Engineering Economics, Inc.

MAKING BUILDINGS BETTER SINCE 1984

CELEBRATING 35 YEARS

Smart Commissioning: Utilizing Technology for Automated Functional Testing

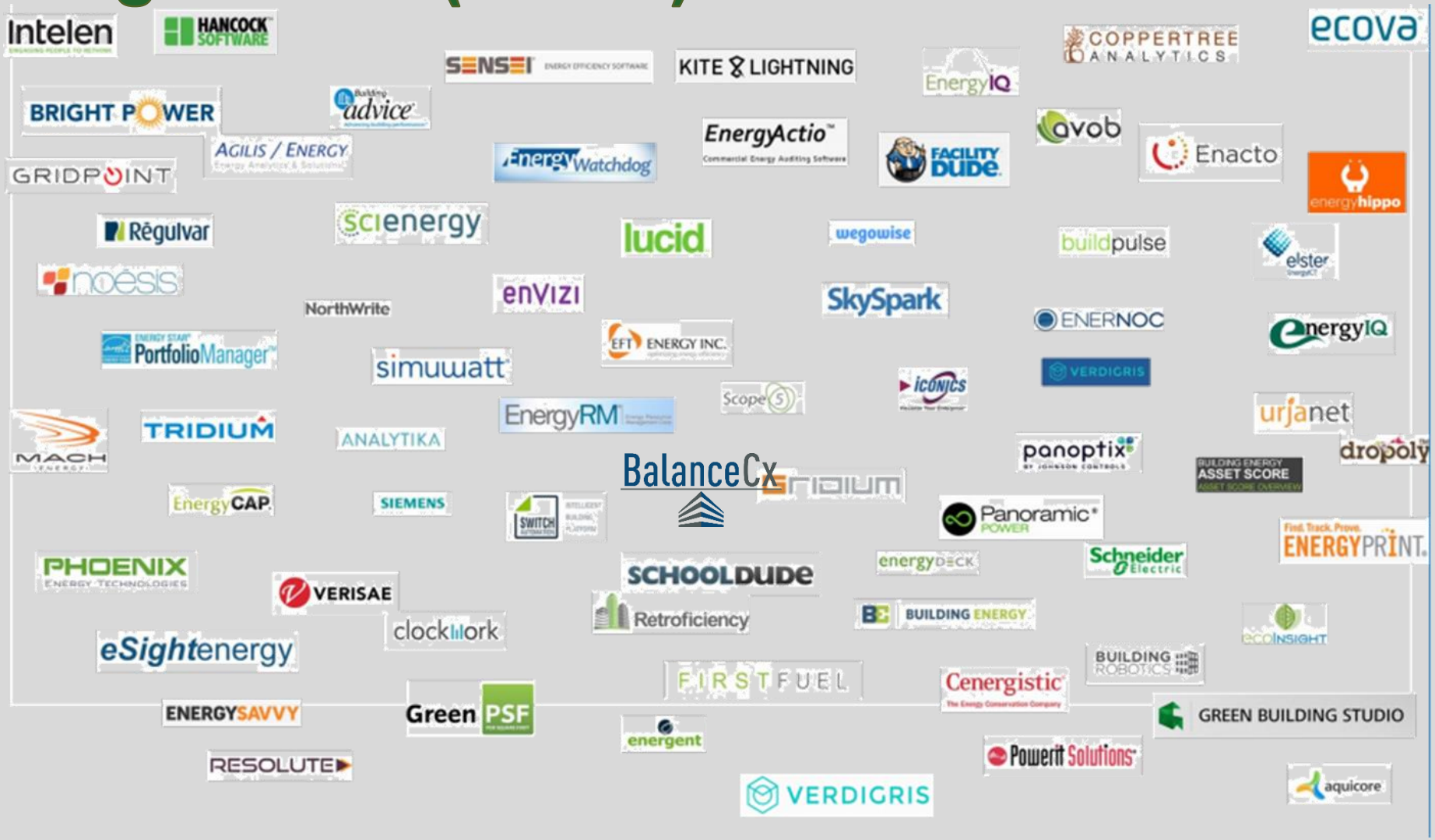
Speaker: Mike Ball

October 5, 2022

Overview

This presentation discusses the emerging technology of Automated Functional Performance Testing (AFPT). AFPT provides additional validation and assurance that building automation systems are optimally performing.

Who are "Automated Fault Detection and Diagnostic" (AFDD) Tool Providers?

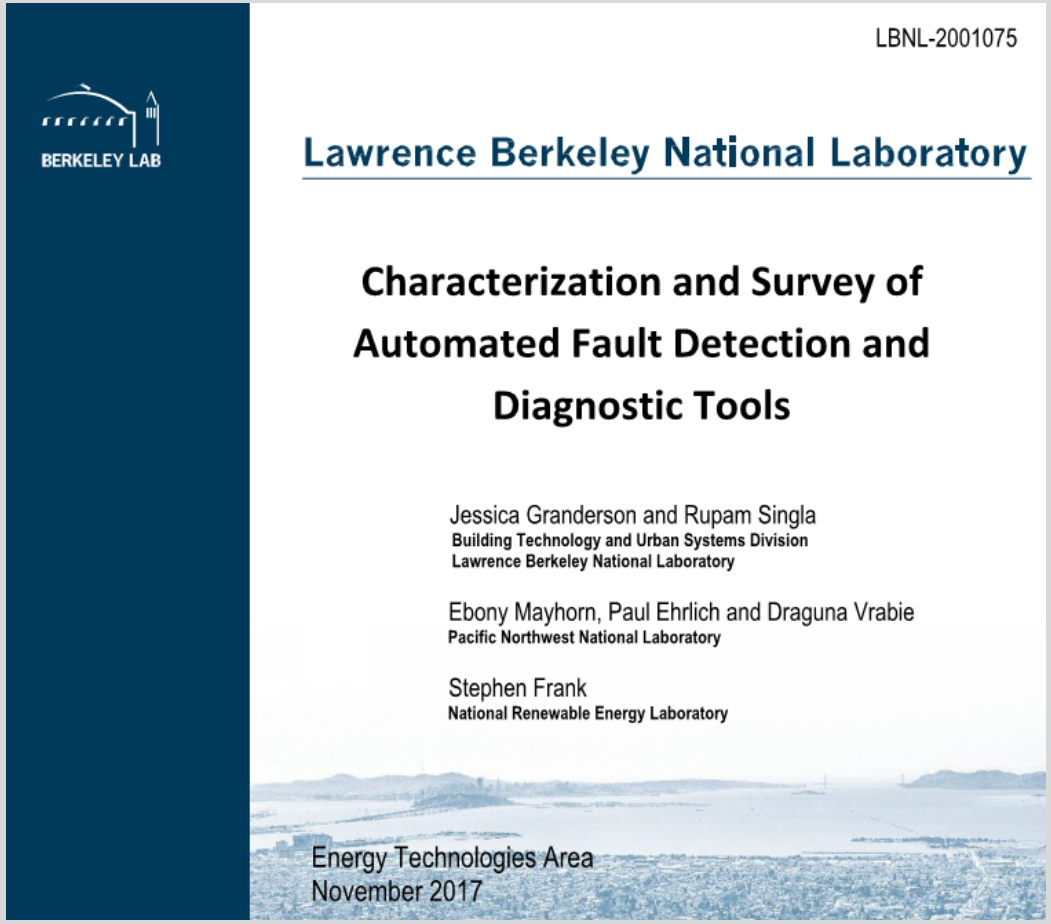


Not all AFDD Tools are Created Equal

Executive Summary

Background: It is estimated that 5%–30% of the energy used in commercial buildings is wasted due to faults and errors in the operation of the control system. Tools that are able to automatically identify and isolate these faults offer the potential to greatly improve performance, and to do so cost effectively. This document characterizes the diverse landscape of these Automated Fault Detection and Diagnostic (AFDD) technologies, according to a common framework that captures key distinguishing features and core elements.

https://eta.lbl.gov/publications/characterization-survey-automated



Classical Functional Performance Testing (Commissioning)

Functional Test Procedure

VAV Terminal Units

Sequence of Operation Verification

1. **Warm-Up & Cool Down Mode**

With the zone in unoccupied mode and the space needing heating, command through the BAS and verify that the following occurs. Indicate with a Yes or No as appropriate in the boxes below:

Equipment ID	VAV 0-X	VAV 1-X	VAV 2-X		
System uses optimum start					
AHU in full return.					
Space enters occupied time at set point					
Trends analyzed to support testing.					

2. **Normal Operating Mode**

a. Temperature Control - Cooling

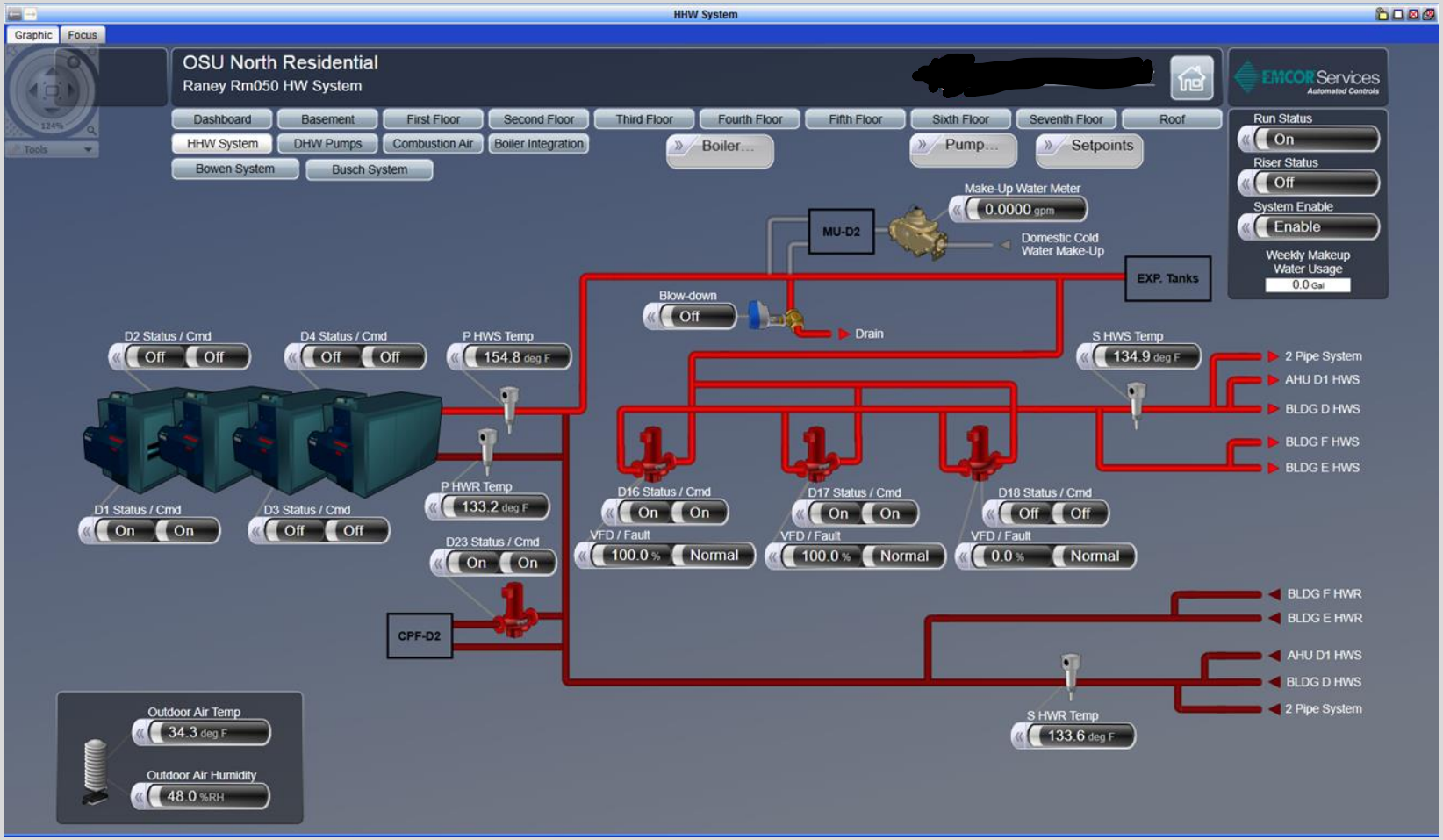
With the zone in occupied mode command through the BAS and verify that the following occurs. Indicate with a Yes or No as appropriate in the boxes below:

Equipment ID	VAV 0-X	VAV 1-X	VAV 2-X		
Damper modulates between min and max to maintain room temperature set point					
Heating remains OFF.					
Space temperature maintained within +/- 2F					

Comments:

Classical Functional Performance Testing (Commissioning)

Classical Functional Testing
Point-to-Point Testing



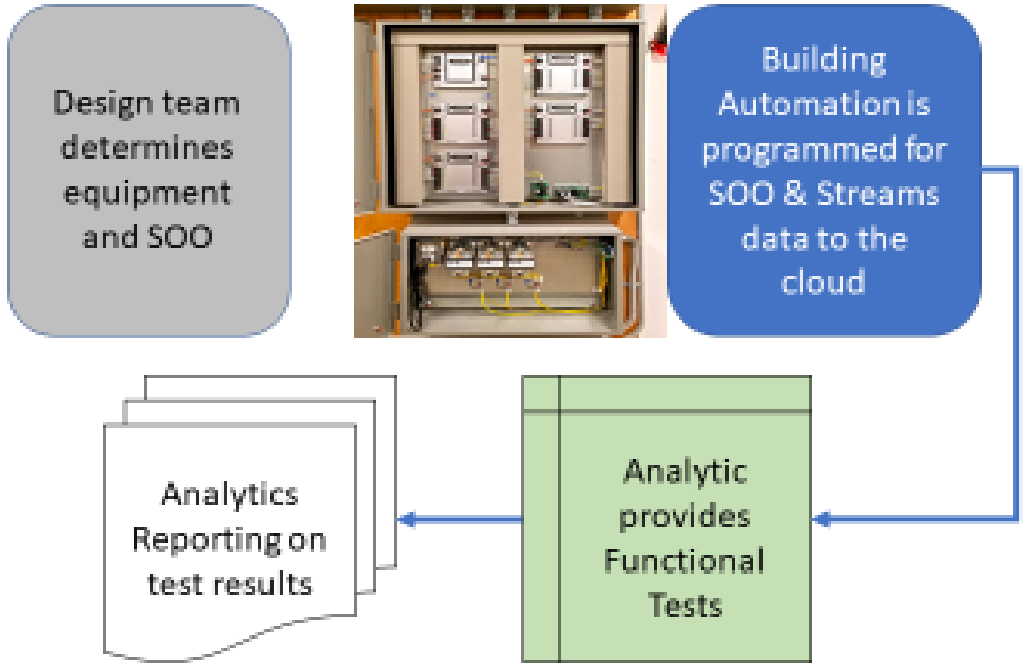
A Better Way to Test

What is Automated Functional Testing

Analytics software digest information from the building automation system (BAS)

Analytics runs the building automation data against commissioning algorithm specifically based on the Sequences of Operation (SOO) that a specified.

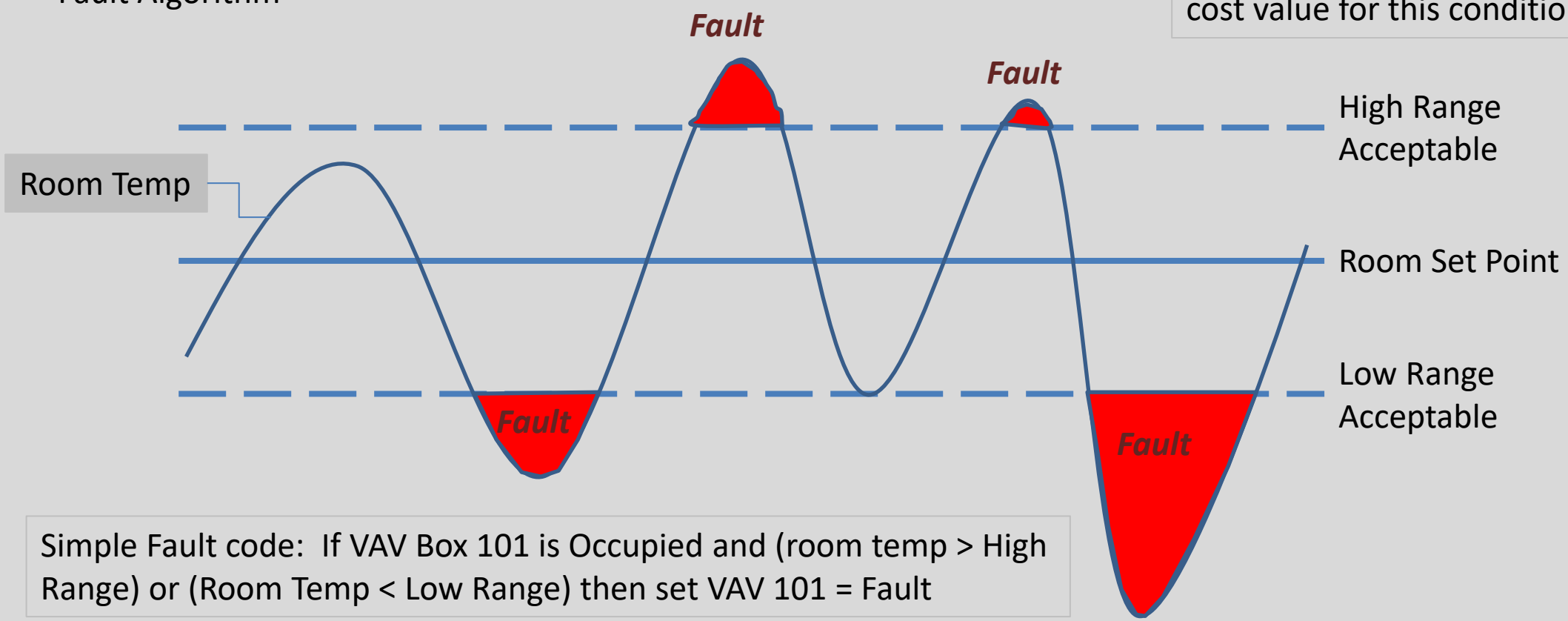
Analytics delivers a pass /failed results with a duration of maintaining the pass/fail criteria stated in the SOO.



