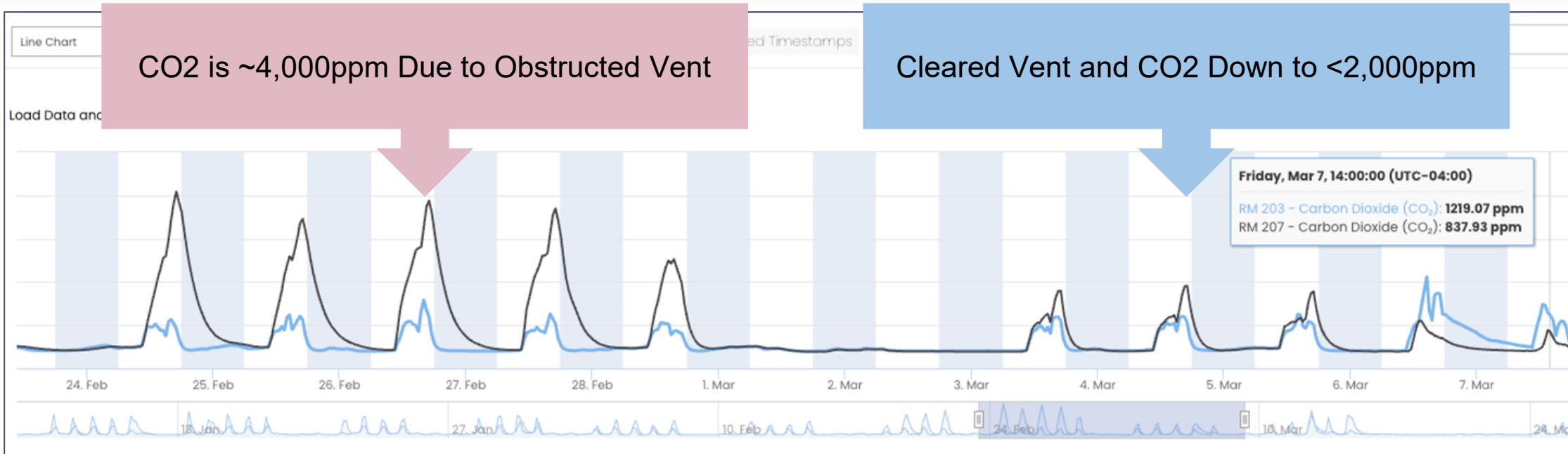
Benefits of Effective IAQ Monitoring

- **Proactive vs. Reactive Maintenance**
 - Early detection through real-time monitoring enables timely interventions, preventing costly repairs and minimizing disruptions
- **Staff Efficiency**
 - Access to real-time data remotely reduces the need for frequent site visits, enabling staff to address issues with full information before deploying resources
- **Division-wide Data Access**
 - Provides a unified view of all schools on a single platform, eliminating the need to navigate multiple BMS interfaces and offering more detailed insights
- **Funding Justification**
 - Real-time data and dashboards supports funding requests by prioritizing critical areas and demonstrating the impact of improvements

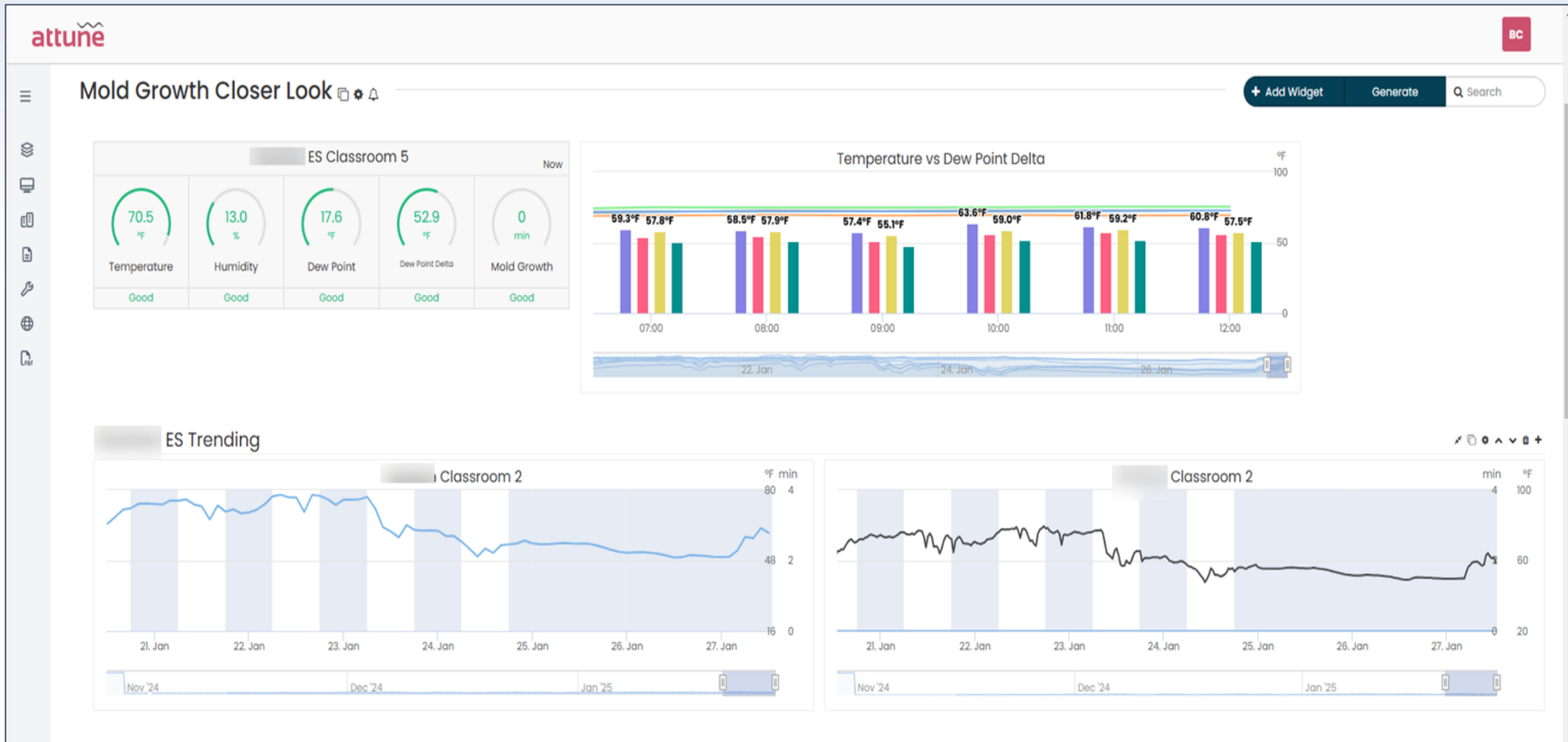


Proactive vs. Reactive Maintenance

- High complaint school for CO₂ levels/stuffiness
- Compared classrooms in the same HVAC zone. The CO₂ levels should have been similar.
- Realized that the **Vent was obstructed** in the bad CO₂ room. Obstruction was removed, and CO₂ levels normalized.
- **90% of CO₂ alerts at PWCS uncovered previously unknown mechanical issues**

