Building Owners and Managers Association of British Columbia

The BOMA BC Building Tune-up Program

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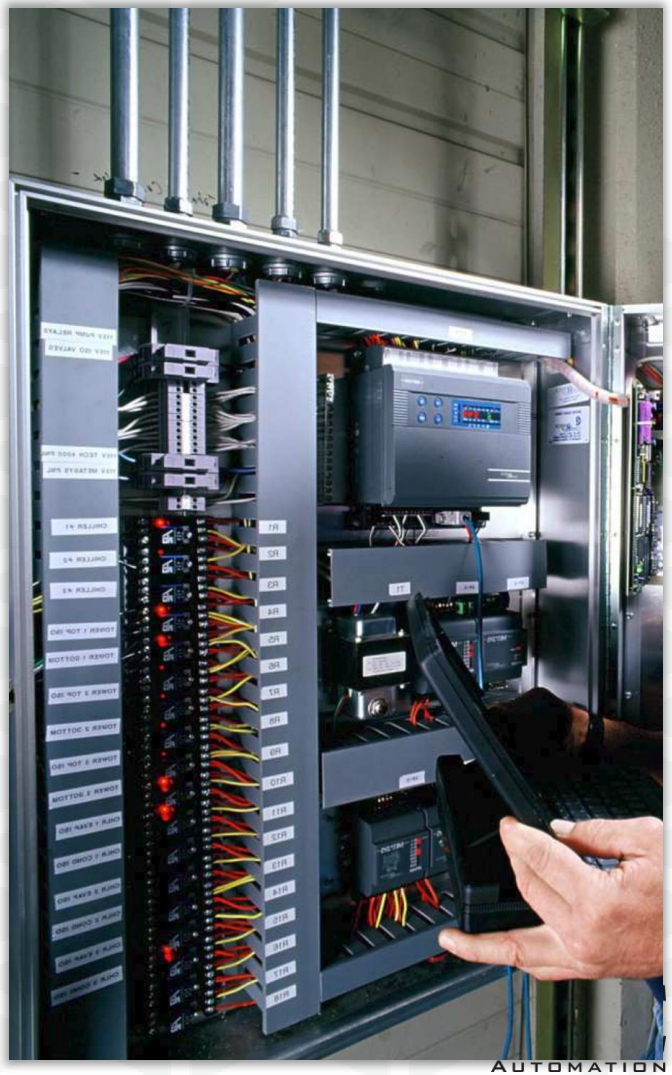
BUILDING INTELLIGENCE.
BUILDING SUCCESS.

Tune-up Program Overview

- ✓ Building Recommissioning (RCx) program to achieve low-cost energy and emissions savings
- ✓ Targeting B & C class office building and shopping centres
- ✓ Free RCx assessment, $3,000 towards implementation of recommendations
- ✓ Traditional and analytics-based delivery options

Recommissioning – a Refresher

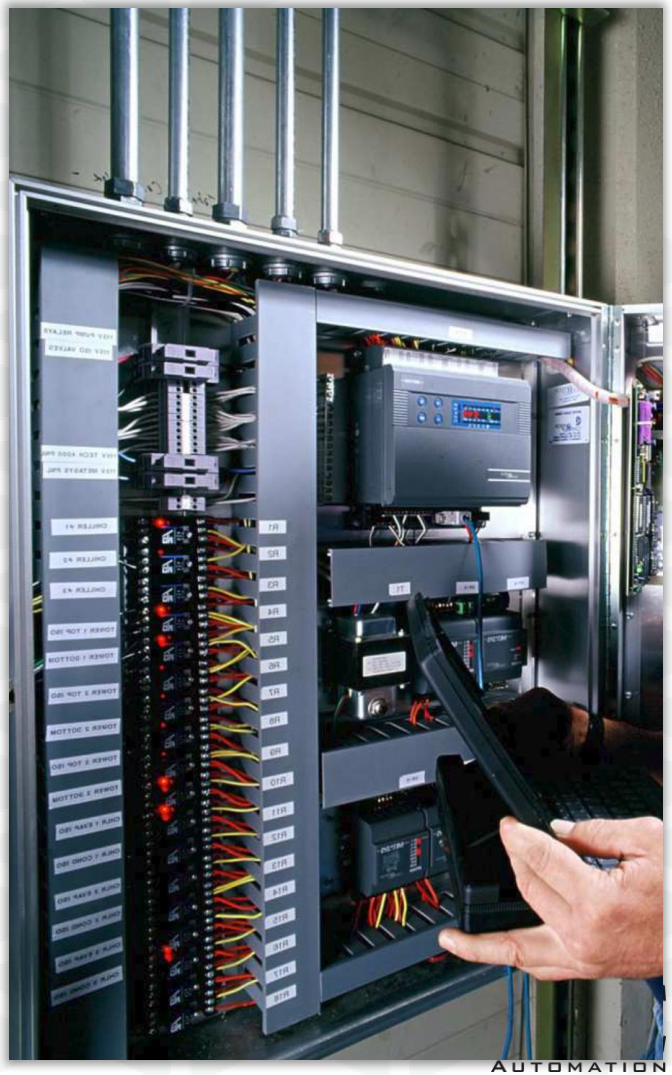
- **Commissioning** – “A quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems and assemblies meets defined objectives and criteria” (ASHRAE Guideline 0-2005)
- Re-commissioning, Retro-commissioning, Existing Building Commissioning, Energy Audit?



