

**EBCx Services**  
**Facility Optimization**  
**Operating Buildings Safely, Comfortably and Energy Efficiently**





## Improving Customer's IAQ, Comfort and Managing Energy Costs with Facility Optimization

- Since Covid-19, Indoor Air Quality (IAQ) has grown into a serious health concern for people to get back to work, school, indoor recreation/exercise and pre-pandemic life in general
- CDC's updated guideline as of October 05, 2020 state that airborne transmission of Covid-19 occurs in the following scenarios:
  - Inadequate ventilation of air conditioning units that allow a build-up of suspended small respiratory droplets and particles that potentially transmit the virus
  - Prolonged exposure to respiratory particles, often generated with expiratory exertion (e.g., shouting, singing, exercising) that increases the concentration of suspended respiratory droplets in the air space
- CDC recommends increased ventilation and Avoidance of crowded indoor spaces as interventions to prevent the spread of Covid-19

# The Goal of Facility Optimization

- Optimization: a process of making a system as fully perfect, functional, or effective as possible
- When working with an existing “Facility”, the goal of “Optimization” is to make the facility **operate as effective as possible**
- Working within the available limits of existing HVAC and control systems, Facility Optimization produces the following results:
  - Improved Indoor Air Quality (IAQ)
  - Improved comfort
  - Efficient energy use
- EBCx Services **Facility Optimization** provides solutions to improve and maintain the performance of facilities

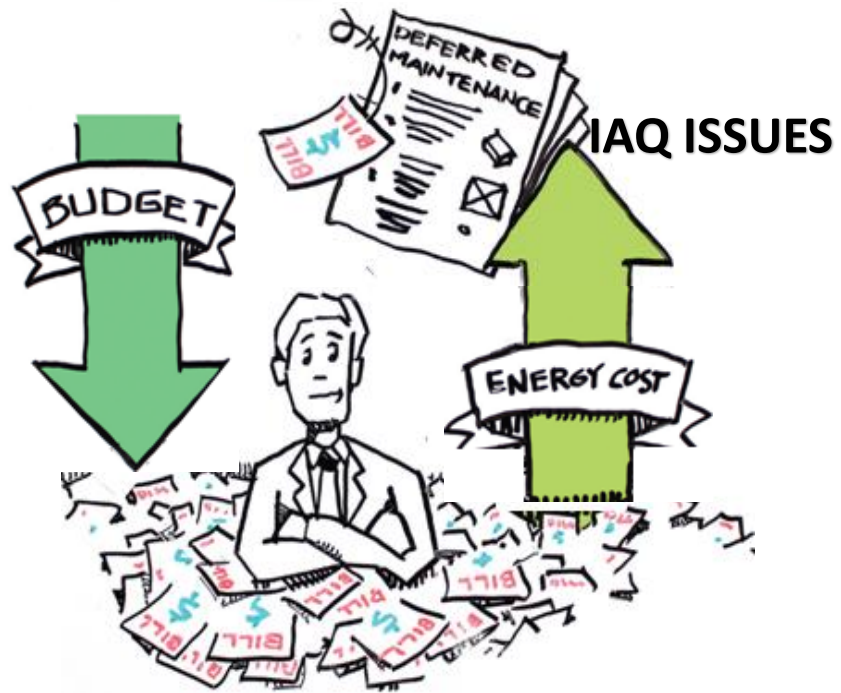




## Increasing Ventilation of Existing Air Conditioning Systems is Not a Simple Procedure

- Improving IAQ of existing buildings is significantly more complicated than social distancing, washing hands and wearing a mask
- Opening windows of buildings has been recommended by certain organizations, however this is not a viable solution
  - Allows uncontrolled, unconditioned and unfiltered outside air to enter a building
- A systematic engineered approach is required to establish the capability of existing HVAC systems and determine the most cost-effective approach for customers to consider
  - Requires sound engineering fundamentals combined with hands-on field testing and analysis
- EBCx Services **Facility Optimization** provides a roadmap to improve and maintain IAQ of existing buildings in a cost-effective manner





# Overview of Facility Optimization

*Solving the puzzle of improving IAQ and comfort, while managing operating budgets and energy costs*

- Evaluate existing HVAC systems to establish a baseline of equipment performance
- Determine current ventilation rates at equipment and required inside the facility based on ASHRAE 62.1 Ventilation Standard
- Evaluate existing air filtration effectiveness
- Identify opportunity for air disinfection using technology such as Needlepoint Bipolar Ionization (NPBI)
- Identify low-cost energy savings through optimizing control sequences
- Develop Facility Optimization Report...recommendations and next steps