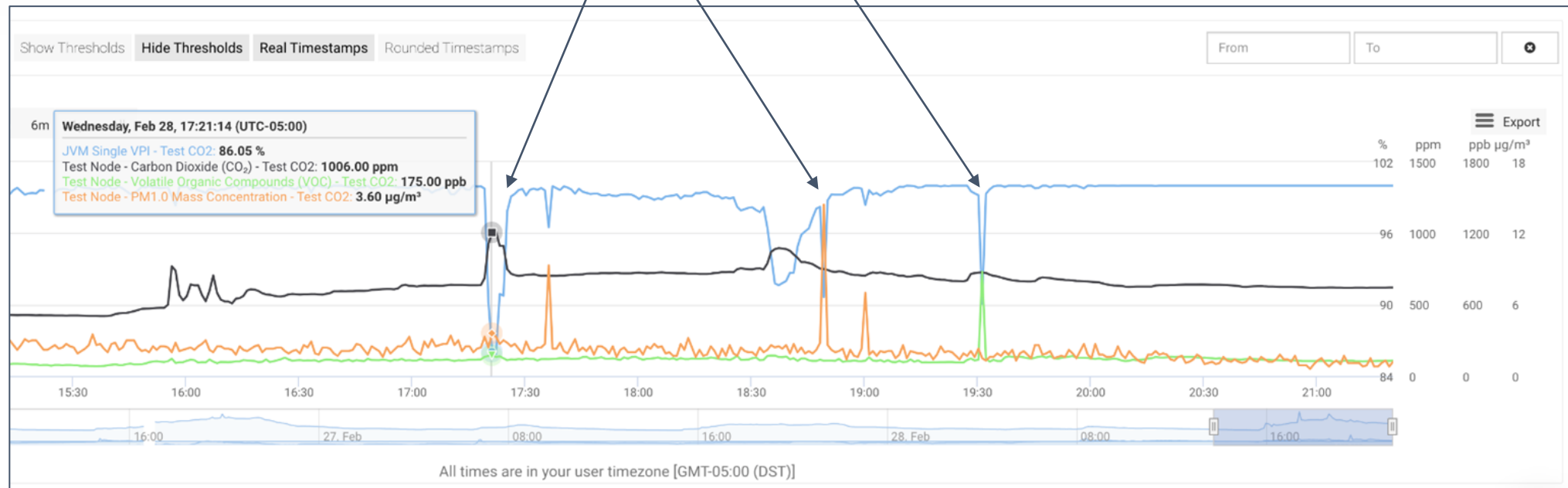


Staff Efficiency & Division-Wide Data Access



Funding Justification

Ventilation Performance Index
based on CO₂, TVOC, and PM
values and rate of change



Complaint-Driven Facilities Management

One Complaint, One Fix

The traditional model triggers a repair only when a teacher complains or a component fails — addressing isolated symptoms rather than the broader system.

Systemic Problems Stay Hidden

Individual issues get resolved, but the root causes affecting building performance, student health, and operating costs remain invisible and unaddressed.

A Never-Ending Cycle

Districts end up replacing faulty components one at a time — an expensive, inefficient loop that never closes the gap on true building health.

The Shift – From Reactive to Data-Driven



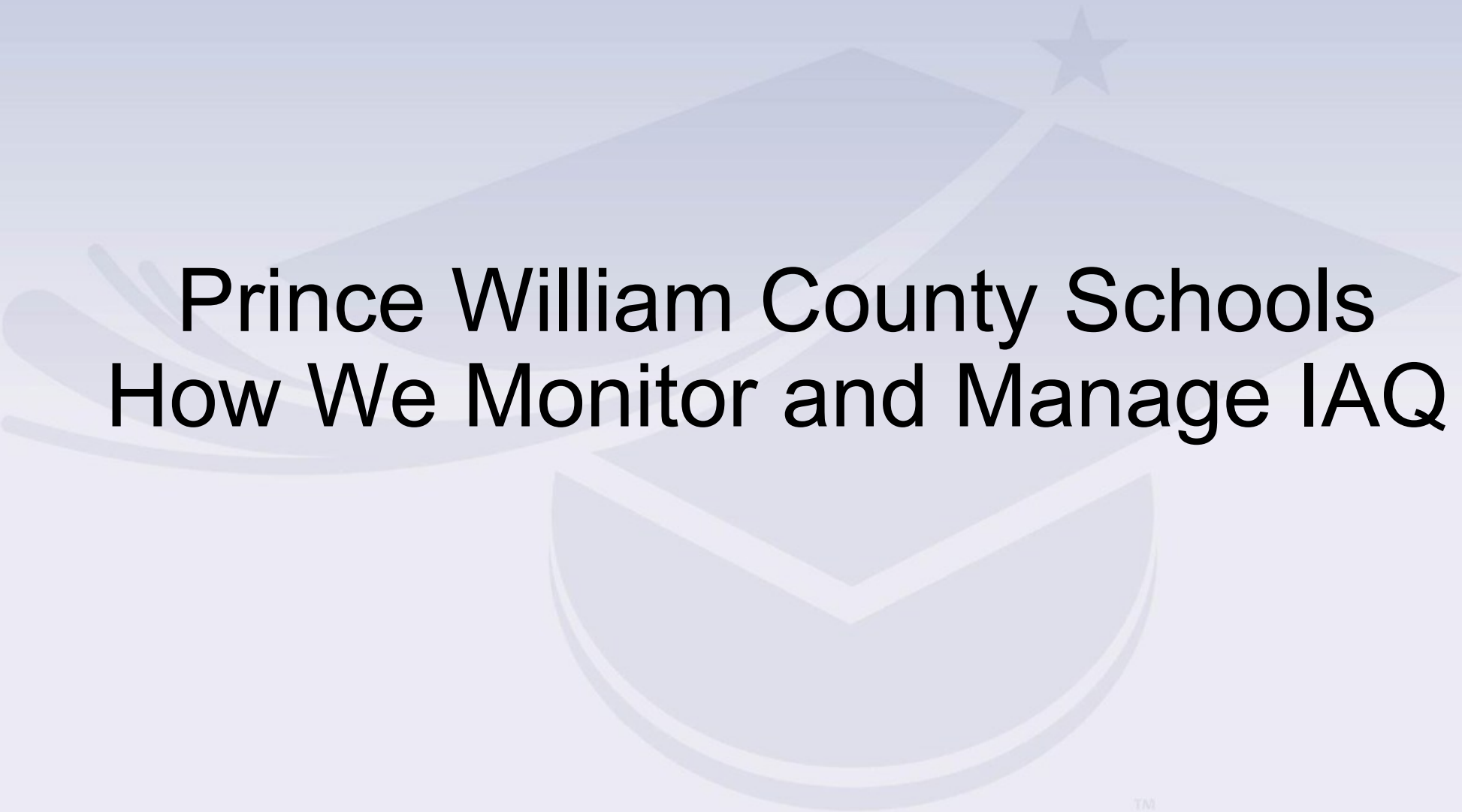
**Isolated
Complaints**

**Continuous
Monitoring**

**Building
Health View**

**Data-Driven
Investment**

By tracking air quality, ventilation performance, and thermal comfort across the entire portfolio, district leaders can move from a building-by-building patchwork to a unified, evidence-based strategy — one that informs leadership decisions and drives lasting investment in healthier learning environments.



Prince William County Schools

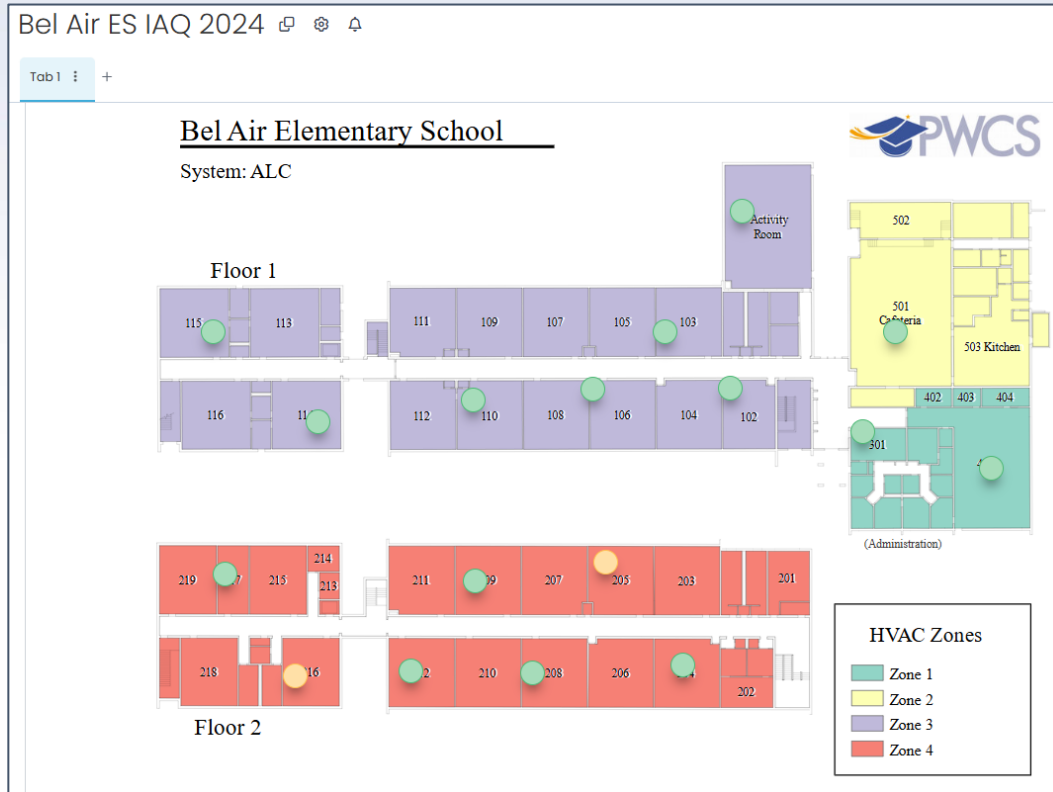
How We Monitor and Manage IAQ

Our Journey...