Example of Algorithm

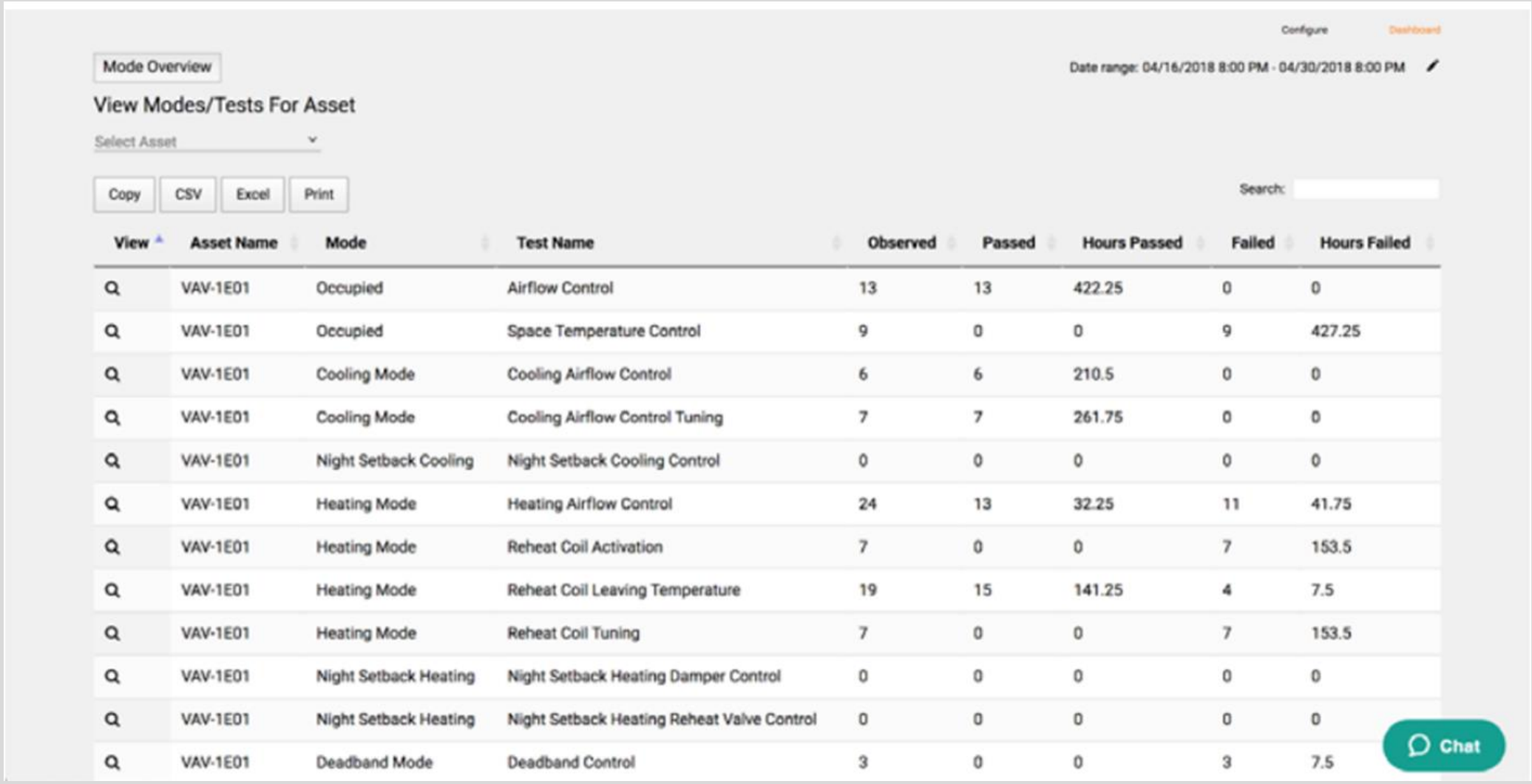
Room Temperature Set Point Fault Algorithm –

Fault application also tracks duration in the fault condition and set operational cost value for this condition



Simple Fault code: If VAV Box 101 is Occupied and (room temp > High Range) or (Room Temp < Low Range) then set VAV 101 = Fault

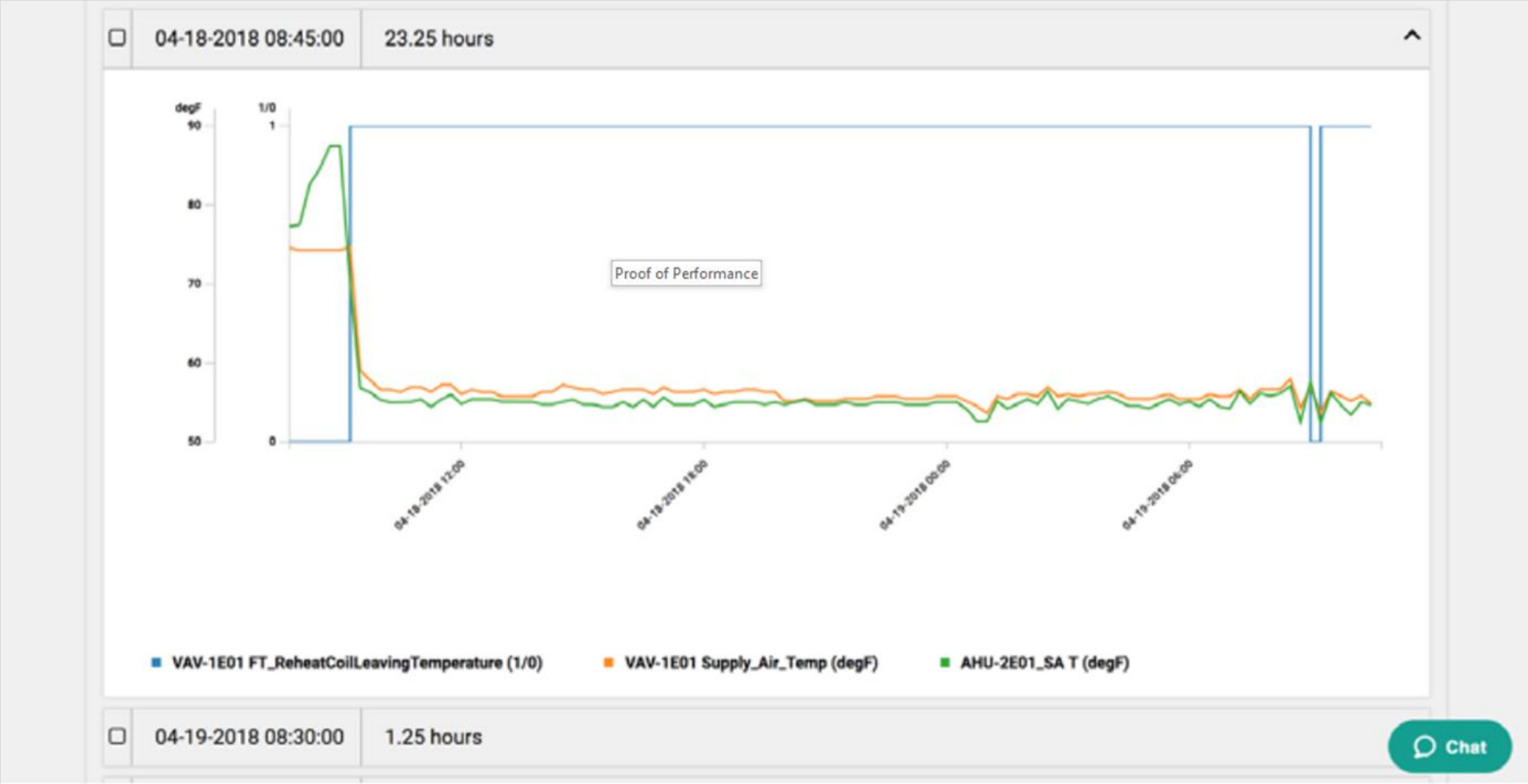
Capitalizing on AFPT Algorithms



View	Asset Name	Mode	Test Name	Observed	Passed	Hours Passed	Failed	Hours Failed
	VAV-1E01	Occupied	Airflow Control	13	13	422.25	0	0
	VAV-1E01	Occupied	Space Temperature Control	9	0	0	9	427.25
	VAV-1E01	Cooling Mode	Cooling Airflow Control	6	6	210.5	0	0
	VAV-1E01	Cooling Mode	Cooling Airflow Control Tuning	7	7	261.75	0	0
	VAV-1E01	Night Setback Cooling	Night Setback Cooling Control	0	0	0	0	0
	VAV-1E01	Heating Mode	Heating Airflow Control	24	13	32.25	11	41.75
	VAV-1E01	Heating Mode	Reheat Coil Activation	7	0	0	7	153.5
	VAV-1E01	Heating Mode	Reheat Coil Leaving Temperature	19	15	141.25	4	7.5
	VAV-1E01	Heating Mode	Reheat Coil Tuning	7	0	0	7	153.5
	VAV-1E01	Night Setback Heating	Night Setback Heating Damper Control	0	0	0	0	0
	VAV-1E01	Night Setback Heating	Night Setback Heating Reheat Valve Control	0	0	0	0	0
	VAV-1E01	Deadband Mode	Deadband Control	3	0	0	3	7.5

Algorithms provide the ability to define criteria to be verified in perpetuity.

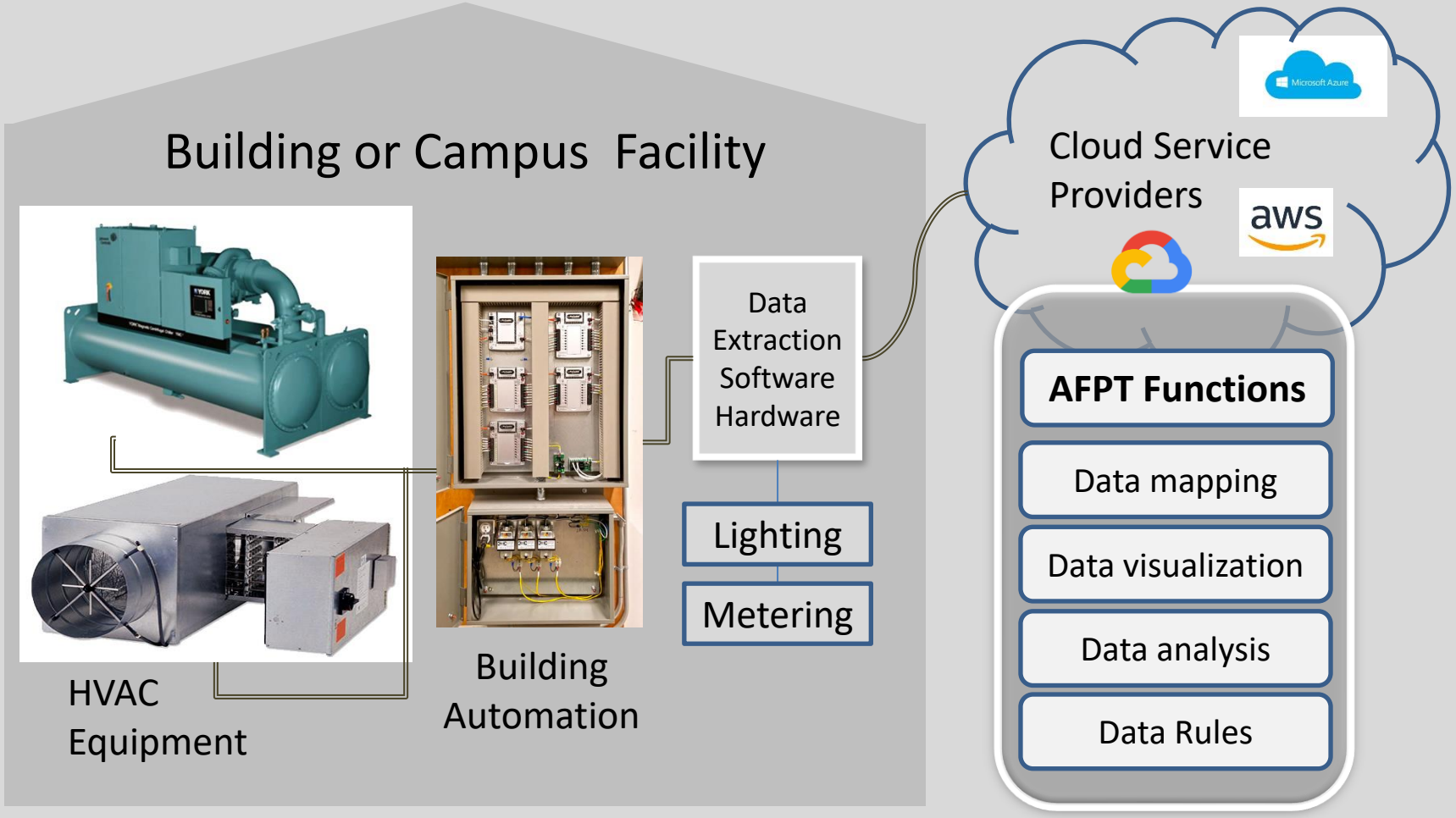
Capitalizing on AFPT Algorithms



The ability to “drill down” into the data to find root causes of issues.

Getting Data to the Cloud

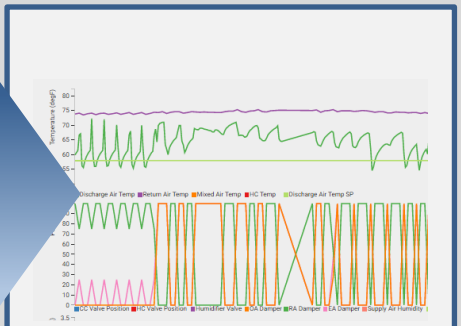
For this discussion, we are focusing on AFPT Tools that have real-time and historical access to data directly from an interface with a Building Automation System (BAS)



Building information (data) is abundant in today's facilities

How do you leverage this dissimilar information for the success of the project and ongoing operation?

Building Information grows based on various systems evolution



AFPT

Building Modeling Applications

Design Information

HVAC Equipment

Building Automation Systems

Integrated Systems

IOT
Internet of Things

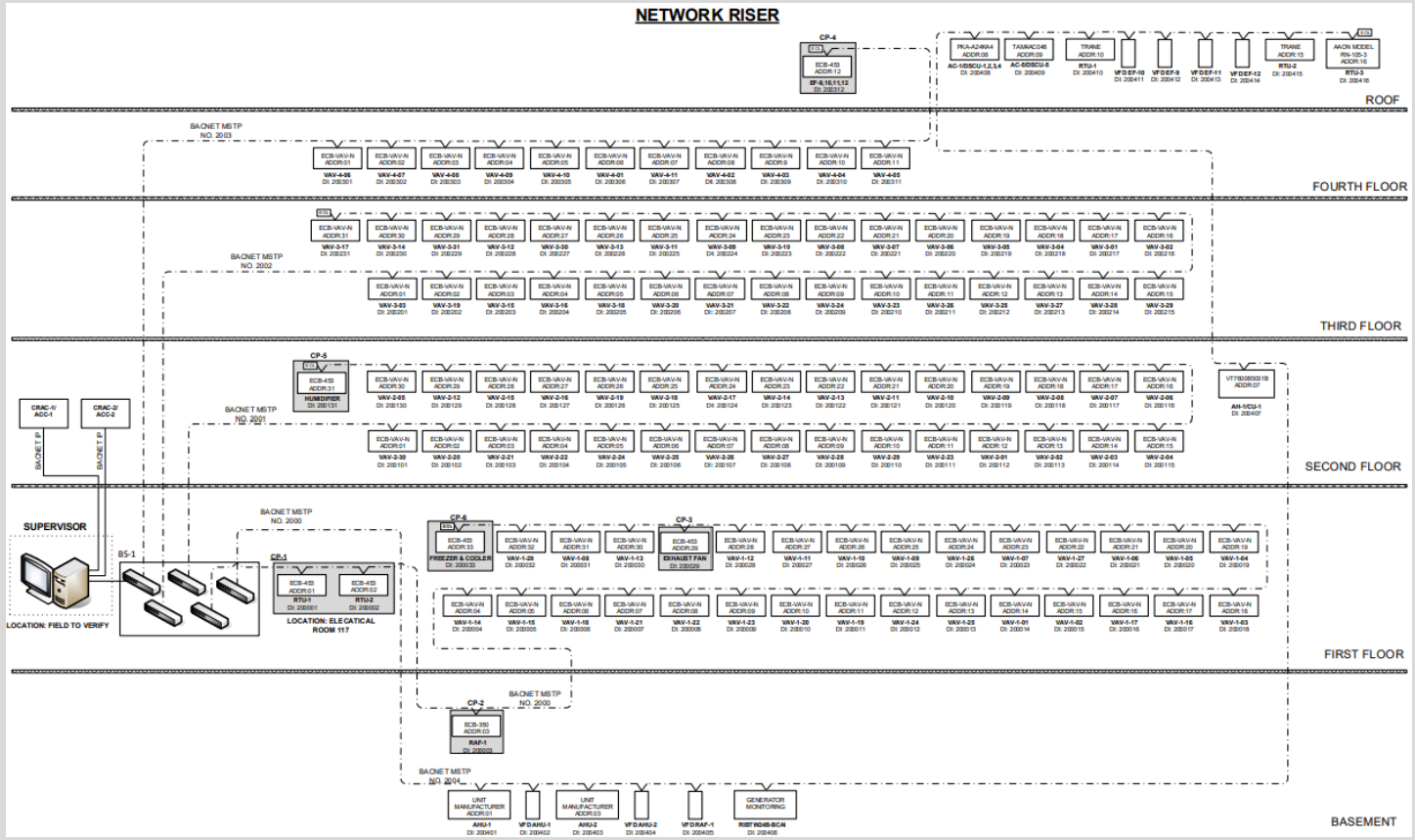
Open Protocols for interdisciplinary communication

1980 | 1990 - 2000 | 2010 | Now

Implementing AFPT on a Project

– Design Phase

- Plan for Data Acquisition (interface to the BAS)
- Acknowledge IT/Security requirements for the project (stay ahead of these requirements)
- Specification Language (defines roles and responsibilities)

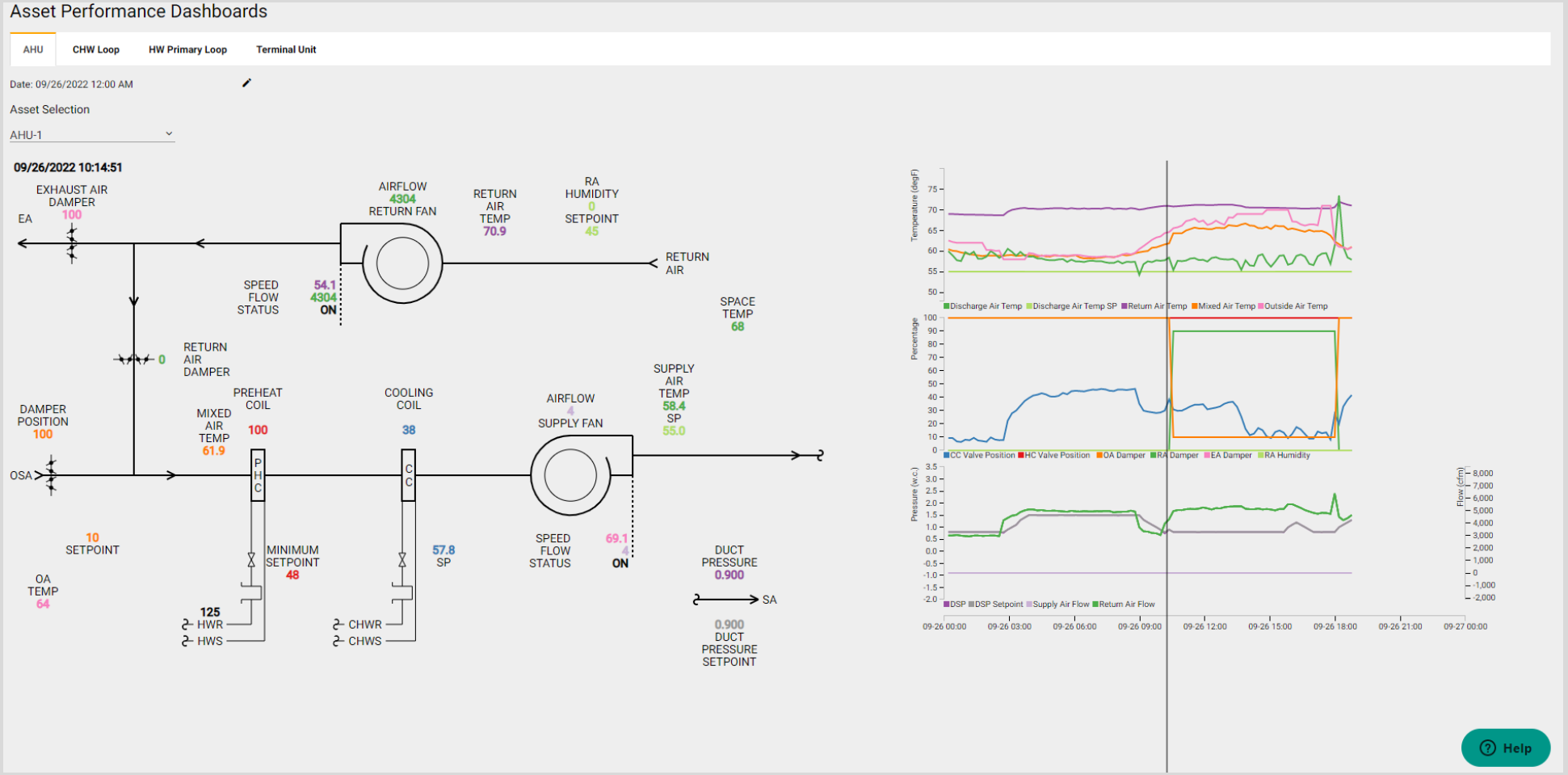


Implementing AFPT on a Project

- Construction/Acceptance Phase
  - Adjust Algorithms based on project specific Sequence of Operations
  - “Point to Point checkout” vs “validate data integrity”
  - Building System data acquisition a prerequisite for Testing
  - Boots on the Ground