Recommissioning – a Refresher

RCx in common practice:

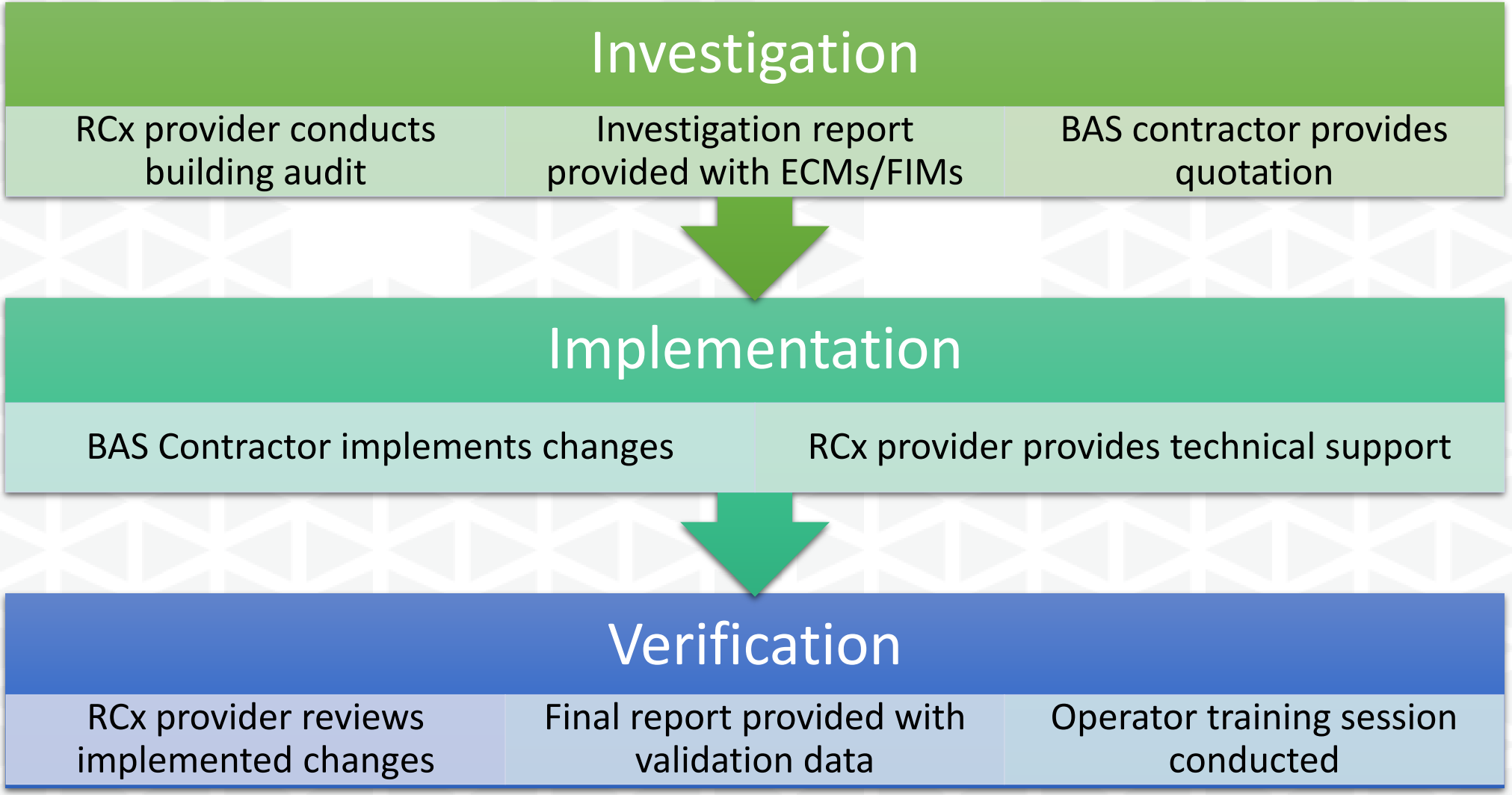
- An energy audit focused on optimizing the control of existing systems, through targeted maintenance, DDC programming changes or minor upgrades
- Improving occupant comfort and resolving operating issues are also considered
- Energy conservation measures (ECM)/Facility Improvement Measures (FIM) are assessed with costs, savings, and paybacks, and summarized in a report
- Larger beneficial upgrades are flagged for further investigation



