



COMMISSIONING POST-PANDEMIC

Coming out of the
Pandemic

May 12, 2022

Agenda

1. Introductions
2. Our Industry Post Pandemic
3. The Engineered Response
4. Getting Back to “Normal”
5. Existing Building Considerations
6. The Commissioning Response
7. Questions?



Tyson Glimme, PE, BCxP, QCxP

Tyson is a commissioning provider with over 16 years of commissioning experience and a registered engineer in numerous states. In 2008 he worked with Focus on Energy in development of their retrocommissioning pilot program. As part of the retrocommissioning pilot program he successfully completed the first retrocommissioning process for a healthcare facility in Wisconsin and saved the facility over \$296,000 in the first year of the program.



Jeff McEntee, CCP, CxA+BE, BECxP, CEM, CAPM, CDSM, IDL

Jeff has over 15 years of commissioning experience for HVAC, Building Enclosure, and low-voltage systems. Jeff holds numerous commissioning certifications as well as being a Certified Energy Manager and Level 1 Thermographer. Jeff has a focus on sustainability and has led the commissioning services for numerous LEED certified facilities, Net Zero Energy facilities and WELL buildings across the nation. Jeff has spear headed the development of Mead and Hunt's Monitoring Based Commissioning platform, Skyspark, to provide advanced data analytics and fault detection and diagnostic analysis. He commissioned the first Collaboration for High Performance Schools (CHPS) project in Colorado and is overseeing Mead and Hunt's commissioning efforts for the Denver International Airport's concourse expansion projects.



Our Industry Post Pandemic

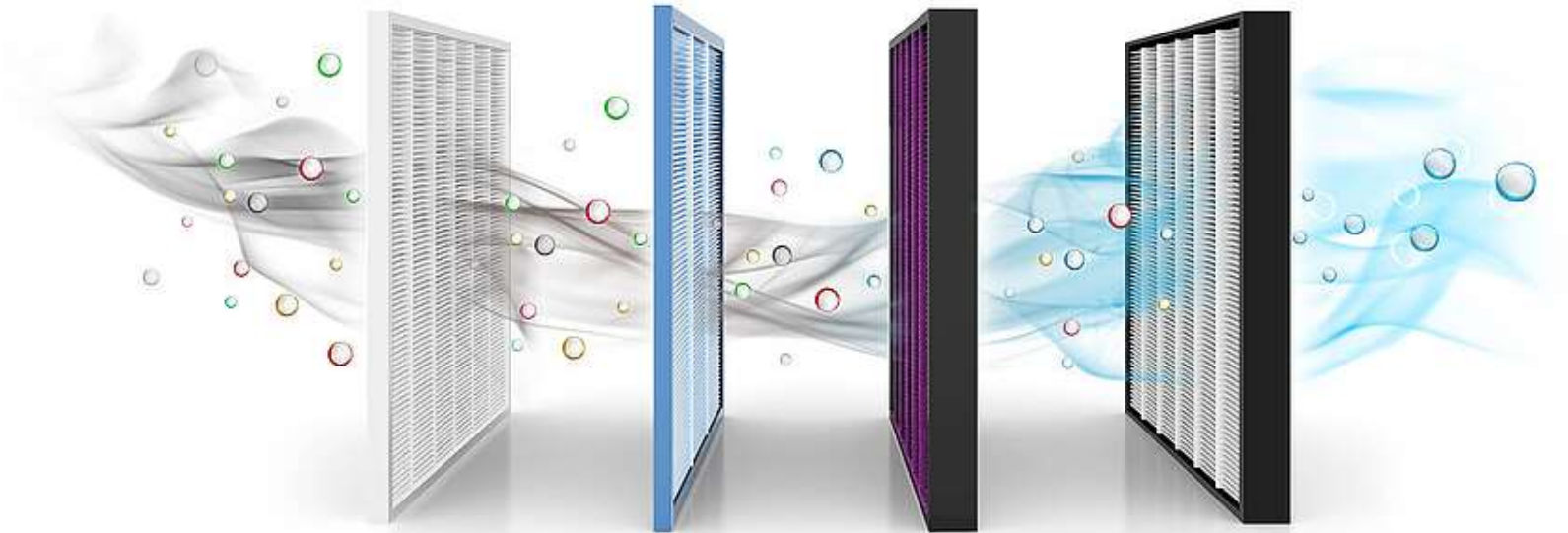
Our Industry Post Pandemic

- What has changed
 - The “Virtual” World
 - Awareness/Focus on ventilation
 - Maintainability
 - Sterilization and overall cleanliness
 - Preparedness/Readiness for pandemics
 - Product availability
 - Product quality may be different



Our Industry Post Pandemic (cont.)

- What have we learned
 - Technology and communications flexibility is critical
 - Ventilation Overrides
 - Sterilization of systems is critical
 - Installation of some systems is not “tried & true”



Our Industry Post Pandemic (cont.)