- Portable IAQ kits were used to support HVAC and Environmental
- A few summers of record breaking dew points
- Environmental school year baselining
- IAQ Sub-committee
- Divisionwide Strategic Plan - Elevate 2030



What are you looking at?



Indoor Air Quality

Classroom 102 IAQ

Now



Temperature

Comfortable



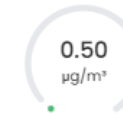
Humidity

Comfortable



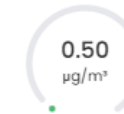
CO₂

Good



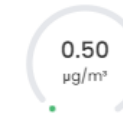
PM_{1.0}

Good



PM_{2.5}

Good



PM₁₀

Good



VPI

Good

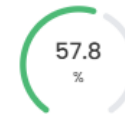
Classroom 106 IAQ

Now



Temperature

Comfortable



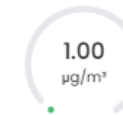
Humidity

Comfortable



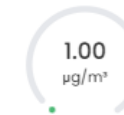
CO₂

Good



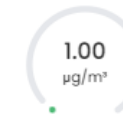
PM_{1.0}

Good



PM_{2.5}

Good



PM₁₀

Good



VPI

Good



Portfolio View

attune

Services

?

Prince William County Public Schools

EARLY PREVIEW

Home > Sites > All > IAQ Readings

IAQ Readings

Showing 40 sites | Sorted by Temperature ↓

Search...

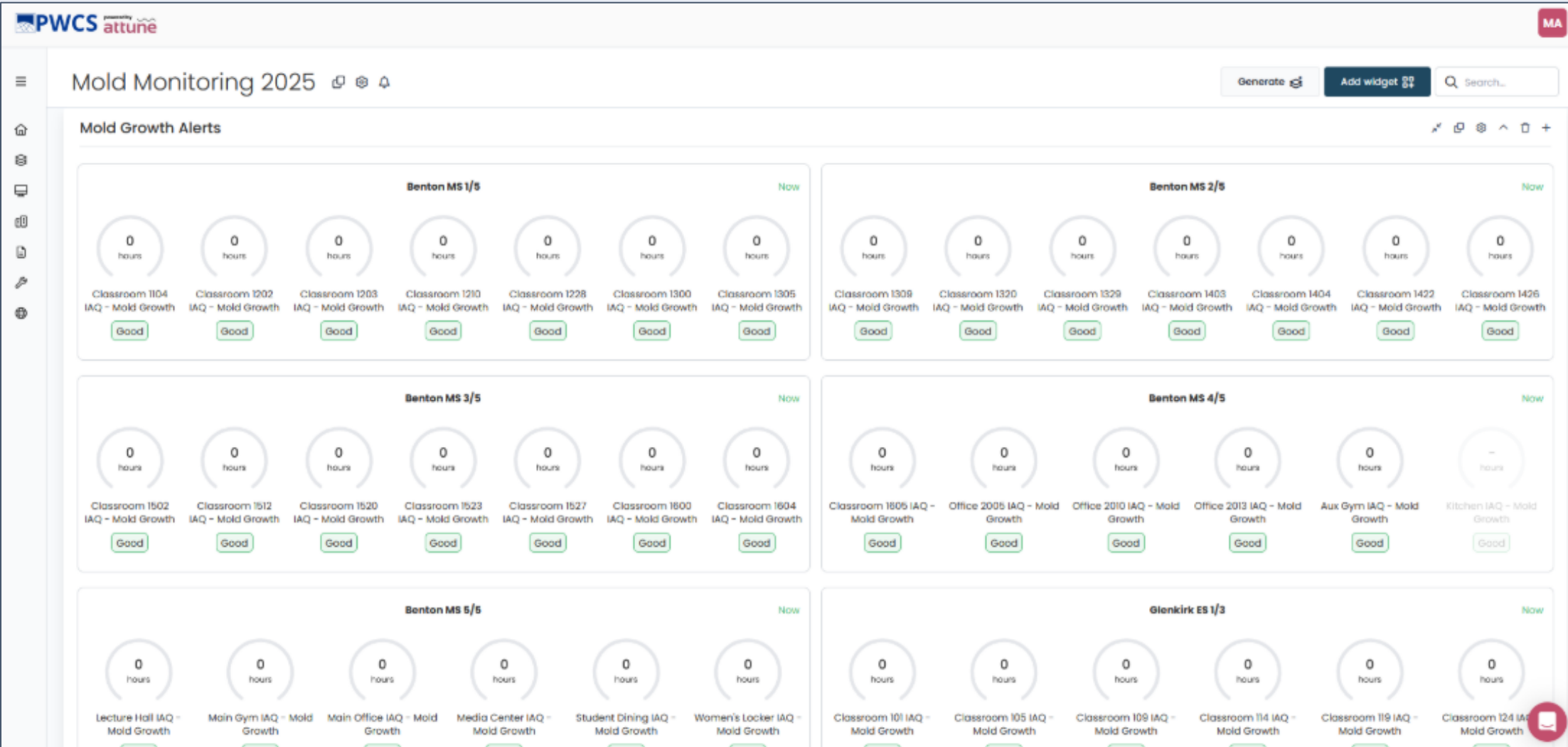
SITE	Temp °F ↓	Humidity %RH	CO2 ppm	Vent Score %
★ River Oaks ES ⓘ	72.0 74.5 77.8	33 39 54	468 863 2145	—
★ Benton MS ⓘ	69.6 74.4 76.9	33 39 51	426 864 1336	0 80 100
★ Dumfries ES ⓘ	72.4 74.1 75.9	35 39 45	433 792 1342	—
★ Coles ES ⓘ	67.6 73.8 81.1	31 40 49	479 900 1645	—
★ Lake Ridge ES ⓘ	66.9 73.7 79.1	30 42 57	395 851 2057	37 88 100
★ Neabsco ES ⓘ	71.0 73.7 76.5	34 40 60	503 644 1481	47 79 89
★ Hampton MS ⓘ	70.2 73.6 76.7	33 41 59	583 997 2306	—
★ Fred Lynn MS ⓘ	70.3 73.6 76.4	35 42 60	435 1076 2515	0 70 100
★ Porter TS ⓘ	71.9 73.5 75.0	35 39 46	432 823 1661	42 92 100
★ Gainesville MS ⓘ	68.0 73.4 75.6	32 38 52	276 705 1047	—
★ Pattie ES ⓘ	68.9 73.3 81.4	30 41 57	535 912 1364	—
★ Belmont ES ⓘ	69.7 73.3 76.4	33 40 52	441 903 2219	8 86 100
★ Glenkirk ES ⓘ	69.6 73.1 76.5	31 37 42	443 658 960	0 88 100

Items per page: 100

1 – 40 of 40



Issue Specific - Mold Monitoring



Who Looks at All of This?

Specific Alerts Established

- CO2 alerts for 2hr intervals:
 - 2000 ppm
 - 3000 ppm
 - 4000 ppm
 - 40000 ppm
- Mold growth conditions for:
 - 1 day
 - 3 days
 - 5 days
 - 10 days
- Alerts are emailed on a 24 hour basis to a specific team. Alerts show when a threshold is exceeded AND when we drop below that threshold.

SOPs Created

- Work Orders written for spaces in the alerts or by school staff.
- BAS reviews and investigates.
- HVAC goes onsite to support as needed.
- Environmental responds as needed depending on BAS/HVAC findings or a direct request from the school.

Early Results

- 90% of CO2 alerts uncovered an issue.
- Identified site specific IAQ issues.
- Data used by the IAQ SC to inform and make recommendations to leadership.

BONUS! Not only does this work when it is hot and humid, but IAQ data gives insight on how to run your buildings year round!



Now What...

Utilizing the IAQ data and engineering assessments:

1. Education opportunities for building and facilities staff.
2. Intermediate mitigation strategies for schools that aren't undergoing a renovation.
3. Actual data to make recommendations to reshape the CIP.
4. Have a framework for how to address VA IAQ Bill.



