GREENING HEALTH CARE
working together for healthier communities

CLIMATE CHALLENGE NETWORK

# Picking the Low Hanging Fruit

*April 10, 2024*

*In Partnership With:*

CHES SCISS
Canadian Healthcare Engineering Society
Société canadienne d'ingénierie des services de santé

*Program Sponsors:*

BELIMO
blackstone energy services
EllisDon FACILITIES SERVICES
ENBRIDGE
ENS Energy Network Services
QMC
SAVE ON ENERGY POWER WHAT'S NEXT
Smith + Andersen
THERMOGENICS

*Technical Direction:*

Enerlife consulting

Join the conversation! Please use Q & A to submit your questions.

# Land Acknowledgement

*We acknowledge with respect the ancestral and unceded territory of the Inuit, Métis, and First Nations people that share these lands with us. While we meet today on a virtual platform, I am speaking from the traditional homes of the Huron-Wendat, Haudenosaunee, Anishinaabe and the Mississaugas of the Credit River. We intend that our work today contributes to our common responsibility as stewards of the environment.*

# Agenda

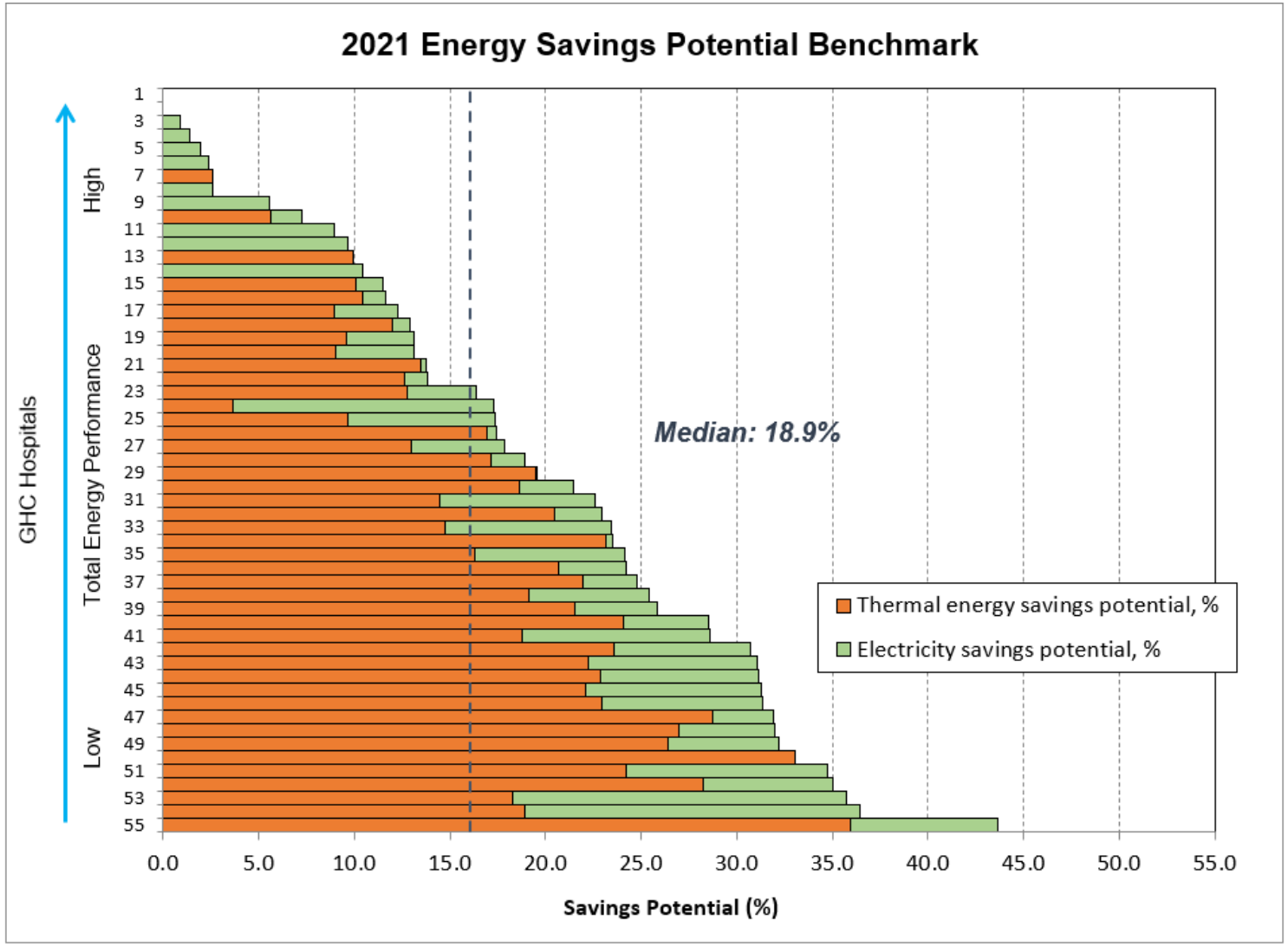
- **Setting the Stage with opportunity, responsibility, urgency and commitment**
- **Taking the Right Direction in identifying your best energy conservation measures**
- **Planning for Success: The Top 5**
  - HVAC scheduling in non-clinical (Type 3) spaces
  - Boiler plant optimization
  - Thermal (enthalpy) wheel control optimization
  - Lighting retrofits and controls
  - Pumping system optimization
- **Updates: Energy Conservation Planning, Greening Health Care 2024**

# Introduction and Context

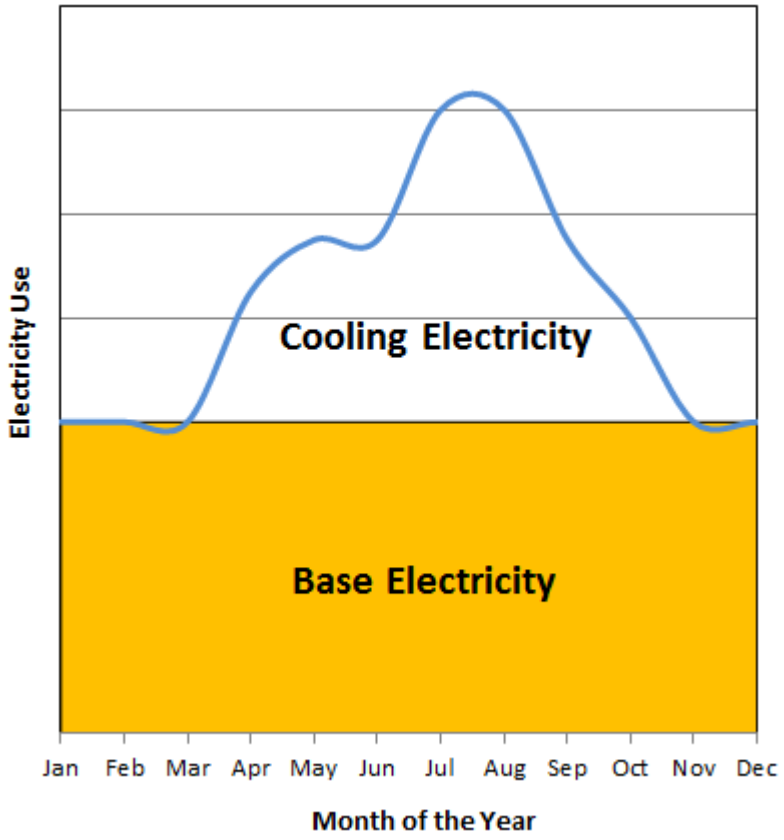
# Urgency and Commitment

1. Climate change is the defining issue of our times, which will disproportionately impact the healthcare sector.
2. Despite government policy and best intentions, emissions due to hospital facility operations continue to climb. ***With the present trajectory we will miss 2030 targets by a wide margin.***
3. Think globally but act locally. Every hospital has a role to play in closing the gap.


# Setting Direction with your Energy Profile



# Electricity Components




**Ventilation Systems**
• Scheduling, control and retrofit to rein in simultaneous cooling and heating

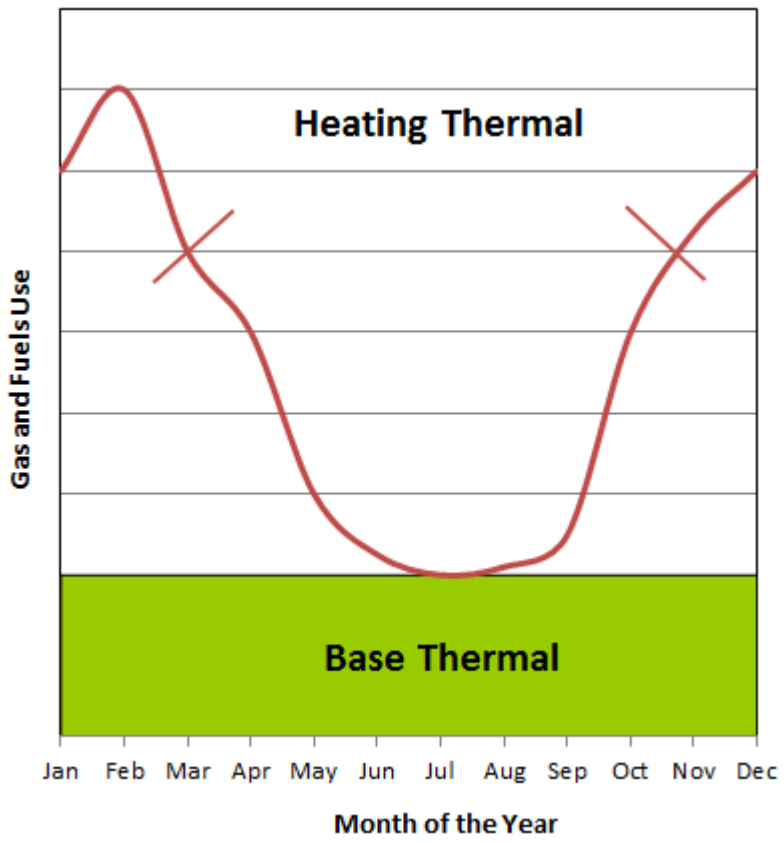
**Cooling System**
• Central plant control and retrofits
• Cooling tower refurbishment and control
• Chilled water system retrofits
• Local AC unit operation and replacement

**Ventilation Systems**
• Scheduling, control and retrofit to reduce fan energy

**Lighting**
• Operation, control and retrofit

**Pumping Systems**
• Testing, adjustments and controls

# Thermal Components




**Ventilation Systems**
• Scheduling, control and retrofit to reduce outside air heating and humidification
**Heating System & Building Envelope**
• Re-insulation and air sealing to reduce heat loss
• Heating system control and retrofit

**Ventilation Systems**
• Operation, control and retrofit to rein in simultaneous cooling and heating
**Boiler Plant & Steam System**
• Repair, retrofit and control
**Equipment**
• Medical, laundry and kitchen retrofits and control

# Same Principles, Different Priorities

| Base Electric kWh/ft2 | | Cooling Electric kWh/ft2 | | Savings Potential | | |
|---|---|---|---|---|---|---|
| 2022 | Target | 2022 | Target | % | $/yr | GHG tonnes |
| 21.4 | 18.7 | 5.2 | 1.4 | 24.6% | $125,305 | 25 |
| **Base Thermal ekWh/ft2** | | **Heating Thermal ekWh/ft2** | | **Savings Potential** | | |
| 2022 | Target | 2022 | Target | % | $/yr | GHG tonnes |
| 42.1 | 19.0 | 21.3 | 21.1 | 36.8% | $95,270 | 553 |

## Hospital 1

- High electric cooling and base thermal heating
- Simultaneous heating and cooling in summer months

| Base Electric kWh/ft2 | | Cooling Electric kWh/ft2 | | Savings Potential | | |
|---|---|---|---|---|---|---|
| 2022 | Target | 2022 | Target | % | $/yr | GHG tonnes |
| 22.3 | 18.3 | 2.6 | 1.9 | 19.1% | $464,222 | 92 |
| **Base Thermal ekWh/ft2** | | **Heating Thermal ekWh/ft2** | | Savings Potential | | |
| 2022 | Target | 2022 | Target | % | $/yr | GHG tonnes |
| 18.2 | 14.7 | 21.9 | 14.4 | 27.4% | $226,494 | 1,315 |

## Hospital 2

- High  base electric and heating thermal
- High fan, lighting and pump energy use
- Over ventilation and thermal wheels underperforming

# Know your Rankings and Savings Potential

GREENING HEALTH CARE
working together for healthier communities

## 2020 Member Report – Ontario Shores Centre

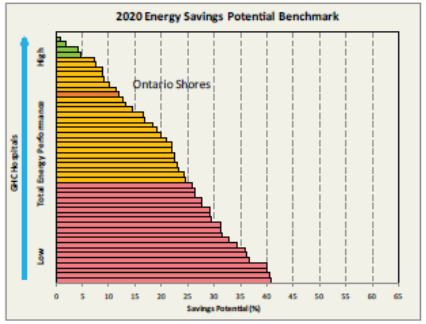
### Summary

Your hospital is close to the top of the energy efficiency benchmark chart with 11.9% savings potential. Your total, weather normalized energy (electricity and gas combined) decreased by 1.8% in 2020, with a 1.0% decrease in greenhouse gas emissions. Utility costs were lower by $73,737 with savings in electricity and water.

Your target energy and water savings potential is worth $98,871/year at 2020 utility rates, with an associated greenhouse gas emissions reduction of 362 tonnes/year. The analysis presented in this report provides the business case and direction for making your hospital the most efficient it can be.

### Your 2020 Energy Efficiency

The savings potential benchmark shows how each of your sites is positioned relative to the other member facilities.




### Your Achievable Savings Potential

| Utility | $/year potential |
|---|---|
| Electricity | $37,816 |
| Natural Gas | $61,055 |
| Water | $0 |
| TOTAL | $98,871 |

| GHG Summary | Tonnes |
|---|---|
| Tonnes Co2e Emissions | 362.1 |

### Your Energy and Water Targets

Your target savings are shown in greater detail below and provide direction on where to find savings. The utility cost and emissions reduction numbers are how much you will save by achieving the Greening Health Care target which is based on the top quartile performance of your hospital type(s). This target is adjusted for weather and site-specific variables including space and heating/cooling system types and considered readily attainable through operational improvements and cost-effective retrofits.

| Electricity Savings Potential | Base kWh/ft2 | | Cooling kWh/ft2 | | Savings Potential | | |
|---|---|---|---|---|---|---|---|
| | 2020 | Target | 2020 | Target | % | $/yr | GHG tonnes |
| Ontario Shores | 14.0 | 14.0 | 1.6 | 1.1 | 3.3% | $37,816 | 7.8 |

| Thermal Savings Potential | Base ekWh/ft2 | | Heating ekWh/ft2 | | Savings Potential | | |
|---|---|---|---|---|---|---|---|
| | 2020 | Target | 2020 | Target | % | $/yr | GHG tonnes |
| Ontario Shores | 11.3 | 7.8 | 10.7 | 10.2 | 17.9% | $61,055 | 354.5 |

| Water Savings Potential | Base litres/ft2 | | Cooling litres/ft2 | | Savings Potential | | |
|---|---|---|---|---|---|---|---|
| | 2020 | Target | 2020 | Target | % | $/yr | GHG tonnes |
| Ontario Shores | 102.6 | 102.6 | 13.9 | 13.9 | 0.0% | $0 | - |

Base components of energy use relate to systems that run year-round, such as lighting, medical and IT equipment, domestic hot water and fans. The cooling component is additional energy used in summer for air conditioning. Heating is the extra energy used for heat and humidification during winter months.

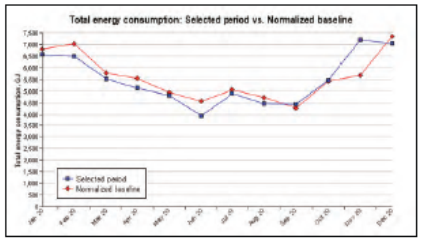
ENBRIDGE greeninghc.com CLIMATE CHALLENGE NETWORK

### Making the Connections

These component savings targets point to the building systems and conservation actions to focus on for the biggest savings. Components shaded in red have high potential, amber are moderate and green are your most efficient with little or no potential. Call us anytime to discuss the best measures and direct you to Greening Health Care checklists and best practices guides which can assist your team with measure identification.

