RE-COMMISSIONING
THE BEST BANG FOR YOUR BUCK!



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September 28, 2023

PRESENTATION AGENDA

- What's Re-Commissioning (Re-Cx)?
- Why Do Re-Cx?
- What's the Value?
- What are the Typical Issues?
- Key Initial Steps to Get Started.
- Team Members.
- Overview of the Process.
- Measuring Impacts and Successes.
- Q&A





WHAT IS RE-COMMISSIONING?



RE-CX PROCESS PER ASHRAE 1.2-2019

- An organized, quality-oriented process (for planning, assessing, investigating, implementing, verifying, and documenting) that improves the performance of facilities to meet defined operational requirements and criteria for the facility over time.
- Phases:
  - *Planning*
  - *Assessment*
  - *Investigation*
  - *Implementation*
  - *Handoff*
  - *Ongoing Commissioning (OCx)*



WHY DO IT?



WHY DO RE-CX?

- Energy Savings & Improve Energy Use Intensity (EUI).
- Utility Incentive Rebate Money.
- ***Enhance the Sustainability Business Model.***
- Invest in your Building Stock.
- Energy Star Certification / LEED Existing Buildings (EBOM).
- ***Deferred Maintenance.***
- ***Operational Issues/Problems.***
- Occupant Complaints.
- Controls Issues/Problems.
- ***Capital Expenditures (CapEx) Planning.***
- Building Tune-Ups.

WHAT'S THE VALUE?



WHAT'S THE VALUE?

- ***Simple Payback is 1-3 years.***
- Equipment Longevity.
- Better Carbon Footprint.
- ***Think Energy Conservation & Occupant Productivity FIRST!***
- Utility Rebates ENABLE Building Owners to Re-Invest in Additional Energy Conservation Measures (ECM) Projects.
- Skillful & Confident Operations Staff.
- ***Continuous Commissioning Plan, includes:***
  - *Sensor Calibration Plan*
  - *Training Plan*
  - *Monitoring Action Plan*
  - *Energy Star Portfolio Manager*

KEY INITIAL STEPS TO GET STARTED AS THE RE-CX PROVIDER



THREE (3) KEY INITIAL STEPS:

1. Outline the Re-Cx Team **IN YOUR PROPOSAL.** The Owner needs to understand that we are CONSULTANTS and need liscenced contractors to demonstrate and measure!

2. Review the GOALS of the Project WITH THE OWNER prior to commencing the project. Note, in some cases, before your proposal is submitted! ***Every Re-Cx Project is different and needs to be customized to the Owner's Goals.***