Case Study: Bel Air Elementary School

Using High Performance Building Renovations to Address IAQ



The Problem



Portable Spot Coolers



Temporary Dehumidifiers

3,000+
ppm CO₂ peaks

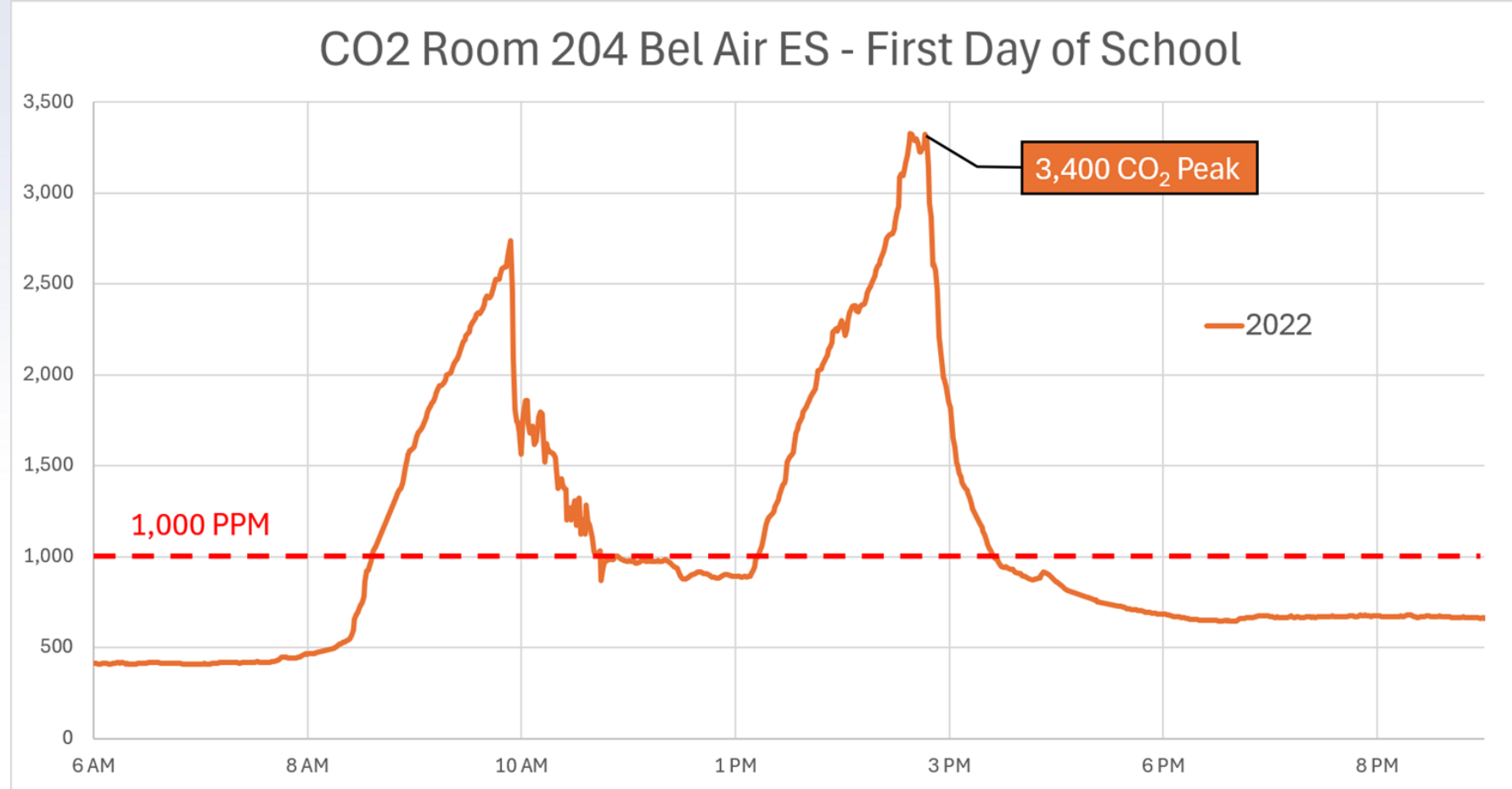
65%+ RH
Consistent Humidity & Mold

15+
HVAC Work Orders Per Month

91
EUI — kBtu/ft²



The Problem