- What have we learned
 - Maintainability and cleanliness is a primary focus
 - Operational Readiness Plan
 - Sustainability Awareness
 - Where is product made
 - What is life-cycle of product
 - What is actual effectiveness of the product



The Engineered Response

A New, Virtual World

Our Industry Post Pandemic



Technology, Communications, Access Control

- Virtual meetings
- Virtual Visit Technology
- Virtual Visitors



Virtual Visits or “Tele-Health”

- Benefits
 - Provides “access” to less critical patients
 - Relieve shortage of physicians and nursing
 - Procedure follow-up
 - Medication renewal after discharge
 - Roughly half the cost of in office visits



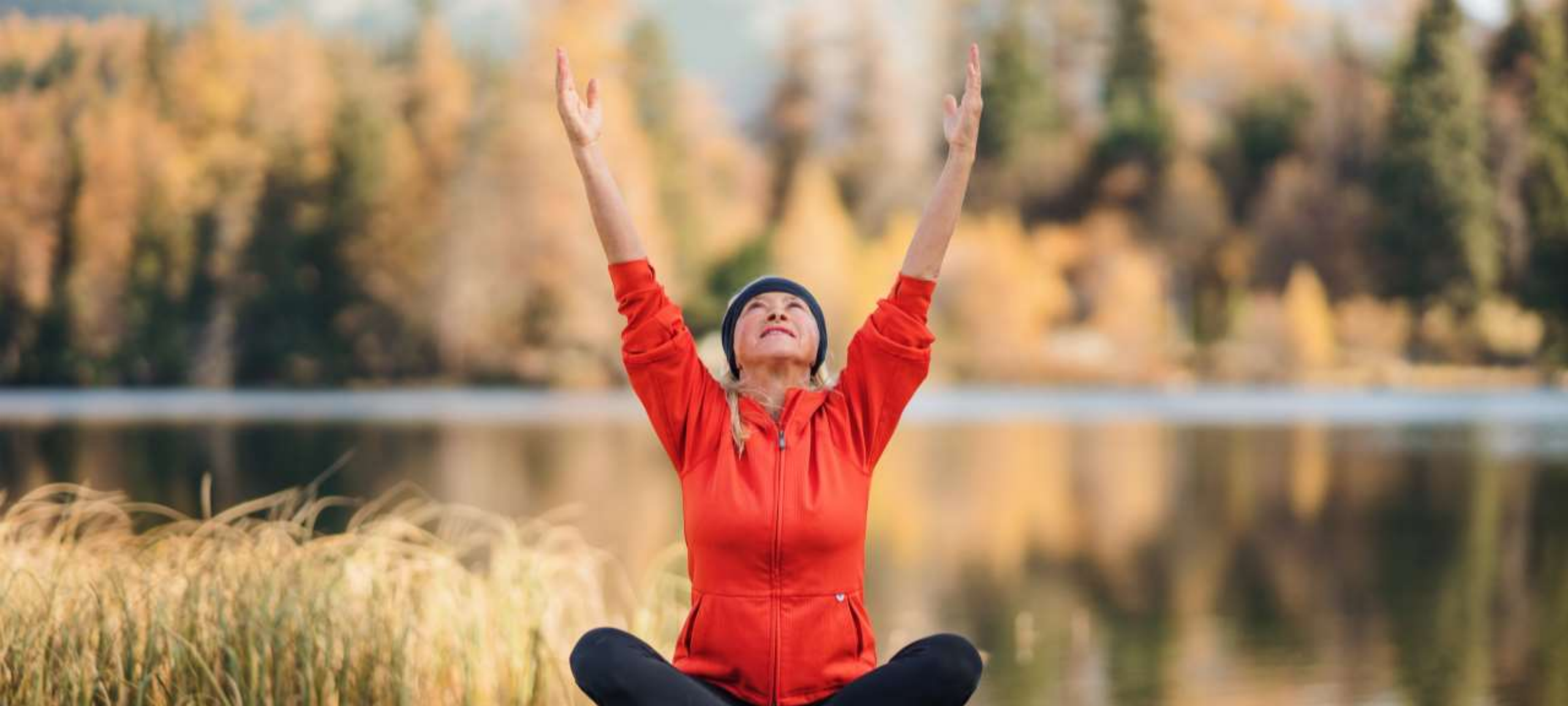
Virtual Visits – Engineered Solution

- Secure Communications
 - Cryptography
 - Secure Channels
 - Confidential Channels
 - Authentic Channels
 - Encryption prior to transmission
 - Dedicated space for video/audio studio



Virtual Visits – Engineered Solution

- Resulting Services
 - Design review to verify service at locations
 - Installation verification for infrastructure needs
 - Testing to confirm readiness at time to occupancy

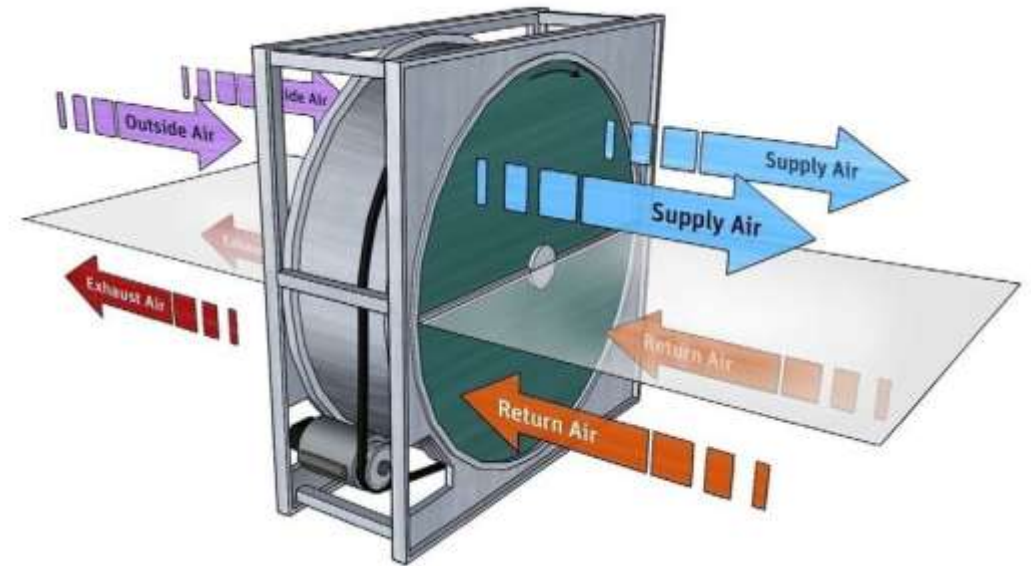


Ventilation

Increase Ventilation - Engineering the Solution

- **Increased Ventilation -Energy Recovery**

- Increases the amount of outside air introduced for ventilation
- Increased levels of oxygen in the ambient air
- Removes CO2 from the space
- Potential to offset heating or cooling costs
- Greatly eliminates the energy consumed from third party service providers