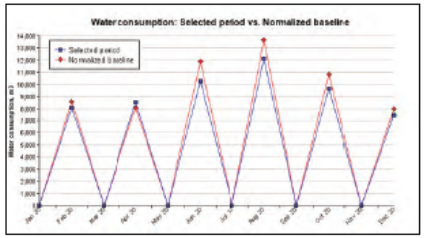
### Your 2020 Savings

Savings, normalized for weather differences from year to year, are monitored through the Greening Health Care online reporting system which you can access at any time at https://ghc.enerlife.com. Call us if you need your user name, password or a guide through the system. The blue line on the chart is your 2020 monthly use and is compared against the red line, which is your 2019 weather-normalized baseline. Real savings were achieved in months where the blue line is below the red.




Overall results show a 1.8% decrease in total energy use (electricity and natural gas combined) for the year, with increases occurring in between September and November. The 1.0% greenhouse gas emissions decrease was mostly due to electricity reductions and a slight increase in gas.

Good water savings during the summer periods totaled 8.1% cost decreases of $21,152.




### Energy, Water and Emissions Savings Summary

| | Electricity | Gas | Water | Total Cost | Energy % | GHG tonnes |
|---|---|---|---|---|---|---|
| Ontario Shores | $52,647 | -$62 | $21,152 | $73,737 | 1.8% | 10.2 |

Savings
Increases

For more information contact: Michael Pagel, Program Manager mpagel@climatechallengenetwork.org

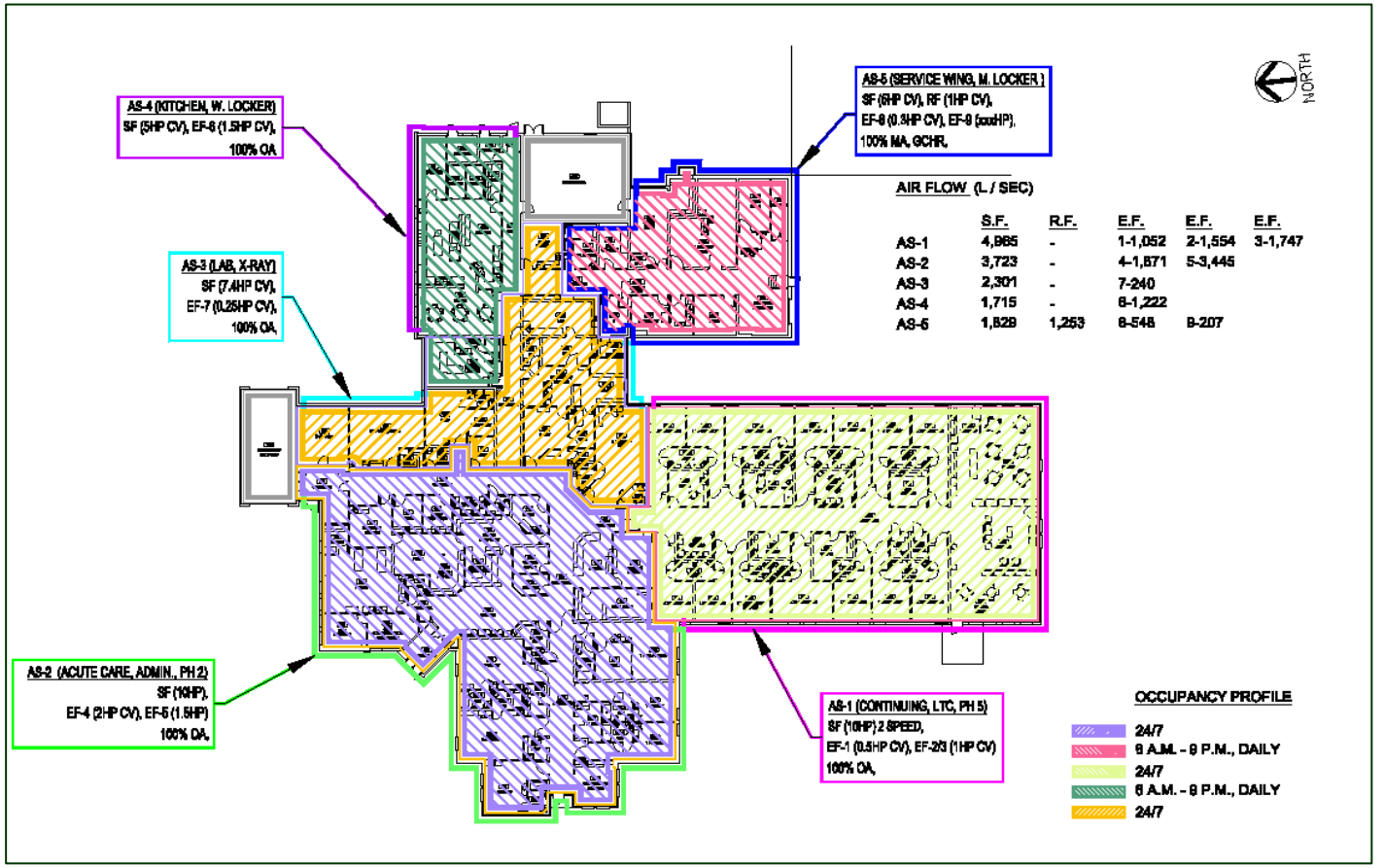
ENBRIDGE greeninghc.com CLIMATE CHALLENGE NETWORK

# Taking Action: The Top 5

# #1: Ventilation Scheduling of Non-Clinical Spaces

- Determine Occupancy Hours

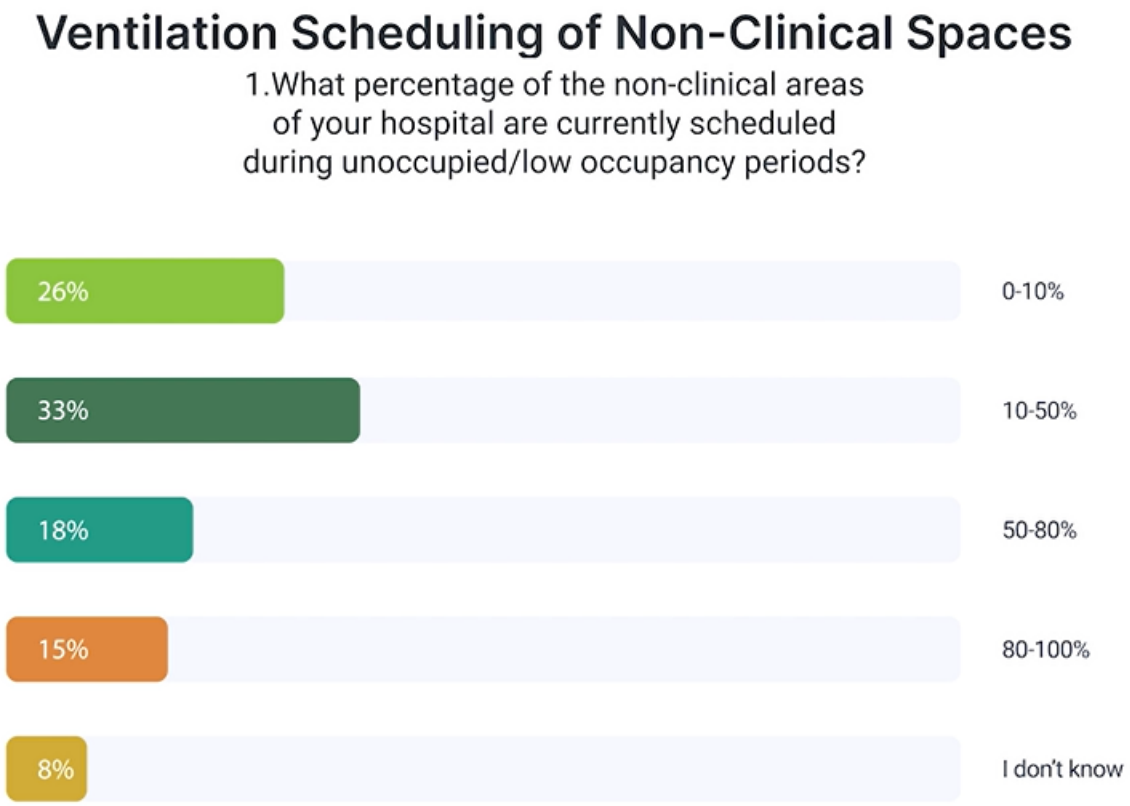

- Determine HVAC Zoning



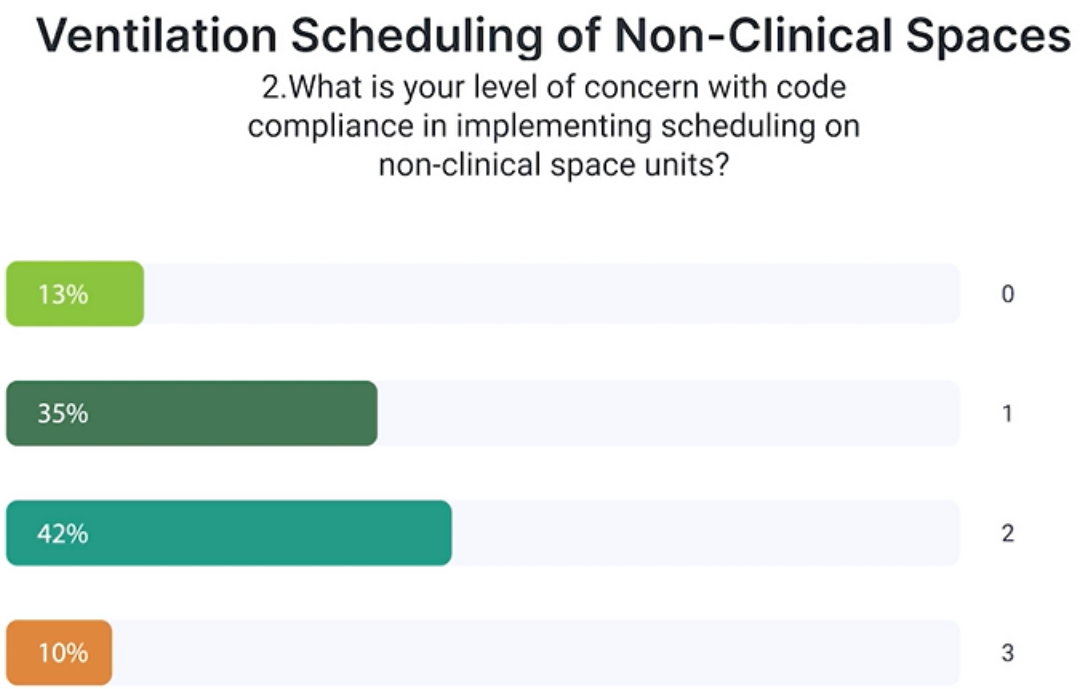
# Implementing Ventilation Scheduling

1. PLANNING
    1. Select initial non-clinical area air handling systems and related exhaust fans.
    2. ID areas served and occupancy periods.
    3. Decide on fan shutdown or airflow setback (VFDs).
    4. Engage utility company incentive programs.
2. IMPLEMENTATION
    1. Program BAS and provide operator's training.
    2. Inspect dampers, fans and AHUs when not running and perform required maintenance.
3. COMMUNICATION
    1. Meet with departments and occupants, confirm operating schedules.
    2. Inform operators and BAS contractor.
    3. Let GHC (Michael) know when changes are made so we can look for the savings.
4. MONITORING & VERIFICATION
    1. Check trend logs for the first week. Add to performance monitoring procedure.
5. CAPITAL BUDGETING
    1. Plan for addition of VFDs and ventilation system testing.