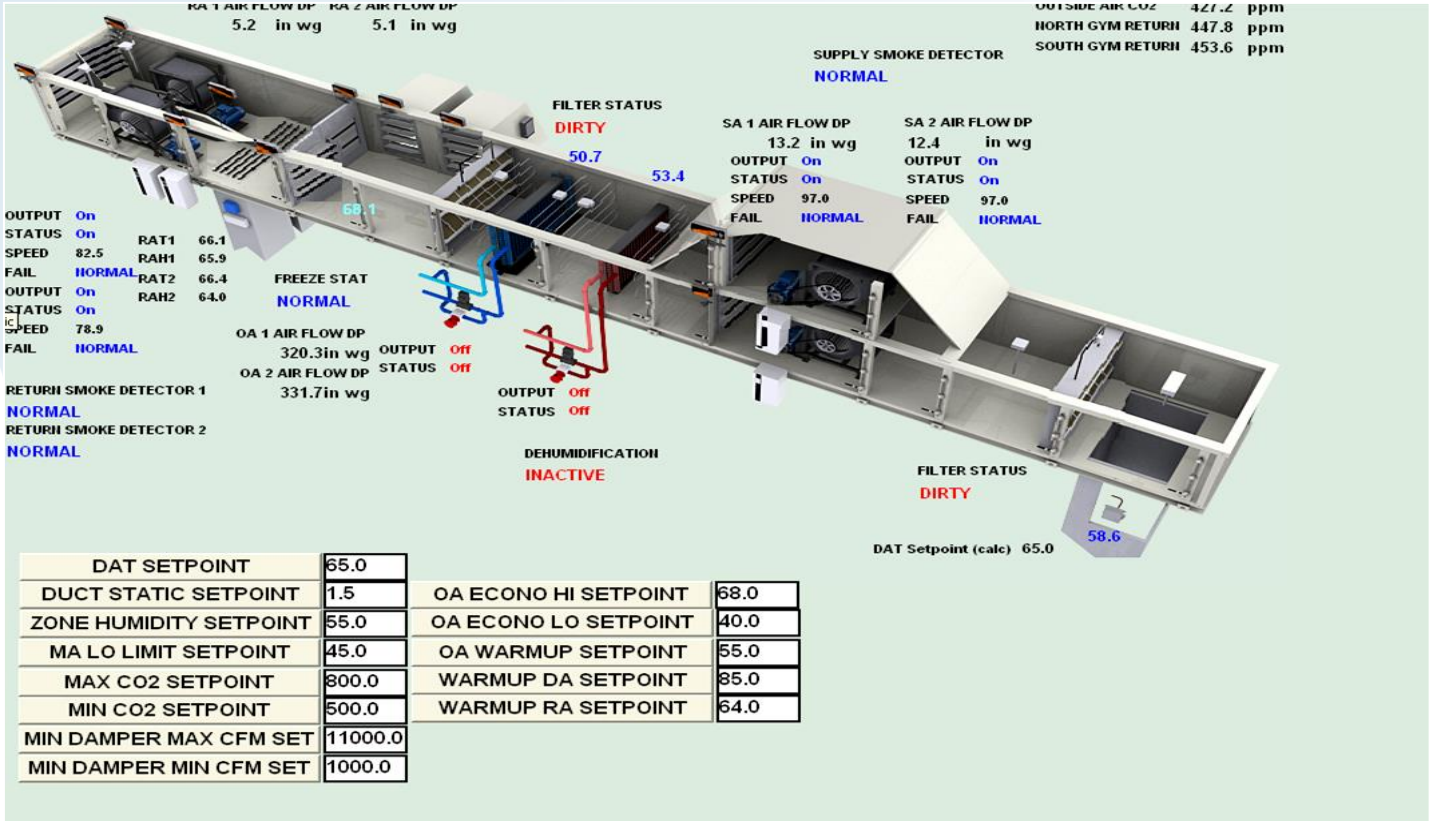
3. **IDENTIFY THE TEAM** and be explicit about the Owner's involvement and support we need to execute the project.

The Re-Commissioning Team

- Owner's O&M staff or O&M provider
- Commissioning Authority (CxA)
- ***Test and Balance Contractor (TAB)***
- ***Controls Contractor / Pneumatics Contractor***



OVERVIEW OF THE Re-Cx PROCESS



DAT SETPOINT	65.0		
DUCT STATIC SETPOINT	1.5	OA ECONO HI SETPOINT	68.0
ZONE HUMIDITY SETPOINT	55.0	OA ECONO LO SETPOINT	40.0
MA LO LIMIT SETPOINT	45.0	OA WARMUP SETPOINT	55.0
MAX CO2 SETPOINT	800.0	WARMUP DA SETPOINT	85.0
MIN CO2 SETPOINT	500.0	WARMUP RA SETPOINT	64.0
MIN DAMPER MAX CFM SET	11000.0		
MIN DAMPER MIN CFM SET	1000.0		