3,000+
ppm CO₂ peaks

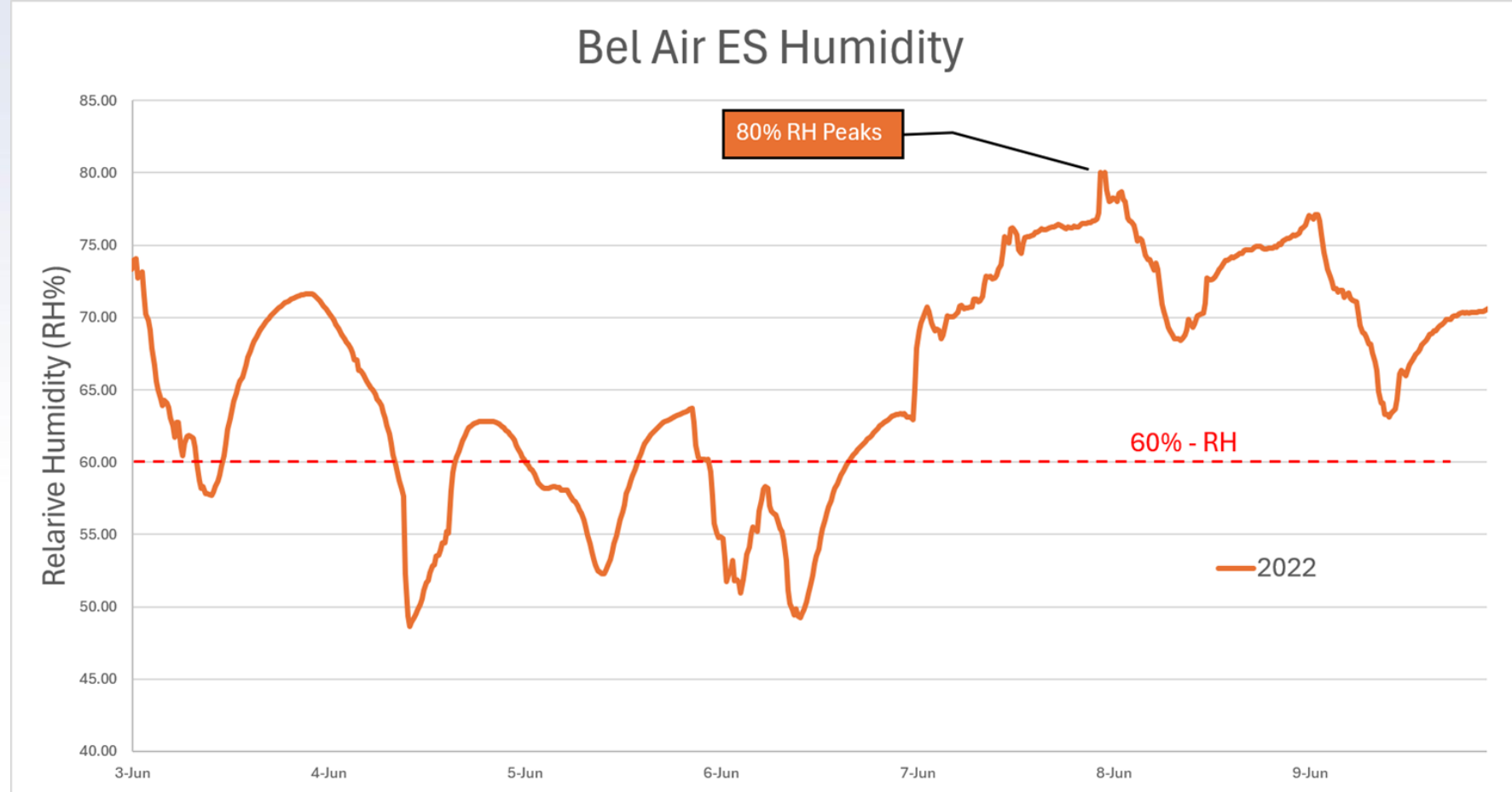
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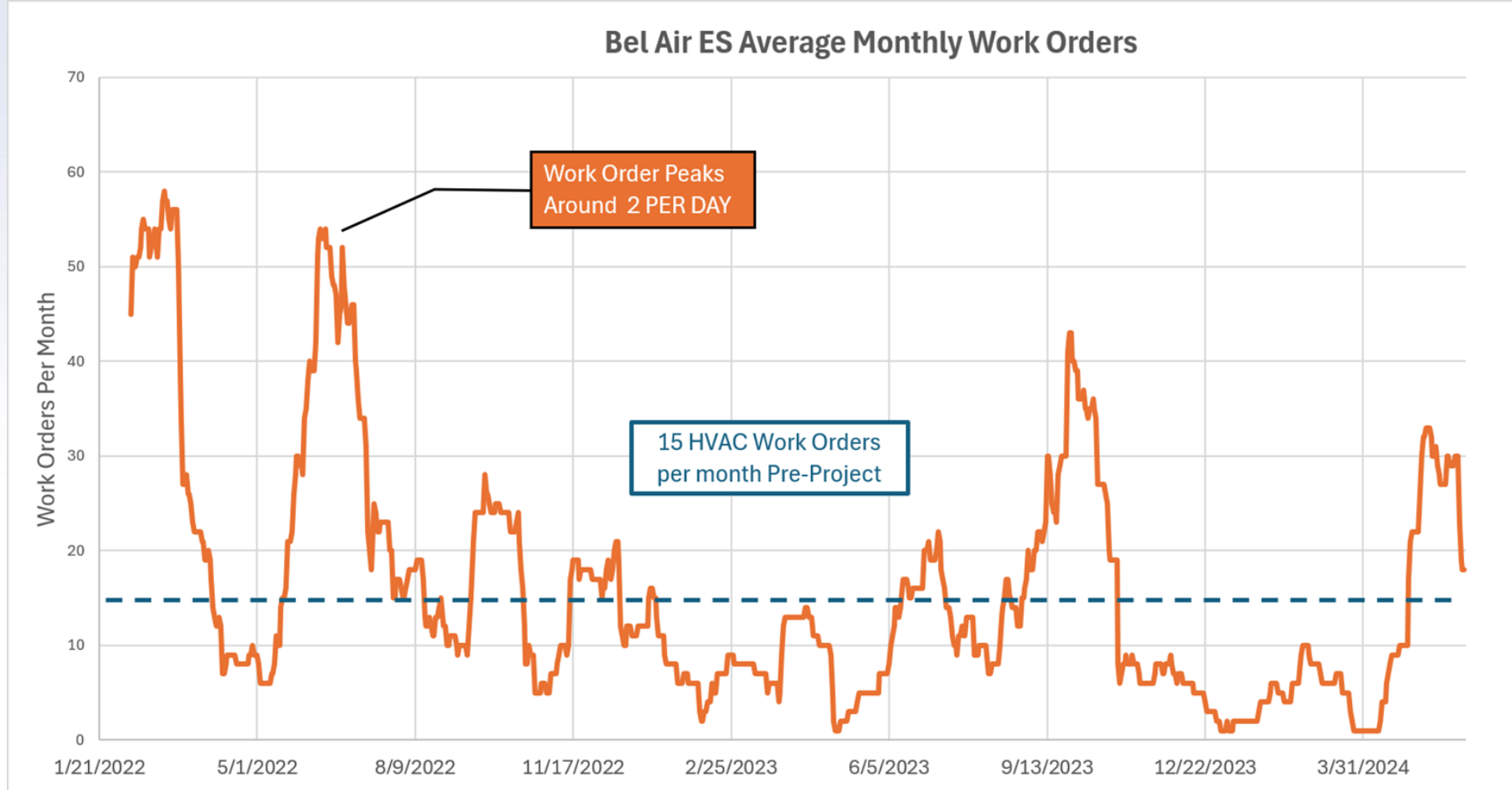
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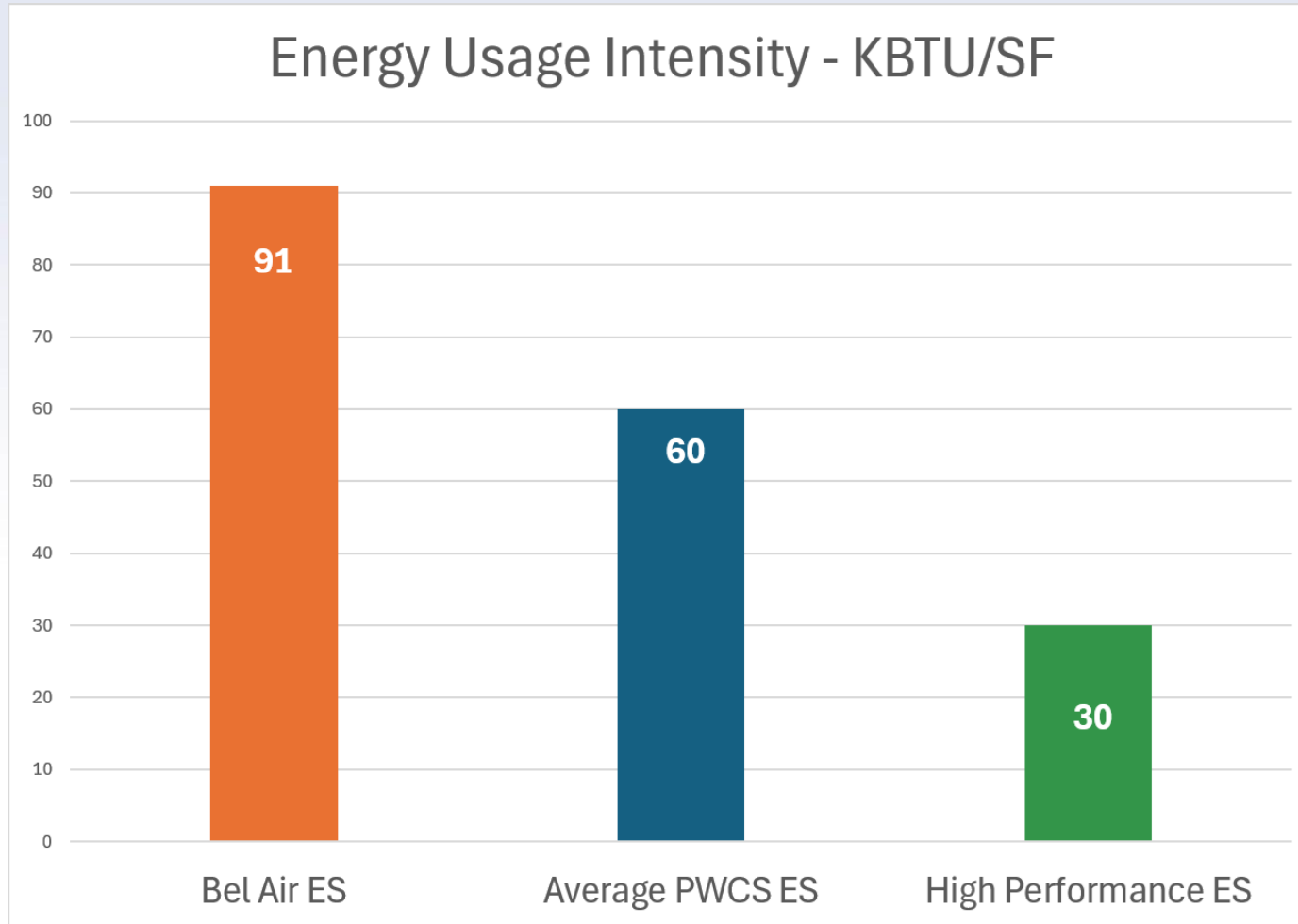
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EUI — kBtu/ft²



