



# UNDERTAKING ENERGY, COMFORT AND HEALTH TRANSFORMATIONS

**In Multi-Unit Residential Buildings**

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Presented at the ACEEE 2018 Conference on Health, Environment, and Energy  
December 4, 2018



## CHALLENGES

- High energy consumption
- High carbon emissions
- Poor indoor environmental quality

## OPPORTUNITIES

- Reduce energy costs
- Reduce carbon emissions
- Improve resident health & comfort

87%

of our time is spent indoors.

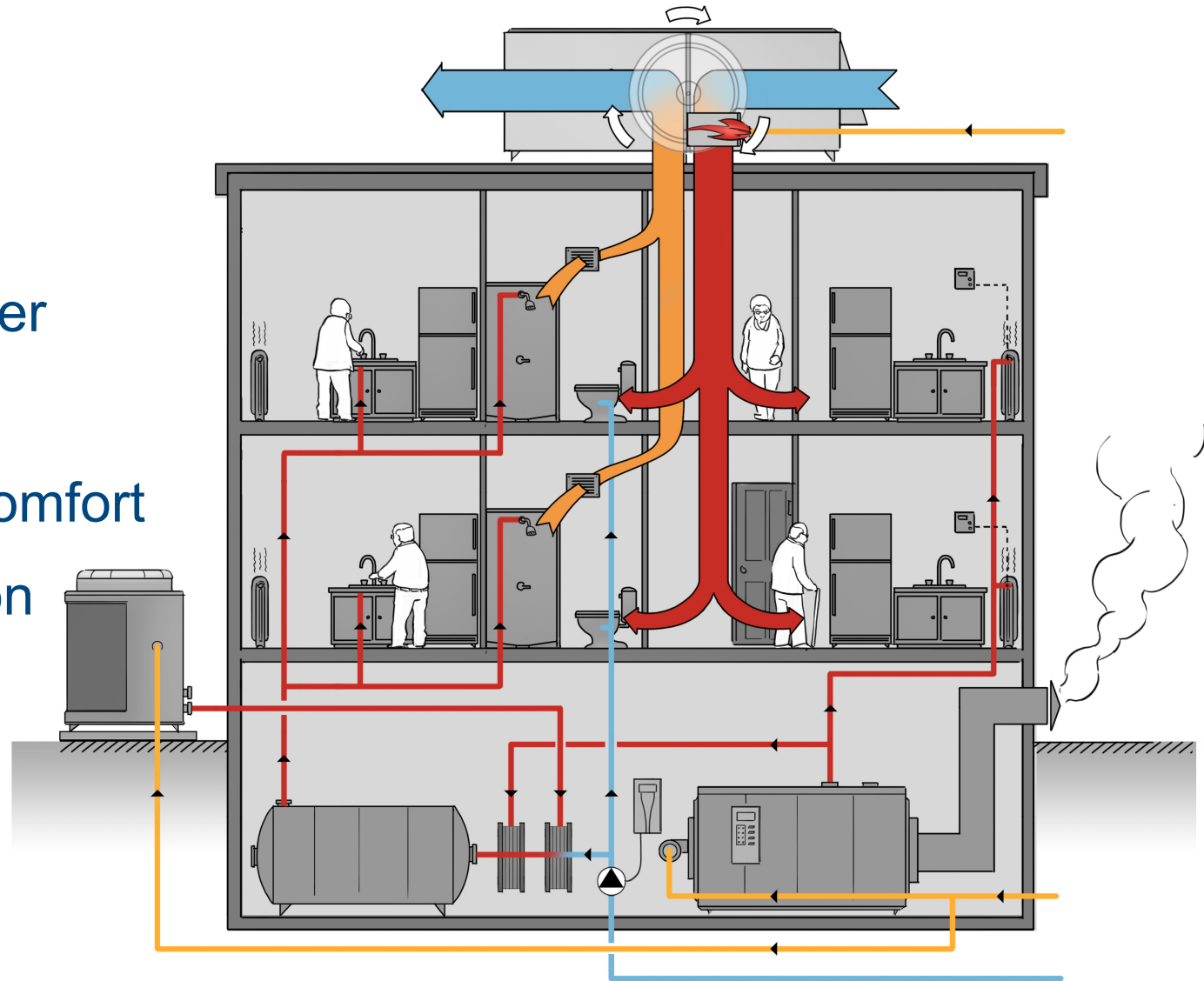




# COMPREHENSIVE APPROACH TO ENERGY RETROFITS

## Focus:

- Energy/water
- Carbon
- Health & Comfort
- Job Creation



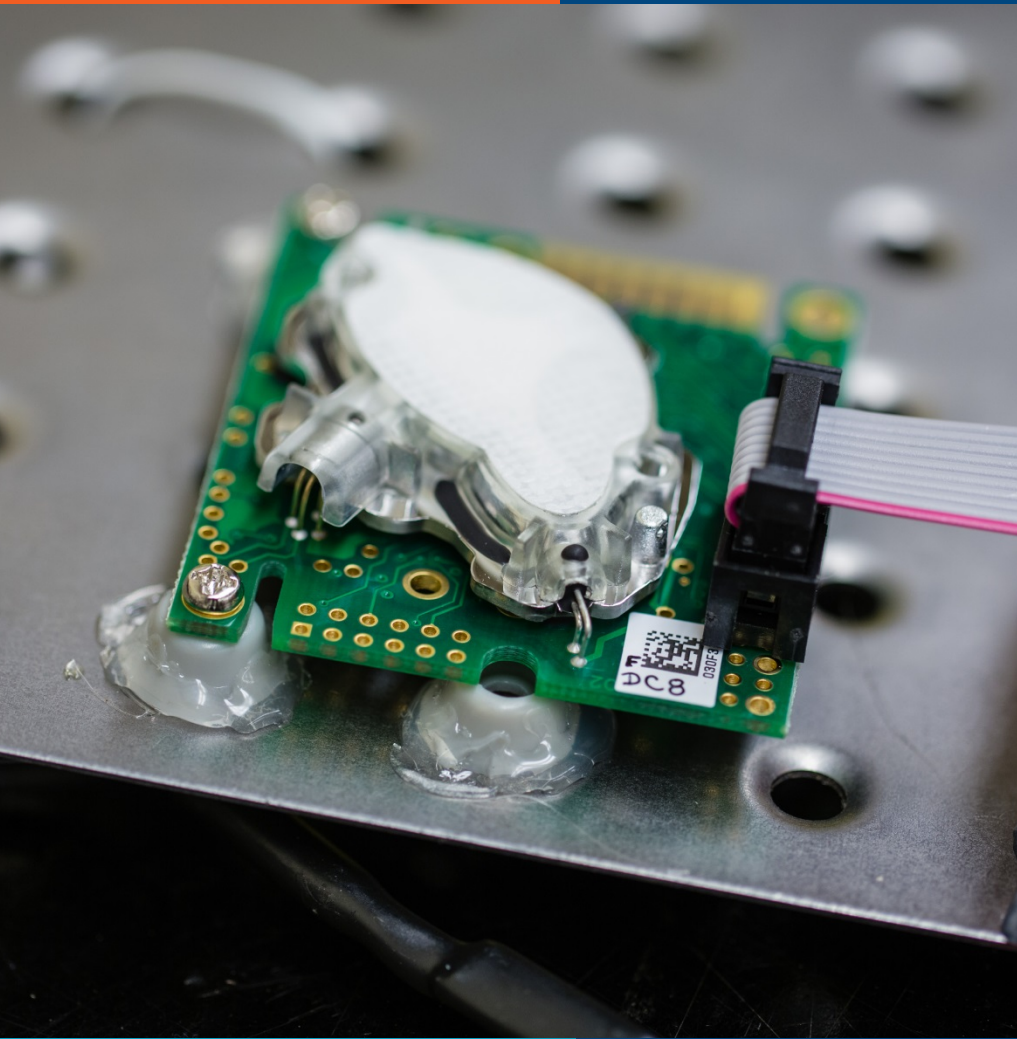




## PROJECT PORTFOLIO

- 7 multi-unit residential buildings
- Built between 1965-1975
- Mid-rise and high-rise
- Mix of seniors and families





## IEQ MONITORING

- Long term monitoring
  - Temperature
  - Relative Humidity
  - CO<sub>2</sub> levels
- Short term monitoring
  - PM<sub>2.5</sub>, PM<sub>10</sub>
  - Formaldehyde
- 320 surveys completed
- 30M data points collected

## KEY IEQ PROBLEMS: THERMAL COMFORT

“ I wish I could control the heat.”

**BUILDING RESIDENT**



## KEY IEQ PROBLEMS: FRESH AIR

“ Have to open window all year round to let air in.”