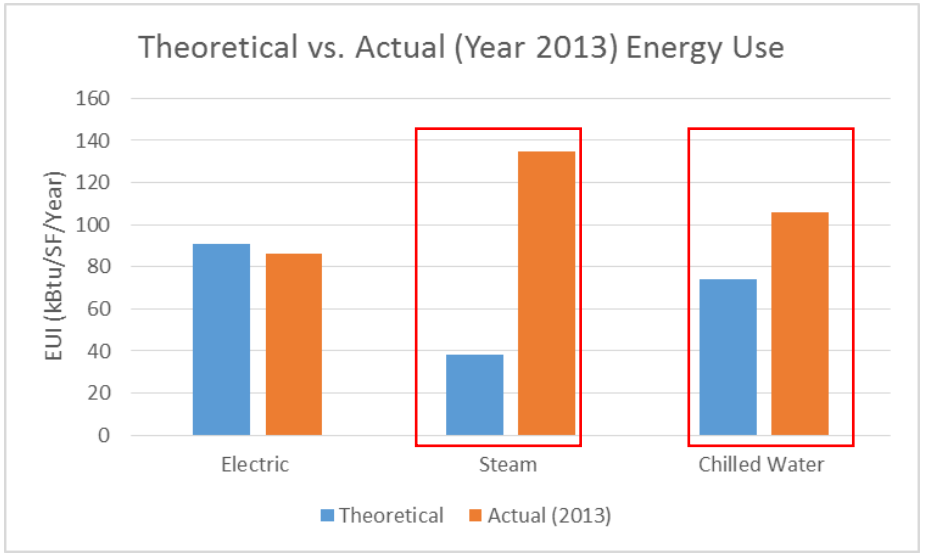
RE-CX STEPS

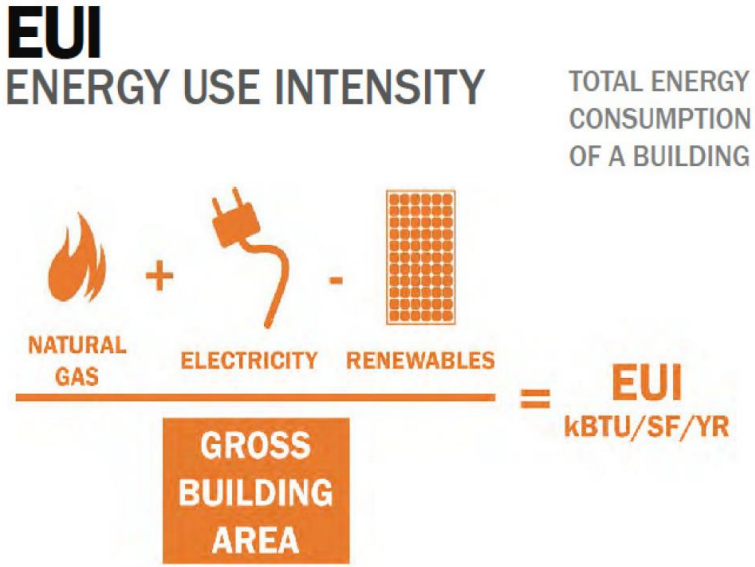
1. *Establishing a Baseline for Energy Use.*
2. *Identifying Operational Issues through Testing.*
3. *Performing Operational Trending Analyses.*
4. *Re-Commissioning to the Design Intent.*
5. *Identifying Optimization Measures.*