Why isn’t my building running perfectly already?

- Physical wear and tear
- Renovations and upgrades creating conflicts
- Underlying mechanical issues
- Sub-optimal existing BMS operating sequences
- BMS changes and overrides

Recommissioning – a Refresher



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Analytics, Fault Detection Software Overview

MANUAL
CORRECTIVE
ACTIONS

Building
Systems
Data

Cloud-based Analysis

Web-based
Dashboards

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Semi-automating the RCx Investigation

Priority	System	Message	Type	Weekday	Occurred	State	Insight ID
High	DHW	Boiler is short cycling		Tuesday	Mar 19, 2019 11:59 pm	Active	46302.1064061
High	GRL_AHUL1	Cooling stage 1 is short cycling		Tuesday	Mar 19, 2019 11:59 pm	Active	46336.1064487
High	GRL_AHUL6	Outside air damper is hunting		Tuesday	Mar 19, 2019 11:59 pm	Active	46338.1064516
High	GRL_AHUL6	Cooling stage 2 is short cycling		Tuesday	Mar 19, 2019 11:59 pm	Active	46340.1064496
High	GRL_AHUL3	Outside air damper is hunting		Tuesday	Mar 19, 2019 11:59 pm	Active	46338.1064515
High	GRL_AHUL1	Outside air damper is hunting		Tuesday	Mar 19, 2019 11:59 pm	Active	46338.1064514
High	GRC_AHU3	High CO2 levels are unable to meet setpoint.		Saturday	Mar 16, 2019 11:59 pm	Active	46352.1064591
High	GRC_AHU1	The CCV is passing.		Saturday	Mar 16, 2019 11:59 pm	Active	46346.1087764
High	GRL_AHUL1	MAD is open when building is unoccupied.		Saturday	Mar 16, 2019 11:59 pm	Active	46356.1064672
High	GRL_RTUL1	MAD is open when building is unoccupied.		Saturday	Mar 16, 2019 11:59 pm	Active	46356.1064675

