

# Comfortable Performance

## Retro-Commissioning Building Operations

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# Building owner's priorities

- Occupant comfort
- Operating cost
- Equipment Condition and Life Cycle
- Environmental impact



# Building owner's challenges

- Occupant comfort
- Operating cost
- Equipment Condition and Life Cycle
- Environmental impact



# NRCan - RCx Definition:

- “The main RCx goal is to improve the overall building operation and system interaction while meeting current’s occupant’s needs”



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Comfort + Building Performance = Comfortable Performance



# Retro-Commissioning

- Technical
  - System design and installation
  - Control parameters
  - Control strategies
- Operation
  - Operation schedule
  - Set-point adjustments
  - Monitoring and troubleshooting



# Operation

- Successful Building Operator requires:
  1. Knowledge
  2. Tools
  3. Time
- RCx will
  - Develop tools
  - Improve knowledge



# Knowledge

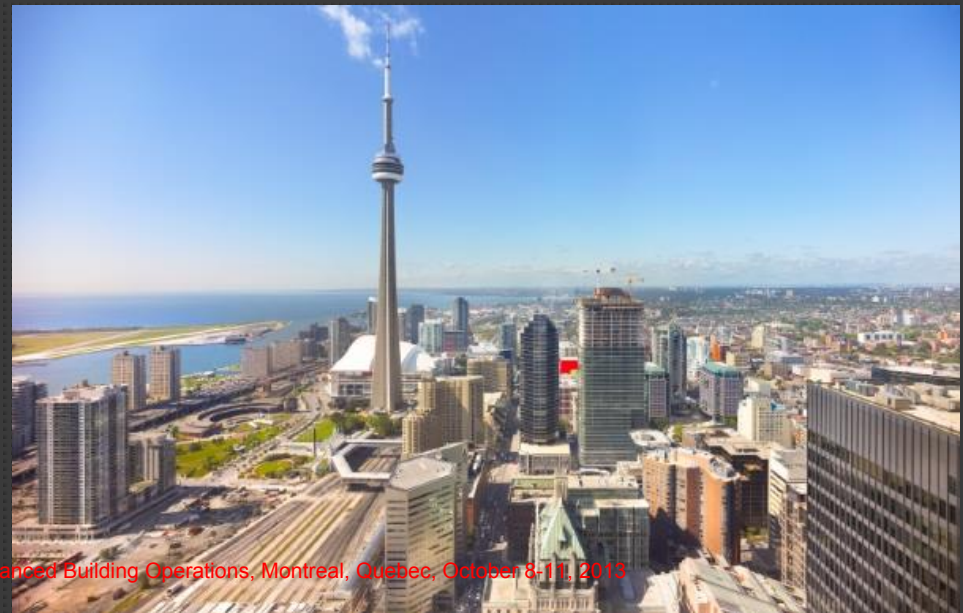
- Comfort and System problem troubleshooting
- Equipment schedule optimization
- New controls strategies





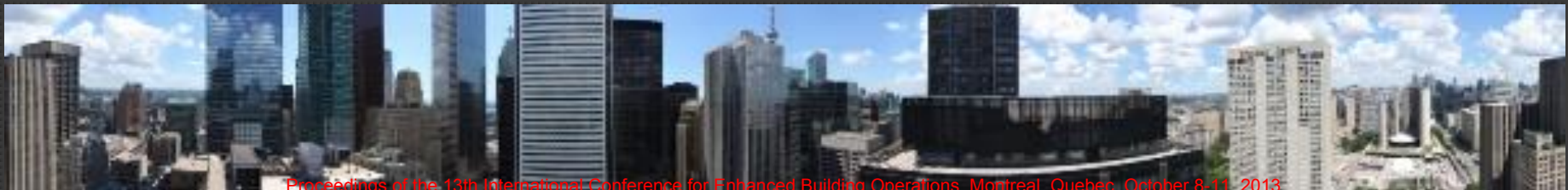
# Tools

- Actuator and system testing
- Sensor Calibration
- Use of Building Automation System trends
- Use of data-loggers