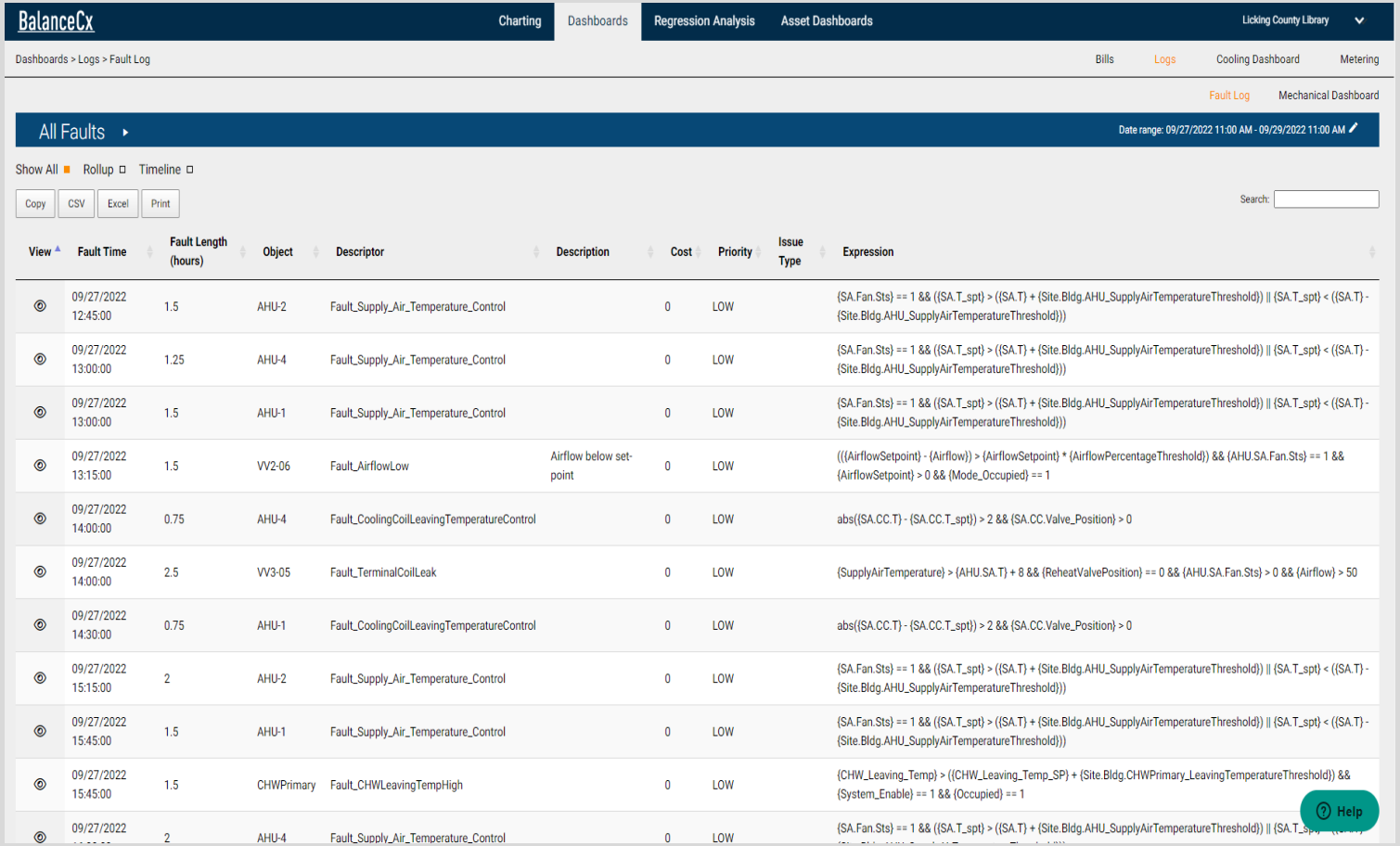
Advantages of having AFPT Tool Online during Commissioning

- Early recognition of what is working and what is not working
- Quickly identify predominate issues that are preventing the systems from performing



Advantages of having AFPT Tool Online during Commissioning

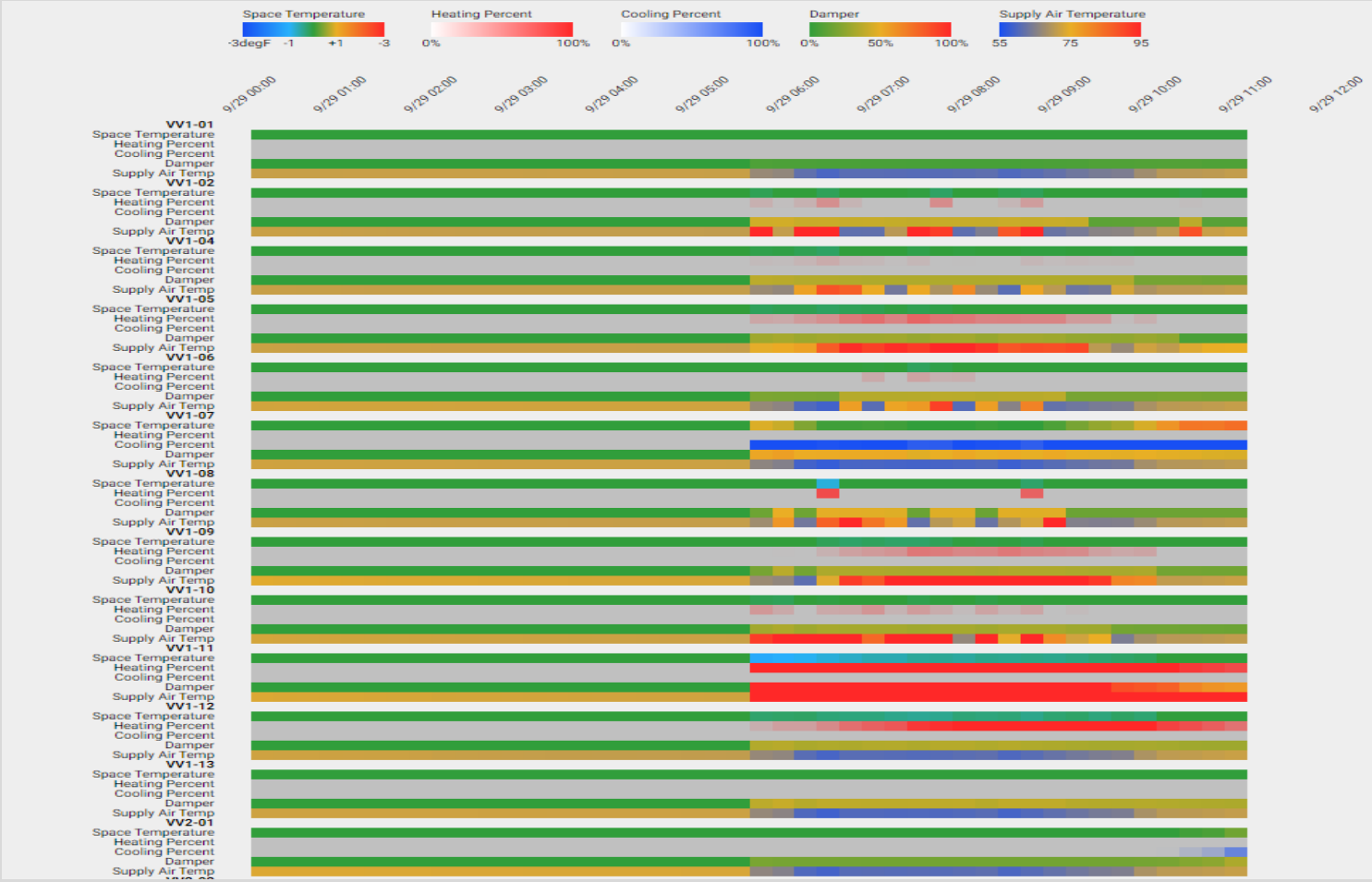
- Transparency of Project Status
- Functional Performance Testing (Commissioning) is no longer a one time test; it can be repeated with minimal extra effort
- Expedite Testing efforts



View	Fault Time	Fault Length (hours)	Object	Descriptor	Description	Cost	Priority	Issue Type	Expression
	09/27/2022 12:45:00	1.5	AHU-2	Fault_Supply_Air_Temperature_Control		0	LOW		{SA.Fan.Sts} == 1 && ({SA.T_spt} > ({SA.T} + {Site.Bldg.AHU_SupplyAirTemperatureThreshold}) || {SA.T_spt} < ({SA.T} - {Site.Bldg.AHU_SupplyAirTemperatureThreshold}))
	09/27/2022 13:00:00	1.25	AHU-4	Fault_Supply_Air_Temperature_Control		0	LOW		{SA.Fan.Sts} == 1 && ({SA.T_spt} > ({SA.T} + {Site.Bldg.AHU_SupplyAirTemperatureThreshold}) || {SA.T_spt} < ({SA.T} - {Site.Bldg.AHU_SupplyAirTemperatureThreshold}))
	09/27/2022 13:00:00	1.5	AHU-1	Fault_Supply_Air_Temperature_Control		0	LOW		{SA.Fan.Sts} == 1 && ({SA.T_spt} > ({SA.T} + {Site.Bldg.AHU_SupplyAirTemperatureThreshold}) || {SA.T_spt} < ({SA.T} - {Site.Bldg.AHU_SupplyAirTemperatureThreshold}))
	09/27/2022 13:15:00	1.5	VV2-06	Fault_AirflowLow	Airflow below set-point	0	LOW		(({AirflowSetpoint} - {Airflow}) > {AirflowSetpoint} * {AirflowPercentageThreshold}) && {AHU.SA.Fan.Sts} == 1 && {AirflowSetpoint} > 0 && {Mode_Occupied} == 1
	09/27/2022 14:00:00	0.75	AHU-4	Fault_CoolingCoilLeavingTemperatureControl		0	LOW		abs({SA.CC.T} - {SA.CC.T_spt}) > 2 && {SA.CC.Valve_Position} > 0
	09/27/2022 14:00:00	2.5	VV3-05	Fault_TerminalCoilLeak		0	LOW		{SupplyAirTemperature} > {AHU.SA.T} + 8 && {ReheatValvePosition} == 0 && {AHU.SA.Fan.Sts} > 0 && {Airflow} > 50
	09/27/2022 14:30:00	0.75	AHU-1	Fault_CoolingCoilLeavingTemperatureControl		0	LOW		abs({SA.CC.T} - {SA.CC.T_spt}) > 2 && {SA.CC.Valve_Position} > 0
	09/27/2022 15:15:00	2	AHU-2	Fault_Supply_Air_Temperature_Control		0	LOW		{SA.Fan.Sts} == 1 && ({SA.T_spt} > ({SA.T} + {Site.Bldg.AHU_SupplyAirTemperatureThreshold}) || {SA.T_spt} < ({SA.T} - {Site.Bldg.AHU_SupplyAirTemperatureThreshold}))
	09/27/2022 15:45:00	1.5	AHU-1	Fault_Supply_Air_Temperature_Control		0	LOW		{SA.Fan.Sts} == 1 && ({SA.T_spt} > ({SA.T} + {Site.Bldg.AHU_SupplyAirTemperatureThreshold}) || {SA.T_spt} < ({SA.T} - {Site.Bldg.AHU_SupplyAirTemperatureThreshold}))
	09/27/2022 15:45:00	1.5	CHWPrimary	Fault_CHWLeavingTempHigh		0	LOW		{CHW_Leaving_Temp} > ({CHW_Leaving_Temp_SP} + {Site.Bldg.CHWPrimary_LeavingTemperatureThreshold}) && {System_Enable} == 1 && {Occupied} == 1
	09/27/2022	2	AHU-4	Fault_Supply_Air_Temperature_Control		0	LOW		{SA.Fan.Sts} == 1 && ({SA.T_spt} > ({SA.T} + {Site.Bldg.AHU_SupplyAirTemperatureThreshold}) || {SA.T_spt}

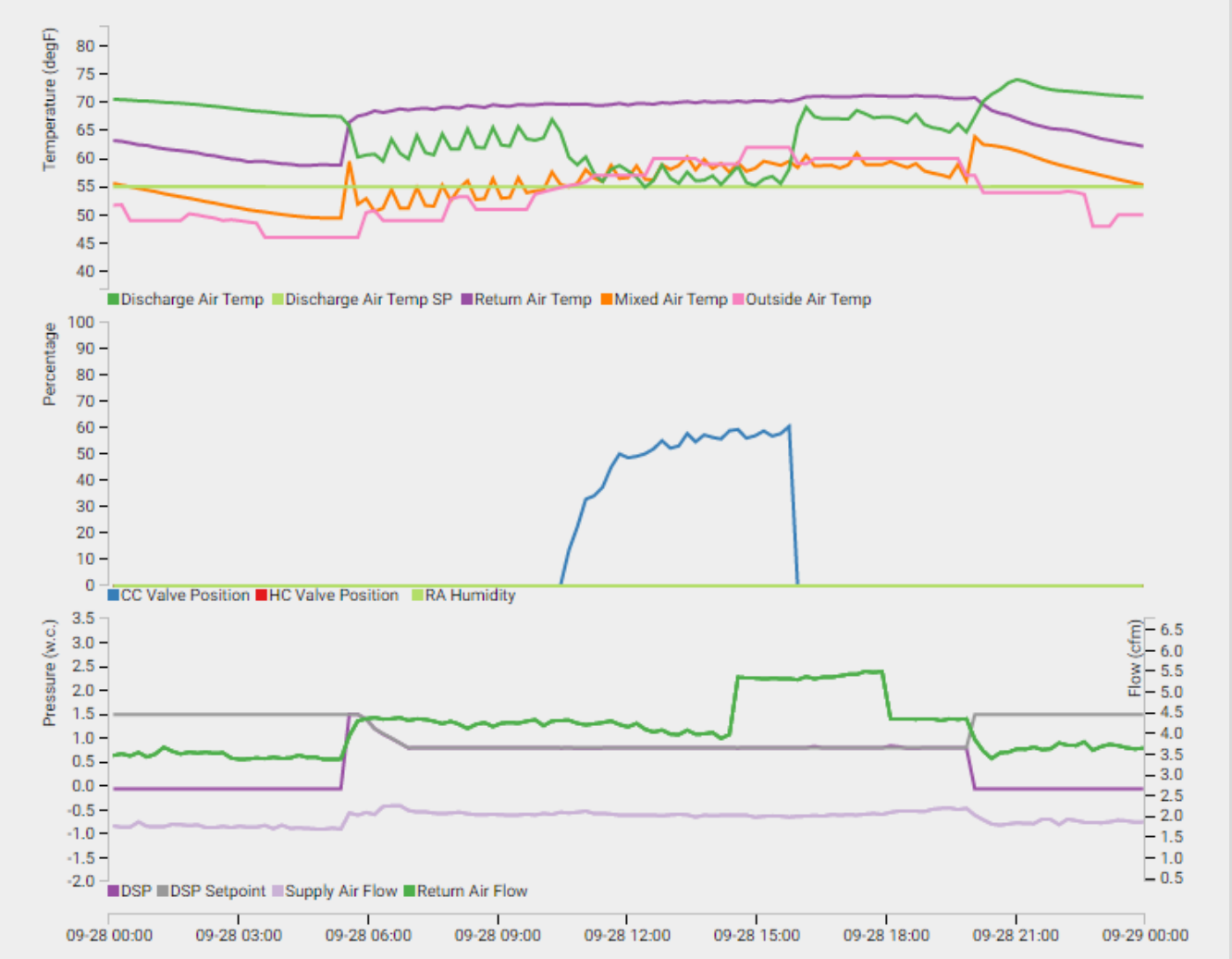
Advantages of having AFPT Tool Online during Commissioning

- Sampling not necessary; 100% testing
- Offsite analysis by CxA



Advantages of having AFPT Tool Online during Commissioning

- Allows technical resources to focus on issue resolution and/or areas for improvement
- Automation of traditional “Trending Analysis”
- Persistent Testing; 24/7



LEED v4: Monitoring Based Commissioning (MBCx) Basics

BLUE OCEAN

Providing a
SAFER and
MORE SUSTAINABLE
option for
INDUSTRIAL WATER
TREATMENT

Kathleen Collier
Director of Sales & Marketing

BLUE OCEAN

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Director of Sales & Marketing

Abo

BLUE OCEAN

- Supplier of water treatment products
- Alumni of the 2021 SustainableCincy Cohort
- Blue Ocean Solids is a company that is committed to making a difference in protecting the planet and providing a much safer work environment.

COOLING TOWERS & BOILERS

- Water plays a key role in the cooling and heating of commercial buildings
- Water also is used in many industrial cooling and heating processes
- Water is heated and cooled using **COOLING TOWERS** and **BOILERS**

WATER TREATMENT BASICS

- During the hydrological cycle, water picks up impurities that can result in scale, corrosion and microbial fouling in cooling towers and boilers
- Water treatment is used to tie up these impurities so they do not cause issues in cooling towers and boilers

WATER TREATMENT BASICS

IMPURITIES

- **SCALE** – can cause equipment to run less efficiently
- **CORROSION** – can cause failed equipment and piping
- **MICROBIAL FOULING** – can also cause equipment to run less efficiently and can allow exposure to bacteria like Legionella

DOES THIS MATTER?

YES!!!

- Scale as thin as a credit card can result in a 12% increase in energy usage
- Microbial fouling can be as much as a 25% increase in energy usage

CURRENT WATER TREATMENT PAIN POINTS

- Traditional water treatment products are a hazardous liquid with a pH of 14
- Usually comes in a 55-gallon, 500-pound drum
- Potential of a hazardous spill
- Risk of injury or caustic burn

LIQUID INSTALLATION PICTURES

- Mechanical rooms are usually tight spaces
- Drums clutter the space
- Drums cause issues due to the tight space
- Hazardous Spills

What Makes BLUE OCEAN Different?