## Evaluate Existing Air Conditioning Systems

- Evaluating existing HVAC systems is the first step towards making actionable recommendations that bring the greatest value and provide the highest degree of IAQ, safety, comfort & energy efficiency
- Inspect HVAC systems and controls to identify existing issues
- Perform appropriate field testing to determine how much additional load can be placed on existing equipment without overloading capacities (coils, fans, chillers, dx equipment)
- Leverage the existing BAS and supplement using data loggers to establish IAQ, safety, comfort & energy issues
- Establish zone level temperature, humidity and CO2 levels
  - Verify occupancy count, space use and size of area (for ASHRAE 62.1 calculation)
- Establish zone level air particle size and count using handheld particle counter
  - identify high particle count locations that require attention
- Identify if existing HVAC equipment require modifications or retrofit

# Determine Current Ventilation Rates

- Evaluate outdoor air ventilation and Current Facility Requirements (CFR) for alignment with ASHRAE 62.1
- If existing equipment cannot handle required ventilation air, consider using air disinfection and IAQ Procedure vs. Ventilation Rate Procedure following ASHRAE 62.1
- Identify opportunity to upgrade controls with Demand Controlled Ventilation (DCV)
- Based on equipment age/condition and performance, consider the feasibility of a retrofit/upgrade
  - Investment cost vs. savings analysis
- Identify existing filters' MERV rating
- Verify calibration of ventilation controls
  - Airflow Measuring Stations (AFMS)







# Evaluate Existing Air Filtration Effectiveness

- Inspect existing filtration system, including filter rack, pre filters and any missing components of filter frame that creates above design bypass air
- Test air particle size and count to establish filter effectiveness
- Based on equipment testing and available fan capacity, determine highest MERV filter that can be used
  - Allow for pressure drop (loading) of filter from clean to dirty
- Increase air filter effectiveness to capture sub micron size air particles that carry and distribute viruses
- If not in all ready in-place, consider upgrading control sequence to monitor filter pressure drop and determine when filters require replacement





# Identify Opportunities to use Air Disinfection

- Based on the Current Facility Requirement (CFR), determine areas of high occupancy and associated risk of viral transmission
- Determine air handlers that serve zones where Needle Point Bipolar Ionization (NPBI) is a viable solution to consider
- Ventilation air rates can be reduced by using NPBI, driving additional energy savings
- When existing equipment cannot handle additional cooling/heating load due to additional ventilation air, using NPBI can be a viable alternative to replacing HVAC equipment
- Field testing and analysis provides most appropriate recommendations to present to the customer



## Identify Low-Cost Energy Savings through Optimizing Control Sequences

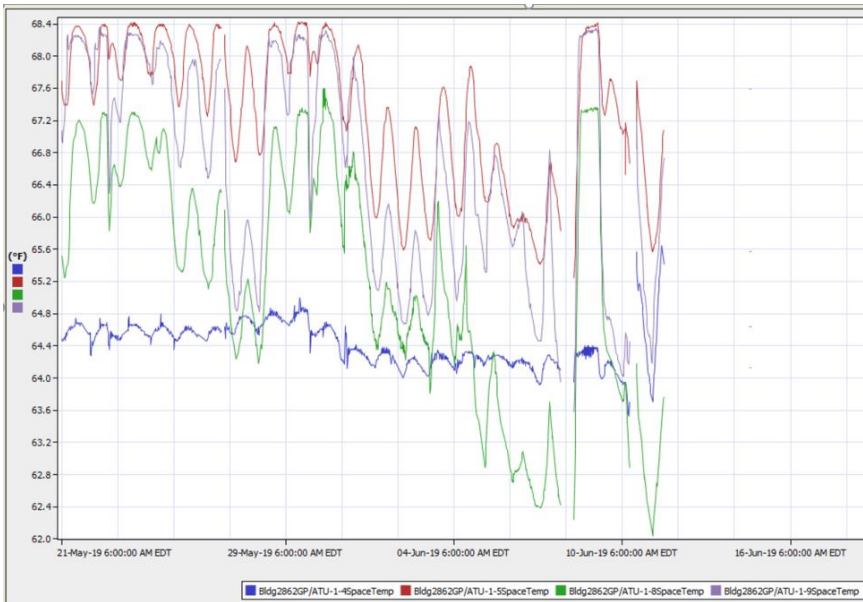
- While evaluating equipment and systems for Facility Optimization, identify opportunities to generate energy savings through modifications of existing control sequences
  - Control sequence modification will be limited by the CFR, climate zone and existing equipment capacity
    - The goal is to maintain IAQ , safety & comfort at the lowest possible energy cost