Repeatable and Reliable – Control of Outside Air

- **Damper Control**

- Parallel Control – Single Output

- Position setpoint
 - Airflow setpoint

- Series Control – Multiple Output

- Position setpoint
 - Temperature setpoint
 - Airflow setpoint
 - Pressure setpoints



Repeatable and Reliable – Control of Outside Air

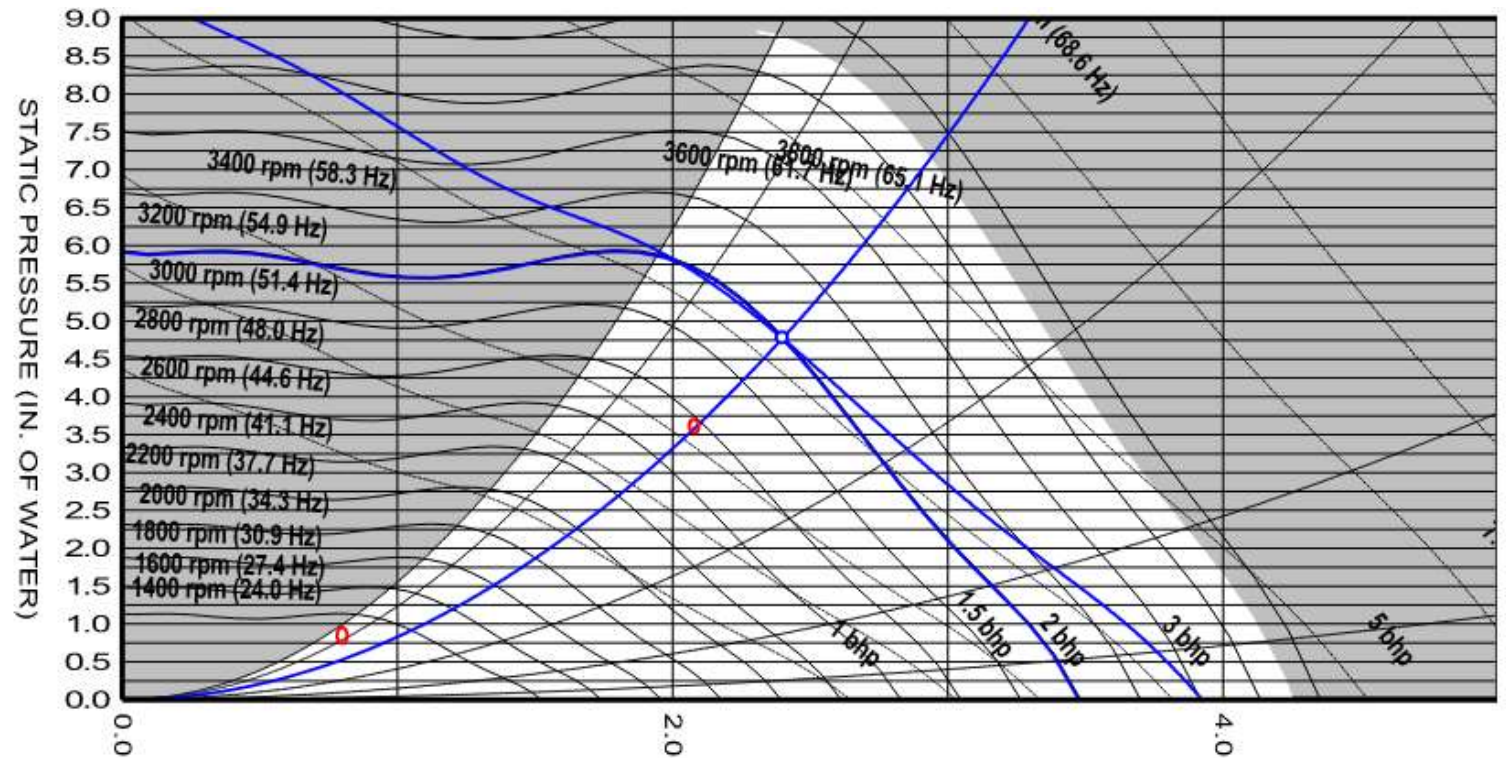
- **Fan Control**

- Static pressure/Building Pressure
- Static pressure/Relief Pressure
- Supply/Return Speed
- Supply/Return flow offset

	equip	minOAcfm	actualOAMinSetpoint
i	AHU-205	16,800	1,000 cfm
i	AHU-903	1,020	1,020 cfm
i	AHU-904	1,020	1,020 cfm
i	AHU-902	2,376	2,376 cfm
i	AHU-901	2,376	2,376 cfm
i	AHU-201	4,338	4,338 cfm
i	AHU-200	4,800	8,500 cfm
i	AHU-203	22,000	10,000 cfm
i	AHU-202	16,800	16,800 cfm
i	AHU-204	22,000	26,000 cfm