The Problem



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ppm CO₂ peaks

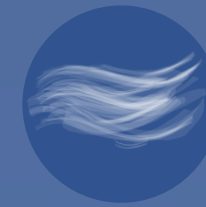
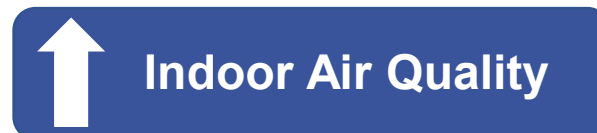
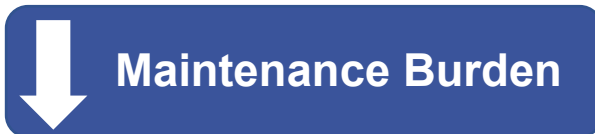
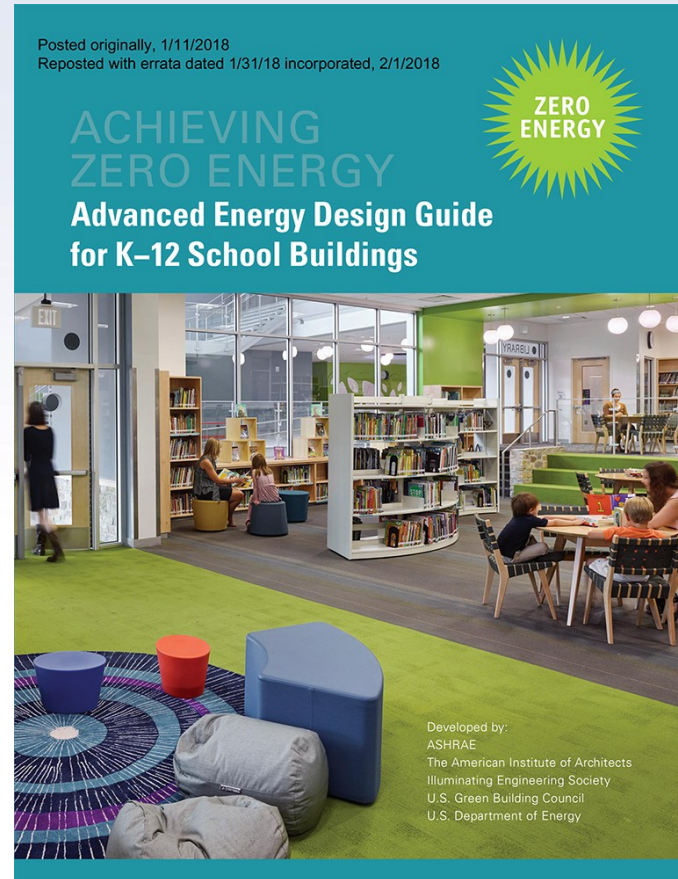
65%+ RH
Consistent Humidity & Mold

15+
HVAC Work Orders Per Month

91
EUI — kBtu/ft²



The Plan



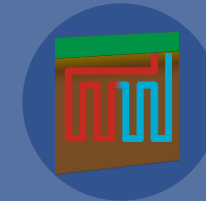
DOAS Ventilation



Zone Level Dehum.



Envelope Sealing



Geothermal



LED Lighting



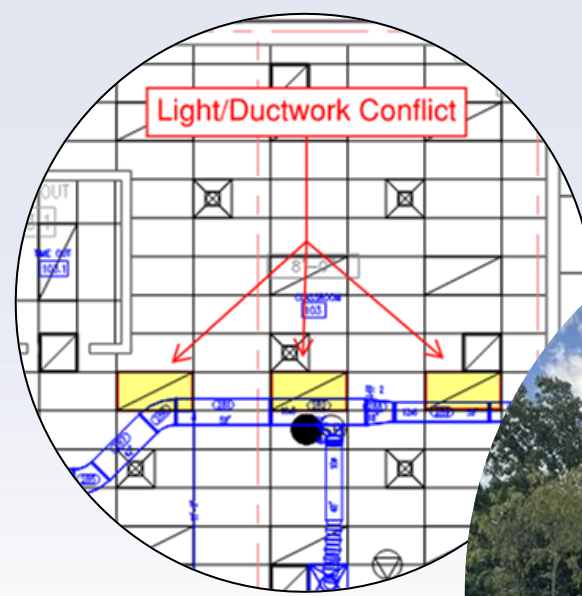
The Execution



**8 Week Summer
Construction**



**Heavy Infrastructure
Renovation**



**Tight Trade
Coordination**



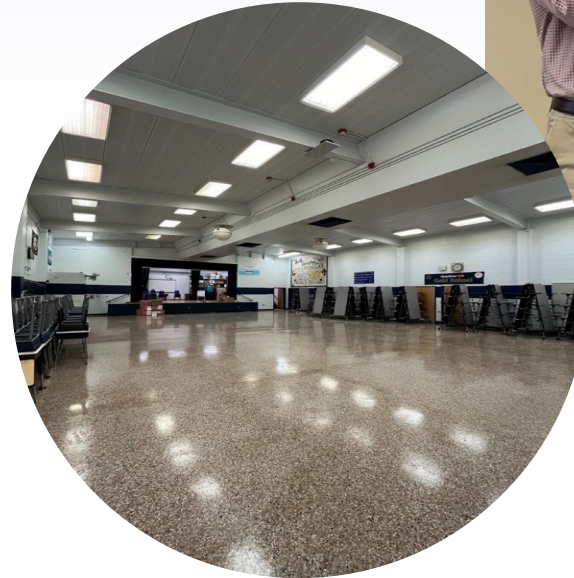
The Execution



School Starts on Time



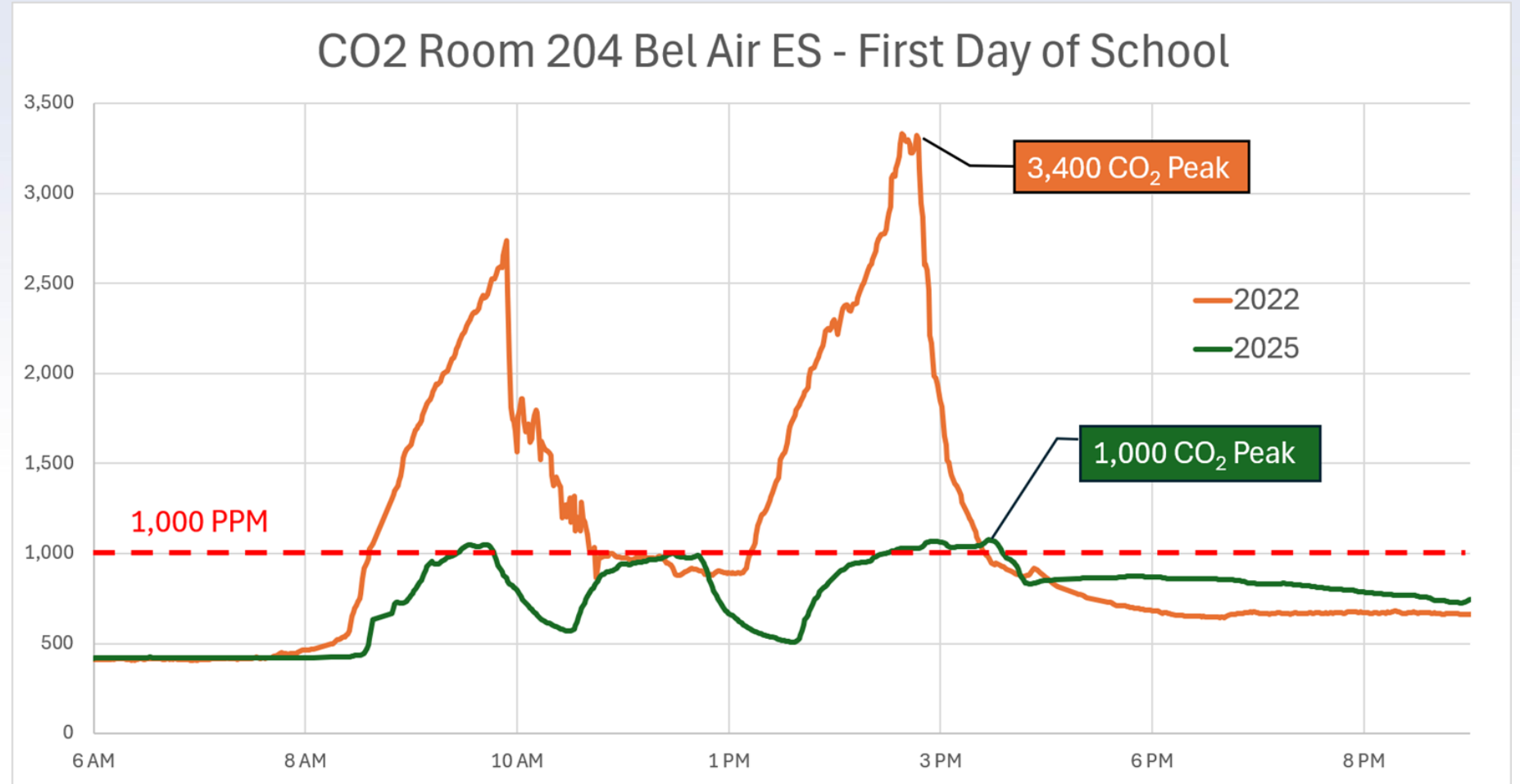
Properly Conditioned,
Ventilated, Dehumidified