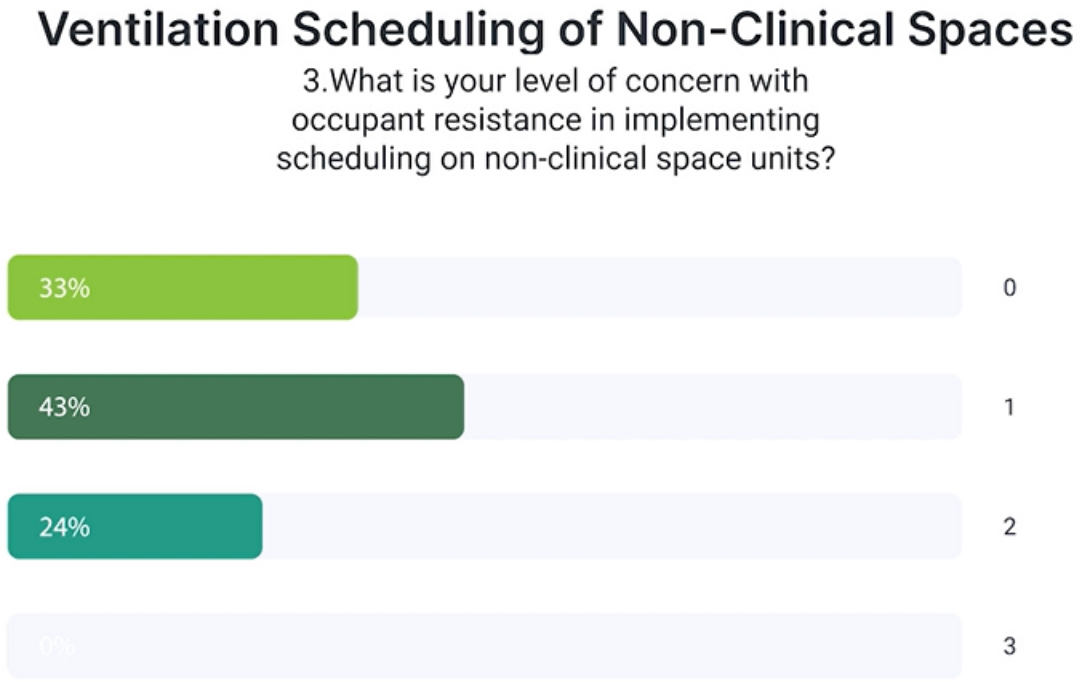
# HVAC Scheduling – Poll



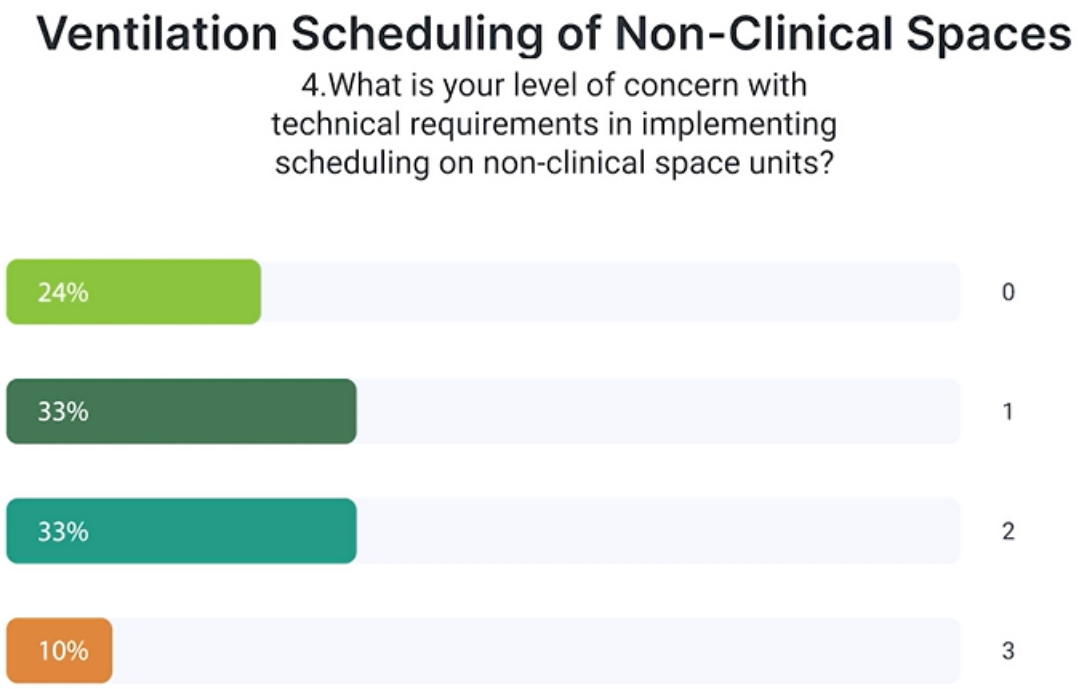
# HVAC Scheduling – Poll



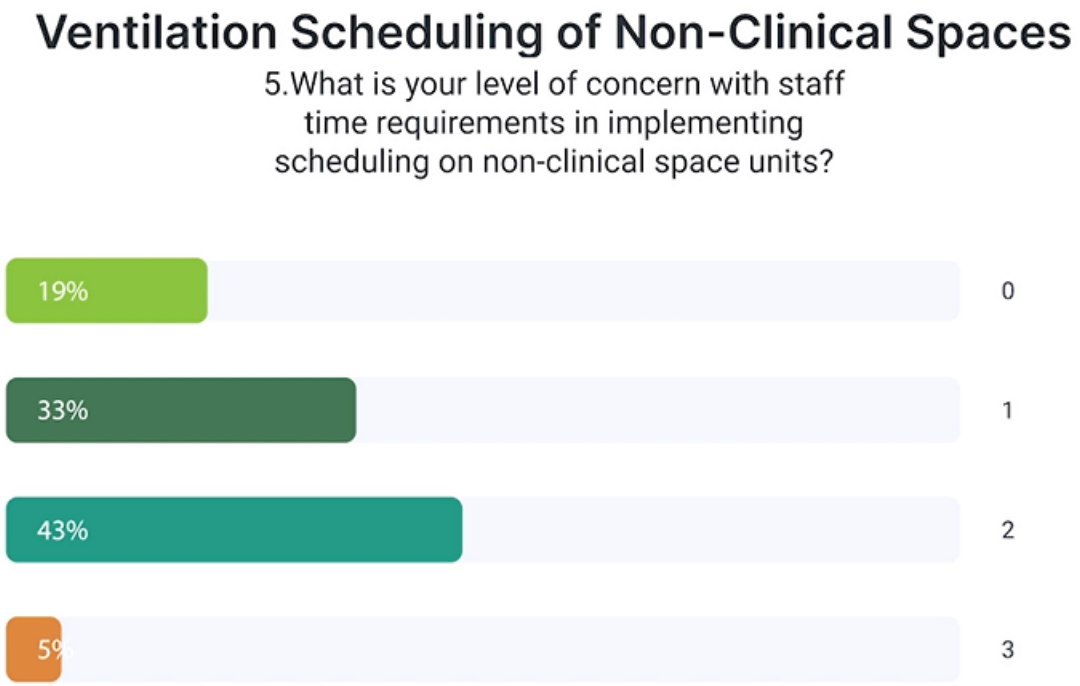
# HVAC Scheduling – Poll



# HVAC Scheduling – Poll



# HVAC Scheduling – Poll



# #2: Boiler Plant Optimization

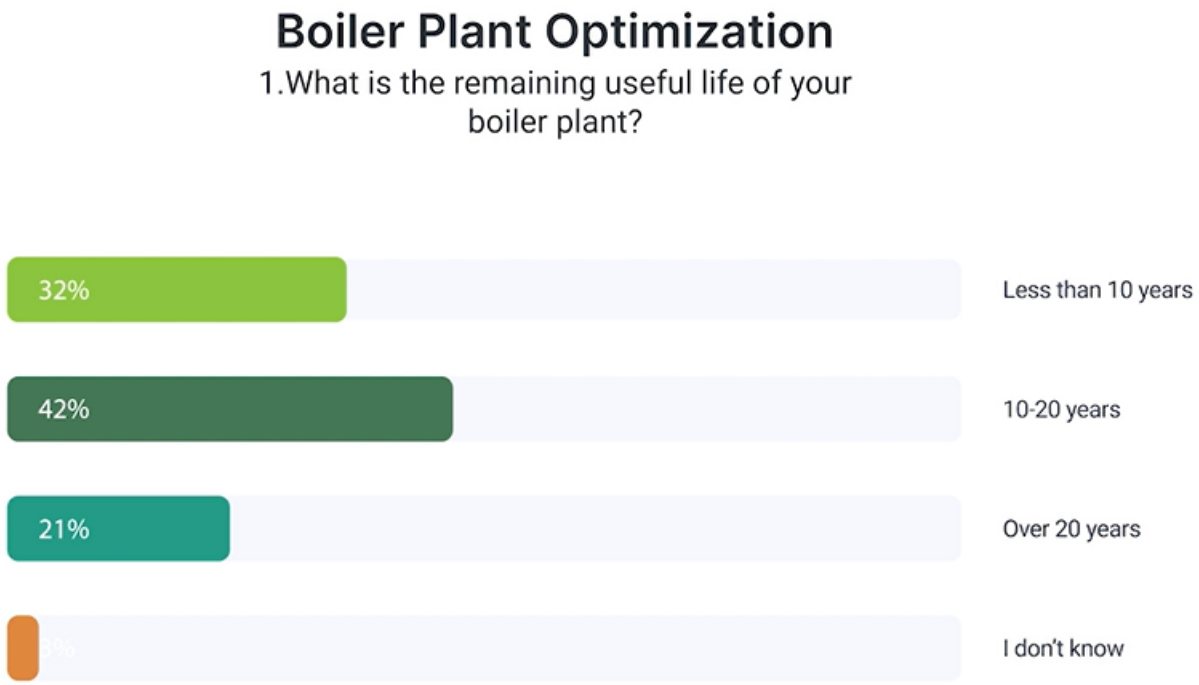
| Action | | Already Implemented | Planned | Consider | Reject/ NA | Details |
|---|---|---|---|---|---|---|
| Guide Section # | Name | | | | | |
| 2 | **Plant Operation, Maintenance and Control** | | | | | |
| 2.1 | Reduce/reset steam pressure and primary HW temperature | | | | | |
| 2.2 | Refurbish/upgrade economizers and controls | | | | | |
| 2.3 | Refurbish/upgrade draft dampers and controls | | | | | |
| 2.4 | Implement steam line isolation | | | | | |
| 2.5 | Tune boilers for maximum full-range efficiency | | | | | |
| 2.6 | Automate boiler sequencing to maximize plant efficiency | | | | | Analyze combustion test reports to determine "sweet spot" for each boiler |
| 2.7 | Increase condensate return, reduce water makeup | | | | | |
| 2.8 | Reinsulate headers, piping, traps and valves | | | | | |
| 2.9 | Introduce electronic operating logs | | | | | |
| 2.10 | Reduce blowdown frequency, converting to continuous and/or adding in recovery | | | | | |

| Action | | Already Implemented | Planned | Consider | Reject/ NA | Details |
|---|---|---|---|---|---|---|
| Guide Section # | Name | | | | | |
| 3 | **Extending Plant Life** | | | | | |
| 3.1 | Perform boiler combustion testing and tuning | | | | | |
| 3.2 | Conduct ND boiler testing and refurbishment | | | | | |
| 3.3 | Upgrade water treatment to optimize % in control | | | | | |

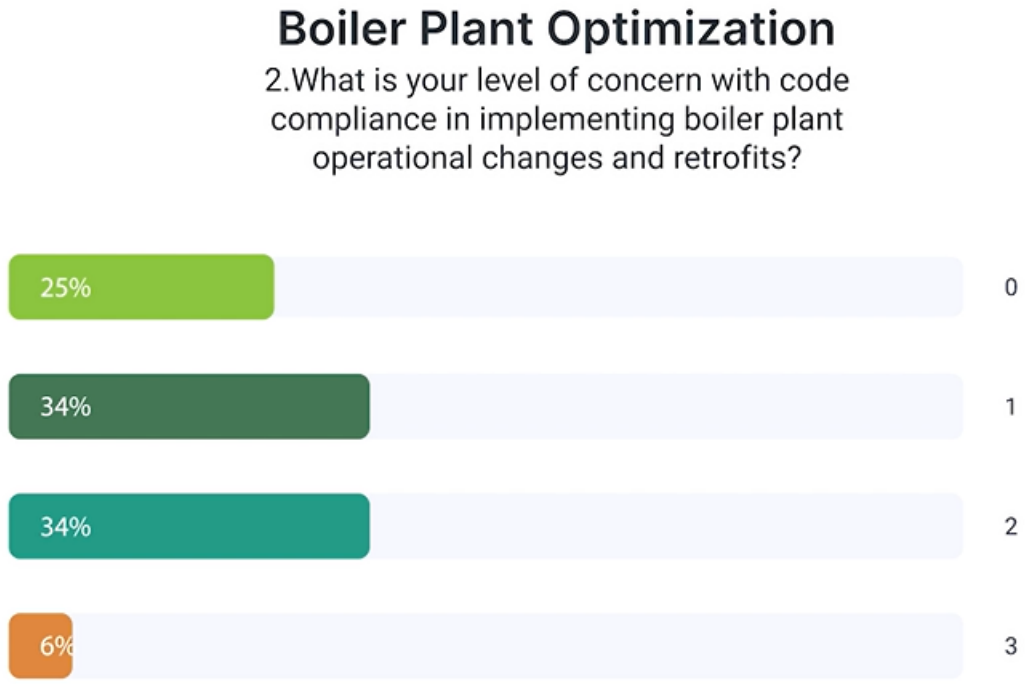
# Implementing Boiler Plant Optimization

1. PLANNING
    1. Inspect boiler room and review the GHC Checklist with your boiler service contractor.
    2. Engage gas utility DSM program.
    3. Watch the GHC 2023 Summer Workshop recording together.
    4. Agree on scope of work (checklist).
2. IMPLEMENTATION
    1. Obtain quotation.
    2. Plan and schedule the work.
    3. Engage BAS contractor in upgraded monitoring and controls.
    4. Adopt enhanced boiler testing, reporting and analytics along with electronic operating log.
3. COMMUNICATION
    1. Include boiler plant operators in strategy and decision-making. Allow reasonable accommodation.
    2. Let GHC (Michael) know when changes are made so we can look for the savings.
4. MONITORING & VERIFICATION
    1. Check trend logs for the first week. Add to performance monitoring procedure.
5. CAPITAL BUDGETING
    1. Plan for addition of capital improvements (GHC Checklist).