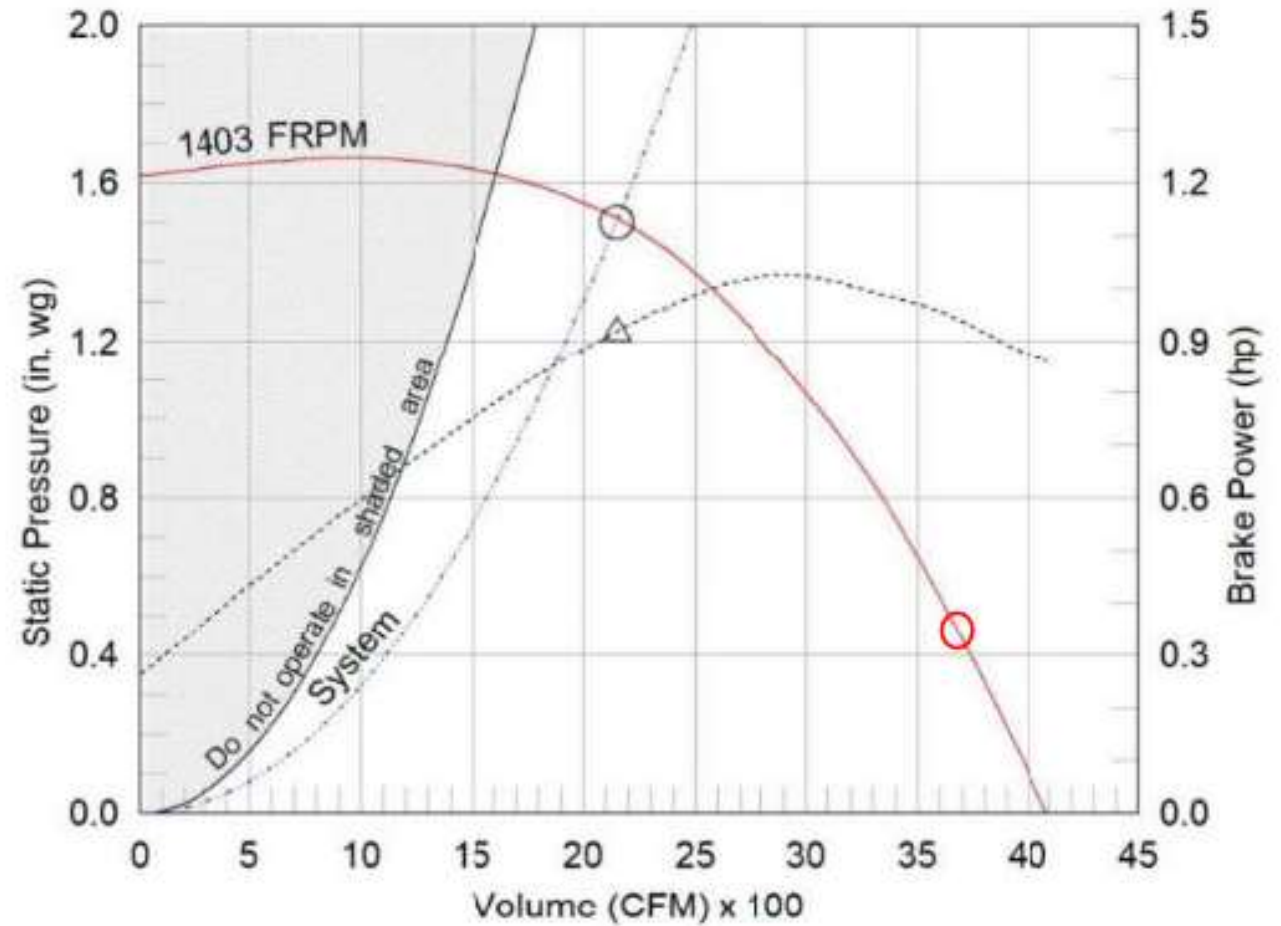
Ventilation Versatility and Repeatability – Engineering the Solution

- Supply Flow Balance
 - Max Flow – Full Economizer
 - Min Flow



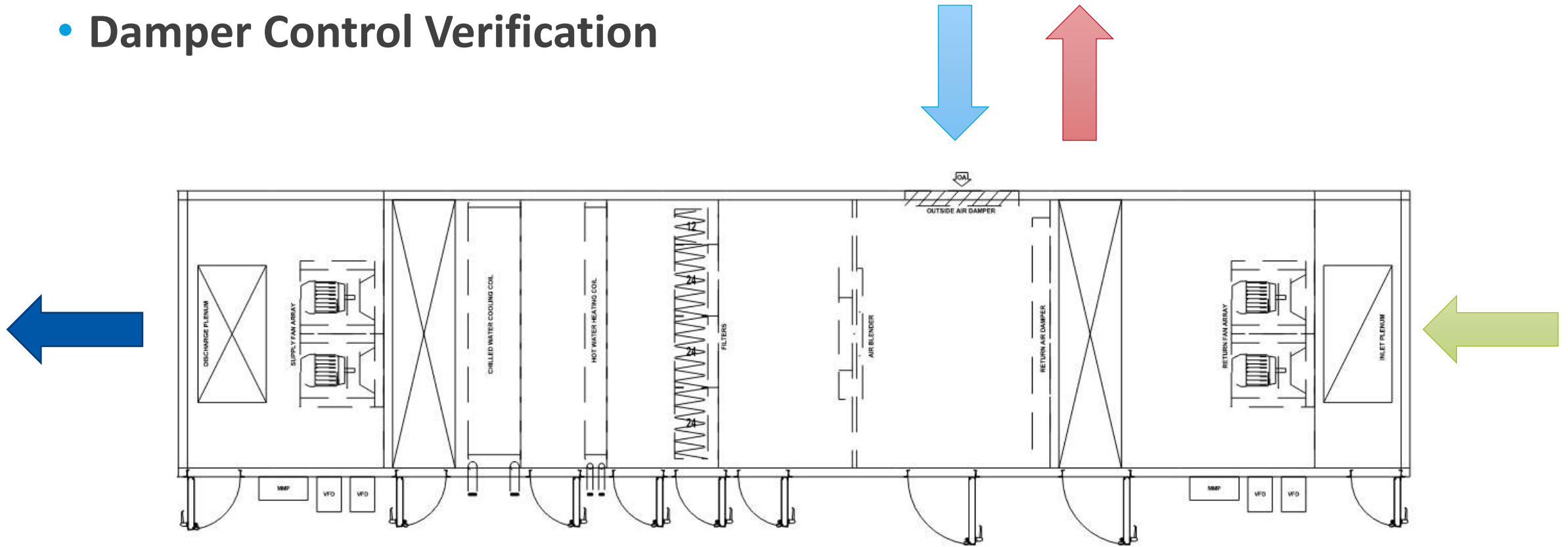
Ventilation Versatility and Repeatability – Engineering the Solution