STEP #1A: *USING THE ENERGY MODEL*
ESTABLISHING A BASELINE FOR ENERGY USE

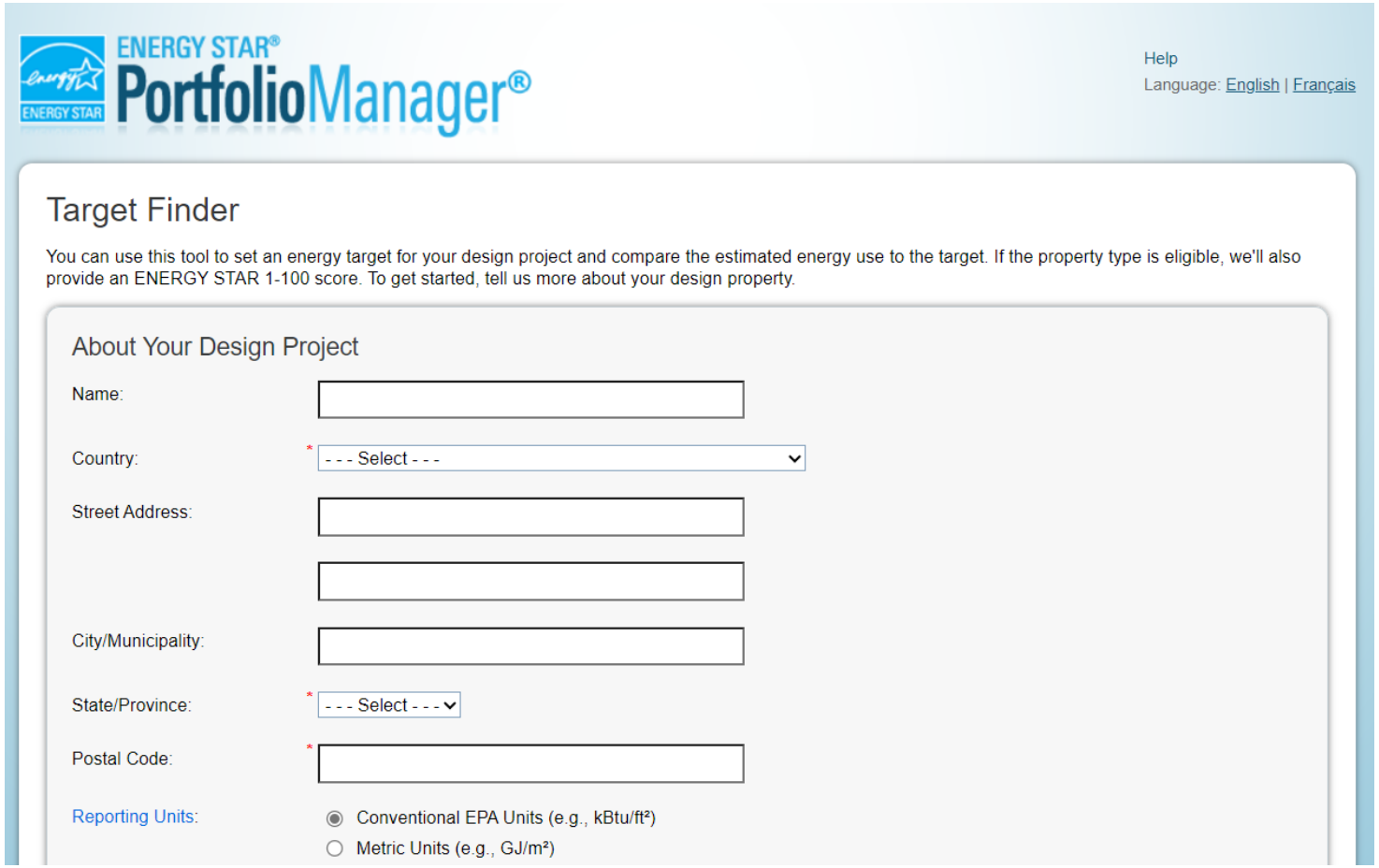




- Theoretical EUI: 204 kBtu/SF
- Actual EUI: 327 kBtu/SF

Actual is 60% greater than theoretical (energy model)

STEP #1B: *USING ENERGY STAR TARGET FINDER*
ESTABLISHING A BASELINE FOR ENERGY USE



ENERGY STAR Portfolio ManagerTarget Finder

TYPICAL ENERGY CONSERVATION SOLUTIONS

- ***Detailed Lighting Audit***
- Institute ***Tighter*** Occupancy/Unnoccupancy Set Points and Schedules.
- Reduce Outside Air (OA) flow to minimum code required per ASHRAE.
- ***Turn Equipment OFF!***
- ***Tune Proportional-Integral-Derivative (PID) Loops on Controllers, Valves, Devices.***
- Remove Overrides.
- Temperature Resets (supply air, Hot Water (HW) heating, etc.).
- Reduce Air Changes Per Hour (ACH's).



STEP #2:
IDENTIFYING OPERATIONAL ISSUES

- Faulty Sensors, Dampers, Devices.
- Dirty Strainers and Filters.
- Pipe and Joint Corrosion Due to Bad Water Quality.
- Over/Under Pumping and Airflow.
- Building Pressure! (negative, most of the time).
- ***No Economizer Operation at Air Handling Units (AHU's).***
- Air and Water Balancing Issues.
- Duct Leakage.
- Integration of Lighting Control with HVAC.
- ***Simultaneous Heating & Cooling at AHU's and/or Terminal Units.***