- Water treatment in a solid, concentrated form
- Four 1-gallon jugs weighing less than 50 pounds takes the place of a 55-gallon, 500-pound drum of hazardous liquid chemistry
- Helps with all 3 pillars of sustainability: PEOPLE, PLANET, and PROFIT

PEOPLE

Safer Handling

Safer Transport

Safer Storage

PLANET

Carbon Emissions Reduction

100% Recyclable Packaging

Water Savings

PROFIT

Reduced Liability

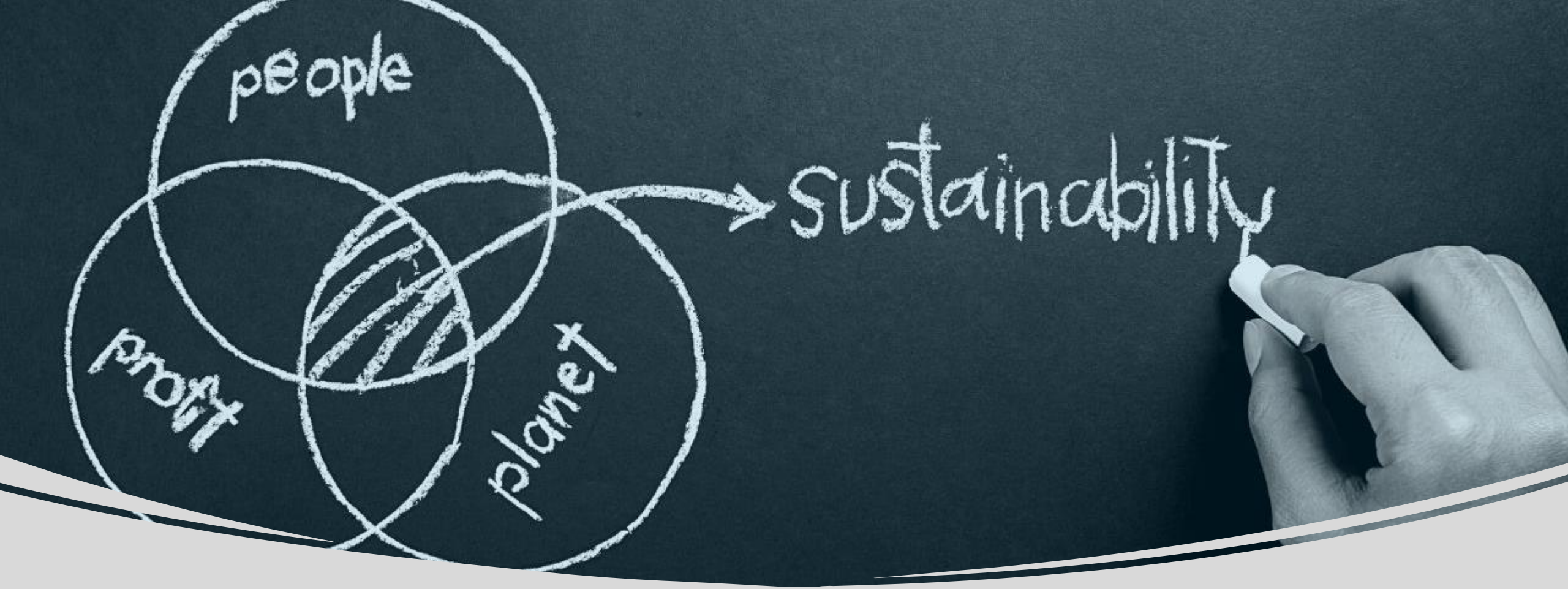
Shipping Savings

Reduced Storage Space

BLUE OCEAN

INSTALLATION PICTURES

- Easily installed on wall
- Frees up valuable floor space
- Neater, less cluttered mechanical room
- Install dissolvers above pumps to maintain prime



Improving All 3 PILLARS of SUSTAINABILITY

- SAFER for your people
- More SUSTAINABLE for the planet
- Savings to positively affect your PROFIT

COMMERCIAL BUILDINGS

BOMA International

IFMA™ International Facility Management Association

stars® a program of aashe

UNIVERSITIES

Climate Leadership NETWORK

Second Nature

aashe The Association for the Advancement of Sustainability in Higher Education

HEALTHCARE

PRACTICE Greenhealth

Health Care Without Harm

GLOBAL GREEN and HEALTHY HOSPITALS

K-12 SCHOOLS

PROJECT Green Schools®

EFC EDUCATION FACILITIES CLEARINGHOUSE

LIGHT INDUSTRIAL

Better Plants® U.S. DEPARTMENT OF ENERGY

WE ARE STILL IN

U.S. GREEN BUILDING COUNCIL LEED USGBC

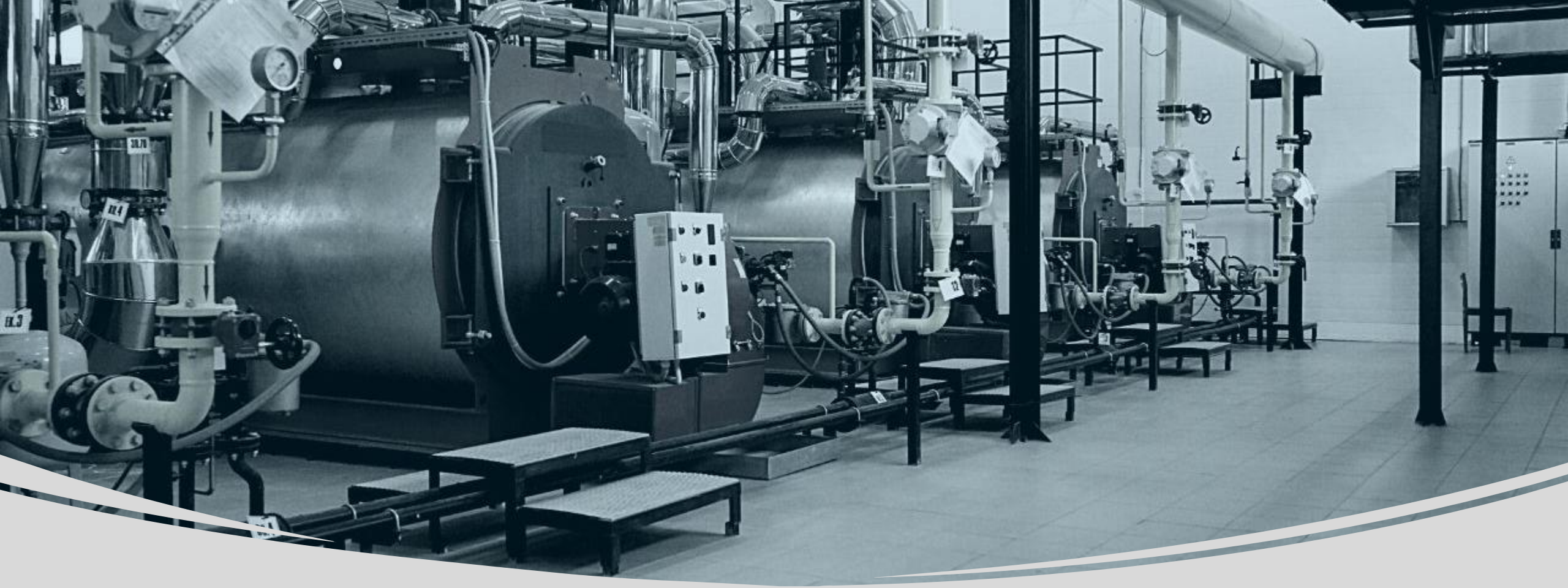
Where Are You On Your SUSTAINABILITY JOURNEY

MAYBE YOU'VE COMPLETED:

- Energy Efficiency (LED)
- Waste Reduction (Recycling)
- Renewables (Solar/Wind)
- **NOW WHAT?**

Have You Thought About Your WATER TREATMENT PROGRAM

- **ENERGY EFFICIENCY** - A reliable water treatment program keeps this equipment running efficiently
- **WATER SAVINGS** – Allows water to be used an optimal number of times and eliminates the need to triple rinse drums



Have You Thought About Your WATER TREATMENT PROGRAM

- **CARBON EMISSIONS** – reduce carbon footprint due to less fossil fuel used in delivery, less plastic in the packaging, and less NaOH
- **REDUCE WASTE** – Blue Ocean has 100% recyclable packaging that can be put in with traditional recycling collections

HAZARDOUS!
(pH of 14)

>500 Pounds
(takes 2.5x more fuel to deliver)

Destined for Landfill
(packaging not easily recycled)

Water Waster
(over 40 gallons of water needed for rinsing for proper disposal)

Expensive to Ship
(approximately 4x more than shipping equivalent amount of BLUE OCEAN)

vs.

Non-Hazardous
(neutral pH)

<50 Pounds
(making it easier to handle)

100% Recyclable Packaging
(can be placed in with traditional recycling collections)

No Triple Rinsing
(easily recycled)

Shipping Savings
(can ship regular UPS of Fedex with no special accomodations)

SOLIDS vs. LIQUIDS

BLUE OCEAN

Come See Us To Find Out
HOW WE CAN HELP

www.BlueOceanSolids.com

Jeff Dollar

CriticalAire

Division of ElitAire

Topic: Challenges Facing "Improving Building HVAC Designs For The Future"

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What might you Do Differently in the Post Pandemic Era?

Architects
Mechanical Consultants
Building Owners
Mechanical Contractors

.....How will you build mechanical systems differently?

Focus Has Shifted from
"Building Health" to "Occupant Wellness"

ASHRAE SAYS:

- Bring in More Fresh Air
- Increase Filtration Effectiveness
- Control Relative Humidity
- Consider Additional Level of Air Cleaning

.....Can it be done?

.....At the same time, you are being asked for:

Sustainable Buildings

Energy Efficiency/Net Zero Designs

Carbon Neutral / Decarbonization

or, Electrification

.....Is there a conflict going on here?

Challenges

The "Bring in More Outside Air" Challenge

Challenge #1

More Outside Air = More Carbon Emissions & Cost

results in higher emissions & more cost

1. Larger and more expensive HVAC systems
2. Higher energy use and carbon emissions
3. Increased operating costs
4. What if the outside air is polluted?

Challenge #2

Outside Air is not Always "Fresh"

"The future of really good indoor air quality is going to be alternatives to ventilation, so we don't have to rely on outside air for everything."

- Prof. William Bahnfleth, Past ASHRAE President

…..a shift in focus

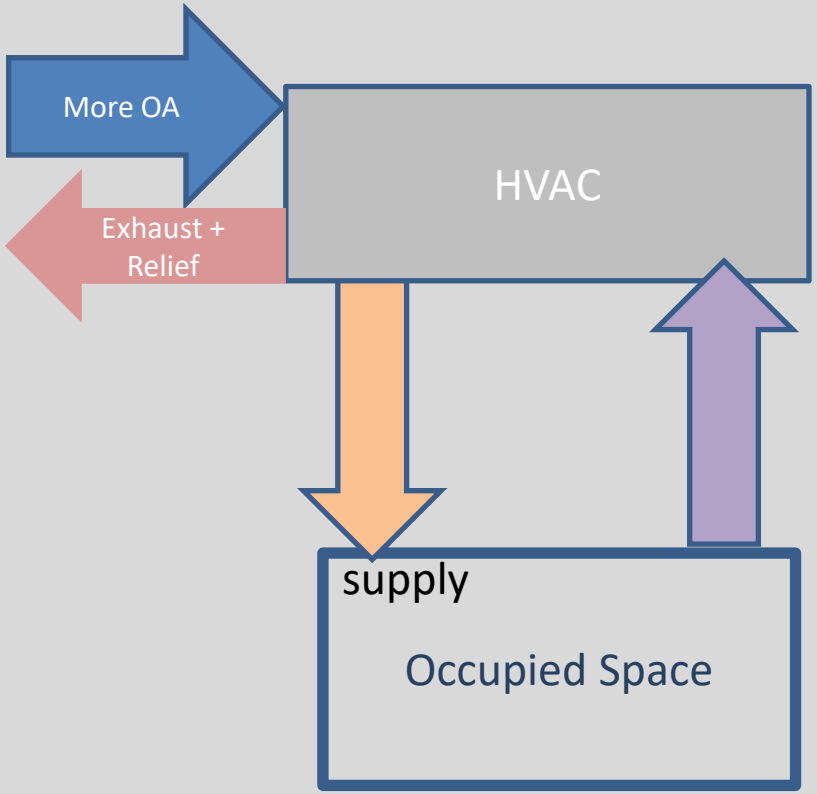
Building Ventilation

(Historically)

*Volume Fresh Air = Bldg FT3 * #Occupants*

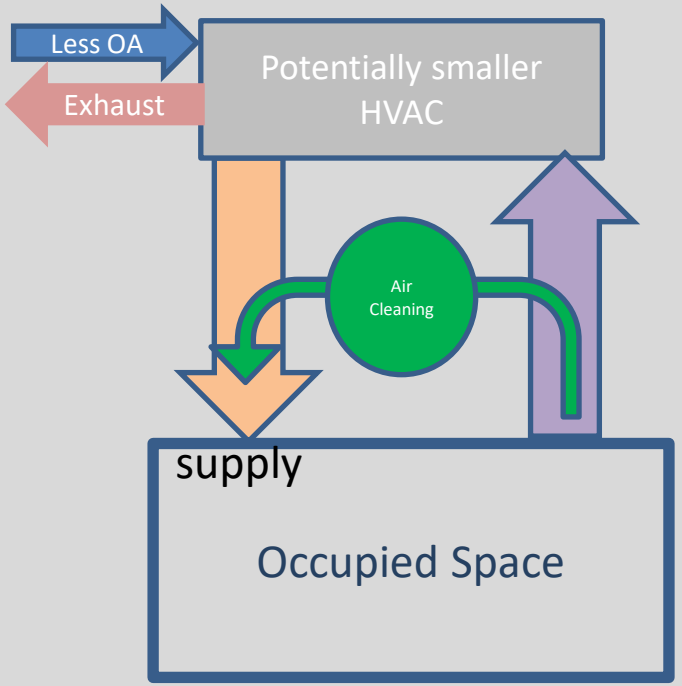
Building Ventilation
(a better way in the Future)

the amount of contaminants in the space = contaminants being emitted into the space − contaminants being flushed out of space with "fresh air" (but adding in contaminants already in the "fresh air") − contaminants being "trapped" or removed by filtration devices



Supply Air
cfm
Remains Constant

Technologies are available



The “Increase Filtration Effectiveness ”

Challenge

Challenge #1

Can your equipment handle it?

Challenge #2

Operational Cost

Not as easy as it sounds

The "Risk" Challenge

Challenge #1

Prove It

Challenge #2

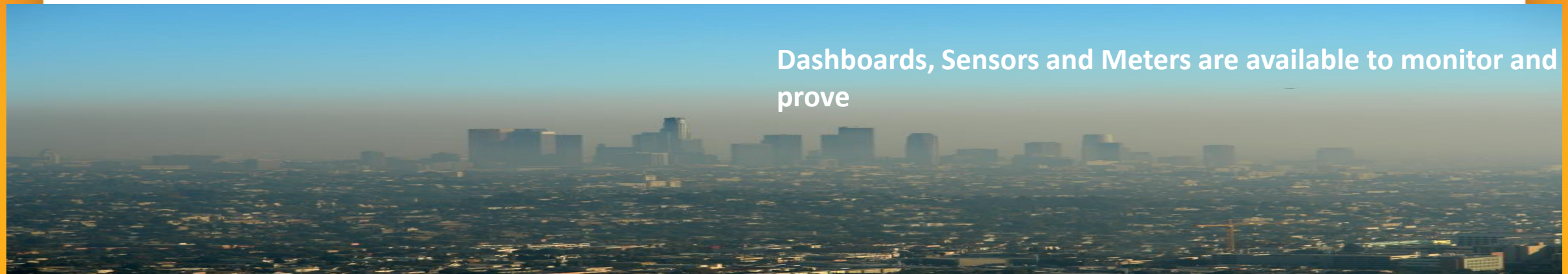
Show Me

Be Ready

Ventilation Effectiveness

IAQ Monitoring

ASHRAE Guidelines and Local Codes



The Message

....if your Company, Client, Building Owner, Tenant comes to you with.....

"I want you to meet all these new criteria and help me remain sustainable, green, energy efficient, reduce carbon footprint and electrify my building"

Performance-based IAQ Design

Innovative Technologies

CUSTOMER: Arlington Public Schools

CHALLENGES: Providing the best-in-class indoor air quality for students and optimizing building energy consumption

SOLUTION: 3 enVerid HLR modules were installed to scrub for all indoor contaminants, reduce ventilation load, and provide best-in-class indoor air quality

RESULTS:

- $304,680 cost savings over 20 years
- 137,488 kWh in annual energy savings resulting in $15,234 in annual energy cost savings
- 112-ton reduction in peak cooling load
- Best-in-class indoor air quality resulting in CO_2 levels around 800 ppm (15% improvement relative to typical schools)

ENIGINEER: CMTA

SALES REPRESENTATIVES: HAVTECH

LOCATION: Arlington, VA

DEPLOYED: 2019

SQUARE FOOTAGE: 110,000 ft²

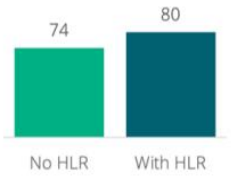
enVerid Snapshot

Alice West Fleet School

Largest Net Zero Energy School in the U.S. Achieves Excellent Indoor Air Quality

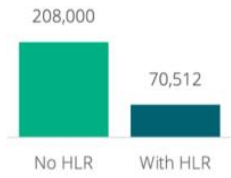
enVerid
Energy savings. Air quality.

LEED Points



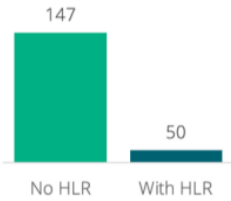
LEED Gold to LEED Platinum rating

Ventilation Energy (kWh/yr.)



$ 305k utility bill lifetime savings

Metric Tons CO_2/yr.



Reduced 97 metric tons CO_2 annually

Case Study: Thoroughgood Elementary School (VA)

PROJECT GOALS

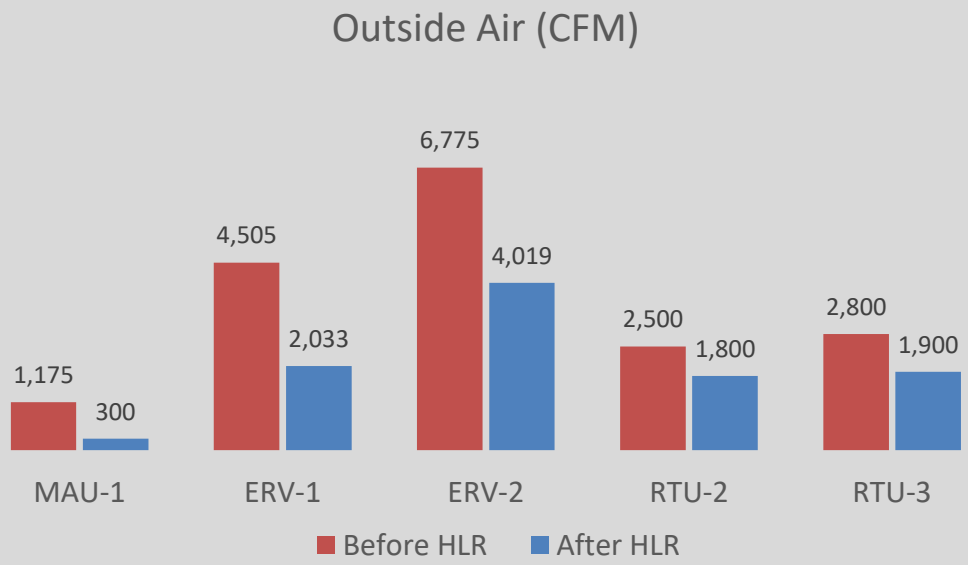
- **LEED Gold certification**
- **Improved indoor air quality**
- **Peak cooling and heating load reduction**

Project Details	
Location	Virginia Beach, VA
Owner	Viriginia Beach City Public Schools
Contractor	Conrad Brothers
MEP	exp.
Year Installed	2020
Project Type	New Construction
Floor Area	91,913 ft^2
HLR Modules	6 Rooftop & 1 Indoor
LEED/WELL	LEED Gold

Partners

Case Study: Thoroughgood – Outside Air & Indoor Air Quality

The design reduced outside air requirements by 43% from 17,755 CFM to 10,052 CFM



Indoor air contaminant levels were measured in 6 locations and remained well below LEED limits

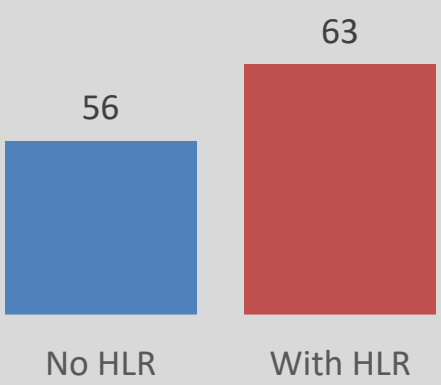
Contaminant	LEED Limit (ug/m3)	Average Concentration (ug/m3)
Formaldehyde	20	**16**
Total Volatile Organic Compounds (TVOC)	500	**375**
Carbon Dioxide	800 ppm (VRP equivalent)	**569 ppm**
PM2.5	12	**1**

Indoor formaldehyde and particulate mater levels were recorded at concentrations below outdoor "fresh" air.

The project demonstrated that the technology can be used to provide superior indoor air quality with much less outside air.