- **Return Flow Balance**
 - Only at Max flow



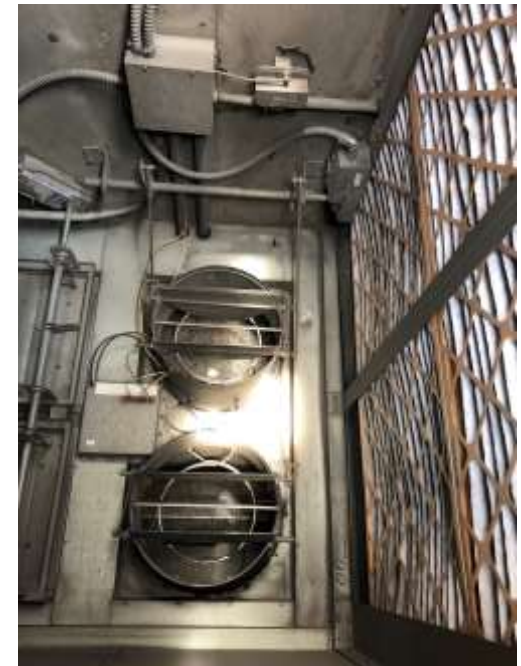
Ventilation Versatility and Repeatability – Engineering the Solution

- Speed Control Verification
- Damper Control Verification



Repeatable and Reliable – Control of Outside Air

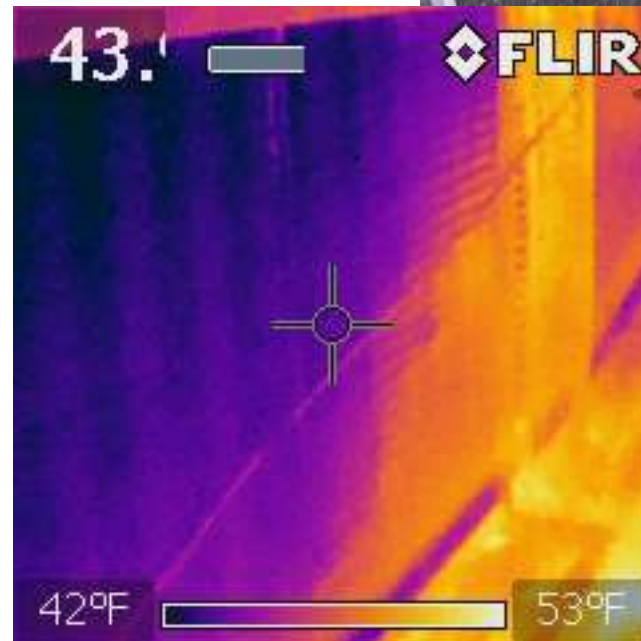
- Air Flow Measuring Stations
 - Confident control of Outside Air.
 - Provides flexibility with outside air flow setpoints.
 - Duct-mounted Air Flow measuring stations



Maintainability

Systems designed to reduce maintenance

- **Consider options and potential future needs**
 - UV Lights
 - Filters and Location
 - Ionization