**BUILDING RESIDENT**

## KEY IEQ PROBLEMS: AIR CONTAMINANTS

“ The smell of smoke and marijuana from the neighbours is making my children sick.”

**BUILDING RESIDENT**



## OVERVIEW OF IEQ RELATED MEASURES

- Space Heating Systems
- Smart Thermostats
- Ventilation



## THERMAL COMFORT OUTCOMES

**34%** **Reduction** in exposure to extreme heat (>82.4F)

**39%** **decrease** in winter window opening

**64%** **Residents** satisfied with smart thermostats.

# BOOSTING FRESH AIR SUPPLY

- Doubled fresh air supply
- Duct cleaning made significant improvements
- Odour complaints decreased by 31%





## REDUCING AIR CONTAMINANTS

- No clear decrease in air contaminants
- Pressurized corridor ventilation has limits
- Reduced window opening due to thermal comfort offset increased ventilation



## SELF-REPORTED HEALTH OUTCOMES

**58%** **less absenteeism** from work or school.

**38%** **decrease** in reported symptoms, on average.

**37%** **decrease** in hospital visit at 4 of 7 buildings.



## LESSONS LEARNED

- Retrofits can achieve energy savings & IEQ improvements
- Target over-heating & under-ventilation
- Optimal air quality requires in-suite ventilation