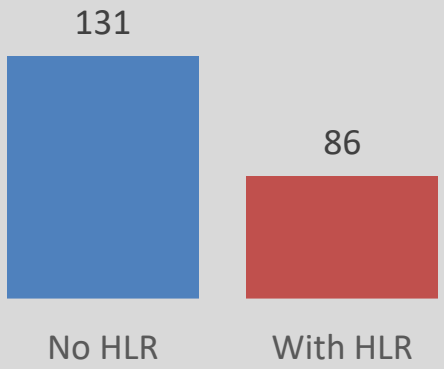
Case Study: Thoroughgood – Project Outcomes

LEED Points



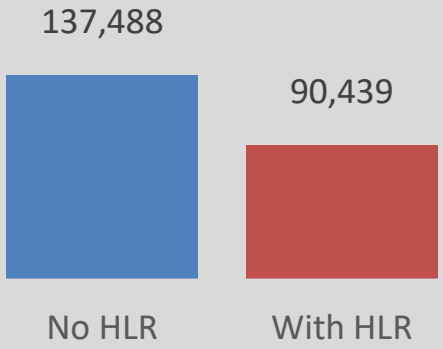
From LEED Silver to LEED Gold rating

Peak Cooling Load (tons)



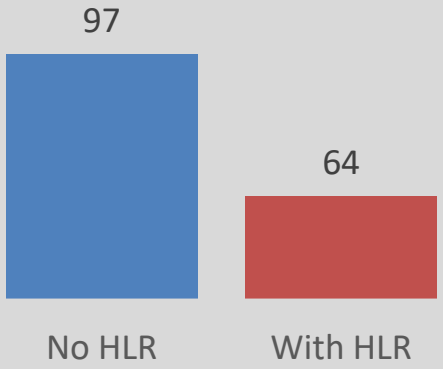
$60k first cost savings on new HVAC system

Ventilation Energy (kWh/yr)



$100k utility bill lifetime savings

Carbon Footprint



Reduced 42 metric tons CO_2 annually

These outcomes were achieved while maintaining indoor air quality well below LEED limits

The Message

....if your Company, Client, Building Owner, Tenant comes to you with.....

"I want you to meet all these new criteria and help me remain sustainable, green, energy efficient, reduce carbon footprint and electrify my building"


Green Cincinnati
BUILDING A SUSTAINABLE AND EQUITABLE CITY


Green Cincinnati
BUILDING A SUSTAINABLE AND EQUITABLE CITY

What is the **Green Cincinnati Plan**?

A community action plan which presents a comprehensive set of recommendations to advance the **sustainability**, **equity**, and **resilience** of our city.

A plan which builds a pathway to reach:

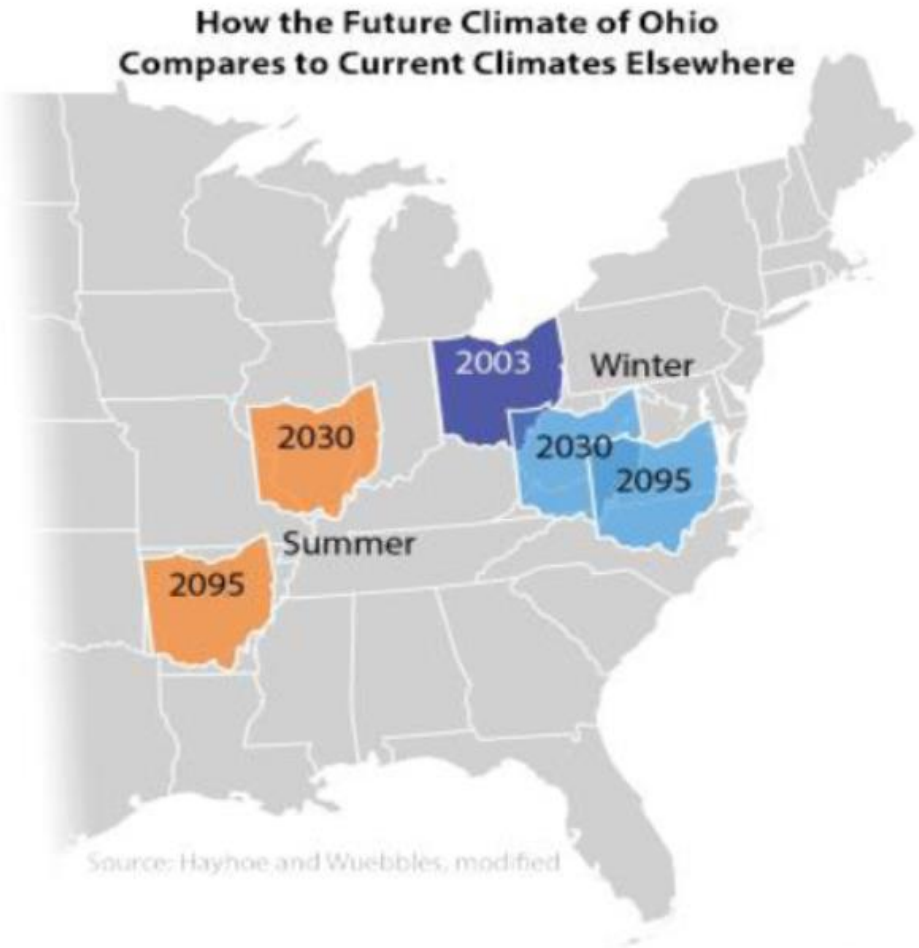
- **50% emissions reduction by 2030**
- **100% carbon neutrality by 2050**

The 2023 plan builds upon the Green Cincinnati Plan developed in 2018.

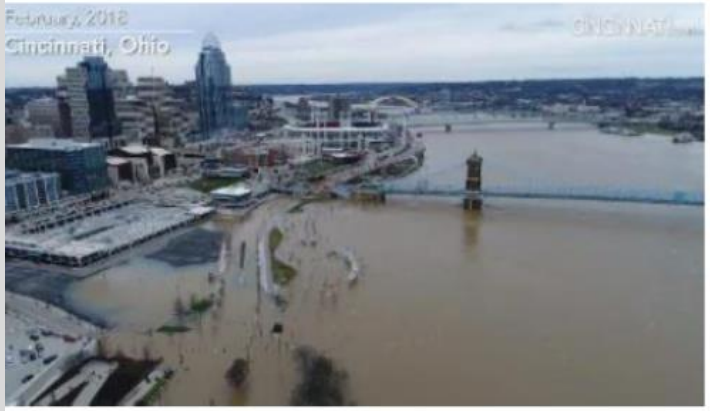
Cincinnati in a Changing Climate

Cincinnati will change

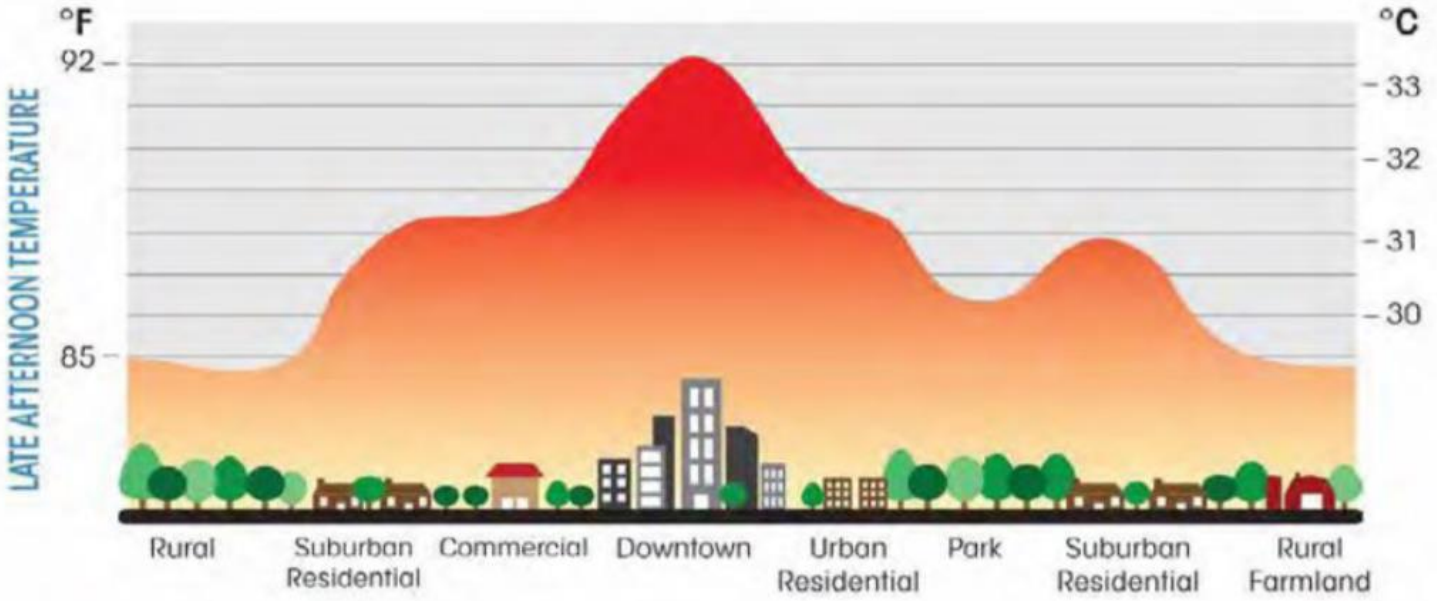
- Hotter
- Wetter overall with periods of drought
- More extreme weather



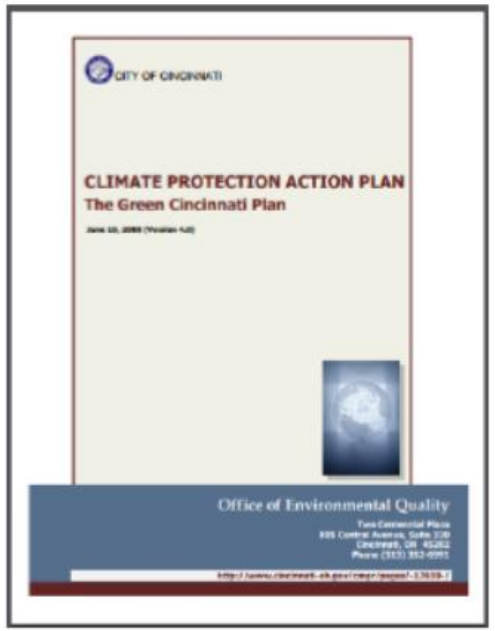
Based on temperature, humidity, and precipitation, future summers in Ohio might resemble those in Arkansas, and winters may become similar to those in Virginia.



We are seeing impacts now



GREEN CINCINNATI PLAN



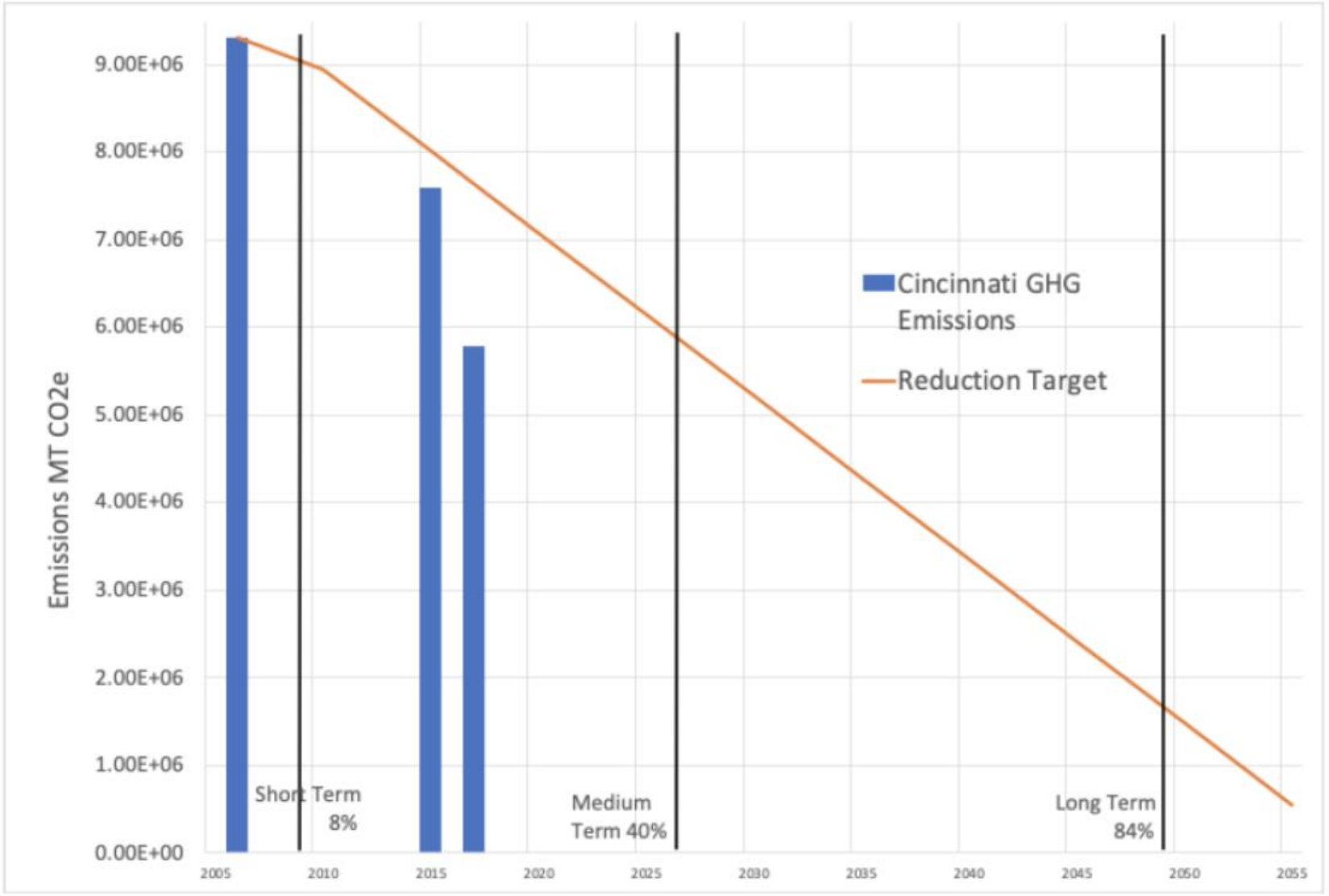
2008

2013

2018

- **Mayor's motion July 2017 called for updated plan, including:**
  - **Carbon reduction goal:** 80x50 – 80% emissions reductions by 2050
  - **Renewable Energy:** 100% by 2035
  - **Steering Committee of organizational leaders** to guide process

Cincinnati Carbon Emissions 2006-2017



5.8 M

mt CO2e
Annual Emissions

-37.8%

emissions reduction
since 2006

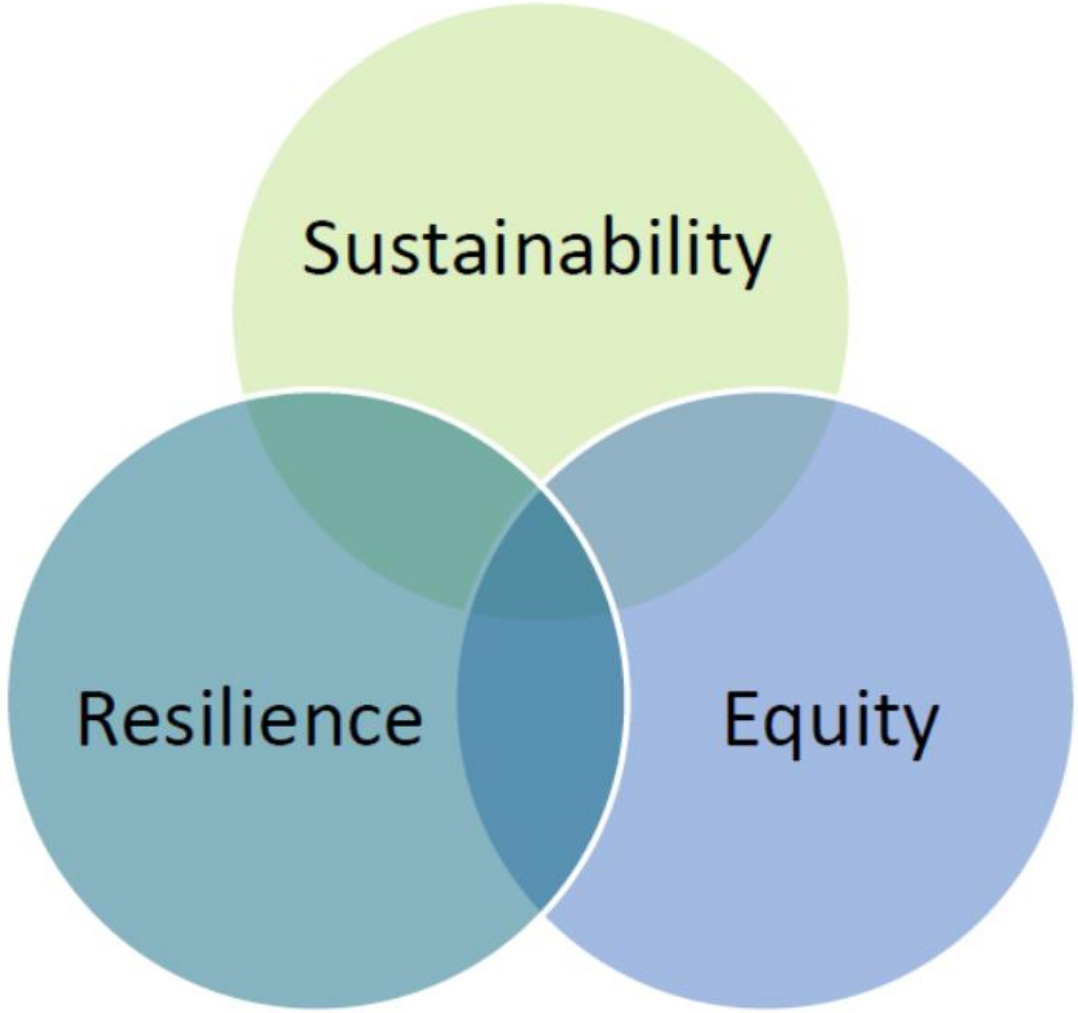
19.3

mt CO2e per
Cincinnati resident yearly
(4.8 mt is global average)

Community Visioning / Input Streams

Community Visioning / Input Streams

2023GCP Pillars



SUSTAINABILITY

EQUITY


transformation
next generation
affordable housing
necessary
essential
opportunities
empowerment
fairness
enduring
fairness
voices
restore
justice
access
outreach
essential
imperative
future success
multi-modal
all
respectful
rebuilding
financial wealth
barriers removed
perseverance
everyone

RESILIENCE


creativity
safe
prevention
forever
improve
won't dissolve
endure
long-term process
durable buildings
frontline experience
worker ownership
resists obstacles
green economy
ecosystem
youth
survival
urgent
long-term
complex

city of CINCINNATI
ENVIRONMENT & SUSTAINABILITY

GREEN CINCINNATI PLAN

BUILT ENVIRONMENT

EDUCATION & OUTREACH

ENERGY

FOOD

NATURAL SYSTEMS

RESILIENCE

TRANSPORTATION

WASTE

80 Strategies to reduce carbon emissions 80% by 2050.

Sustainability. Equity. Resilience.

Buildings & Energy Sub-committee

Sanyog Rathod
Subcommittee Chair
Sol design + consulting

Flequer Vera
Equity Liaison
Sustainergy Coop

Rob McCracken
Support Staff
City of Cincinnati
Office of Environment & Sustainability (OES)

Buildings & Energy Sub-committee - Vision

Adoption of 100% renewable energy sources by 2050 resulting in net zero buildings that contribute to the health and resiliency of all our city.

Buildings & Energy Sub-committee - Goals

Grid Optimization

Smart-Grid demand response for all buildings by 2050

Building Optimization

Carbon neutrality of all buildings by 2050

Electrification of Buildings

100% electrification of all buildings by 2050

Renewable Energy

100% renewable energy source for all buildings by 2050

Key Themes of Input

We received over **350 recommendations** from the community through the **GCP Kick-off meeting** in May, **online survey responses**, and **in-person meetings**.

Many recommendations had similar themes. The most common themes are:

- Increasing **renewable energy** production and **modernizing the grid**
- Enacting **building performance standards** to decrease energy use
- Encouraging energy efficiency improvements that result in **high performing buildings**
- Reducing **energy burden** in low-income communities

We have 50 unique recommendations and need your input to prioritize them!