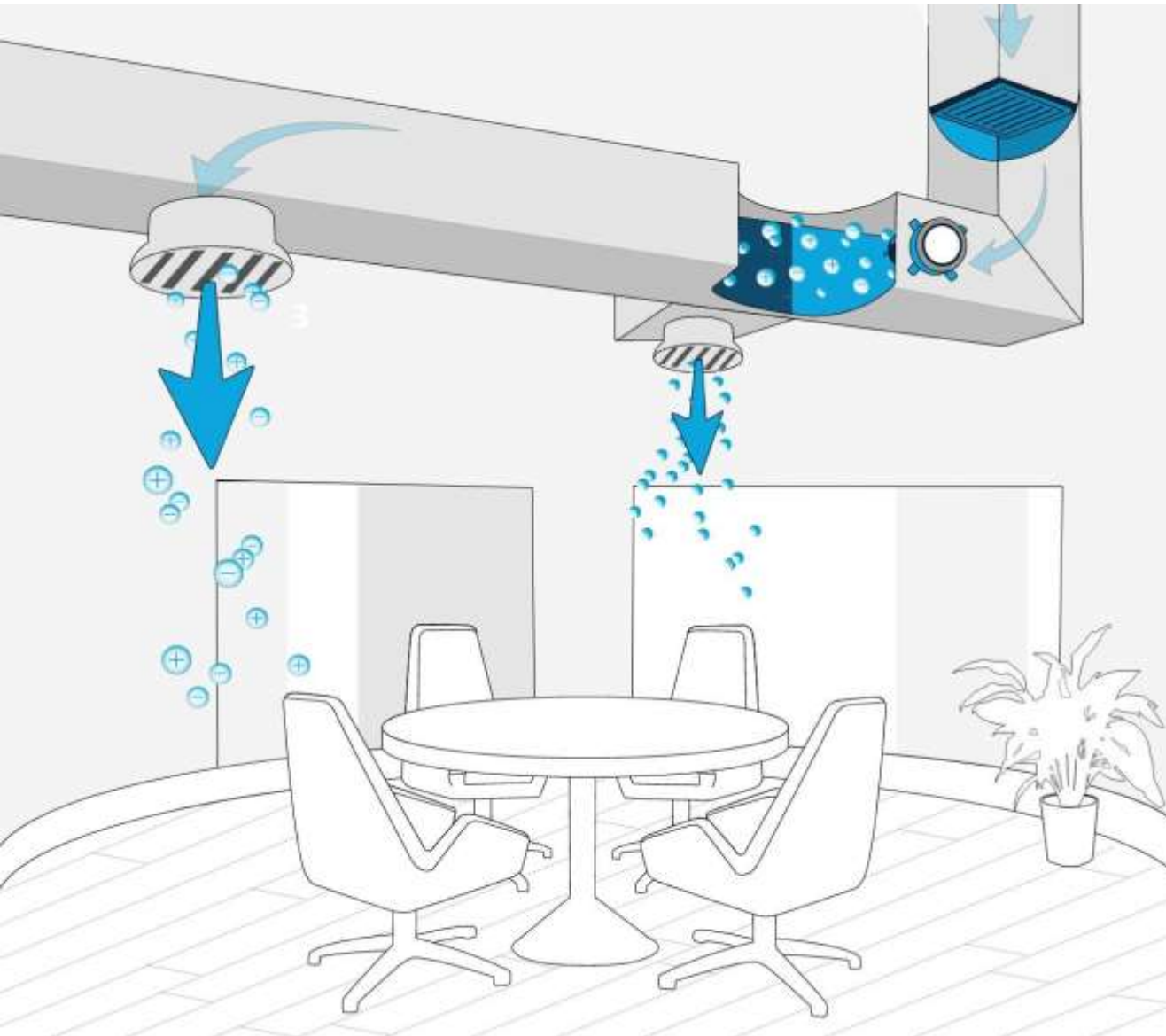
Sterilization of Systems

Airstream Sterilization – UV Lighting



- Ultra-Violet Lighting in Mechanical Systems
 - Reduction in airstream contaminants
 - Reduces particulates in the air
 - Extends filter life
 - Improves cooling and heating performance.
 - Complies with CARB Certification
 - Complies with UL Certification
 - Per the CDC UVGI can be used to control SARS-CoV-2.

Airstream Sterilization – Needlepoint Bipolar Ionization (NPBI)



- Bi-Polar Ionization
 - Relatively new technology
 - Introduces ions into the air stream.
 - Large bacteria and viruses (COVID-19) bond and drop out of the air-stream.
 - Challenge is verification of effectiveness

Maintenance Benefits

- Ultra-Violet Lighting in Mechanical Systems
 - Increased filter life
 - Reduced maintenance on cooling coils
 - Improved coil performance
- Bi-Polar Ionization
 - Effectiveness is still be studied



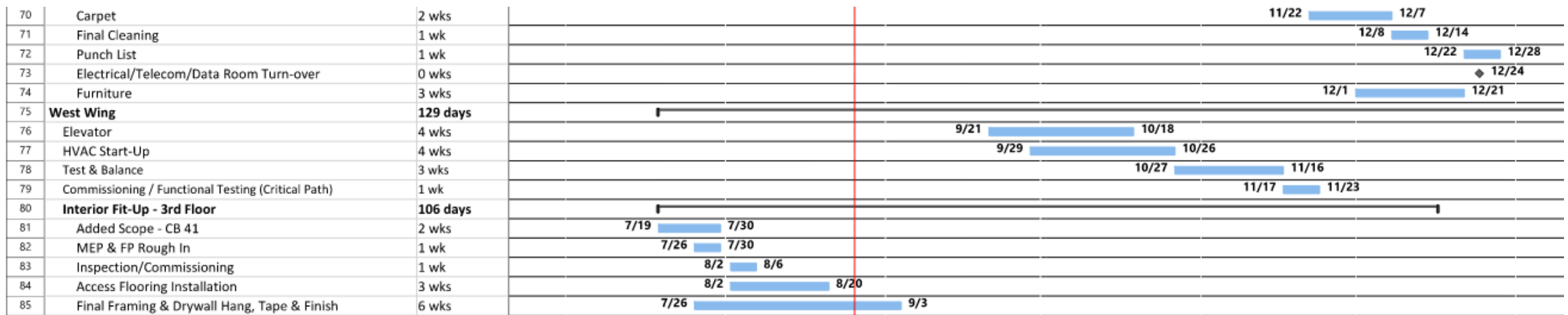
Product Availability

Product Availability and Sustainability

- What is the lead time
- What effect does this have on the schedule
- Where is the device manufactured
- What are options from this manufacturer
- What are alternate products and are they comparable
- What is “Plan B”