Maintenance and
Faculty Training



The Results



<1,000
ppm CO₂ peaks



32% Reduction



3,000+
ppm CO₂ peaks

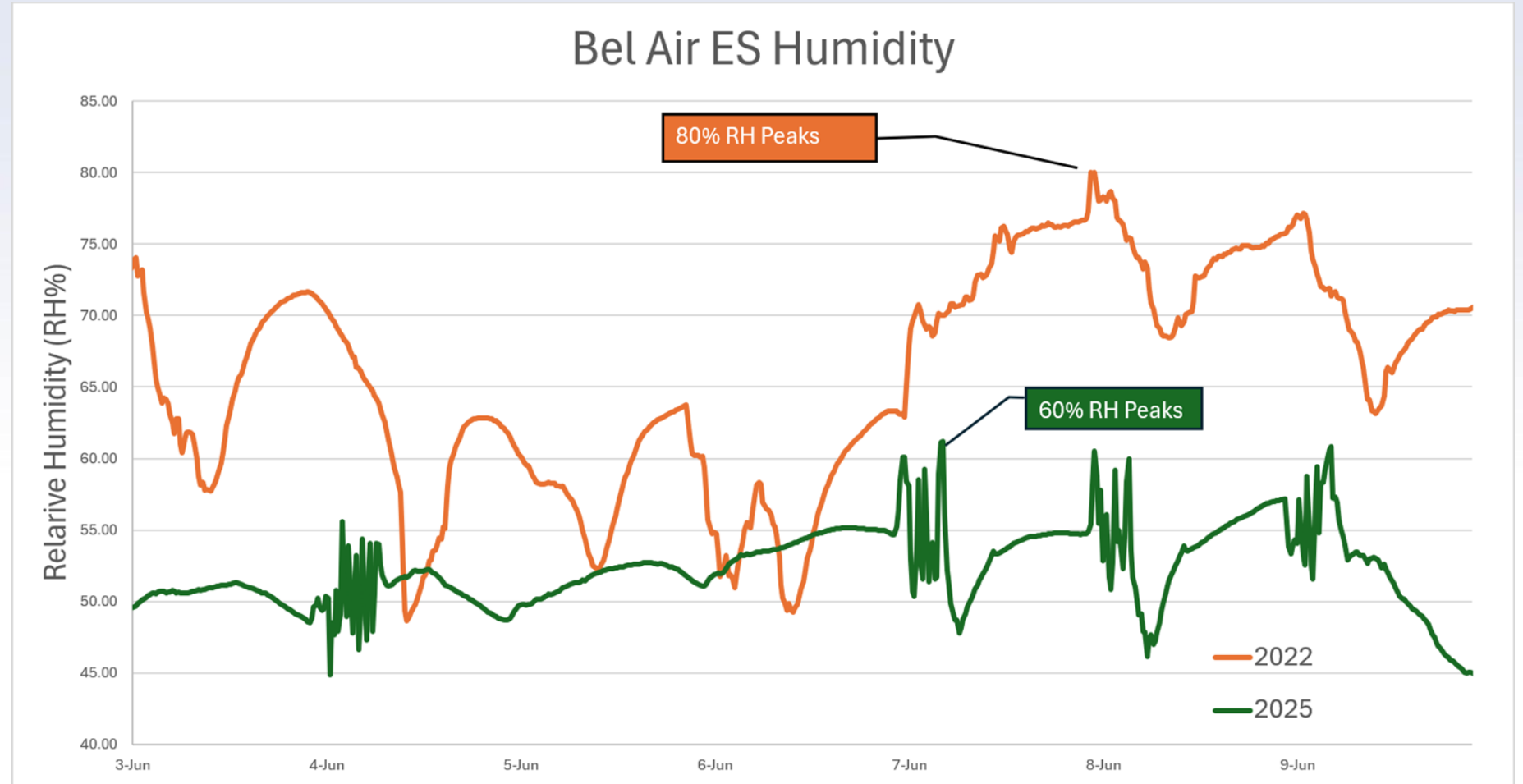
65%+ RH
Consistent Humidity & Mold

15+
HVAC Work Orders Per Month

91
EUI — kBtu/ft²



The Results



<60F Dewpoint
Dehumidified Zones



99% Reduction



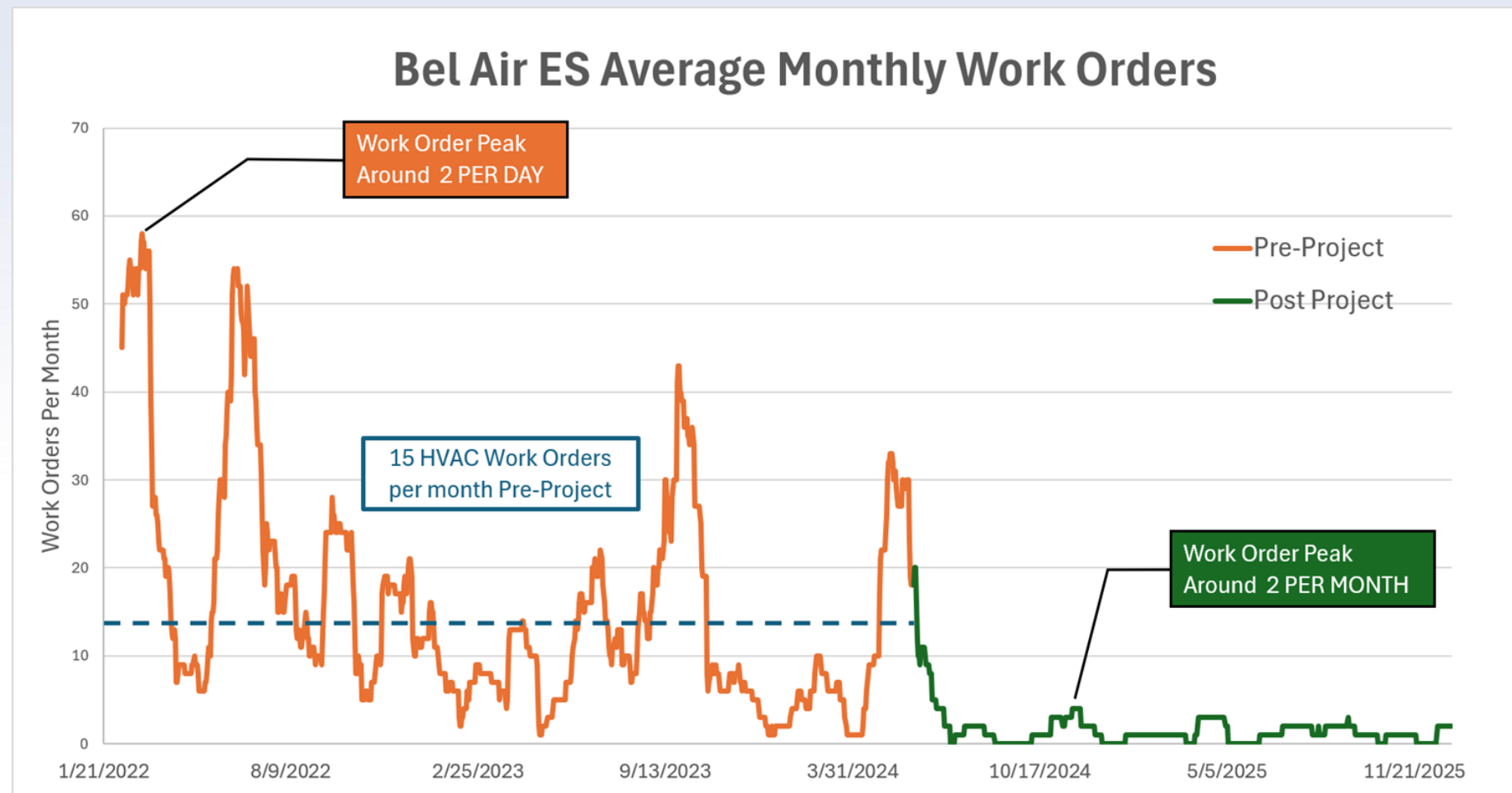
65%+ RH
Consistent Humidity & Mold

15+
HVAC Work Orders Per Month

91
EUI — kBtu/ft²

<1,000
ppm CO₂ peaks

The Results



1.1

HVAC Work Orders Per Month



93% Reduction



15+

HVAC Work Orders Per Month

91

EUI — kBtu/ft²

<1,000

ppm CO₂ peaks

<60F Dewpoint

Dehumidified Zones



The Results

\$127,123

Annual Energy Savings



24

EUI — kBtu/ft²