Buildings & Energy Focus Area

The Team:

Sanyog Rathod
B&E Focus Area Chair
Sol Design

Flequer Vera
Equity Liaison
Sustainergy

Rob McCracken
OES Support Staff

The Place:

McKie Rec Center

The People:

50+ participants

2023GCP What Now?

- Distill the information collected tonight
- Revise the vision and strategies
- Identify priority actions
- Begin to draft goals
- Present these at the next meeting for feedback

Next meeting:
Monday, October 10
6:00-7:30 PM
Price Hill Library
970 Purcell Ave

Green Cincinnati Plan
Focus Area Meetings Schedule

Join us! Provide your input during this last round of meetings as we work to form the 2023 Green Cincinnati Plan. Help us prioritize approaches and actions as we move forward into the next phase in development of the plan. Your contributions are essential right now, as they provide necessary support for our efforts of building a more sustainable, equitable, and resilient Cincinnati for all!

Natural Environment	**September 28, 2022** **6:00-7:30 PM** **Civic Garden Center** 2715 Reading Road | Cincinnati 45206
Buildings & Energy	**October 10th, 2022** **6:00-7:30 PM** **Price Hill Library** 970 Purcell Avenue | Cincinnati 45205
Mobility	**October 11th, 2022** **6:00-7:30 PM** **Price Hill Library** 970 Purcell Avenue | Cincinnati 45205
Zero Waste	**October 12th, 2022** **6:00-7:30 PM** **Price Hill Library** 970 Purcell Avenue | Cincinnati 45205
Food	**October 13th, 2022** **6:00-8:00 PM** **Civic Garden Center** 2715 Reading Road | Cincinnati 45206
Resilience	**October 18th, 2022** **6:00-8:00 PM** **Civic Garden Center** 2715 Reading Road | Cincinnati 45206
Advocacy, Education, & Outreach	**October 19th, 2022** **6:00-7:30 PM** **Civic Garden Center** 2715 Reading Road | Cincinnati 45206

For further information about the GCP, to learn about other ways that you can contribute, and so much more...please visit our website:
www.greencincinnatiplan.org

Green Cincinnati · city of CINCINNATI · GROUNDWORK Ohio River Valley · Green Umbrella REGIONAL SUSTAINABILITY ALLIANCE

Cincinnati Recycling & Reuse Hub

Our Mission & Goal

- To change how people think about “things” and to provide a place where almost anything can be recycled or reused.
- To help mitigate the effects of climate change by increasing recycling, reuse, and landfill diversion rates in the Greater Cincinnati area.

Cincinnati Recycling & Reuse Hub

Our Mission & Goal

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- To help mitigate the effects of climate change by increasing recycling, reuse, and landfill diversion rates in the Greater Cincinnati area.

Cincinnati Recycling & Reuse Hub

Our Story

In 2020, the Hub was created as resource to bring together existing, independent recycling and reuse efforts across Cincinnati.

From 2008 to 2019, these organizations collected a total of 465 tons of recyclable materials.

- ZeroLandfill Cincinnati
- Mount St. Joseph University's Sustainability Committee's Community Electronic Recycling Days
- Mount St. Joseph University's Sustainability Committee's Beyond the Bin collections
- Pleasant Ridge Montessori's TerraCycle Program

Cincinnati Recycling & Reuse Hub

Items We Accept

Cincinnati Recycling & Reuse Hub

Cincinnati Recycling & Reuse Hub

Currently, almost **1.8 million tons of waste** go to the Rumpke landfill in Colerain Township each year. Almost a third of that is potentially recyclable material.

Cincinnati Recycling & Reuse Hub

Partner Organizations

The Hub strives to help other non-profit organizations be more effective, by providing them with free resources to help them better fulfill their own missions.

Ronald McDonald House Charities® Greater Cincinnati

DRESS FOR SUCCESS® Going Places. Going Strong.

NEW LIFE FURNITURE BANK

AFC ARCHITECTURAL FOUNDATION OF CINCINNATI

Matthew 25 Ministries

OAR ohio alleycat resource & spay/neuter clinic

LIONS INTERNATIONAL

CINCINNATI PERMACULTURE INSTITUTE

SOLES4SOULS

Various food pantries

RECYCLE FORCE

CivicGardenCenter greater cincinnati

Cincinnati Recycling & Reuse Hub

Partner Organizations

Matthew 25 Ministries

DRESS FOR SUCCESS®
Going Places. Going Strong.

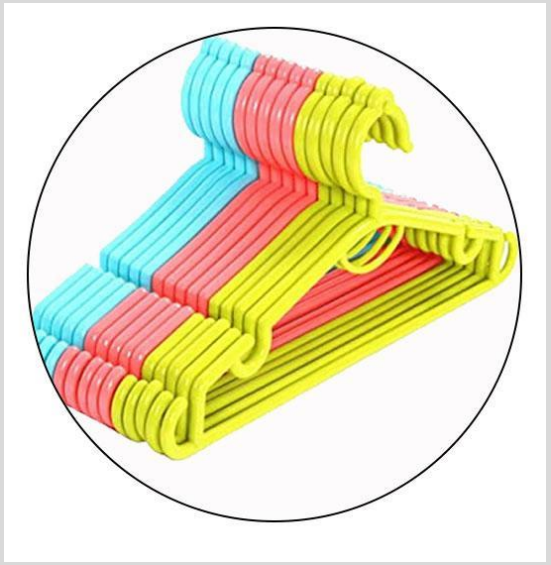
gotsneakers?
A Sneaker Recycling Organization

SOLES 4 SOULS

LIONS INTERNATIONAL

Cincinnati Recycling & Reuse Hub

Items for Reuse



Cincinnati Recycling & Reuse Hub

What We Take For Free

- Egg cartons
- Footwear
- Plastics #2-7 and flexible plastic
- Styrofoam
- Office supplies
- Plant pots
- Wrapping paper and party supplies
- Prescription bottles
- Colored pencils
- Crayons
- Dried markers/pens
- Empty glue sticks
- Corks
- Denim
- Eye Glasses
- Hand tools
- Foil-lined packaging (pouches, bags, wrappers, etc.)
- Medical supplies & items
- Packing materials: styrofoam peanuts, air pillows, bubble wrap, foam sheets)

Cincinnati Recycling & Reuse Hub

Items for Reuse

ZeroLandfill items

- carpet squares
- tile (glass, acrylic, ceramic)
- wood flooring samples
- fabric swatches and bolts
- pavers
- misc. design materials

Cincinnati Recycling & Reuse Hub

What We Take For Free

TerraCycle

- Kroger flexible packaging
- Oral Care
- Credit/gift cards
- Burt's Bees
- Drink pouches
- Squeeze pouches
- Swiffer
- Dried pens, highlighters, markers and glue sticks
- Popsockets
- Brita
- Pumps, spray triggers
- Razors
- Garnier
- Babybel

*See our website for complete list of brands.


Cincinnati Recycling & Reuse Hub

What We Take For a Fee

- Tires
- Batteries
- Car seats (plastic part only)
- Light bulbs & lighting ballasts
- Electronics
- Smoke detectors
- Electronic media:
  - CDs/DVDs, VHS tapes, cassette/8-track tapes, record albums & singles, floppy discs, memory cards & sticks, PC software, game cartridges, cases and covers for all of the above

  *fee list can be found on our website








www.cincinnatirecyclingandreusehub.org • 513-629-9040 • www.facebook.com/CintiRRH

Cincinnati Recycling & Reuse Hub

Fulfilling Our Mission

Education

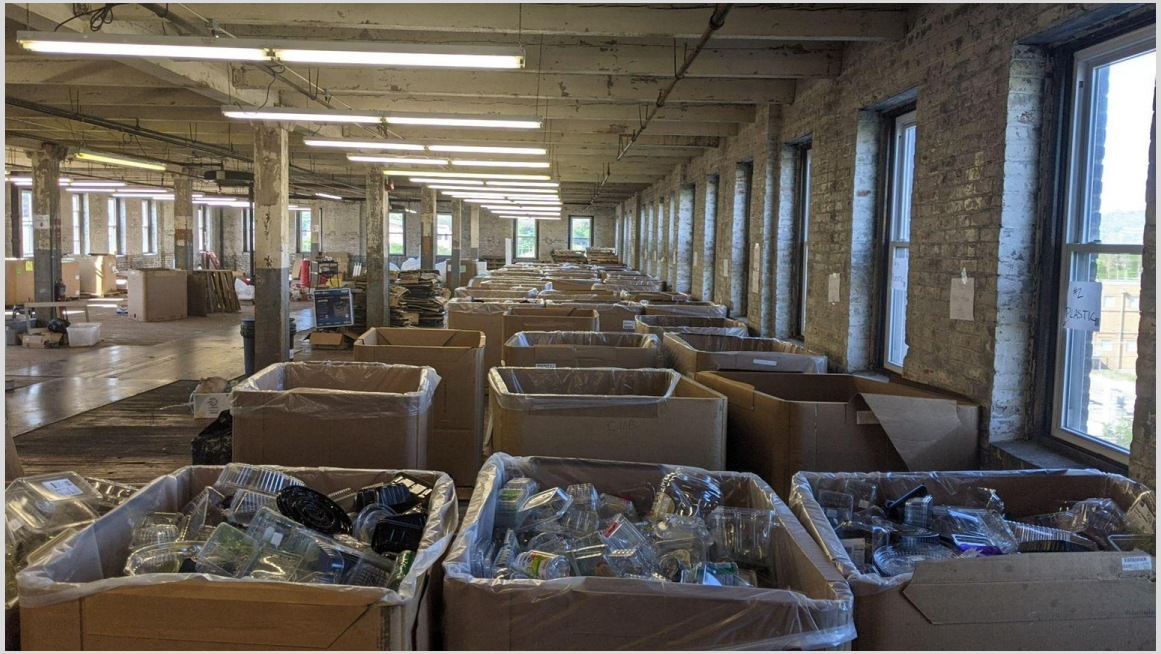
- Website
- Social media via Facebook, Twitter, Instagram
- Email
- Phone
- Promoting other organizations
- Tours of our facility

Cincinnati Recycling & Reuse Hub

Impact (since April 2021)

Over 144 tons of items sent for recycling or reuse, including:

- 73 tons of electronics
- 18 tons of plastic
- 5 tons of Styrofoam
- 2 tons shipped to TerraCycle
- 3 tons of shoes
- 29 tons of items taken at ZeroLandfill events
- 1042 pounds of denim



Cincinnati Recycling & Reuse Hub

How You Can Help

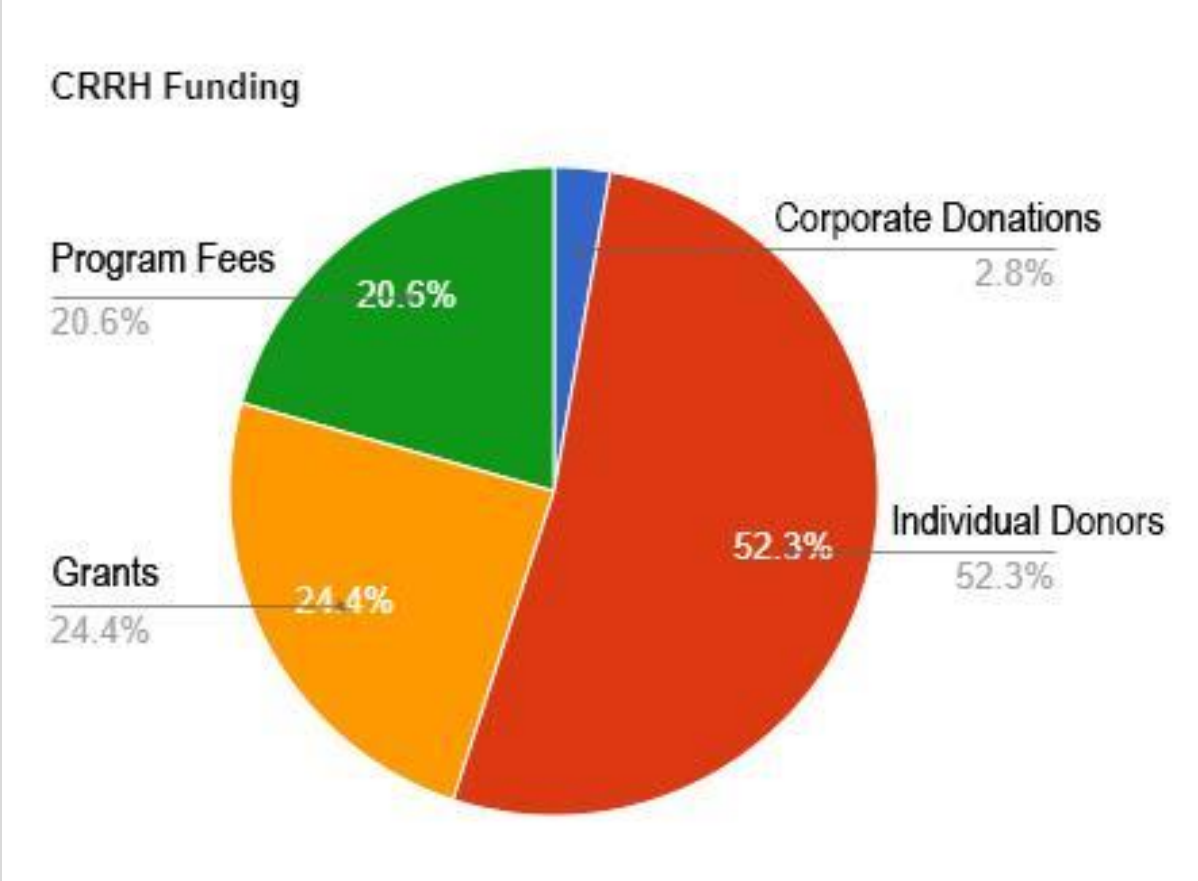
- Volunteer for one of our events or during our regular operating hours sign up here: https://bit.ly/CRRHvolunteer
- Bring items to us for recycling or reuse
  - Hours: Thursdays 12-6; Saturdays 10-2
- Make a monetary donation
- Help spread the word about what we're doing:
  - Word of mouth
  - Social media
  - Help connect us to potential sponsors or donors

Cincinnati Recycling & Reuse Hub

How We Are Funded

- Generous donors like YOU
- Grants
- Sponsorships
- Recycling Fees
- Other Programs (Terracycle)

We are a volunteer run organization with four part time employees.



Cincinnati Recycling & Reuse Hub

Visit Us

911 Evans Street Cincinnati, OH 45204

Cincinnati Recycling & Reuse Hub

The Warehouse

Cincinnati Recycling & Reuse Hub

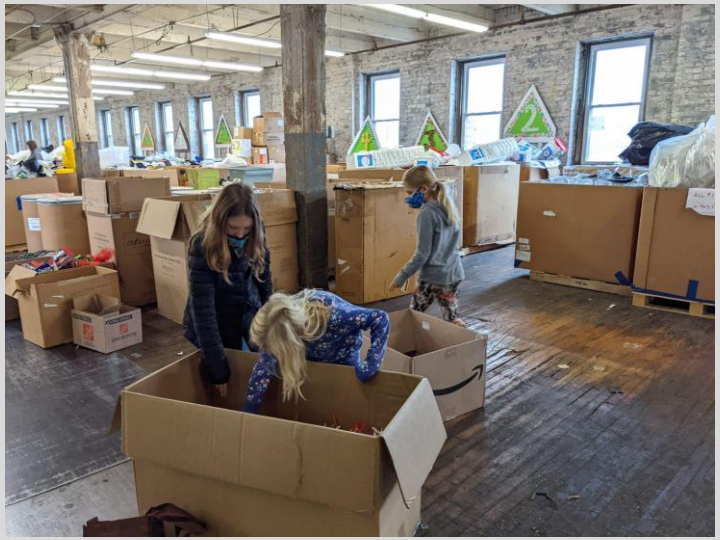
Colleen McSwiggin, Managing Director and Recycler-in-Chief
Email: crrh.managingdirector@gmail.com

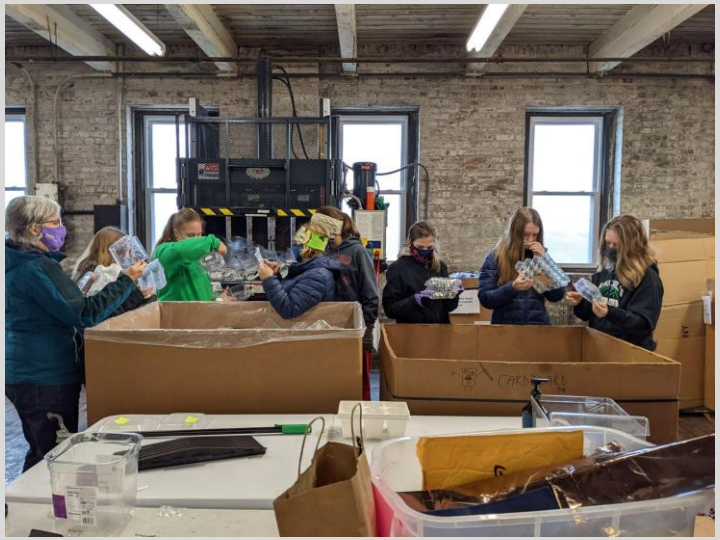
General email: cintirecyclingandreusehub@gmail.com
Phone: 513-629-9040
Website: www.cincinnatirecyclingandreusehub.org
Volunteer: https://bit.ly/CRRHvolunteer

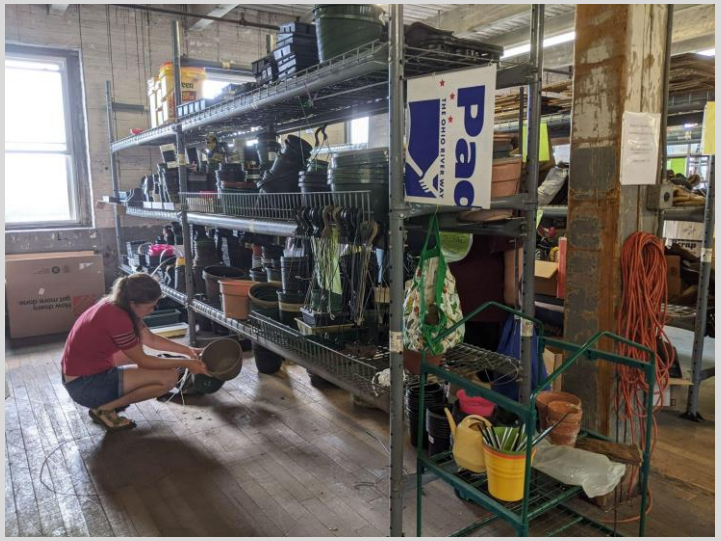
CintiRRH
@CintiRrh
cintirecyclingreusehub
Cincinnati Recycling & Reuse Hub
cintirecyclingandreusehub

Cincinnati Recycling & Reuse Hub

Thank You!