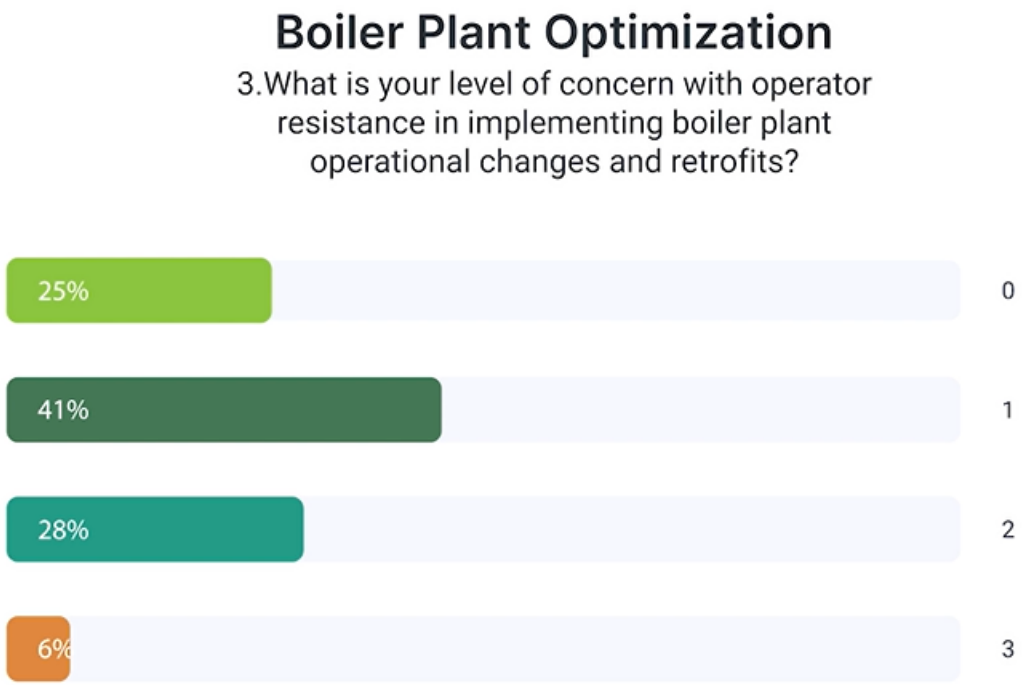
# Boiler Plant Optimization – Poll



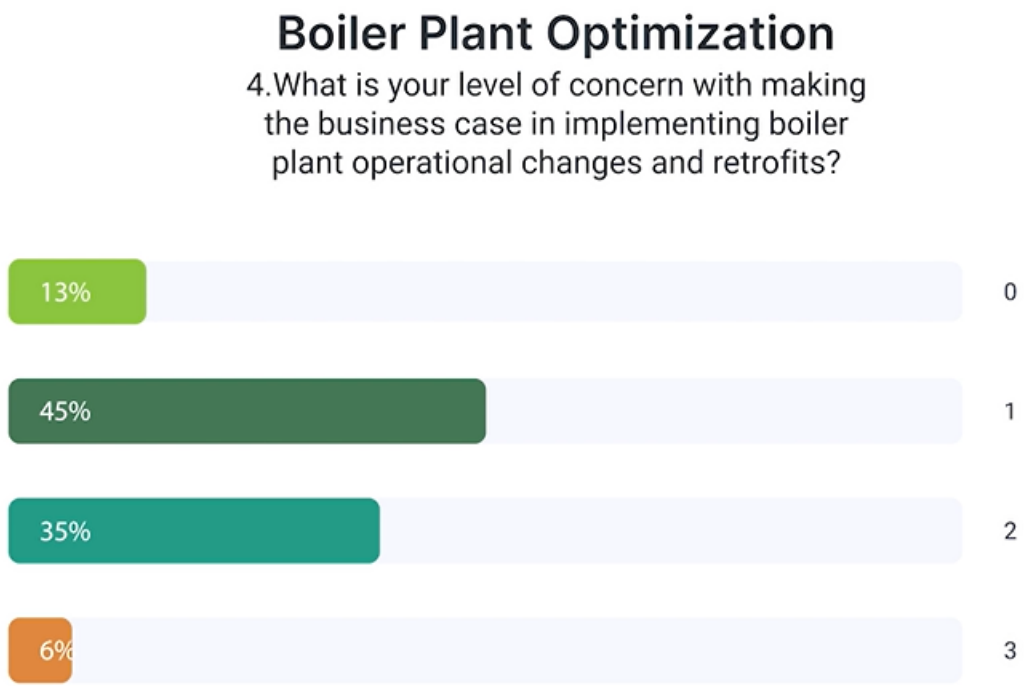
# Boiler Plant Optimization – Poll



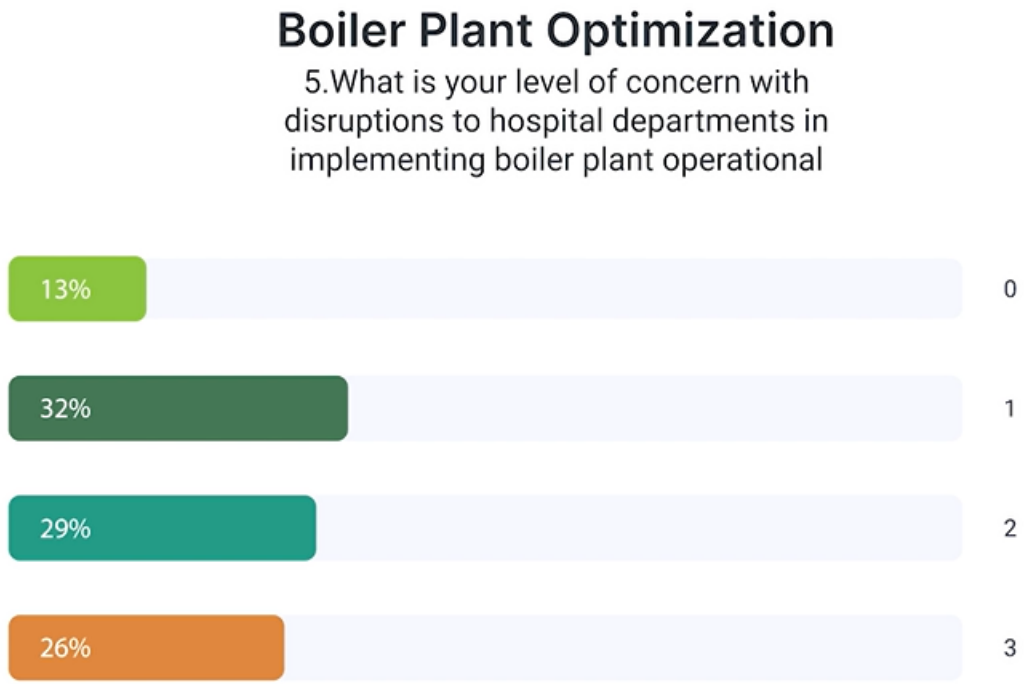
# Boiler Plant Optimization – Poll



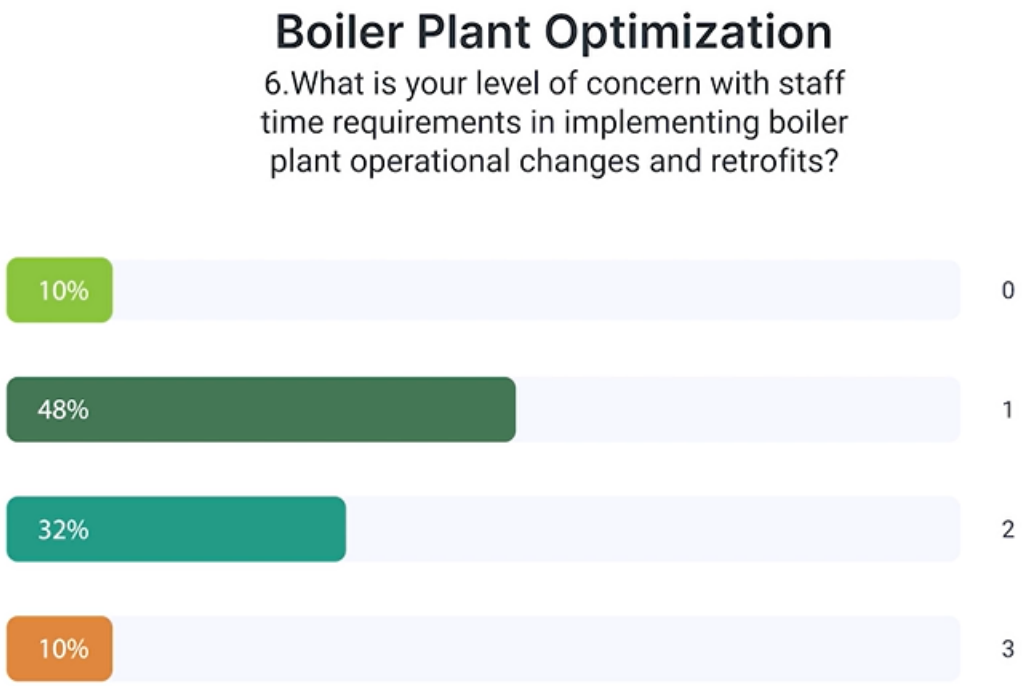
# Boiler Plant Optimization – Poll



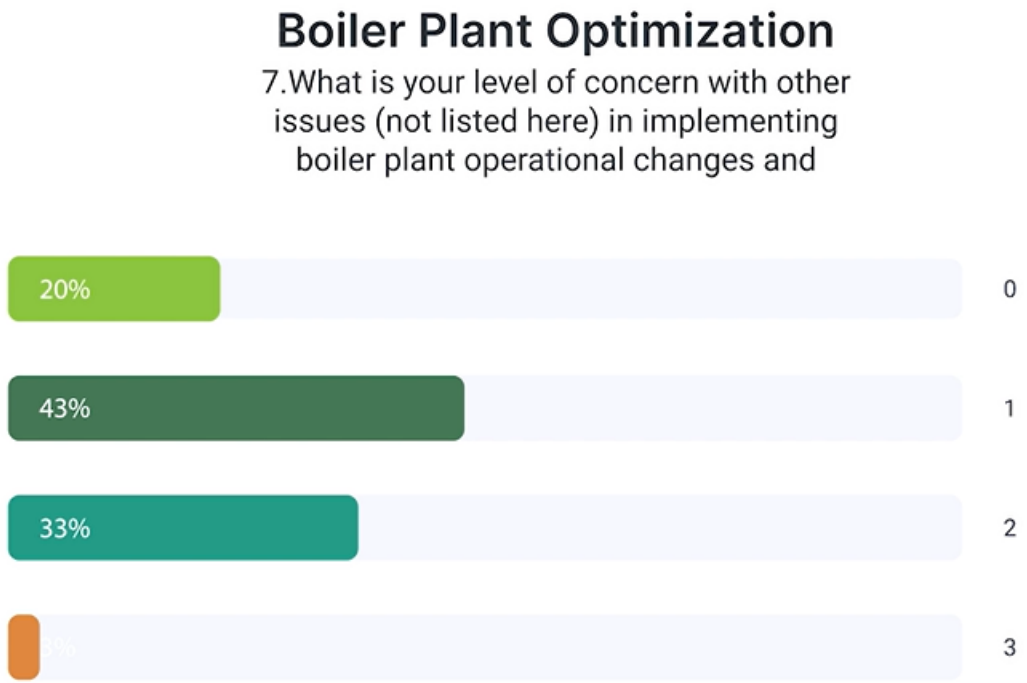
# Boiler Plant Optimization – Poll



# Boiler Plant Optimization – Poll

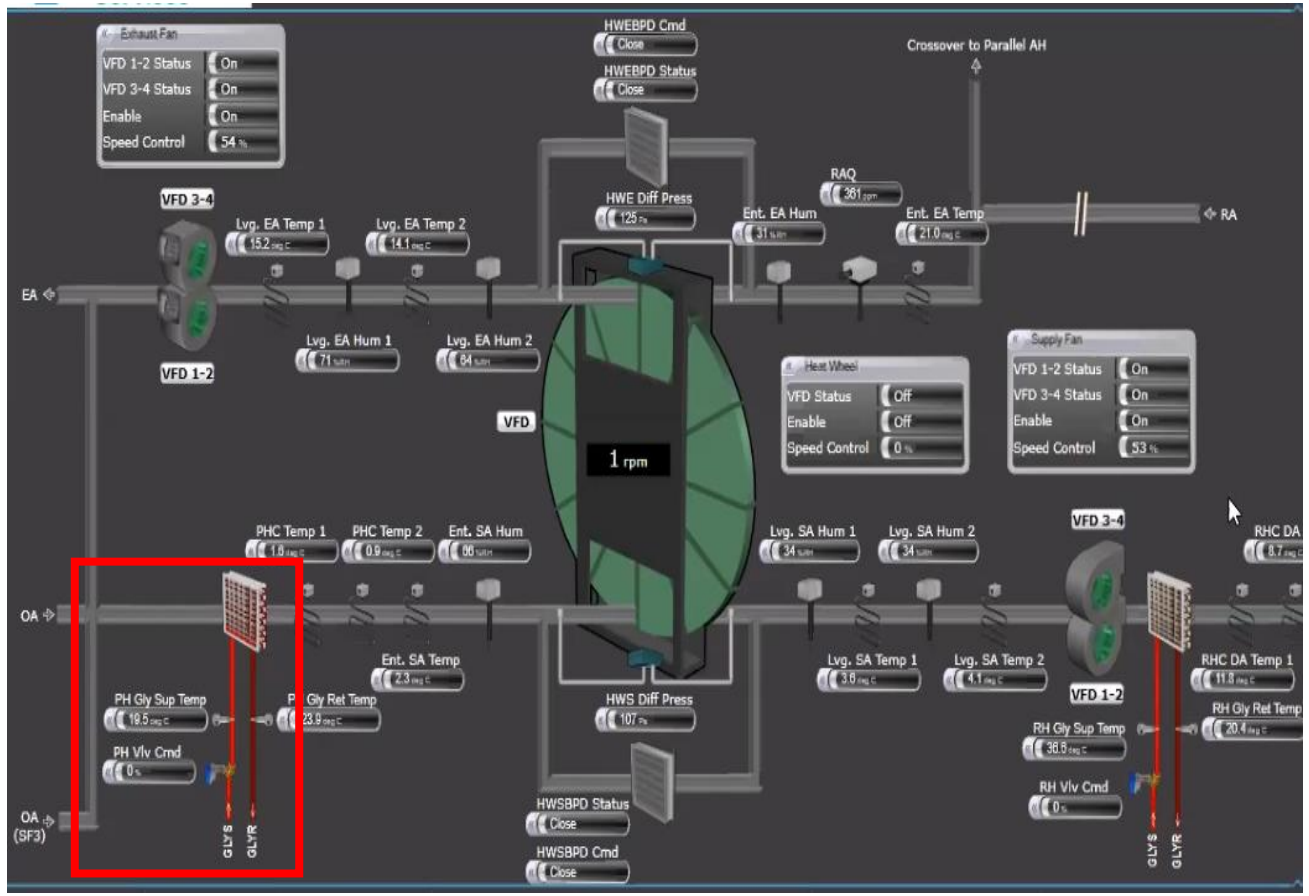


# Boiler Plant Optimization – Poll



# #3: Thermal Wheel Control Optimization

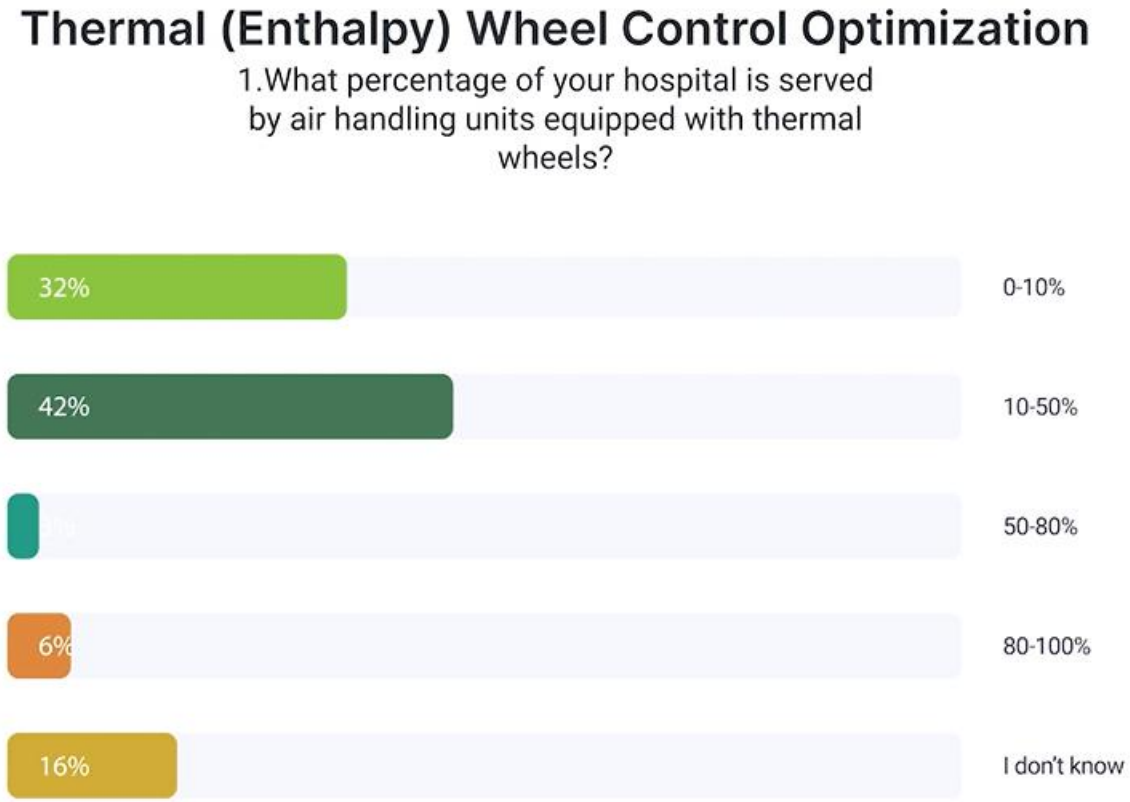
- **Pre-heat setpoint too high,** preventing heat recovery
- Thermal wheel **underperforming**
  - Sequence of operations limiting wheel performance
  - Leaving air temperature control
  - Air imbalance between supply and exhaust fans



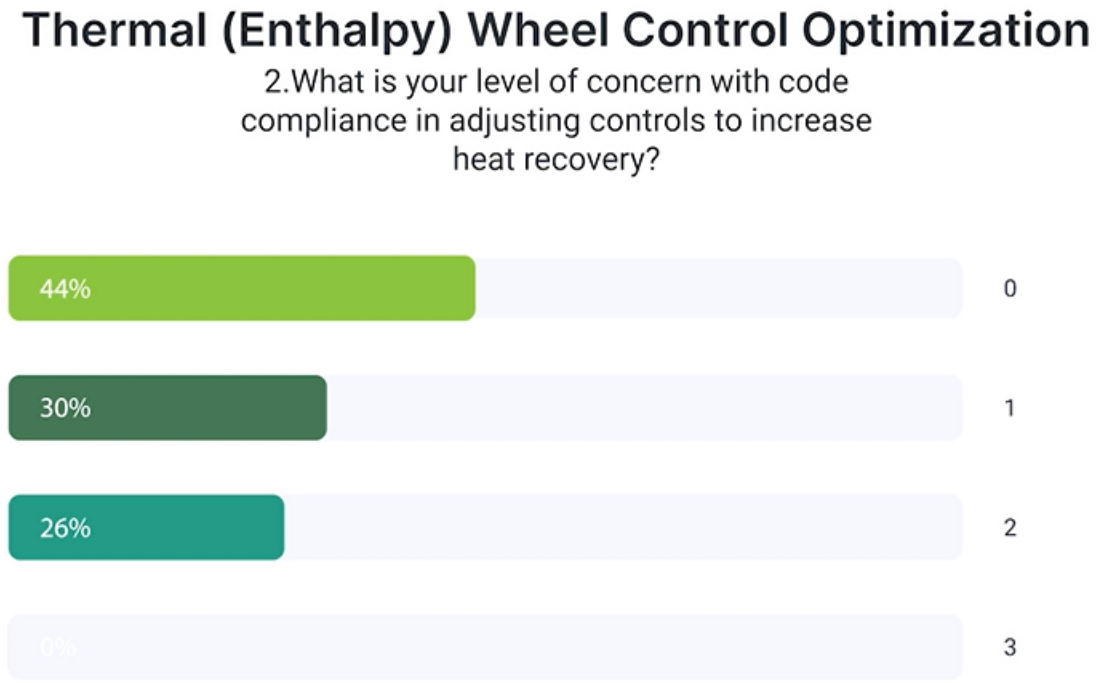
# Implementing Thermal Wheel Control Optimization

1. PLANNING
    1. Contact AHU manufacturer and confirm thermal wheel entering air temperature setpoint.
    2. Review the BAS program with controls contractor and confirm pre-heat coil setpoint.
    3. Reprogram BAS to incrementally lower pre-heat coil setpoint and check for any potential issues.
2. IMPLEMENTATION
    1. Engage gas utility DSM program.
    2. Implement new BAS program incrementally resetting pre-heat coil setpoint to a lower value.
    3. Monitor the progress over the cold weather conditions.
3. COMMUNICATION
    1. Let GHC (Michael) know when changes are made so we can look for the savings
4. MONITORING & VERIFICATION
    1. Check trend logs for the first week. Add to performance monitoring procedure
5. CAPITAL BUDGETING
    1. Test and replace underperforming thermal wheels