Displaying 1 to 10 of 54 entries

1 2 3 4 5 6

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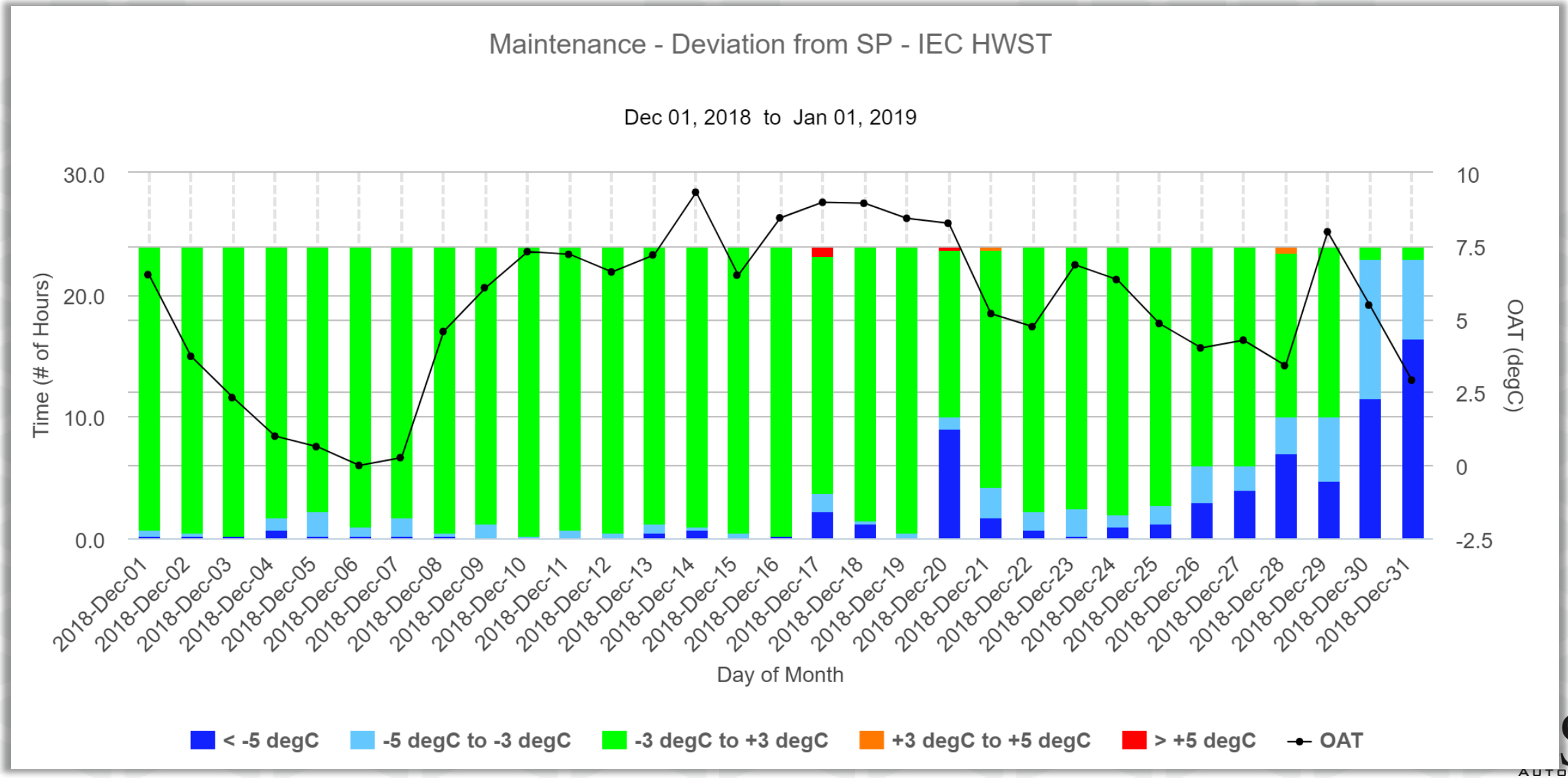
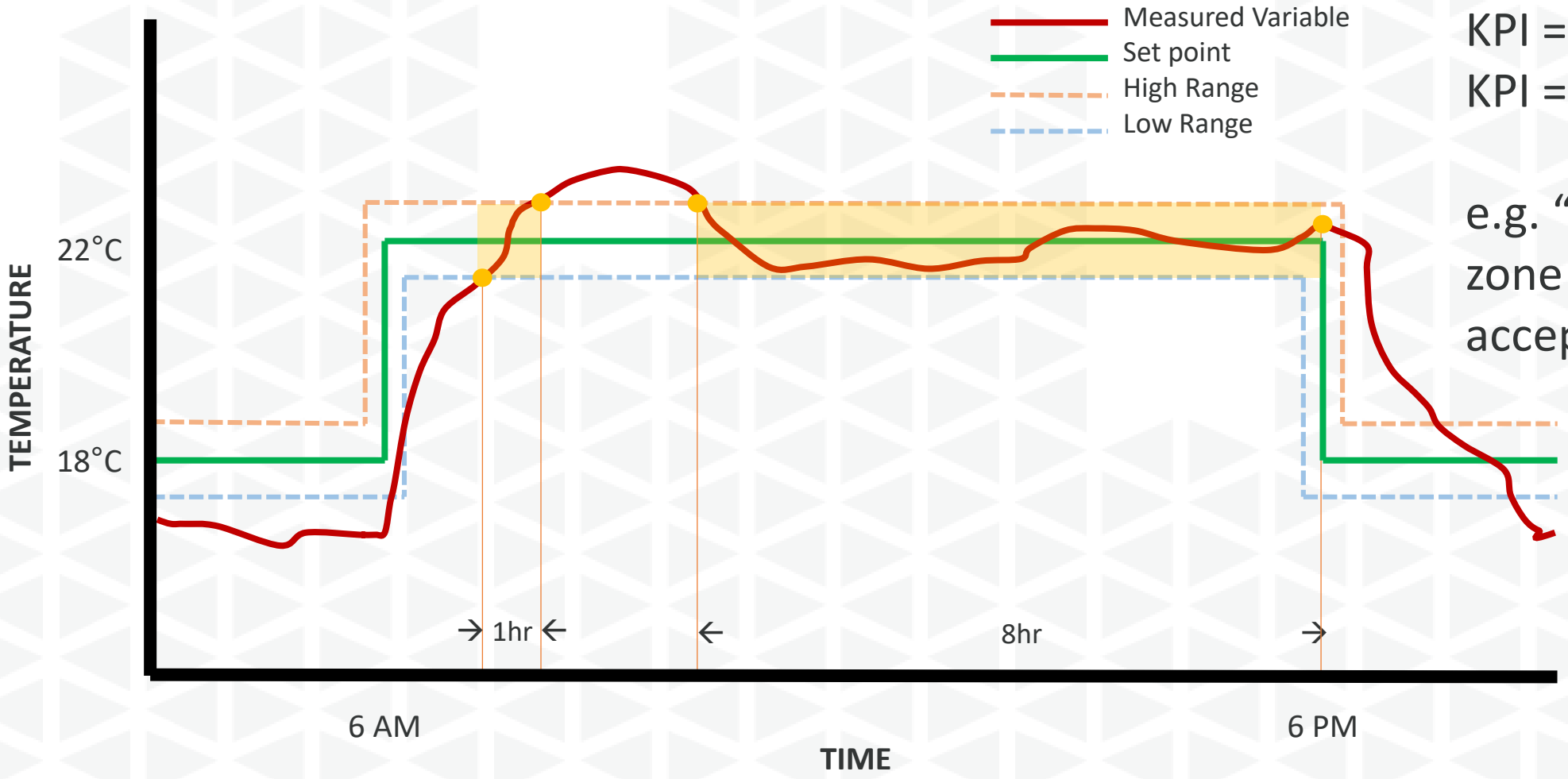
Visualizing Operating Data and Performance