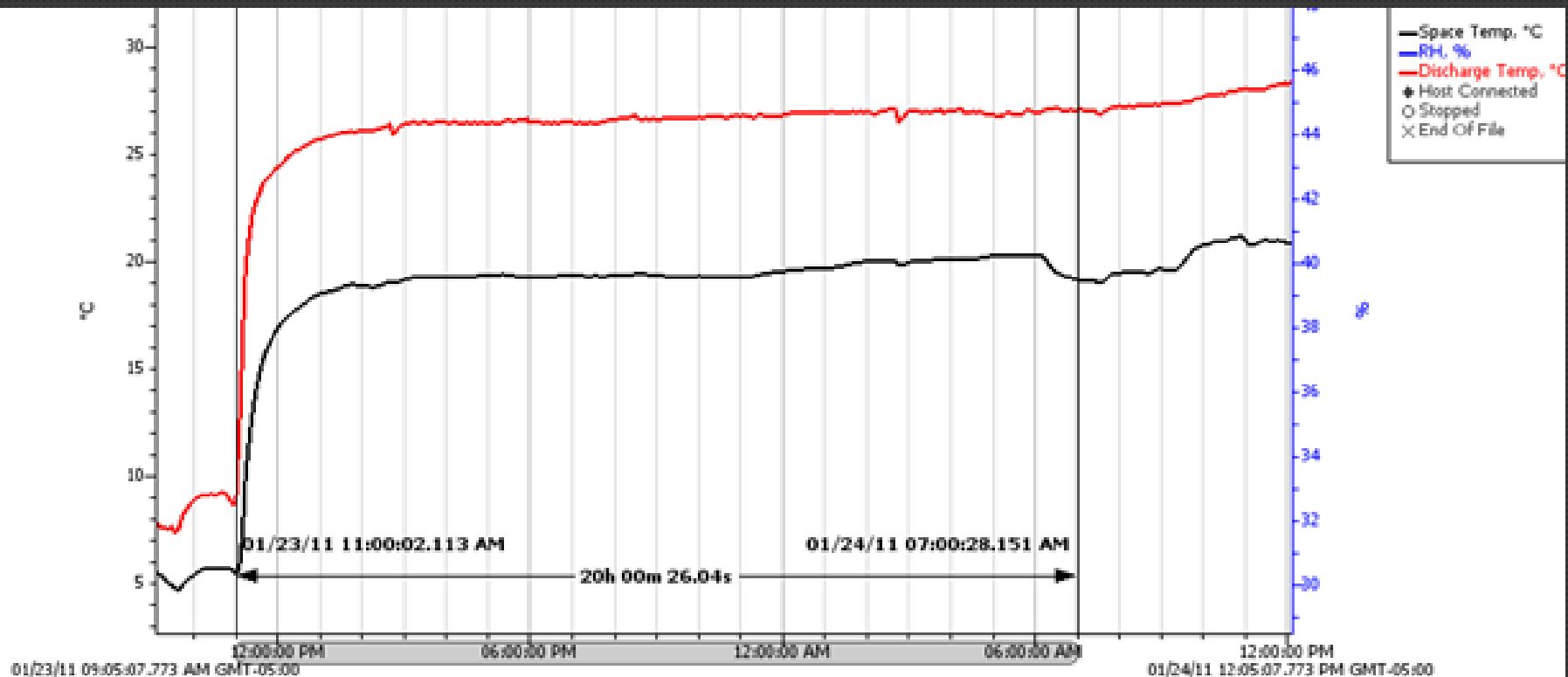


# Example 1

- Problem
  - Monday morning “too cold” complaints
- Solution
  - Heating system start-up on Sunday at 11:00 AM