### Control Sequences to consider:

- Scheduling
  - AHUs
  - VAVs
  - Lighting
- Optimal start/stop
- Unoccupied setback
- Discharge air temperature reset
- Static pressure reset
- Minimize simultaneous heating & cooling
- Demand Controlled Ventilation (DCV)
- Enhance airside economizer operation
- Keep outdoor air dampers closed or min during morning warmup/cooldown prior to occupancy
- Reduce outdoor air (when applicable)
- Condenser water temperature reset
- Chilled water temperature reset
- HW temperature reset
- Pump pressure reset (CHW / HW)
- Cond. water on WSHP eq.

# Develop Facility Optimization Recommendations

- Facility Optimization recommendations are based on the CFR, submittal data of existing equipment, field testing and analysis of all data
- Determine most appropriate solutions to improve indoor air quality, focusing on:
  - Ventilation
  - Filtration
  - Humidity control
  - Disinfection
  - Enhanced O&M
- Guided by the CFR, testing and analysis, site-specific value-added recommendations are developed





# Update Existing Maintenance Plan to Sustain IAQ Performance

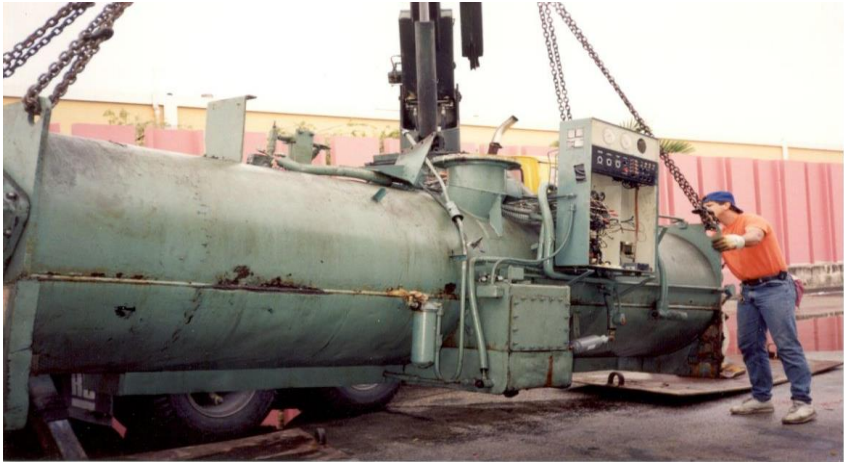
- It is critical that existing maintenance plans are updated to ensure IAQ upgrades and modifications remain effective
- Leverage BAS to monitor system performance
- Schedule verification of ventilation air flow rates and calibration of Airflow Measuring Stations (AFMS)
- A comprehensive maintenance plan will keep your facility's indoor air quality, comfort and energy use at optimized performance





# History Behind EBCx Services

- Evolved from decades in the mechanical contracting, TAB and energy services industry
- Experienced in the development, sale and project management of energy related projects
  - PC and non-PC
  - Design/Build
  - Energy Audits (ASHRAE Level 1 through 3)
- Technical expertise in the following areas:
  - Mechanical retrofits
  - Control system retrofits
  - Maintenance & Service
  - TAB
  - Cx
  - RCx/EBCx
  - IAQ Surveys
  - Training



# Credentials and Certifications of Scott Gordon

- Certified Air Conditioning Contractor Class-A, Florida (since 1981)
- NEBB Certified Professional
  - TAB
  - Cx
  - RCx
  - Building Enclosure Testing
- Tridium Niagara N4 Certified
- Certified Energy Manager (CEM)
- Certified Measurement & Verification Professional (CMVP)
- Certified Indoor Air Quality Professional (CIAQP)
- LEED AP O+M
- Refrigeration Service Engineers Society, CM (Certificate Member)
- OSHA 30 Hour Construction Safety
- USACE EM-385-1-1 40-hour Safety & Health



- Please contact EBCx Services for additional information on how **Facility Optimization** will improve the IAQ, comfort and energy use of your facility

Thank You!

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