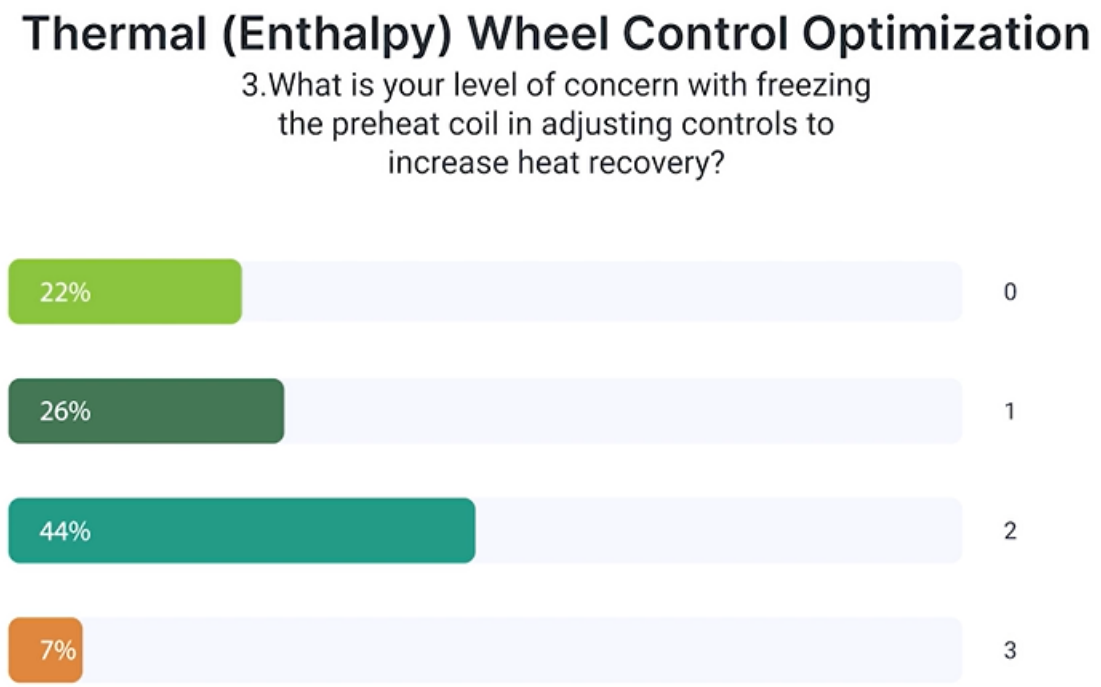
# Thermal Wheel Optimization – Poll



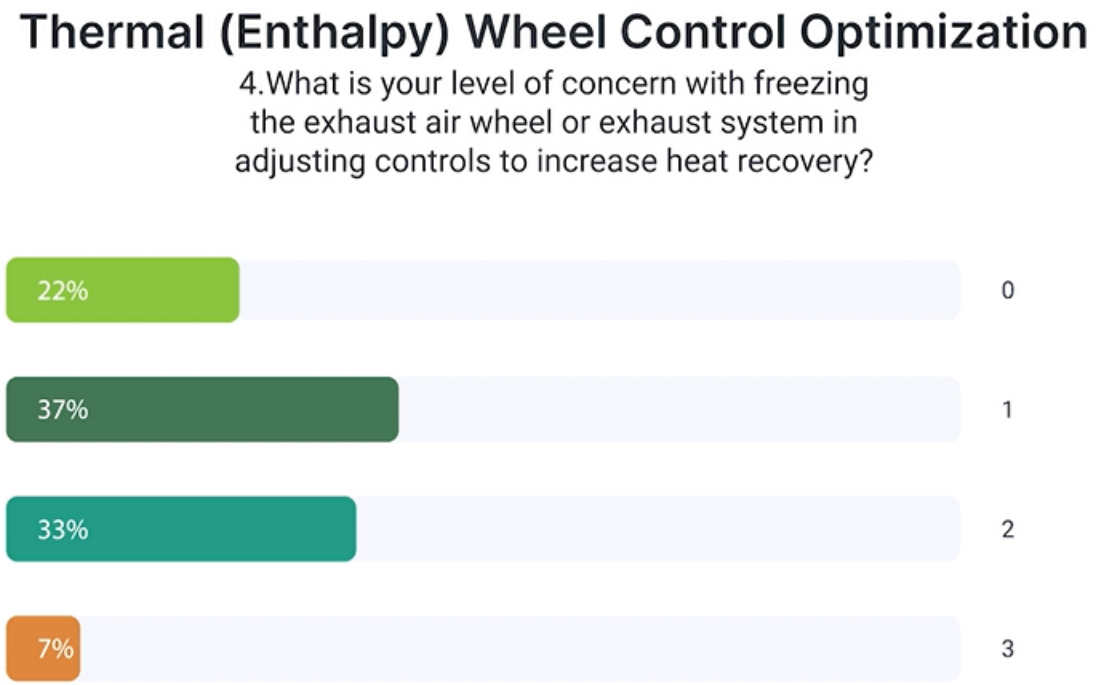
# Thermal Wheel Optimization – Poll



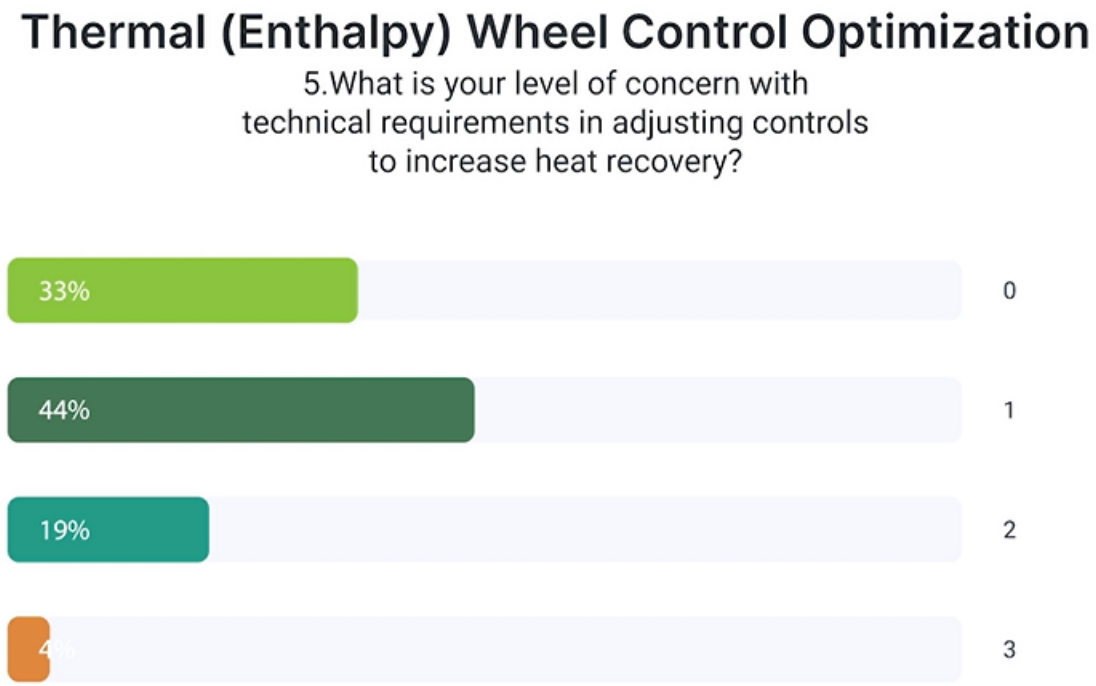
# Thermal Wheel Optimization – Poll



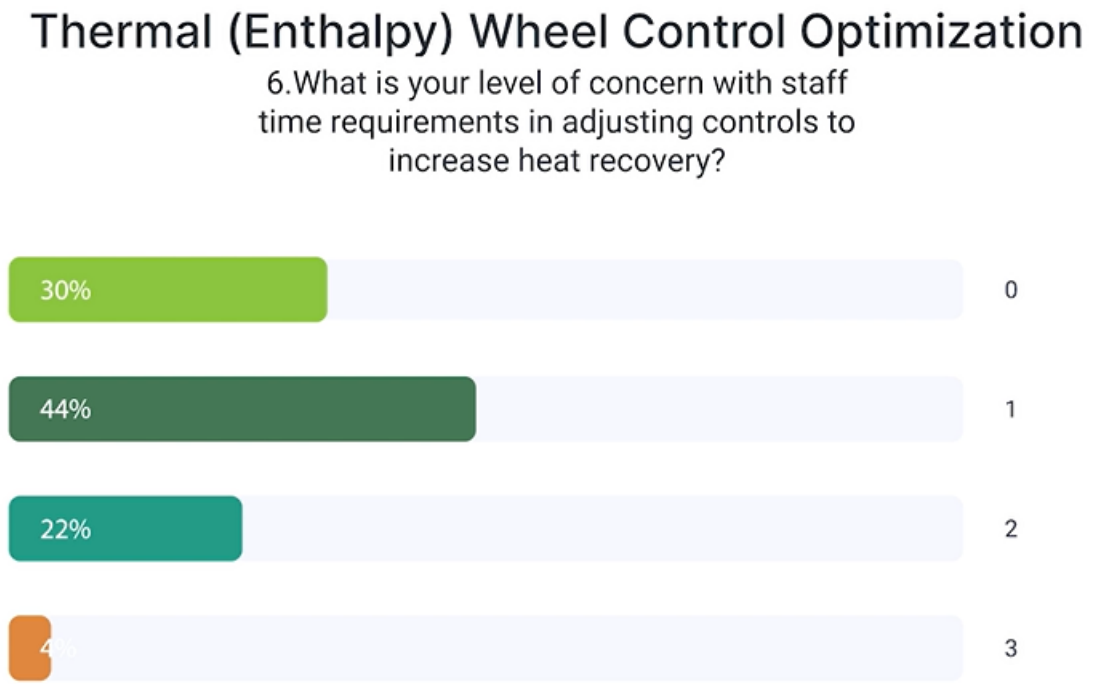
# Thermal Wheel Optimization – Poll



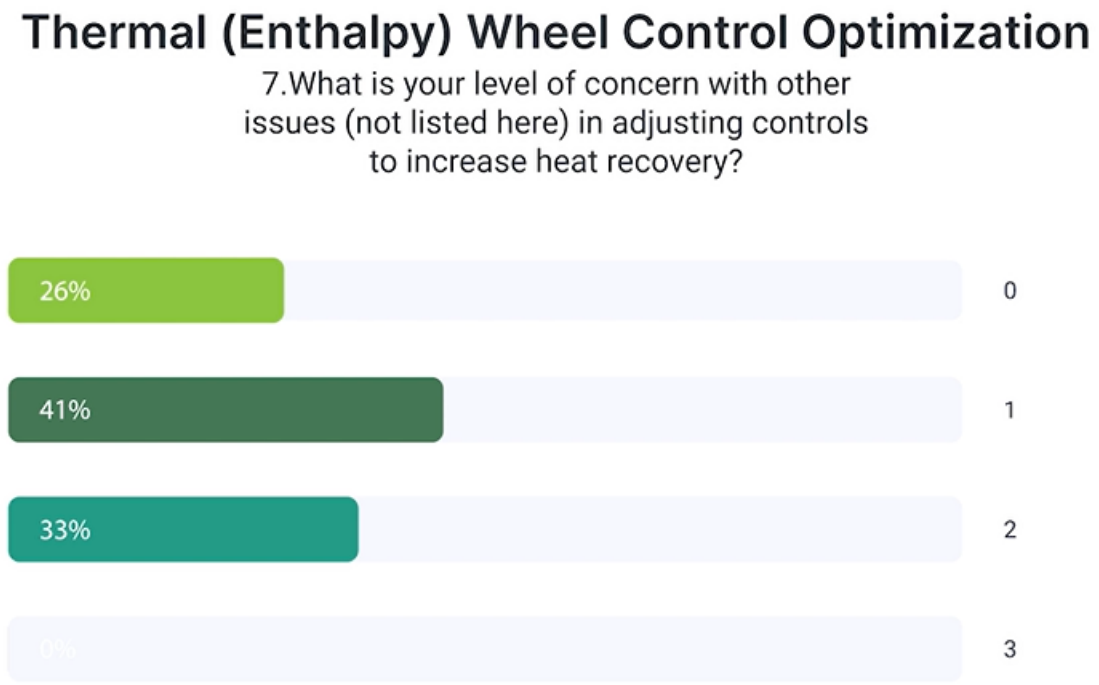
# Thermal Wheel Optimization – Poll



# Thermal Wheel Optimization – Poll



# Thermal Wheel Optimization – Poll

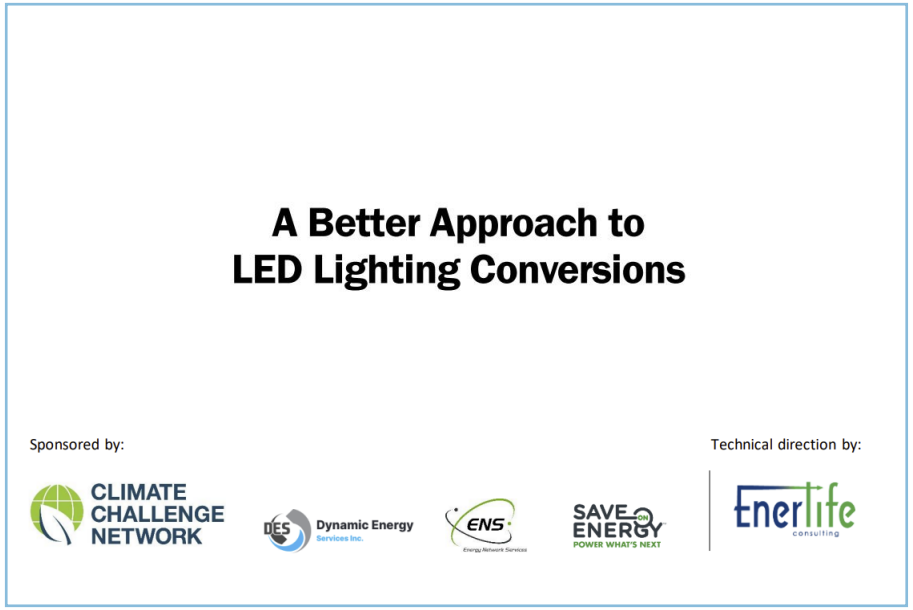


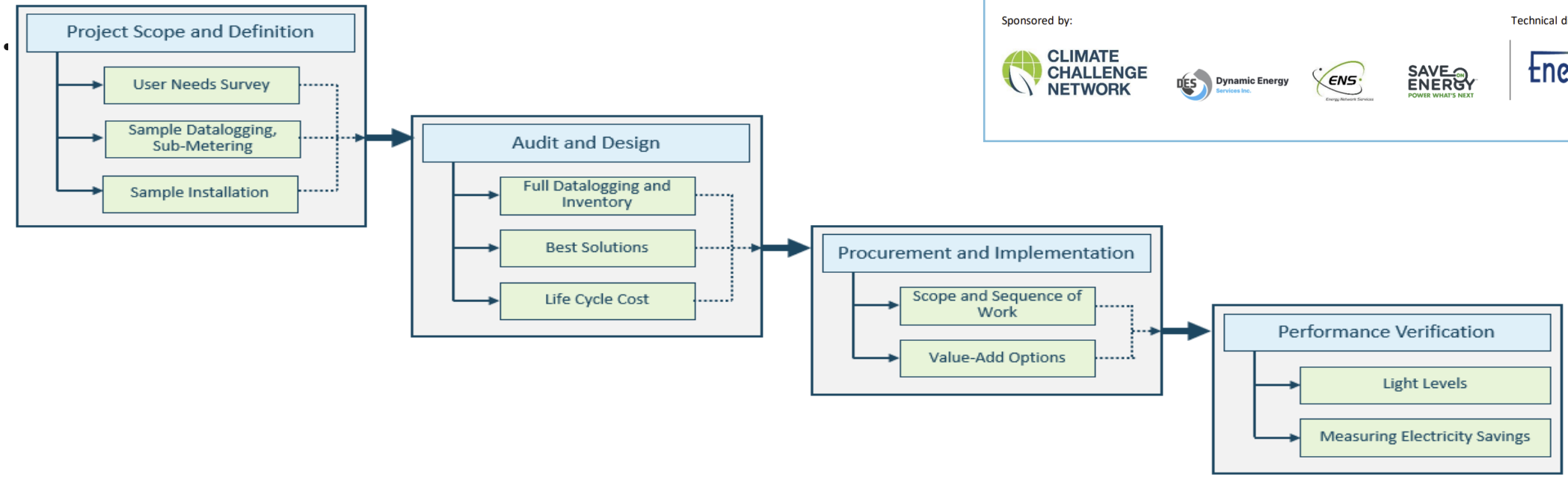
# #4: Lighting Retrofits and Controls

- Documentation and panel identification
- Datalogging and light level measurements
- Review data, life cycle cost analysis
- Lighting designs, procurement & implementation