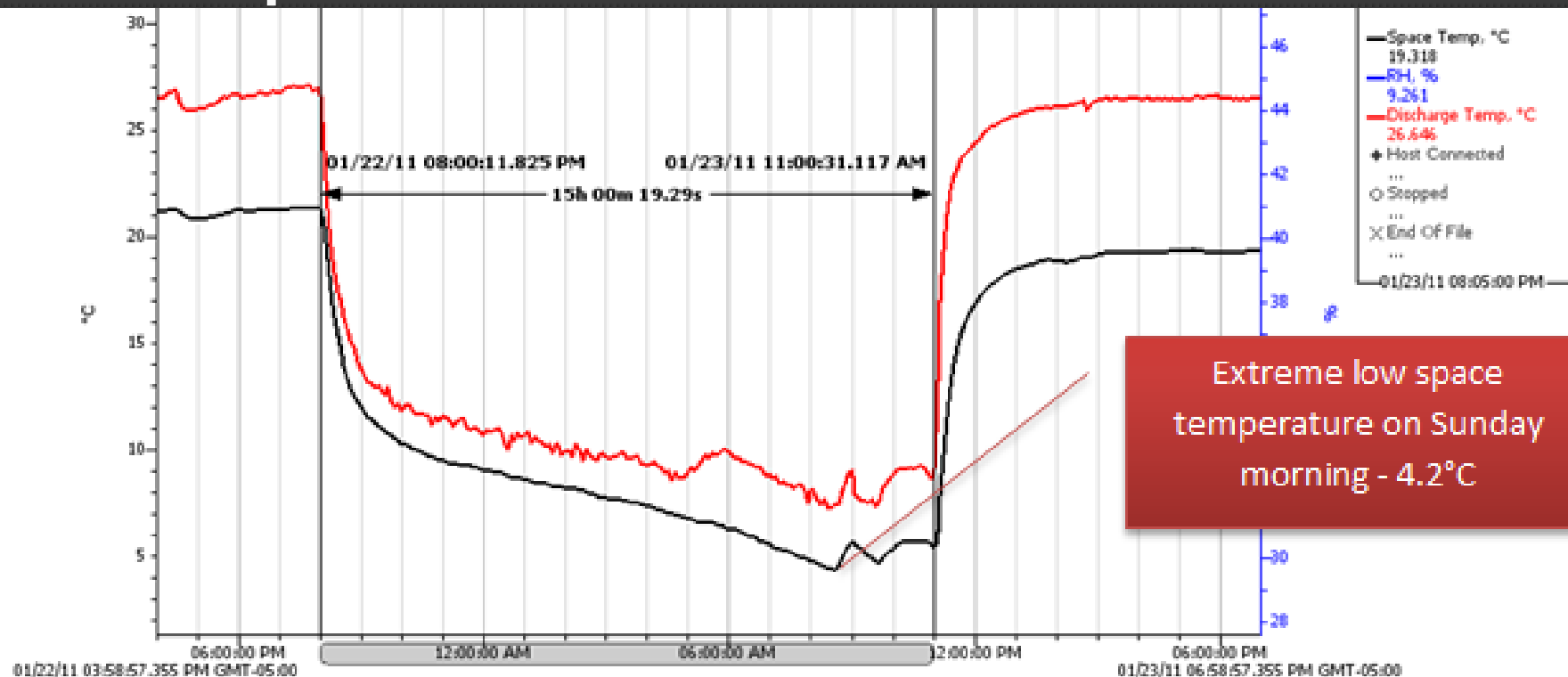


# Example 1



Continuous system operation for 20 hours prior 07:00 AM Monday morning.

# Example 1



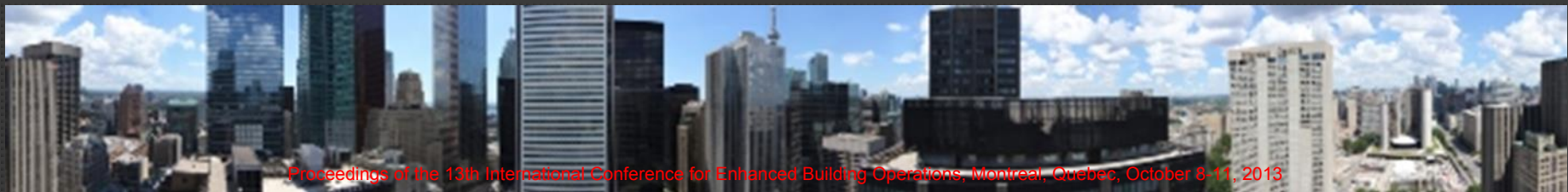
**Over the 15 hours of shutdown the space temperature dropped continuously, from a high of 20.6°C to an extreme low of 4.2°C.**