2022 REBUILD CONFERENCE

Wednesday, October 5, 2022

Jeff Raser, AIA
Cincinnati Urban Design and Architecture Studio

CNU-32 in Cincinnati

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Cincinnati Urban Design and Architecture Studio

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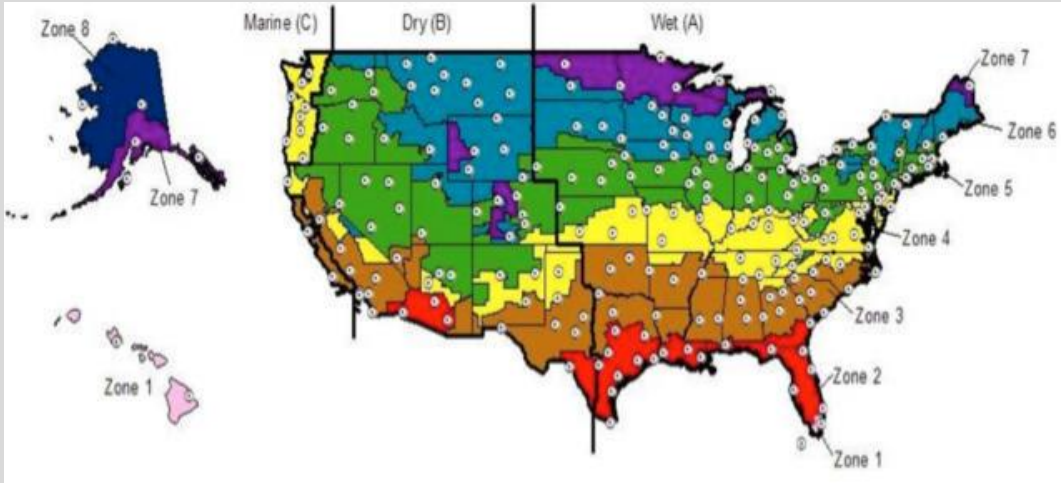
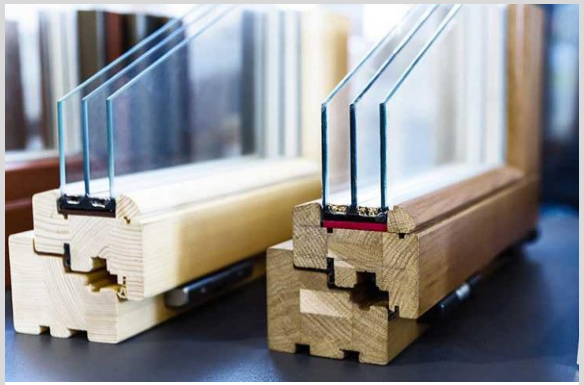
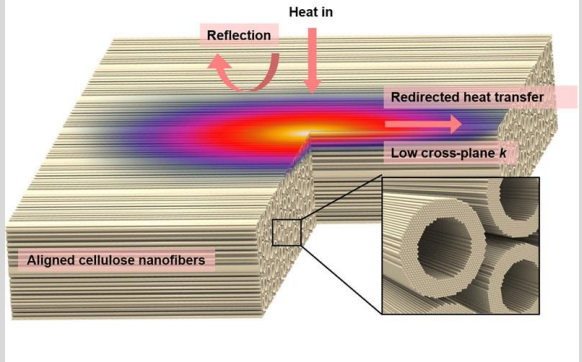
Sustainable Solutions

Building science has never been better.
Building efficiency never more prevalent.



USGBC, NIST





Building Advisor, OpenAccess.org, Science Advances, Melink Corp., Smart Cities World, Worldenergy.org

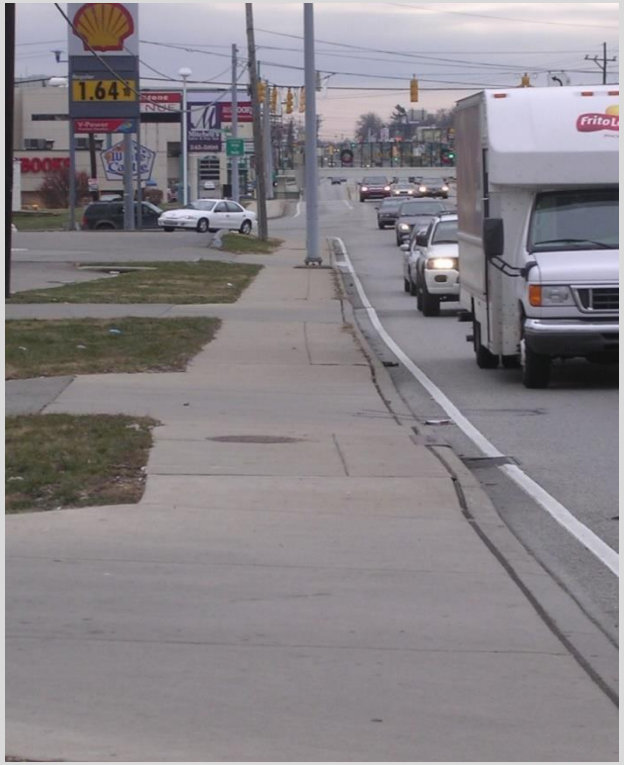
Sustainable Solutions?

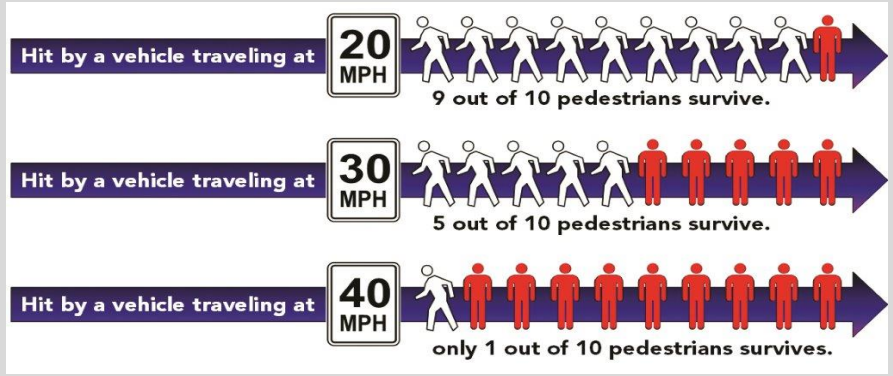
Google Earth, USGBC


Sprawl Sucks
Check 'n Go
The fastest way to pay.
SHOE CARNIVAL
ONLY
ONLY

Sprawl Sucks

Anywhere America, disconnected, segregated uses, traffic congestion, pollution, unsafe.
Unworthy.

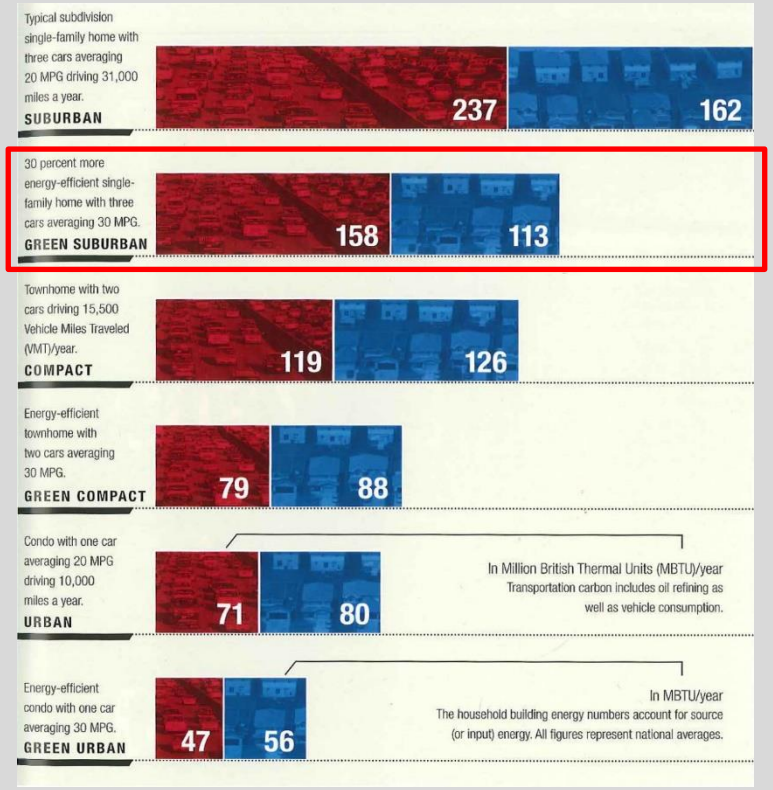


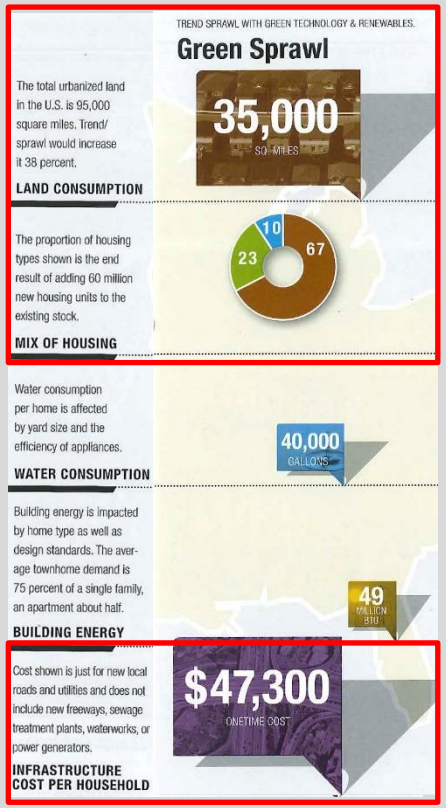


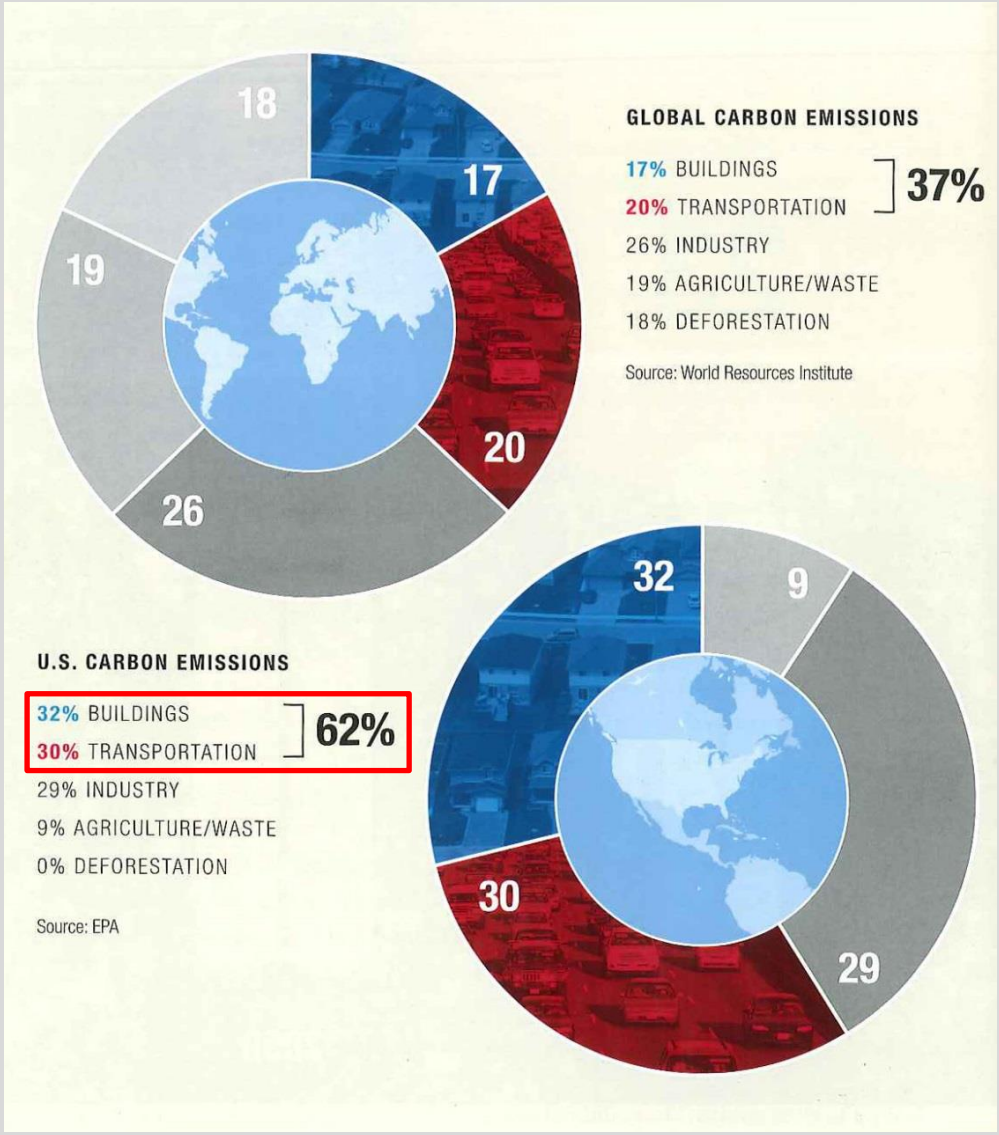
Peds.org

Sprawl Sucks

Even with green building solutions sprawl still sucks.
In the United States, Buildings *and Transportation* combined account for **62%** of all carbon emissions.
Even if every new building is GREEN, it's not enough.







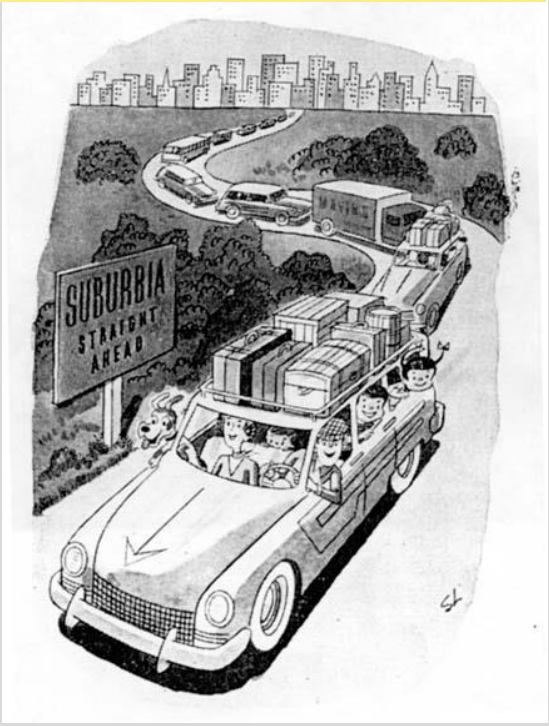
USEPA; Peter Calthorpe

We Had Great Cities

Walkable , mixed-use urbanism for 1000's of years, here and abroad.

Sprawl Sucks

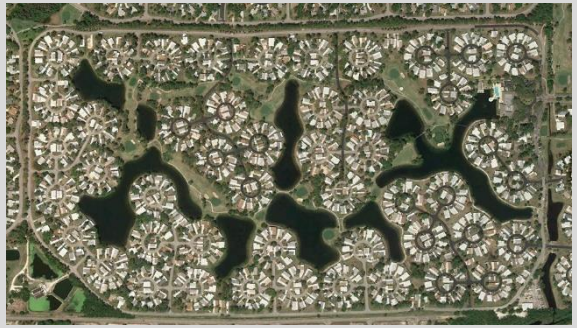
We feel in love with the idea of freedom – as brought to us through the car.
Promises and policies followed.

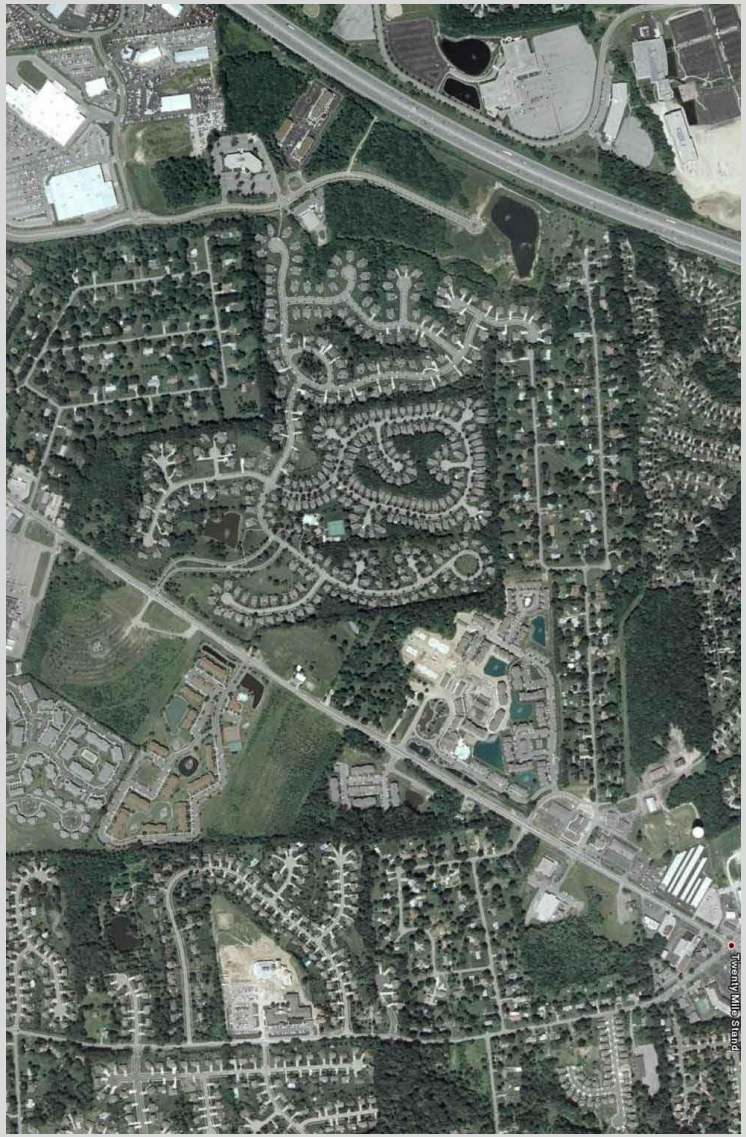


Life Magazine, Jethro Soudant, Affordable Housing Institute, General Electric, Electrical Merchandising

Sprawl Sucks

This led to craziness.





Google Earth, TxDOT

Sprawl Sucks

The focus of resources on suburbs led to the depletion of urban areas.

University of Cincinnati, Google Earth

Culprits… …and Solvers

Real estate developers
Politicians
Architects
Planners
Real estate agents
Lenders
Consumers
Policy-makers
Retailers
Transportation businesses
Traffic engineers

Sustainable Growth

We’re going to grow but we must grow wisely

Sustainable Re-Growth

Our cities needed to repopulate, but needed to do so wisely.

Sustainable Growth

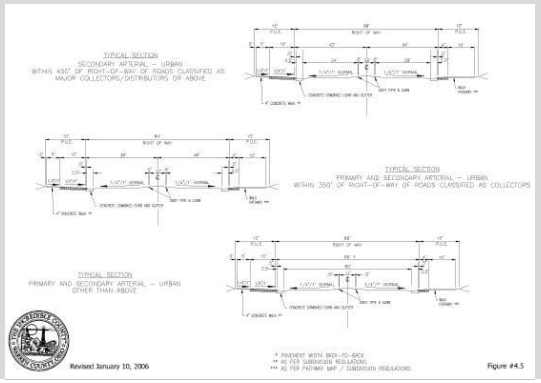
But the rules were against us.

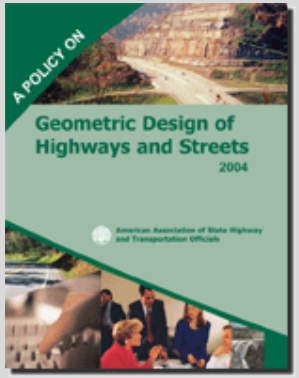
Table 2 Improvement Requirements by Type of Street Serving Residential Subdivisions

Type of Street	Number of Lots Served	Right-of-Way	Pavement Width (ft)	Curb and Gutter	Sidewalks Along Street	On-Street Parking	Minimum Front Yard Depth (ft)	Off Street Parking Required	Minimum Lot Width Required at Setback (ft)	Minimum Pavement Thickness
Courts - Dead end										
Typical	under 7	40	22	yes (c)	none	one-side	(a)	(a)	(a)	(g)
Optional	under 7	50	20	no	none	none	50	4 spaces (e)	100	(g)
Cul-De-Sac-Dead End										
Typical	7-25	50	25	yes (c)	one side	one-side	(a)	(a)	(a)	(g)
Optional	7-25	50	20	no	one side	none	50	4 spaces (e)	100	(g)
Local										
Typical	under 100	50	25	yes (c)	both sides (b)	one-side	(a)	(a)	(a)	(g)
Optional	under 100	50	20	no	both sides (b)	none	50	4 spaces (e)	100 (h)	(g)
Sub-Collector										
Typical	100-500	50	28	yes (c)	both sides (b)	one-side	(a)	(a)	(a)	(g)
Optional	100-500	40	22	no	both sides (b)	none	50	4 spaces (e)	100	(g)
Collector										
Typical	over 500	60	30	yes (c)	both sides (b)	one-side	(a)	(a)	(a)	(g)
Optional	over 500	60	22	yes	both sides (b)	none	50	4 spaces (e)	100	(g)

Note: Where streets are to serve industrial or commercial areas, the pavement design shall be based on a study prepared by the subdivider's Engineer, projecting type of vehicles using the street and traffic volumes and approved by the Planning Commission's duly authorized representative.

a. Minimum as per applicable zoning ordinance requirements.
b. Sidewalks may be permitted on only one side of the street, providing the minimum front yard depth is 50 feet and the lot width is 100 feet. When subdivisions are designed to provide pedestrian walkways to the rear of lots or in other locations other than along the street, the Planning Commission or its duly authorized representative may waive sidewalks along the streets. In the case where local streets serving less than 25 lots, sidewalks may be permitted on one side of the street.
c. Shoulders and side ditches may be permitted and designed in accordance with these regulations (See Appendix C) provided the minimum front yard depth is 50 feet, the minimum lot width is 100 feet, the minimum right-of-way is increased by 10 feet, except for collector streets.
d. Driveway access points along collector streets shall be discouraged, however, if permitted, shall be spaced not less than 200 feet apart.
e. Individual off-street parking spaces shall be laid out in such a manner to insure that each space has unrestricted ingress and egress to a public street (i.e., not blocked from gaining access to the street via another parked vehicle).
f. Arterial streets shall be designed in accordance with the requirements of the Kentucky Department of Transportation.
g. Minimum pavement thickness for Portland Cement concrete and asphalt concrete shall be designed in accordance with Tables 3 and 6, respectively.
h. In the case where local streets serving less than 25 lots, the minimum lot width shall be as per the applicable zoning ordinance requirements.