**GHC Publication**

Greening-Health-Care-Better-LED-Lighting-Conversions-2023-1.pdf

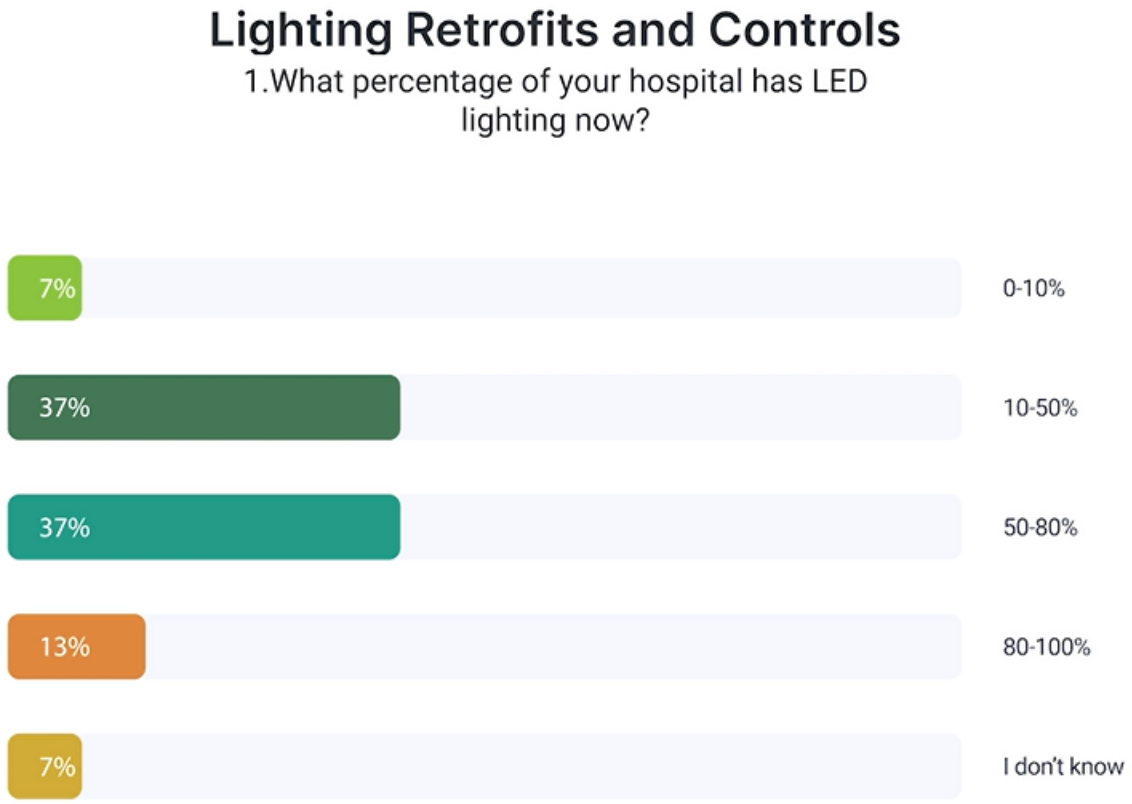


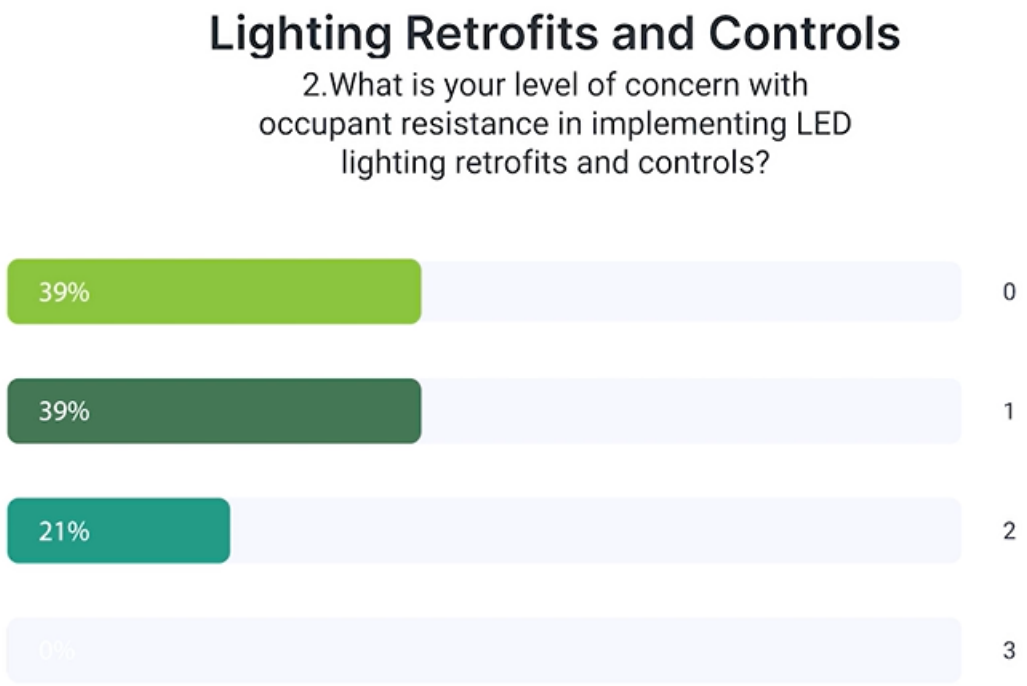
# Implementing Lighting Retrofits & Controls

1. PLANNING
    1. Finalize area of improvements and lighting solution. Refer to GHC LED Lighting conversion guide for implementation planning
    2. Consult with lighting vendors for space lighting options and product selection.
2. IMPLEMENTATION
    1. Engage electric utility DSM program.
3. COMMUNICATION
    1. Let GHC (Michael) know when changes are made so we can look for the savings
4. MONITORING & VERIFICATION
    1. Note the dates when major lighting retrofit is completed. Track savings at the utility meter.
5. CAPITAL BUDGETING