# Example 1

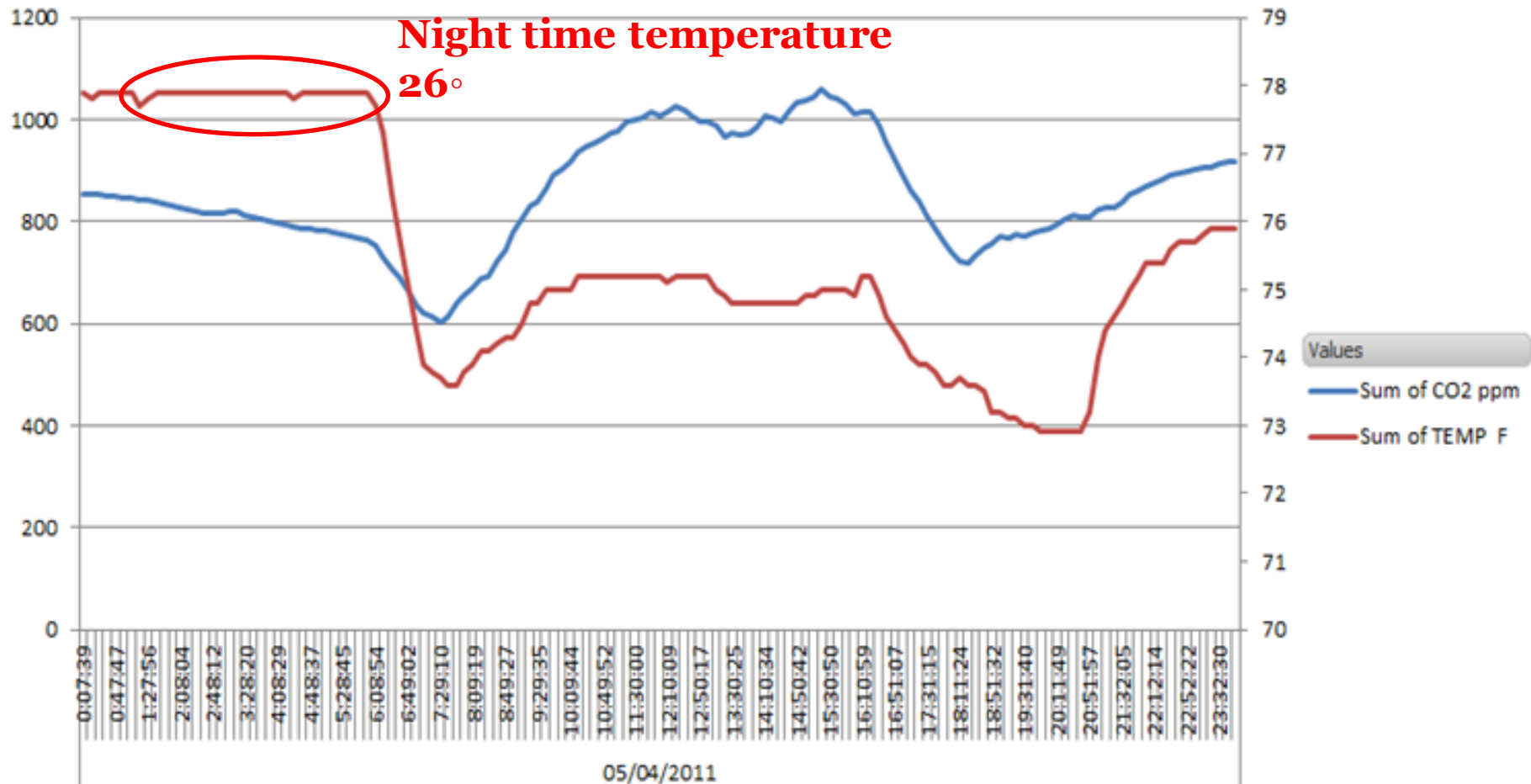
- Problem
  - Monday morning “too cold” complaints
- Solution
  - Heating system start-up on Sunday at 11:00 AM
- RCx Investigation
  - Tenant MAU running 24x7 with no heat (space temperature dropped to 5°C)
- Solution
  - Advise tenant and repair defective unit

# Example 2

- Problem
  - Constant indoor air quality complaints
- Solution
  - Increased fresh air volume



# Example 2



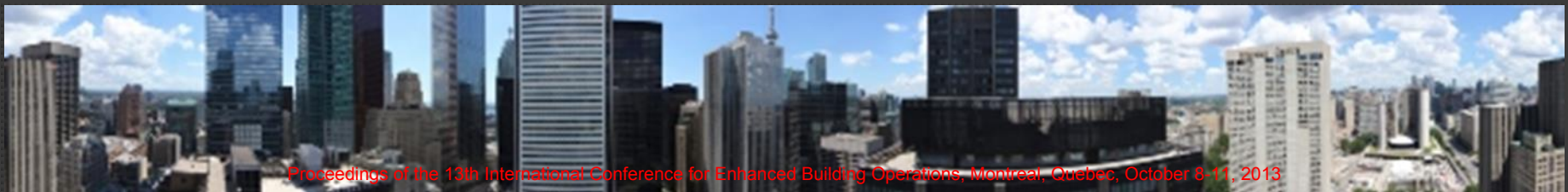
# Example 2

- Problem
  - Constant indoor air quality complaints
- Solution
  - Increased fresh air volume
  
- RCx Investigation
  - Overnight over-heating the space to 26°C
- Solution
  - Repair faulty heating valves



# Example 3

- Problem
  - Indoor air quality failure and too hot complaints
- Solution
  - Increased MAU fresh air volume



# Example 3

5.975    7.99A    2.77kW

59.43%

35.7Hz

Auto Remote Ramping



# Example 3

## BAS Values:

Static Pressure = 1"