73% Reduction



91

EUI — kBtu/ft²

<1,000

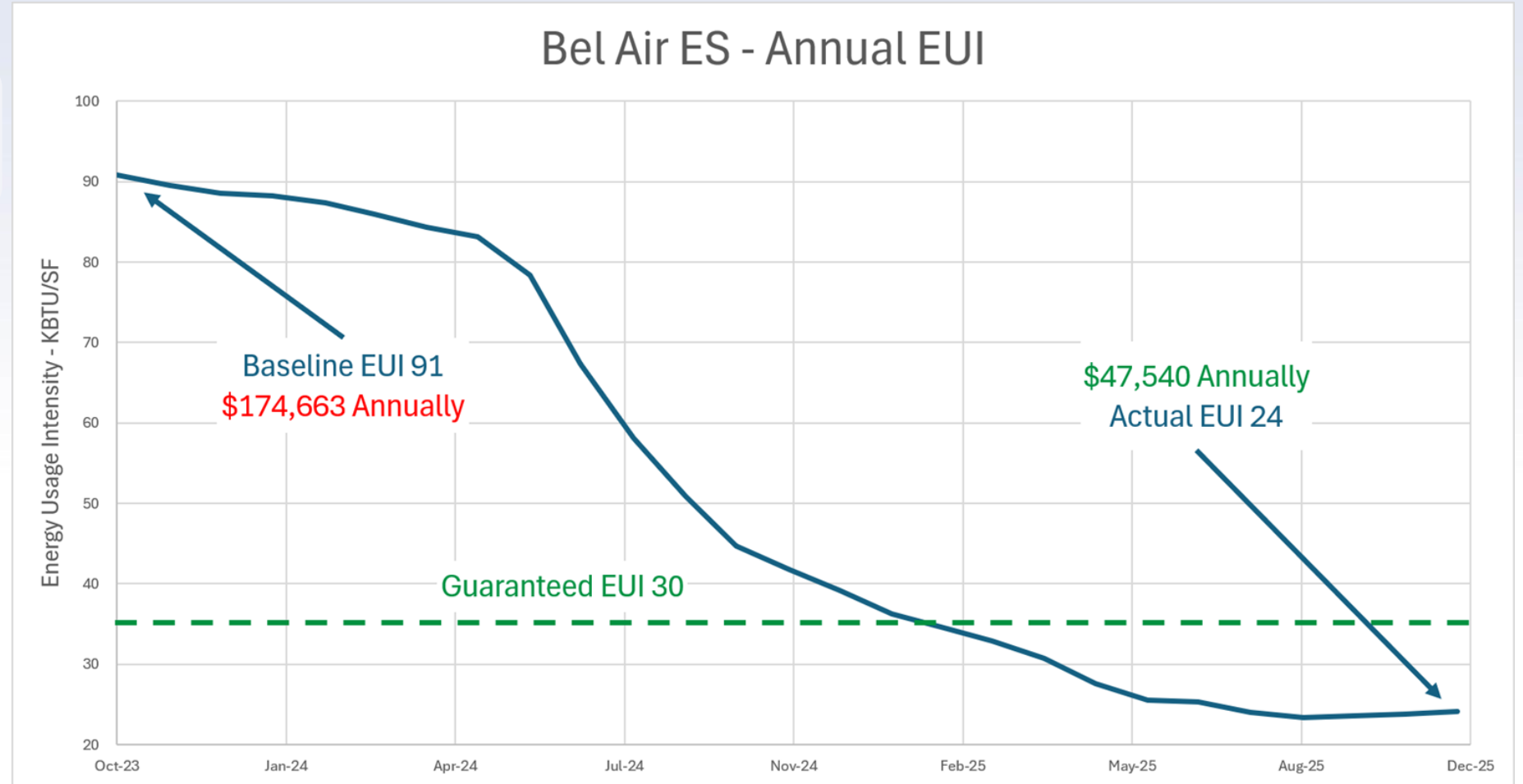
ppm CO₂ peaks

<60F Dewpoint

Dehumidified Zones

1.1

HVAC Work Orders Per Month



The Results

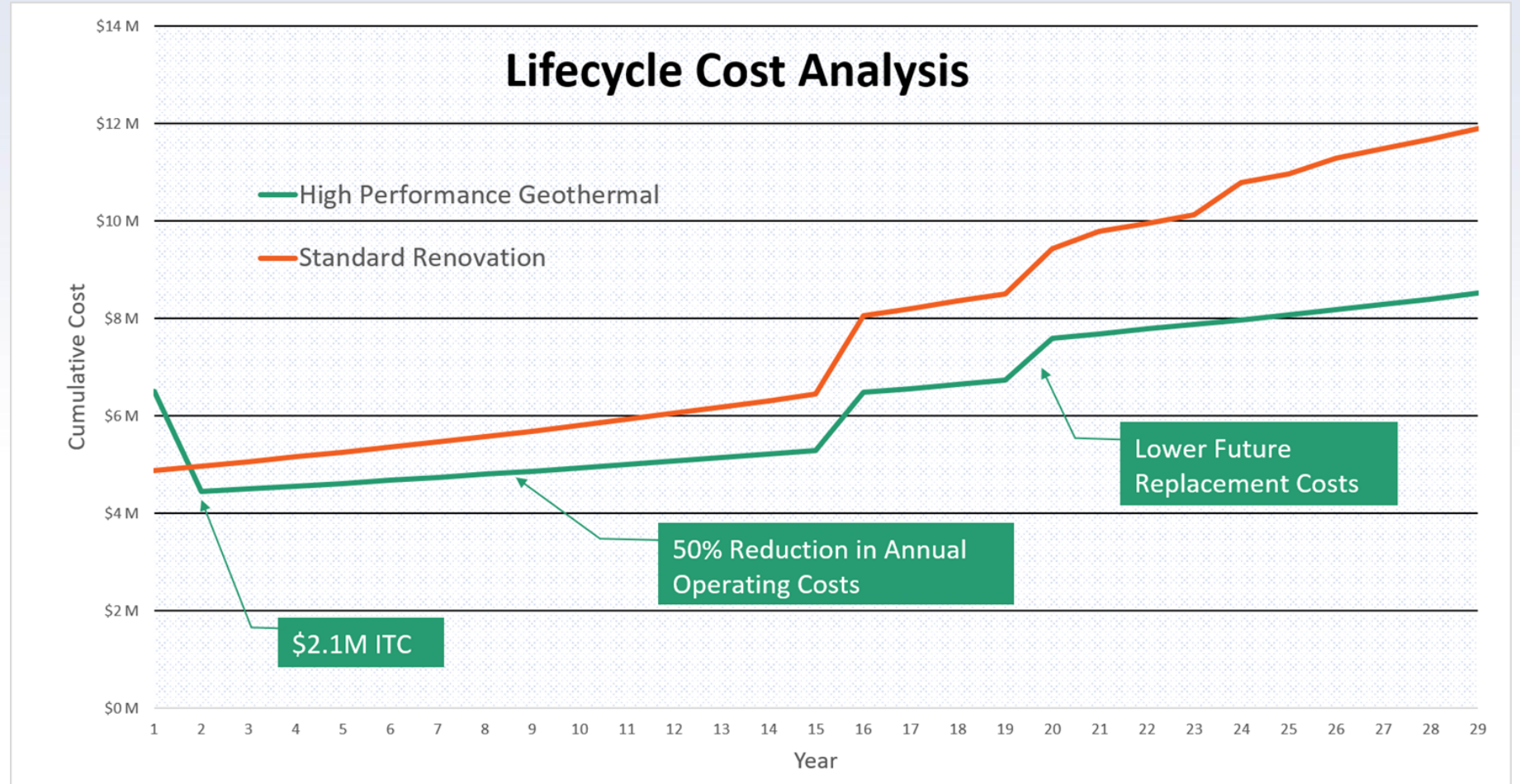
\$2,100,000 ITC Rebate

**1st Net Zero Ready
PWCS School**

**Most Efficient School
in the Division**

**1st Place ASHRAE
Technology Award**

**30% Reduction in 30
Year Life Cycle Costs**



24

EUI — kBtu/ft²

<1,000

ppm CO₂ peaks

<60F Dewpoint

Dehumidified Zones

1.1

HVAC Work Orders Per Month





Q&A

TM



Cost Savings through Data-Driven Building Assessment for Healthy & Efficient Schools

Virginia School Plant Management Association

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