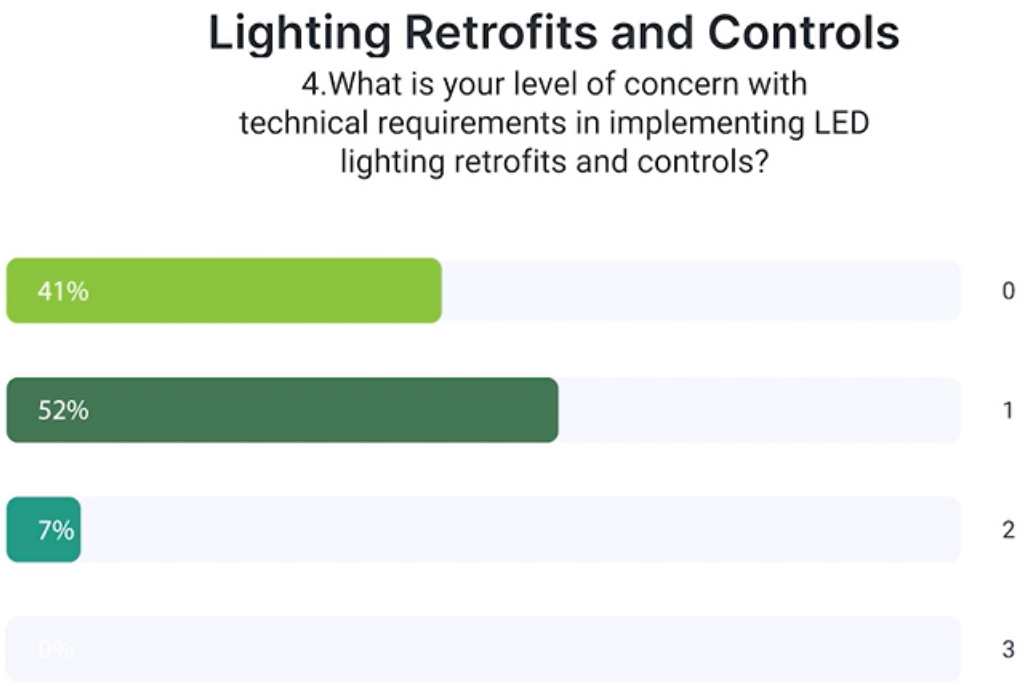
# Lighting Retrofits & Controls – Poll



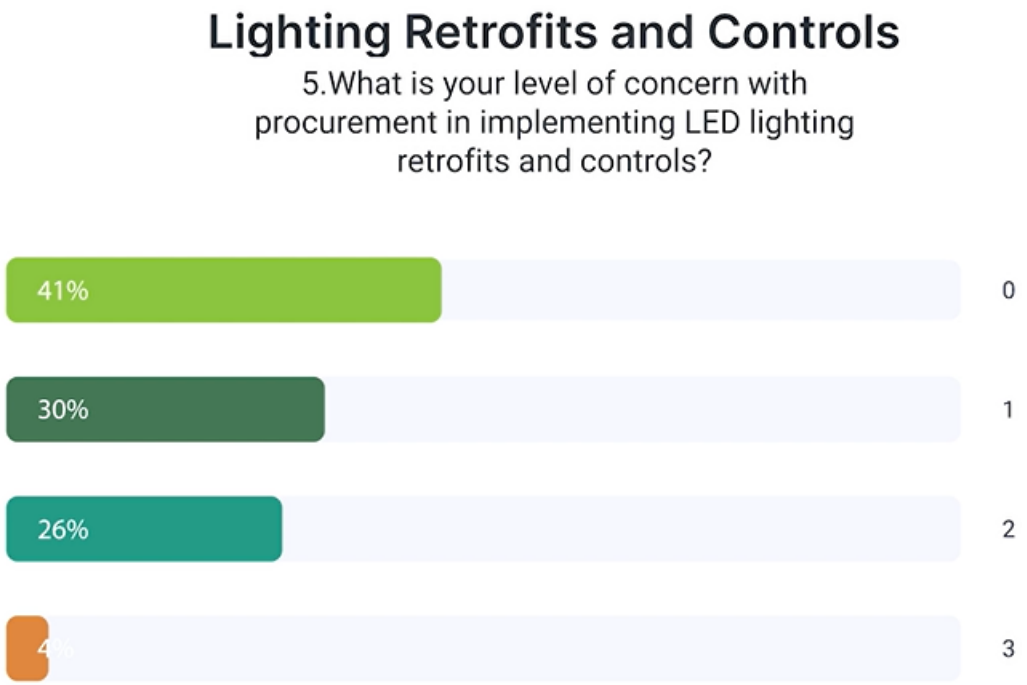
# Lighting Retrofits & Controls – Poll



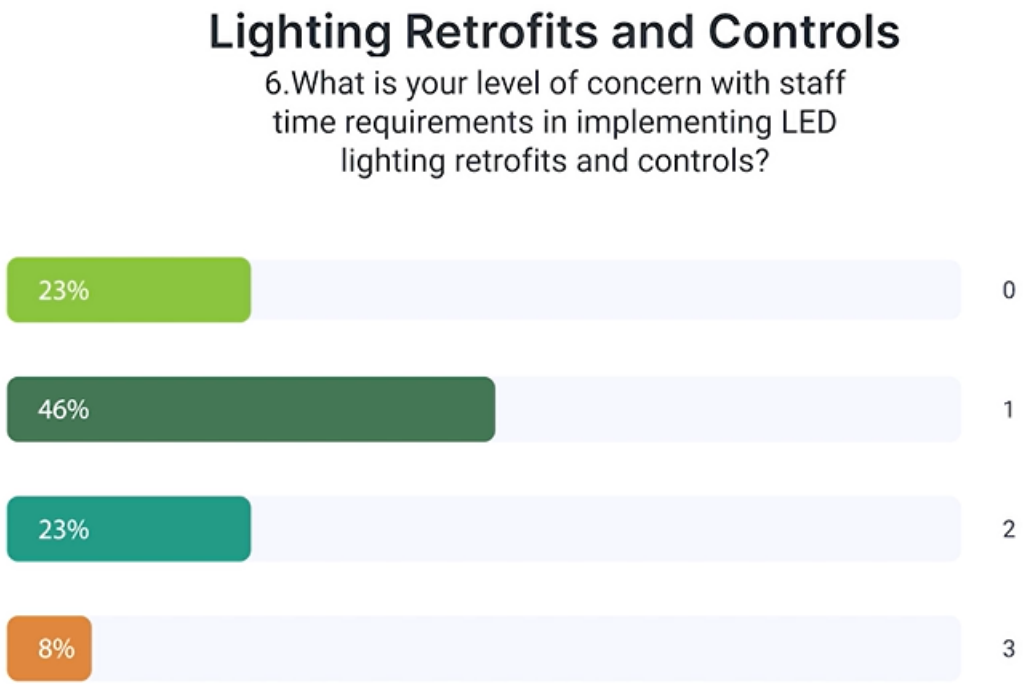
# Lighting Retrofits & Controls – Poll



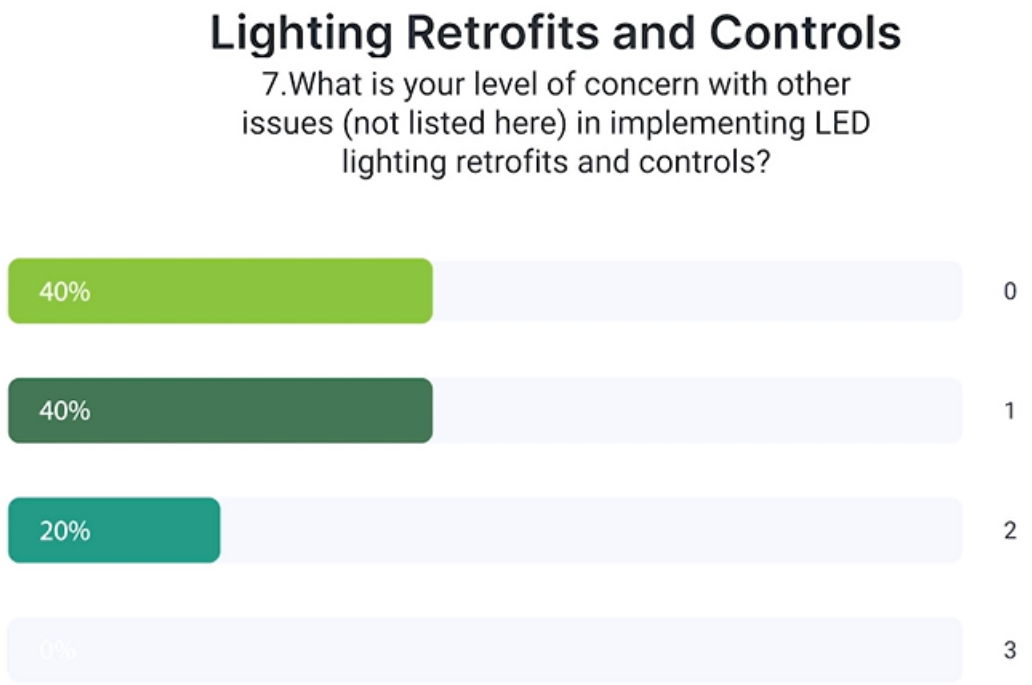
# Lighting Retrofits & Controls – Poll



# Lighting Retrofits & Controls – Poll

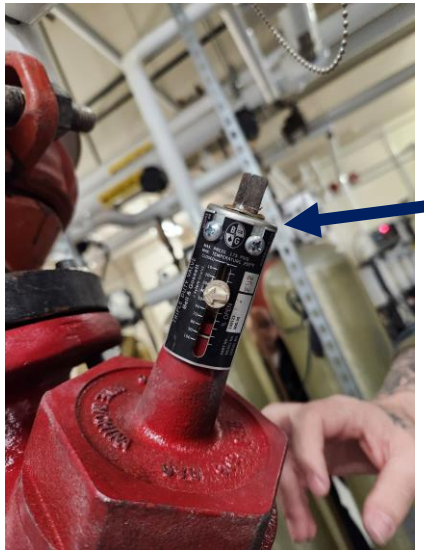


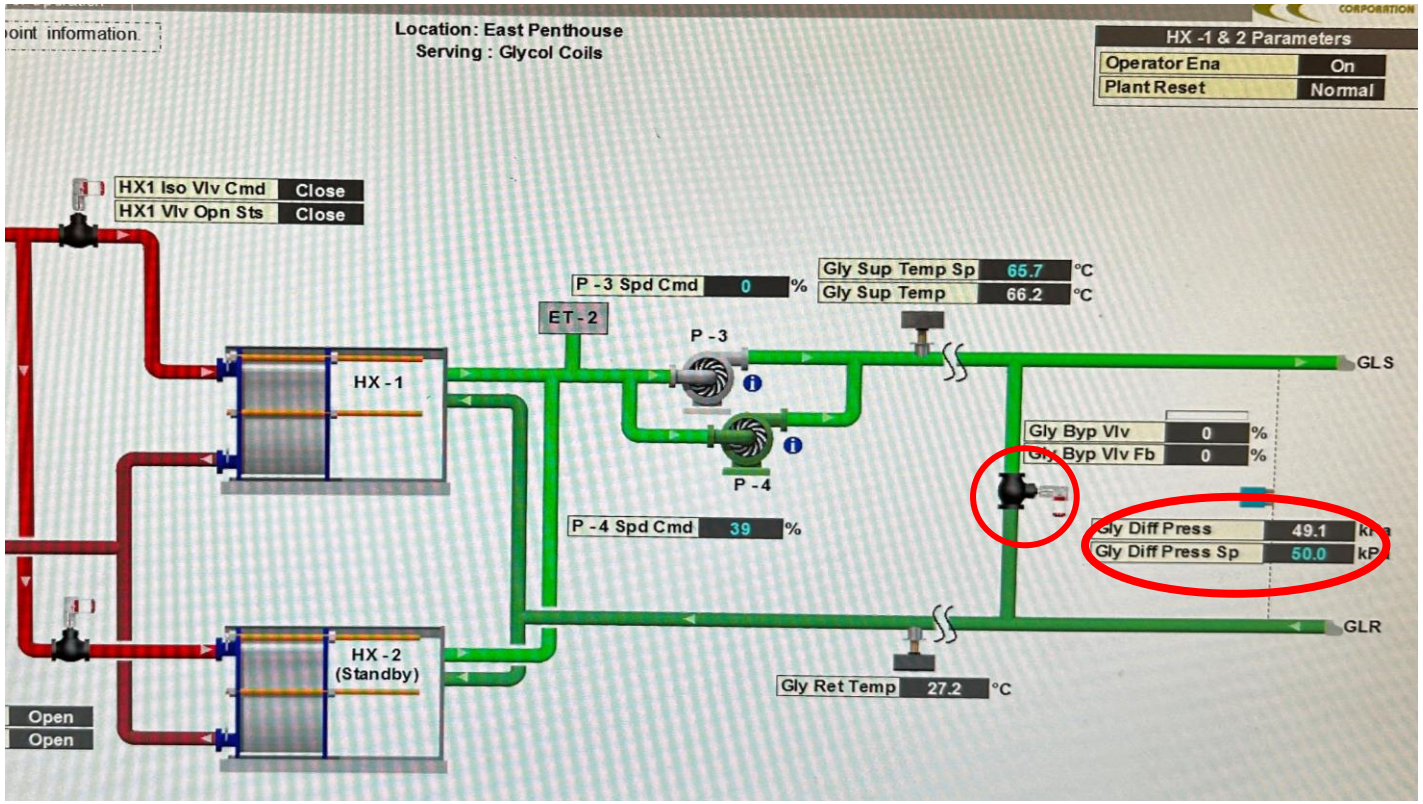
# Lighting Retrofits & Controls – Poll



# #5: Optimizing Pumping Systems

- VFD installation
- Control valve replacement
- Pump scheduling
- DP sensor setpoint and control
- Triple Duty Valve adjustments
- Testing and balancing

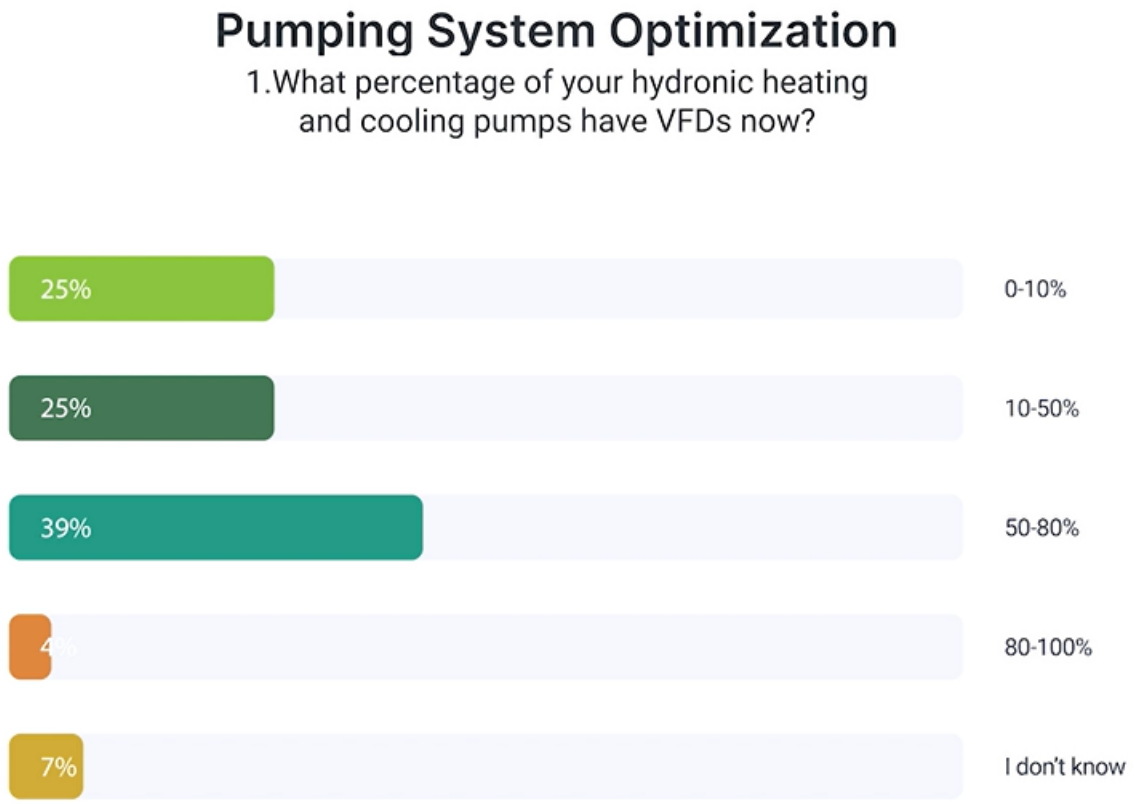




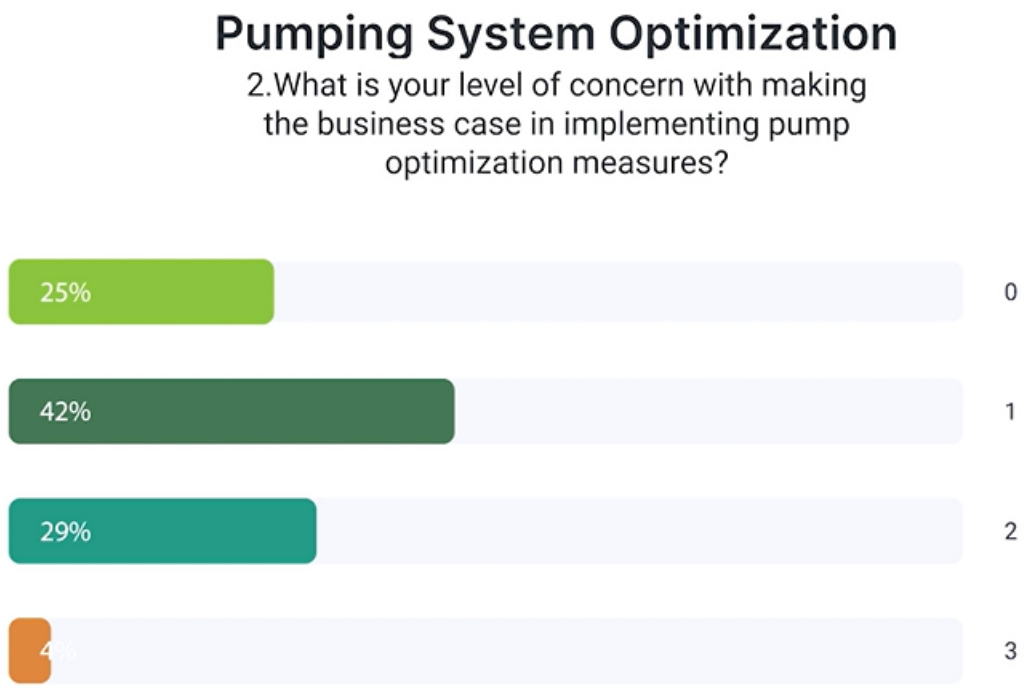
# Implementing Pump Optimization

1. PLANNING
    1. Inventory all heating and cooling pumps with motor HP, flow rating and drives.
    2. Inventory control valve sizes, types and remaining life.
    3. Engage electric utility incentive program.
    4. Inspect and document triple duty valve positions.
2. IMPLEMENTATION
    1. Obtain quotation for best available technology.
    2. Plan and schedule the work.
    3. Engage BAS contractor in upgraded monitoring and controls.
3. COMMUNICATION
    1. Inform and train operators.
    2. Let GHC (Michael) know when changes are made so we can look for the savings.
4. MONITORING & VERIFICATION
    1. Check trend logs for the first week. Add to performance monitoring procedure.
5. CAPITAL BUDGETING
    1. Plan for addition of smart valves, VFDs.