Calculating Setpoint Control Performance



KPI = 9 hours / 12 hours
KPI = 0.75 = 75%

e.g. “75% of the time, the zone temperature is in an acceptable range”

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Aggregate System and Building KPIs

Jul 01, 2018 to Aug 01, 2018

Statistics:

Key Performance Indicator (KPI) is calculated hourly and averaged over the specified date range.

KPI Target:	Greater Than: 80
Performance Goal	100% of Systems meet KPI Target
Total Number of Systems:	287
System(s) above KPI Target:	227
System(s) below KPI Target:	60

79

Performance Index

Percentage of systems working above the KPI Target

Highest KPI:	100
Lowest KPI:	0
Average KPI:	85

System(s) with the Lowest KPI:

List of system(s) with the lowest KPI score(s):

- CP22815_DTBZ85_0A315
- CP23003_DTBZ86_0A303
- DTBZ19_0A209
- DTBZ20_0A301
- DTBZ23_0A320

Analytics Pros and Cons

Pros	Cons
▪ More issues uncovered in investigation (a lot of hidden maintenance items)	▪ Additional upfront and ongoing cost
▪ More data and information = better analysis and savings estimates	▪ Requires a relatively high level of technical expertise to use effectively
▪ Can streamline the maintenance process	▪ Requires ongoing training or technical support
▪ Provides a means of ensuring savings persist over time	▪ Internal processes need to be developed and/or refined