TYPICAL OPERATIONAL ISSUES







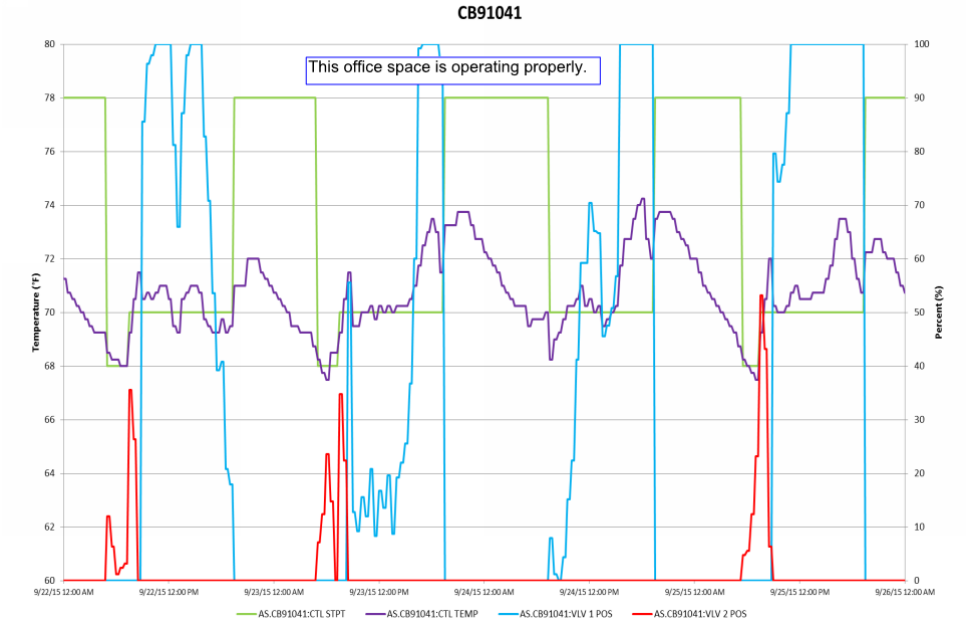


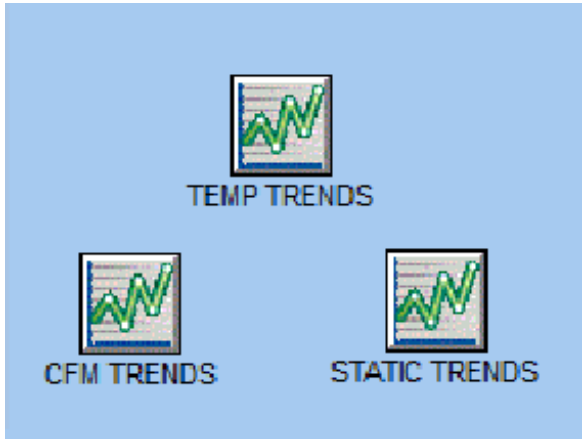


STEP #3:
PERFORMING OPERATIONAL TRENDING ANALYSES

— Intent:

1. *Confirm **perceived** operational issues by leveraging historical building management system (BMS) data.*
2. *Understand potential cause(s) of confirmed operational issues and develop Functional Test Procedures (FTPs) accordingly.*





STEP #4:
RE-CX TO THE DESIGN INTENT

- Develop ***Functional Testing Scripts*** using the Original Sequence of Operations.

- Systems confirmed as having operational issues via field observations and ***trending analyses***