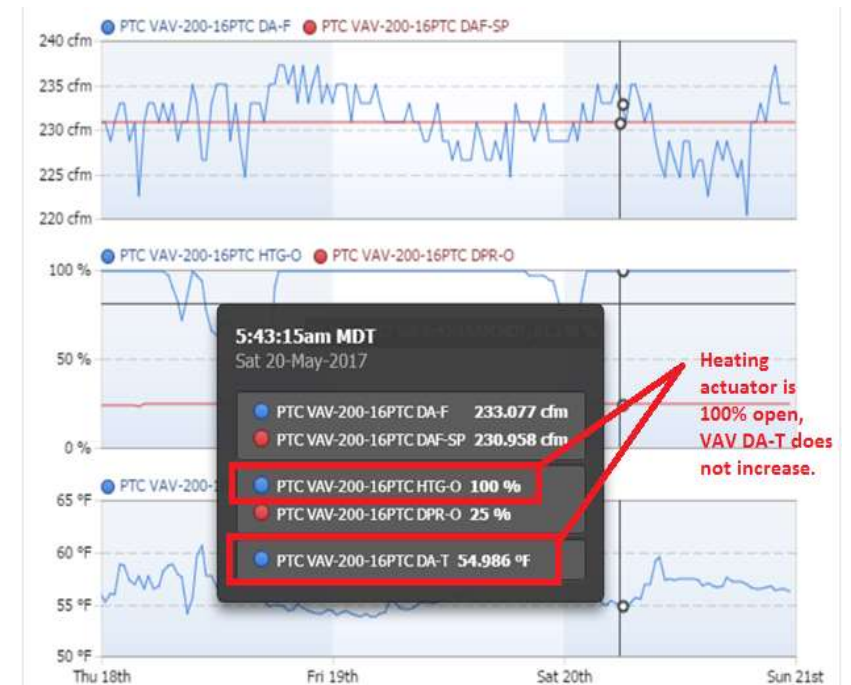
Product Availability and Project Schedule

- Product delivery delays + Designated Occupancy Dates
- Limited or NO opportunity for system verification (aka Functional Testing).



Monitoring-Based Commissioning – Commissioning Solutions

- **Monitoring-based Commissioning (MBCx)**
 - 100% Sampling of Systems
 - Monitoring based trending through seasons and for extended verification and tuning
 - Reduce Energy Consumption
 - 5-9% energy use savings (LBNL)
 - Continuous improvements on performance
 - Continuous improvements on efficiency
 - Proactive control and not reactionary



Our Technology and effects on Lighting Design

- Expectations of Lighting has changed
 - The old philosophy of brighter is better is now reimagined
 - Lighting has the primary effect on our ability to focus.
 - Natural daylight reduces anxiety and stress
 - Lighting play significant role in overall wellness and people mental health



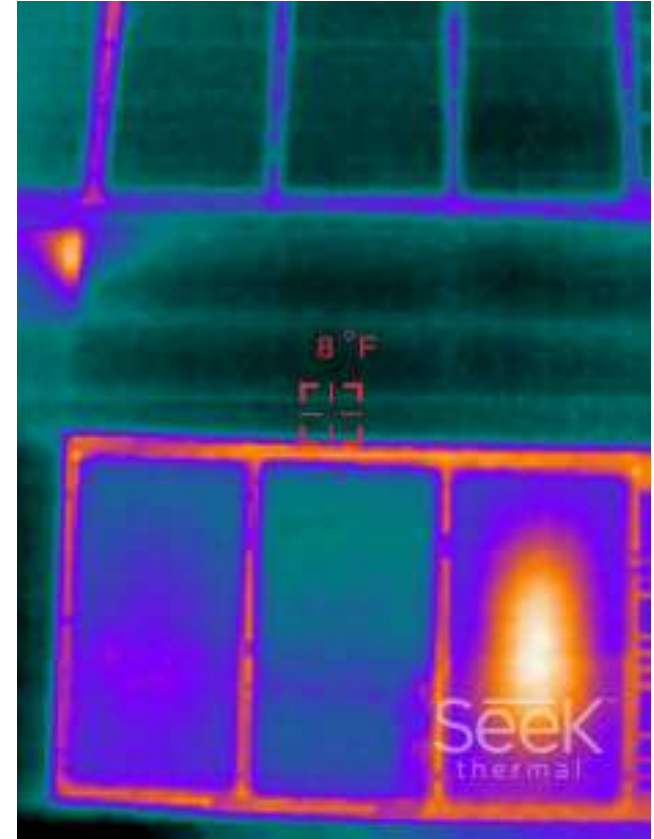
Lighting Availability and Awareness

- Lighting design considerations
 - Some entire lines of fixtures have been discontinued.
 - Verify lead times during early design
 - Verify illumination of the fixtures installed



Focus on product quality

- Expectations of Equipment vs. Achieved
 - Thermal Imaging of all openings.
 - Lighting levels in spaces
 - Control comparisons
- Maintainability



Getting Back to “Normal”

ASHRAE EPIDEMIC TASK FORCE

“It is crucial to note, that each HVAC system needs to be analyzed for the appropriate engineering controls to utilize to improve its potential to reduce virus transmission in the building.”