SUBDIVISION REGULATIONS

CAMPBELL COUNTY KENTUCKY
FOUNDED 1794

CAMPBELL COUNTY
COMMONWEALTH OF KENTUCKY

Adopted by:
Campbell County Fiscal Court
Ordinance No. 9-11-82

Issued by
CAMPBELL COUNTY AND MUNICIPAL PLANNING AND ZONING COMMISSION

discouraged. Local street intersections with arterial streets shall be discouraged, wherever practical.

5. Frontage Roads: Frontage roads may be required along an existing or proposed arterial street to provide access to lots along such streets.

6. Alleys: Where alleys are to be provided (e.g., in the case of certain commercial development), they shall be designed to provide only secondary access.

D. Street Rights-of-Way:

1. Widths and grades of new streets: Street right-of-way widths and grades shall conform to the following minimum requirements:

TABLE 1 - STREET RIGHTS OF WAY WIDTH AND GRADE REQUIREMENTS

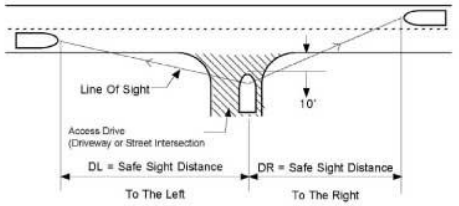
TYPE OF STREET	MINIMUM RIGHT-OF-WAY WIDTH (IN FEET) ***	GRADES BY PERCENT (%) MAX.	MIN.
ARTERIAL	*	*	*
COLLECTOR	60	10	0.5
SUBCOLLECTOR	50	12	0.8
LOCAL (INCLUDING CUL-DE-SACS)****			
Residential	50	12	0.8
Commercial and Industrial Areas	60	10	0.8
COURTS	40	12	0.8
FRONTAGE ROAD	**	**	**
ALLEYS	20	10	0.5

* Arterial streets shall be based on current design standards and other pertinent requirements of the Kentucky Department of Transportation and the official Comprehensive Plan, as adopted. Requirements will vary for a frontage road depending on whether the street would service as a Local, Subcollector or Collector type street and as such would be designed in accordance with the respective requirements of said streets.
** Except as may be permitted in Table 3 of these regulations.
*** Descending centerline grades approaching the terminus of a cul-de-sac shall be reduced within a vertical curve to a maximum of four (4) percent unless determination is made by the planning commissions duly authorized representative that a steeper grade will provide adequate clearance for vehicles entering ascending driveways.
****

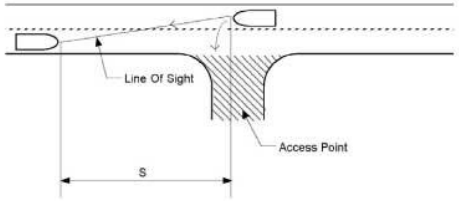
2. Existing Streets: Existing rights - of - way (i.e., public or private) and widths shall be determined from existing deeds or lots of record and other statutes or agencies establishing such widths. Subdivisions platted along existing streets shall dedicate additional right-of-way, if necessary, to meet the minimum street width requirements set forth in Section 6.0, Subsection D (1) of these regulations. Such dedication shall be in accordance with the following:

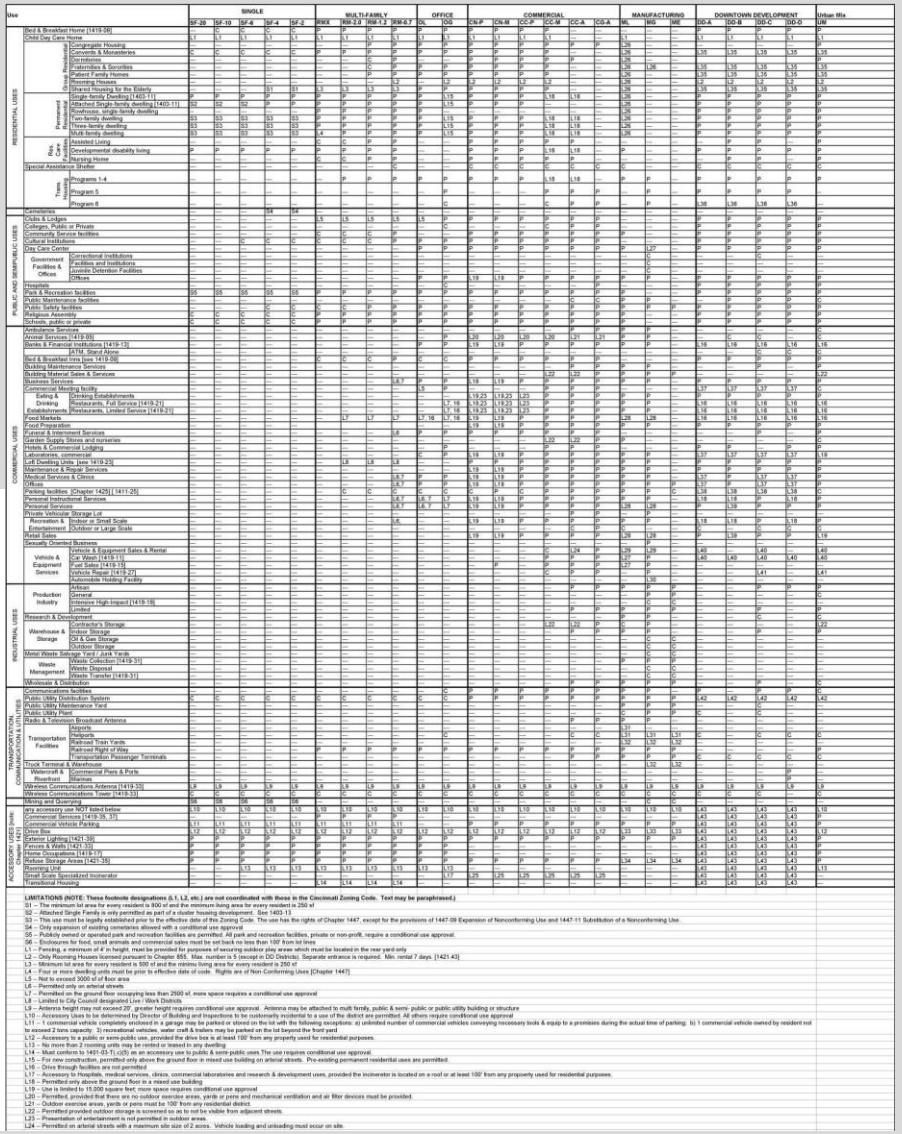
TABLE 2C

SIGHT DISTANCE FOR VEHICLES EXITING FROM ACCESS POINTS
(refer to Table 2A)



LEFT TURN SIGHT DISTANCE FOR VEHICLES ENTERING ACCESS POINTS
(refer to Table 2B)





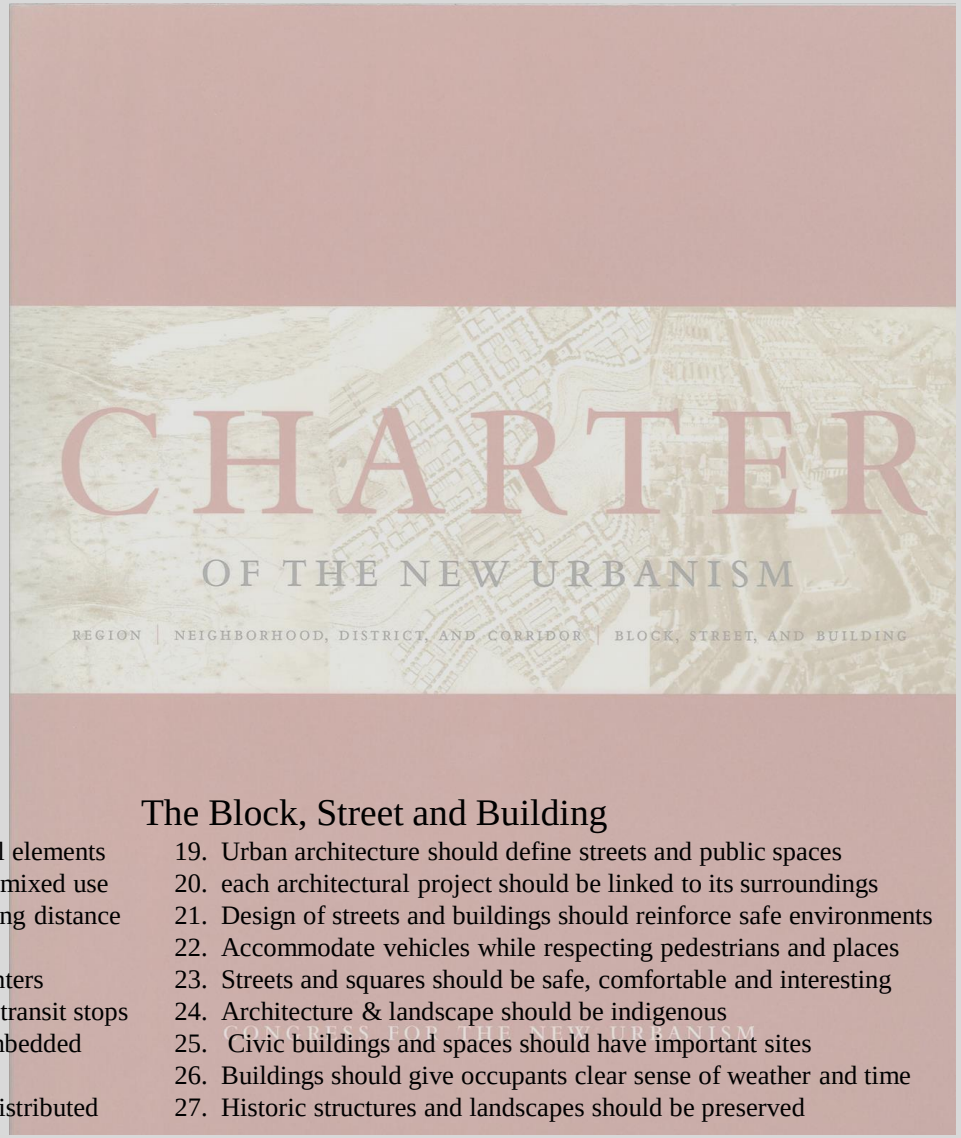
Campbell County, Ky.; Cincinnati, Oh.; AASHTO

Charter of the New Urbanism

PREAMBLE

The Congress for the New Urbanism views disinvestment in central cities, the spread of placeless sprawl, increasing separation by race and income, environmental deterioration, loss of agricultural lands and wilderness, and the erosion of society's built heritage as one interrelated community-building challenge.

We stand for the restoration of existing urban centers and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighborhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy.
We advocate the restructuring of public policy and development practices to support the following principles: neighborhoods should be diverse in use and population; communities should be designed for the pedestrian and transit as well as the car; cities and towns should be shaped by physically defined and universally accessible public spaces and community institutions; urban places should be framed by architecture and landscape design that celebrate local history, climate, ecology, and building practice.
We recognize that physical solutions by themselves will not solve social and economic problems, but neither can economic vitality, community stability, and environmental health be sustained without a coherent and supportive physical framework.
We represent a broad-based citizenry, composed of public and private sector leaders, community activists, and multidisciplinary professionals. We are committed to reestablishing the relationship between the art of building and the making of community, through citizen-based participatory planning and design.
We dedicate ourselves to reclaiming our homes, blocks, streets, parks, neighborhoods, districts, towns, cities, regions, and environment.



PRINCIPLES OF THE CHARTER

The Region: Metropolis, City and Town

1. The metropolitan region is the fundamental economic unit
2. Metropolitan regions are formed by natural boundaries
3. The metropolis has a fragile relationship with its landscape
4. Infill growth within the edges of the metropolis
5. New Development should integrate with existing urban patterns
6. Development should respect historical precedents
7. Cities should have a broad spectrum of uses and housing
8. Supportive framework of transportation alternatives for the region
9. Cities within regions should cooperate and share resources

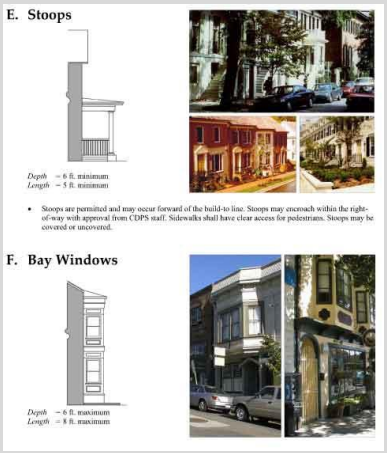
Neighborhood, District and Corridor

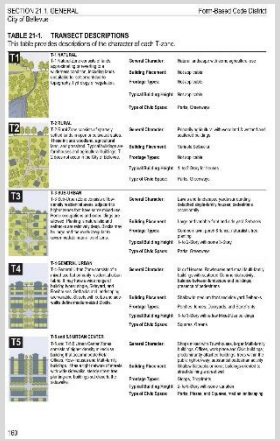
10. The Neighborhood, District and Corridor are essential elements
11. Neighborhoods to be compact, pedestrian-friendly & mixed use
12. Many activities of daily living should be within walking distance
13. Broad range of housing types
14. Transit corridors can organize and revitalize urban centers
15. Appropriate uses and densities should be clustered at transit stops
16. Civic, institutional and commercial uses should be embedded
17. Graphic urban design codes to be employed
18. A range of park sizes and characters should be well distributed

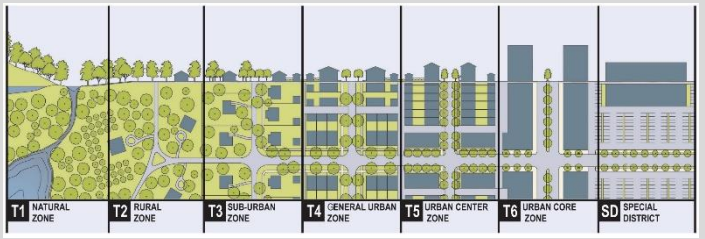
The Block, Street and Building

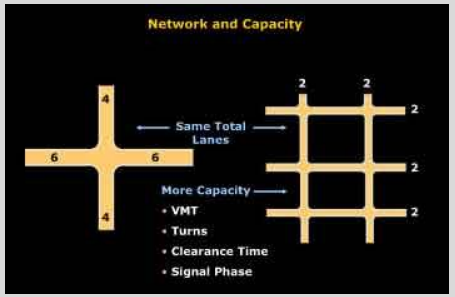
19. Urban architecture should define streets and public spaces
20. each architectural project should be linked to its surroundings
21. Design of streets and buildings should reinforce safe environments
22. Accommodate vehicles while respecting pedestrians and places
23. Streets and squares should be safe, comfortable and interesting
24. Architecture & landscape should be indigenous
25. Civic buildings and spaces should have important sites
26. Buildings should give occupants clear sense of weather and time
27. Historic structures and landscapes should be preserved

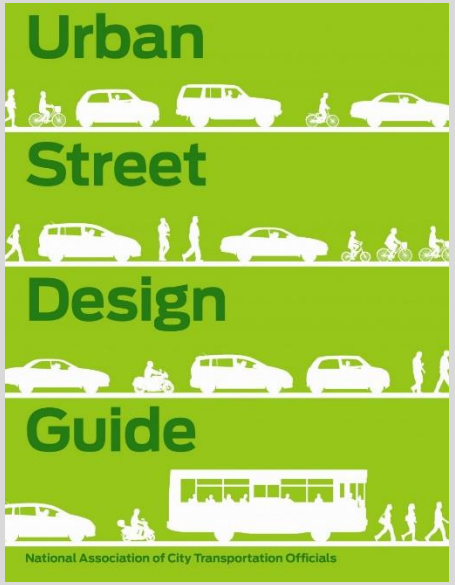
CNU analyzed issues and rebuilt codes & standards









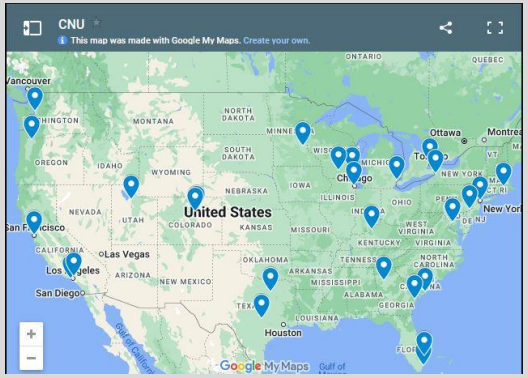


Dover Kohl & Assoc.; SmartCode, Placemakers, NACTO

The Congress for the New Urbanism

To build sustainable places worthy of pride

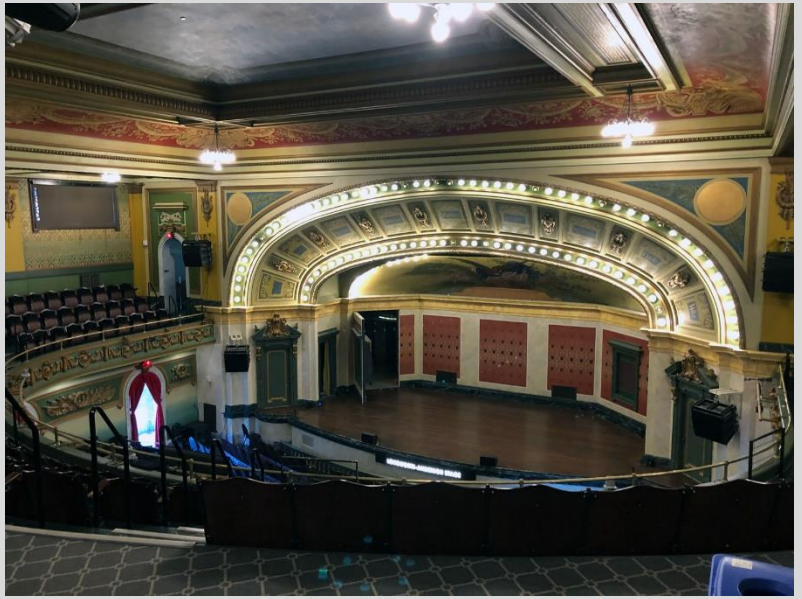
An immersive Congress



CNU

CNU-32 Cincinnati

May, 2024



CNU-32 Cincinnati

May, 2024

Avondale
Bellevue
Clifton
College Hill
Columbia Tusculum
Covington
Dayton
Downtown
Green Hills
Glendale
Hyde Park
Loveland
Northside
Norwood
Oakley
Over-the-Rhine
Madisonville
Mariemont
Mount Adams
Newport
South Fairmount
Walnut Hills
West End
Wyoming