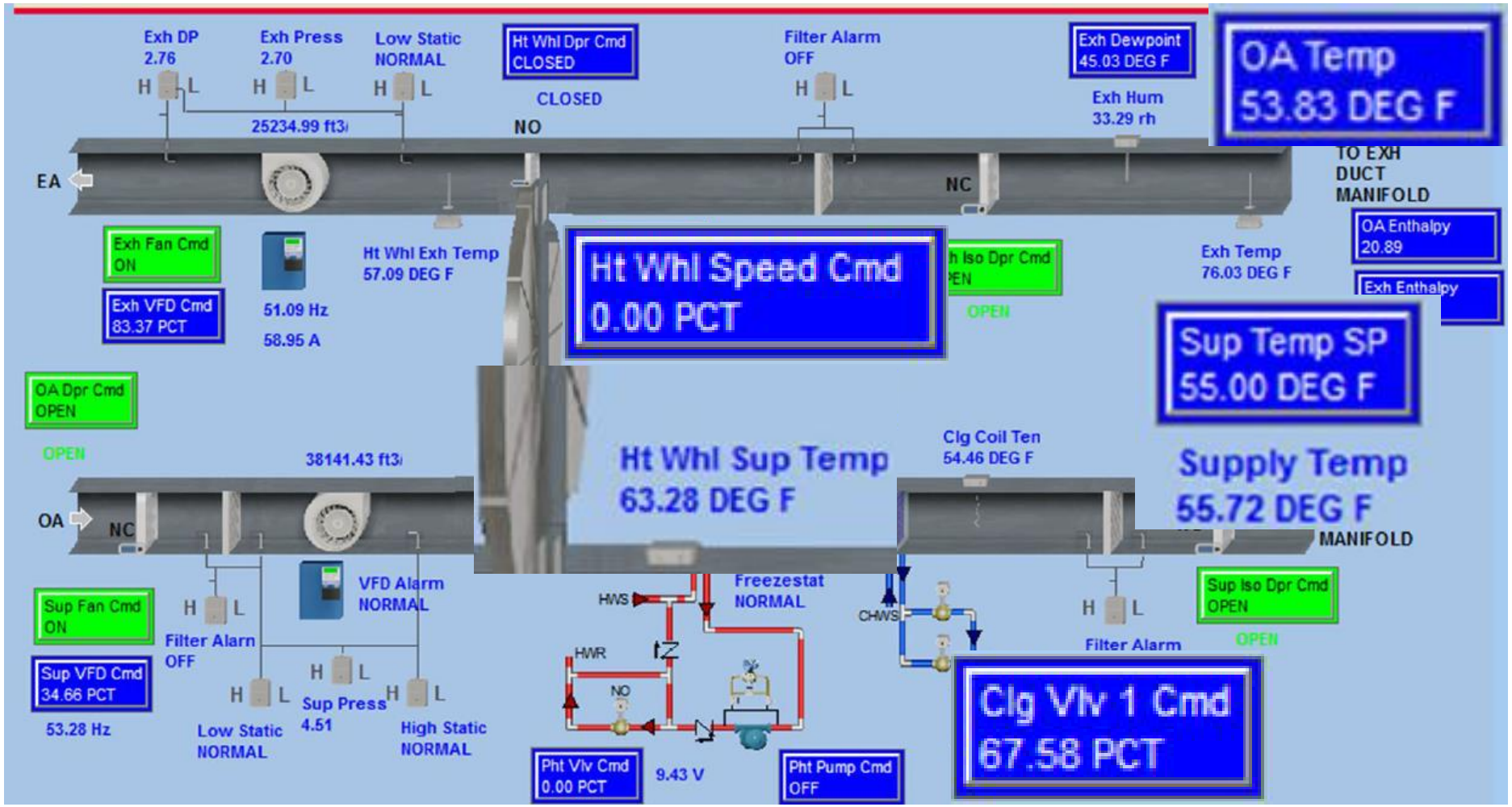
- The ***Issues Log*** is a cumulative list of all deficiencies identified through interviews, field observations, trending analyses, and functional testing.

STEP #5:
IDENTIFYING OPTIMIZATION MEASURES

- Through interviews with the staff and reviewing the buildings operations in Phase-I.

- Typical Optimization Measures:
  1. ***Improve Enthalpy Wheel Operation***
  2. *Implement a Discharge Air Temperature Reset Schedule*
  3. *Eliminate Over-Ventilation in Office Spaces*
  4. *Implement Unoccupied Mode Setbacks: Airflow and Temperature in Office Spaces*

IMPROVE HEAT WHEEL OPERATION



MEASURING IMPACTS AND SUCCESSES



MEASURING IMPACTS AND SUCCESSES

1. ***Be cost-effective*.** Measure the solution against the energy savings to get a simple payback/ROI.

2. ***Preventative Maintenance Program and/or Maintenance Service Companies.*** Consistent and persistent maintenance keeps buildings tuned and elongates equipment life.

3. ***Ongoing/Continuous Commissioning*.** Keeps buildings tuned beyond initial demonstration to foster long-term success.

4. ***Keep Detailed Records*.** A detailed record of maintenance, improvements, replacements, etc. will provide seamless staff transitions.

5. ***Keep Staff Trained & Up-to-date*.** A robust training program for the operations staff will provide them the teaching necessary to understand the new technologies.

Q&A

THANK YOU!