ASHRAE BUILDING READINESS PLAN

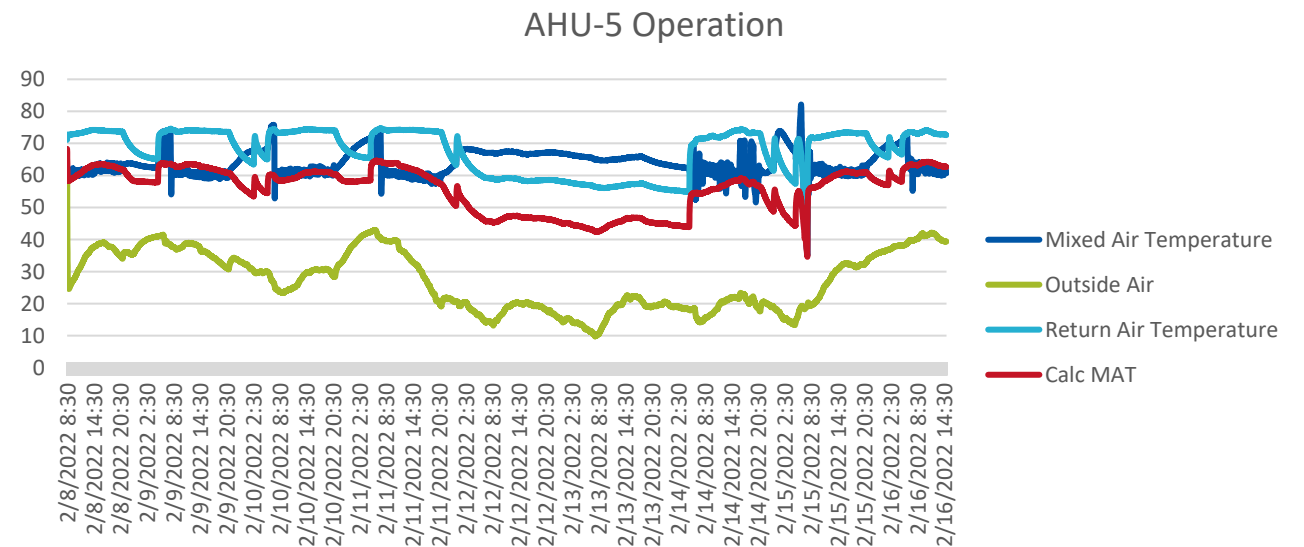
Getting back to “NORMAL” - Existing Building Commissioning



- Identify the original operating conditions vs. intent
- Is the original intent still applicable?
- Consider current operational strategies
- Planned future use and necessary versatility
- Identify improvement opportunities and available incentives
- Evaluate costs

Existing Building Considerations (Post-Pandemic)

- Ventilation reduces recovery time and increases alertness
- Mechanical systems need to be versatile and repeatable
- Operational preparedness
 - Are systems capable of being modified to align with HVAC mitigation strategies
- Improve filtration
- Sterilization and air cleaning options
- Maintainability needs to be considered
- Updates in lighting
- Cleanliness is a focal point
- Sustainability Awareness



Existing Building Services (Post-Pandemic)



- Retro-Commissioning of MEP Systems
- Review of Current Facility Requirements
- Consider current operational strategies
- Planned future use and necessary versatility
- Identify improvement opportunities and available incentives
- Evaluate costs
- Consider incentives

The Commissioning Response

- Program Phase
- Design Phase
- Construction Phase
- Acceptance Phase
- Warranty Phase



Program Phase

- Assist the Owner in creating the OPR and review the OPR.*
- Develop and implement a Commissioning Plan.*
- Review the Design Documents prior to 50% Design
 - Product selection
 - Operational requirements
 - Future Needs



*LEED Fundamental Commissioning Prerequisite

Design Phase

- Review the Basis of Design and design for compliance to the OPR*
- Design Review
 - Accessibility
 - Maintainability
 - Repeatable operations
 - Achieved performance metrics
- Integrate Commissioning Process requirements during construction and occupancy phases into the specifications*
- Verify inclusion of operator and occupant training requirement in construction documents*

*LEED Fundamental Commissioning Prerequisite

*LEED Enhanced Commissioning



Design Review Based on Flexibility

- Communications and Technology Design
- Product availability
- Product evaluation with A/E
- Ventilation control strategies
- Controllability of systems and various OA flows
- Types of sterilization and location



Construction Phase

- Review submittals for compliance*
 - Understand acceptable substitutions
 - Device Compatibility
- Are devices compatible
 - Focus on future needs and flexibility
- On-going Cx Meetings
- Track construction checklists*
- Verify O&M Manuals for inclusion into the Systems Manual*
- Accomplish initial training and O&M walk-throughs*

*LEED Fundamental Commissioning Prerequisite

*LEED Enhanced Commissioning



Acceptance Phase

- Witness and verify Functional Performance Testing (FPT's)*
 - Schedule Conflicts
 - Device communication
 - Reporting
 - Available trends
- Verify on-going system training*
- Verify the Commissioning Issues List*
- Review and verify final O&M documentation
- Substantial Completion

*LEED Fundamental Commissioning Prerequisite

*LEED Enhanced Commissioning



Warranty Phase

- Complete and submit Commissioning Report*
 - Including Systems Manual*
- Monitoring Based Commissioning
- Perform seasonal testing and re-training*
- Review equipment performance prior to warranty expiration and provide recommendations to improve performance*
- Lessons learned meeting
- Develop an on-going commissioning plan*

*LEED Fundamental Commissioning Prerequisite

*LEED Enhanced Commissioning



New Construction Considerations (Post-Pandemic)

- Technology and Communications
- Product availability (Temporary or Discontinuation)
- Ventilation reduces recovery time and increases alertness
- Mechanical systems need to be versatile and repeatable
- Maintainability needs to be considered
- Sterilization of systems can be improved
- Updates in lighting
- Cleanliness is a focal point
- Sustainability Awareness





Questions?

Thank you.