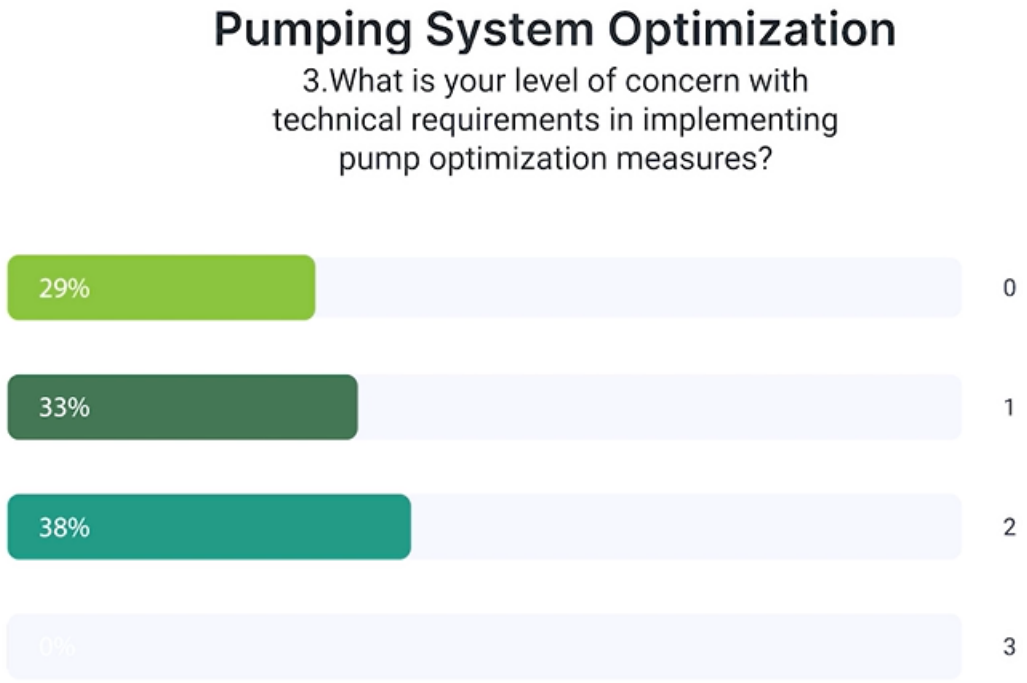
# Pump Optimization – Poll



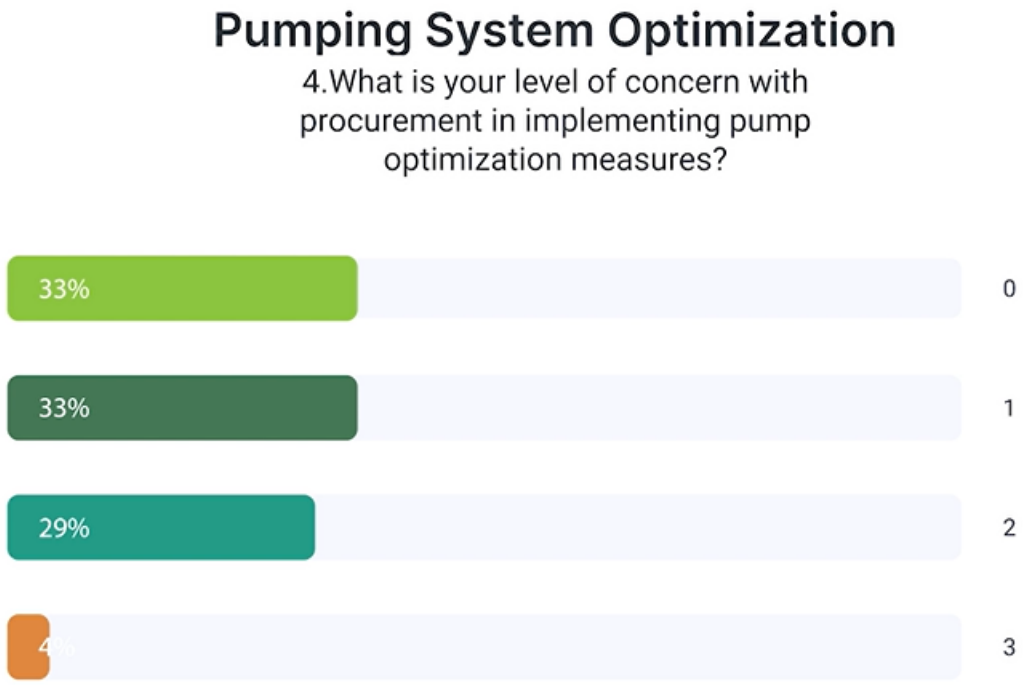
# Pump Optimization – Poll



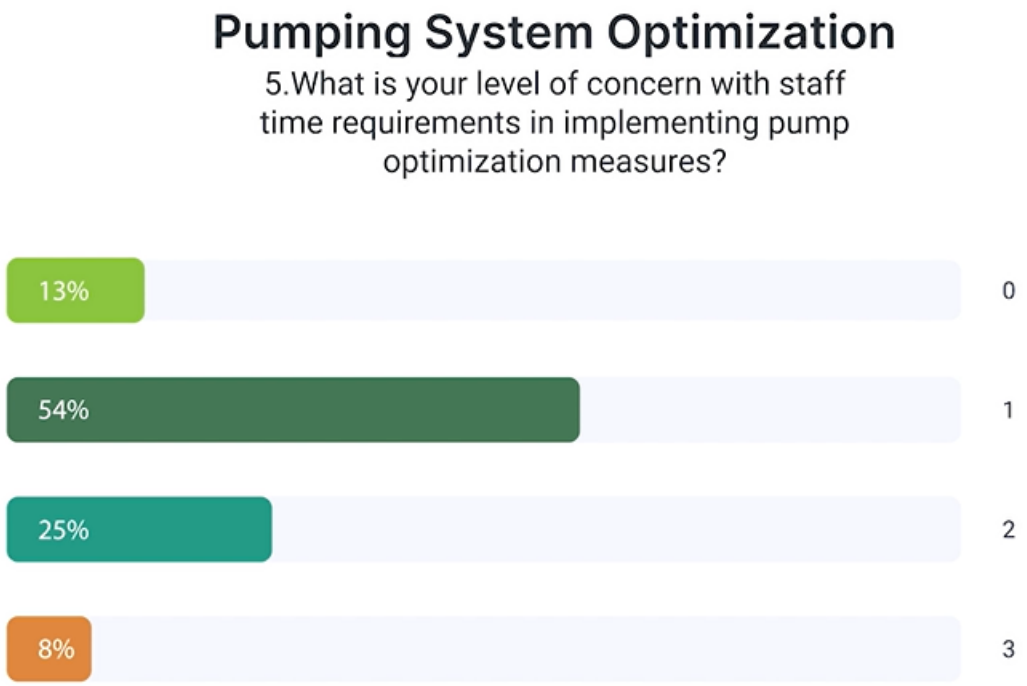
# Pump Optimization – Poll



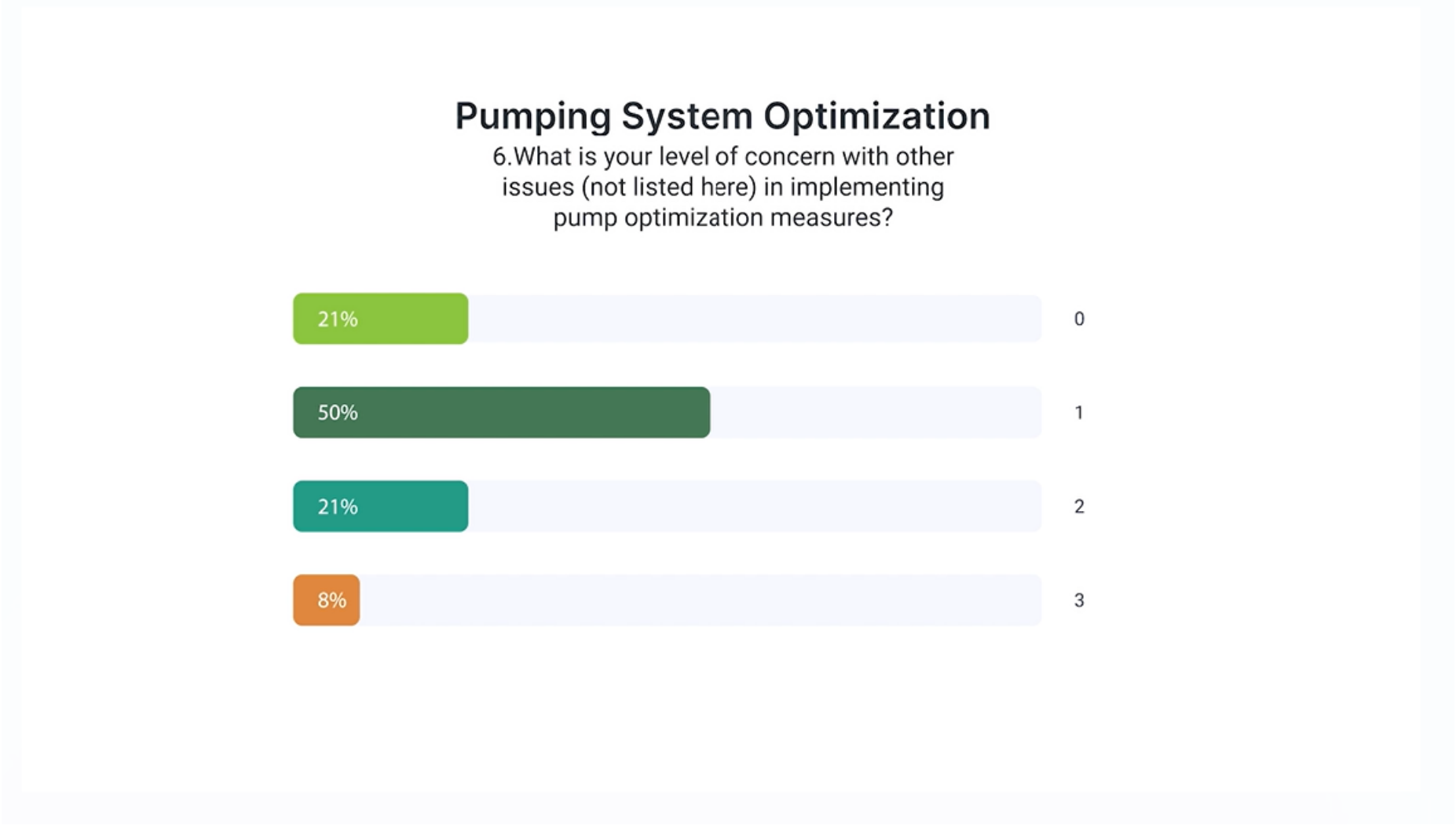
# Pump Optimization – Poll



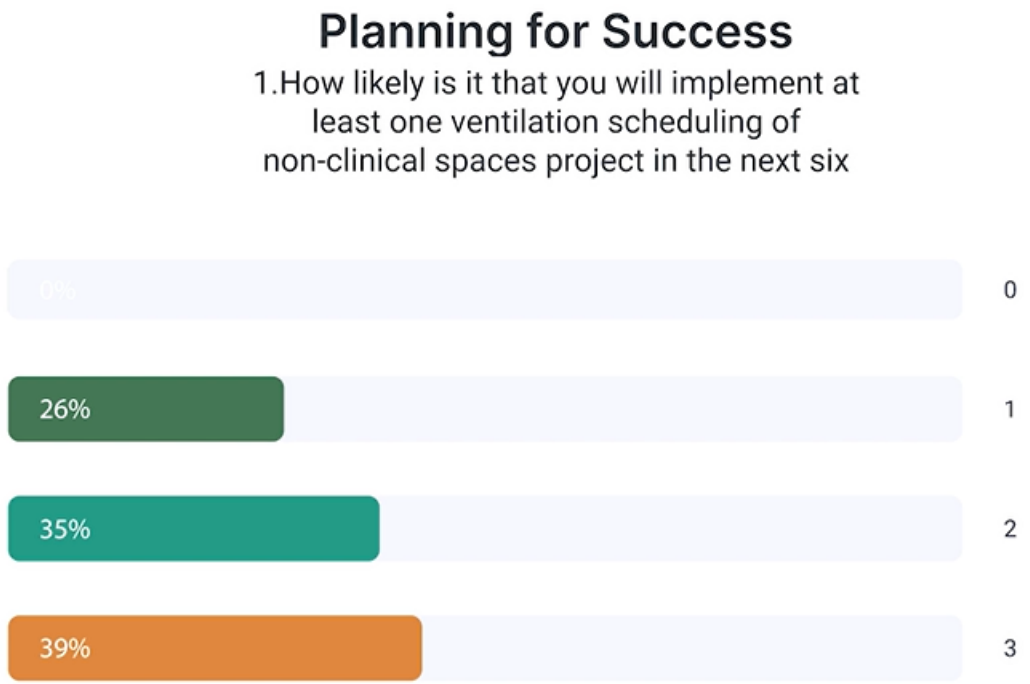
# Pump Optimization – Poll



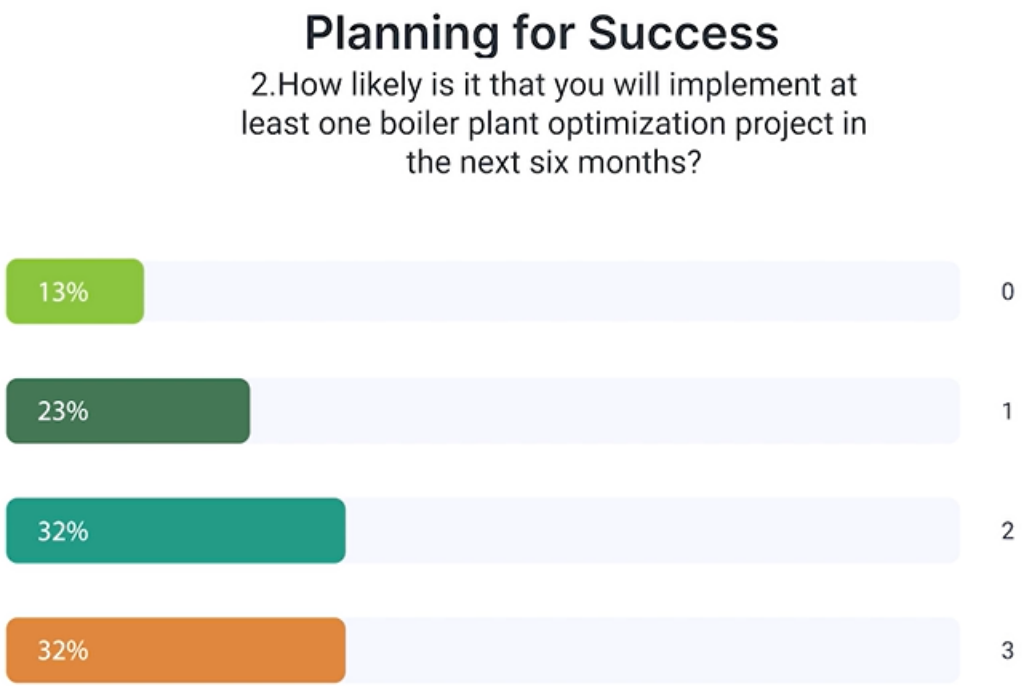
# Pump Optimization – Poll



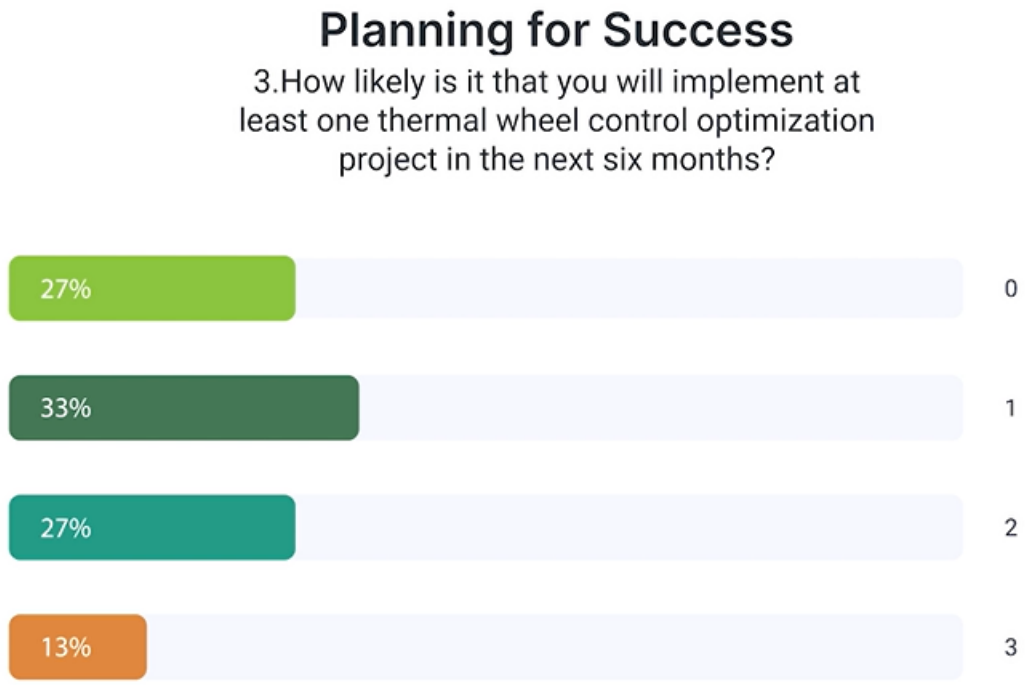
# Planning for Success – Final Poll



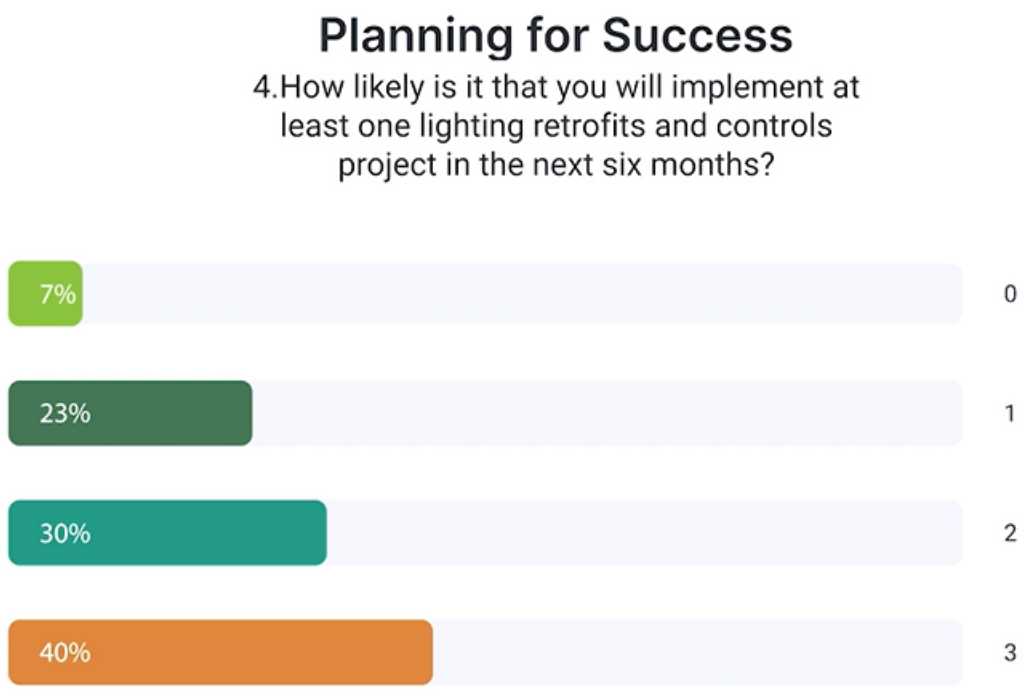
# Planning for Success – Final Poll



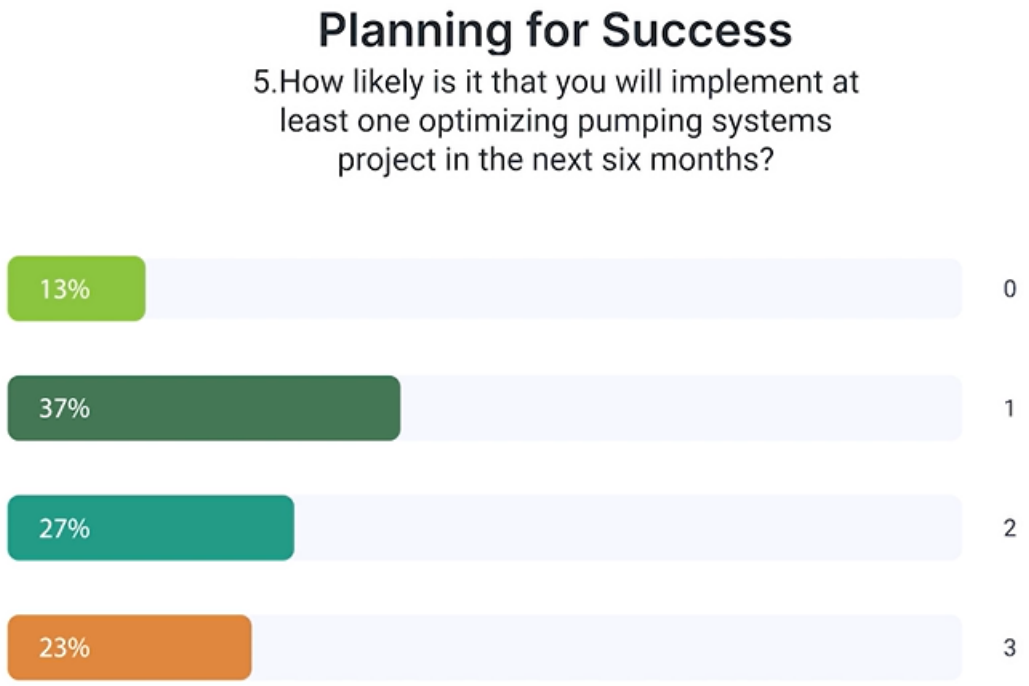
# Planning for Success – Final Poll



# Planning for Success – Final Poll



# Planning for Success – Final Poll




Greening Health Care 2024: Join Us!

# 2024 Calendar of Events

Events are posted on greeninghc.com and webinar registrations are open

## Webinars (times in EST/EDT)

- *February 7: 12:30 – 1:30 pm  Energy and Emissions Reductions – Planning for Success*
- ***April 10: 12:30 – 1:30 pm Picking the Low Hanging Fruit***
- July 31: 12:30 – 1:30 pm Energy Savings Leaderboard
- September 25: 12:30 – 1:30 pm New Hospital Performance

## In-person Events

- June 3 or 10: Summer Workshop (date and location TBC)
- November 4: Annual Forum 2024, 8:00 am to 6:00 pm, Delta Hotel, Toronto

## Join Us! Membership and Support

GREENING HEALTH CARE
working together for healthier communities

CLIMATE CHALLENGE NETWORK

# Staying in Touch


**Ian Jarvis**

Executive Director
Climate Challenge Network
ijarvis@climatechallengenetwork.org

**Heather Bell**

Director, Program and Partnership Development
Climate Challenge Network
hbell@climatechallengenetwork.org

**Michael Pagel**

Program Manager
Greening Health Care
mpagel@climatechallengenetwork.org

**Amandeep Deol**

Technical Director
Greening Health Care
adeol@climatechallengenetwork.org


Visit greeninghc.com to learn more.