DAT = 57F

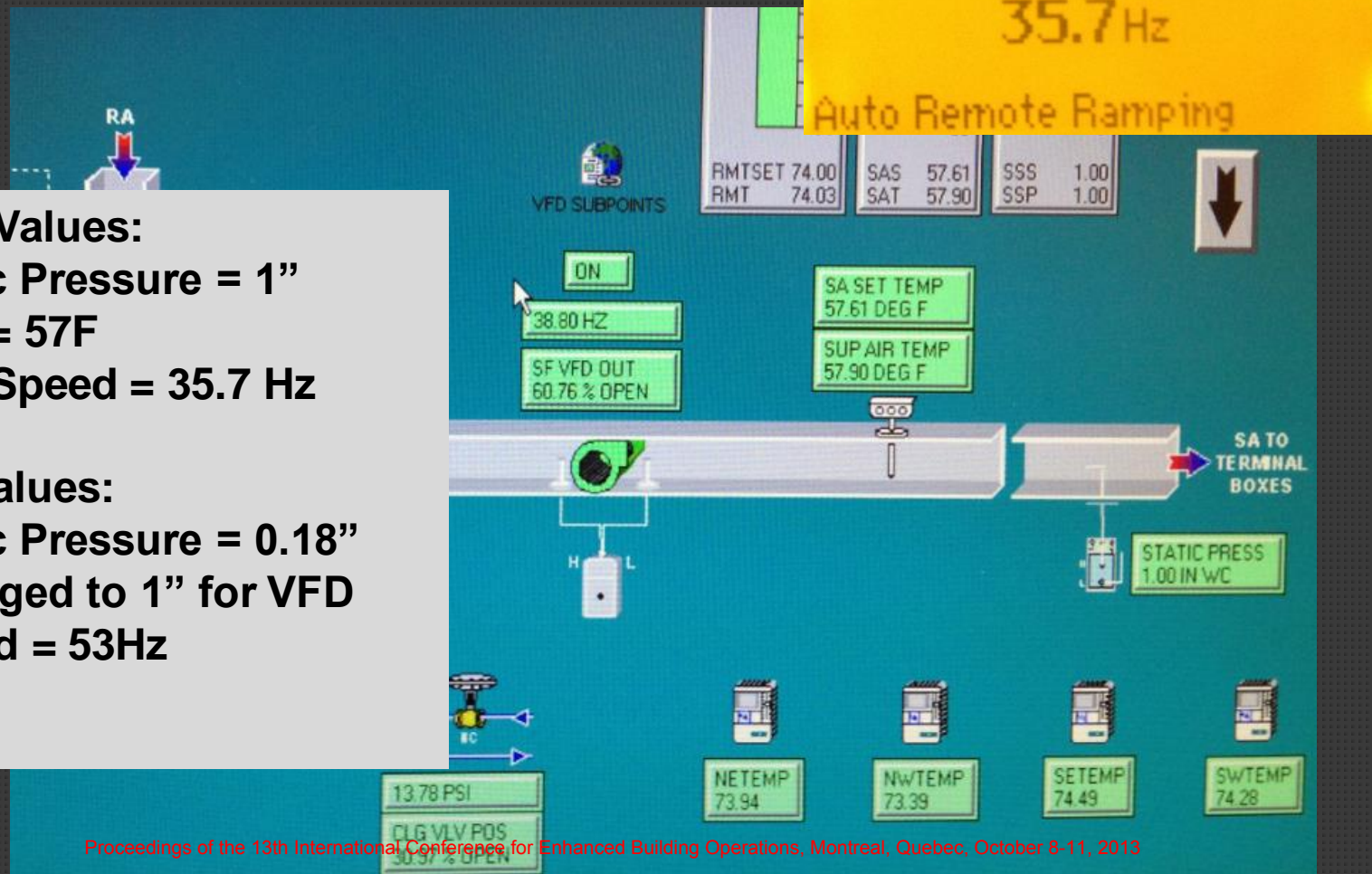
VFD Speed = 35.7 Hz

## CU Values:

Static Pressure = 0.18"

Changed to 1" for VFD Speed

Speed = 53Hz



# Example 3

- Problem
  - Indoor air quality failure and too hot complaints
- Solution
  - Increased MAU fresh air volume
- RCx Investigation
  - VFD running at low speed, Static Pressure sensor faulty
- Solution
  - Replace faulty Static Pressure sensor

# Comfortable Performance

- Operator training:
  - Investigation of comfort problems
  - Energy efficient control strategies
- Operator tools:
  - Equipment testing
  - Sensor Calibration
  - BAS trends and Data-loggers



# Thank you!



# Any questions?

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