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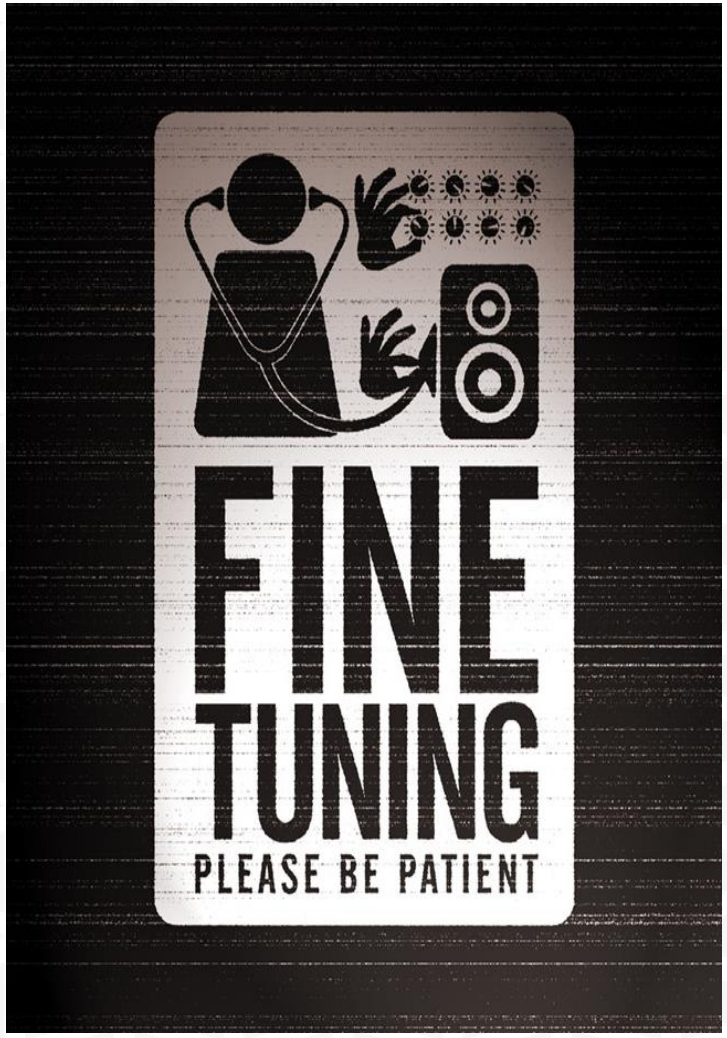
RCx Findings

1. **Resolve Maintenance Issues**
   - Short-cycling, setpoint hunting
   - Equipment not responding to BMS commands
   - Failed actuators, dampers, compressors, fans
   - Calibration issues
2. **Reduce Equipment Run-Times**
   - Revise operating schedules
   - Implement/tune optimal start/stop control
   - Implement/tune unoccupied setback control



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RCx Findings

2. **Reduce Equipment Run-Times**
   - Optimize System and Plant on/off control (operate based on demand)
3. **Reduce Equipment Loads/Optimize Operating Efficiency**
   - Adjust space temperature setpoints
   - Optimize zone airflow control
   - Optimize ventilation air control
   - Implement/tune pressure and temperature resets
   - Optimize plant equipment staging

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RCx Typical Results

BC Hydro C-Op, 10 Years of RCx:

- Medium office (~75,000 ft^2) – 10% energy savings, $0.32/ft2 cost, 2.3 year payback
- Large office (~240,000 ft^2) – 7% energy savings, $0.28/ft2, 2.2 year payback
- Shopping centre (~375,000 ft2) – 2.4% energy savings, $0.08/ft2, 1.4 year payback

1st BOMA Tune-up Building

- Medium office (~95,000 ft^2) – 10% energy savings, $0.09/ft2 cost before incentive, ~6 month payback, traditional approach

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The Tune-up Program Offer

What's covered:

- ✓ FREE Investigation & Verification phases
- ✓ $3,000 towards Implementation phase
- ✓ Operator training – 4 hour session

What isn't:

- ✓ Remaining Implementation cost (~$0.1-0.2/ft^2)
- ✓ Analytics software: $5,300 for 1000 trend setup and 1st year license (renews at $2,400/year)

No commitment to implement!

The Tune-up Program Offer

What is required from you:

- ✓ BMS/DDC remote access and shop drawings, mechanical drawings
- ✓ At least 12 months of utility data
- ✓ A few hours of operator support time

Process:

- ✓ Analytics software setup ~1 month
- ✓ Investigation Phase ~2 months
- ✓ Implementation Phase – varies but 2-3 months typical
- ✓ Verification Phase <1 month

The Tune-up Program Offer

Eligibility:

- ✓ BOMA BC Membership!
- ✓ ~>75,000 ft^2 B/C class building, at least 5 years old
- ✓ DDC system controlling major equipment (and preferably zone equipment)
- ✓ Preventative maintenance program in place with at least an annual cycle

<u>Room for 6-7 more buildings under current pilot!</u>

How to Enroll

Building Owners and Managers Association of British Columbia

www.boma.bc.ca/green-buildings/building-tune-up-program/