July 2024 ASHRAE Journal Online Content

The following pages contain supplementary information for the following articles in the July 2024 issue of ASHRAE Journal:

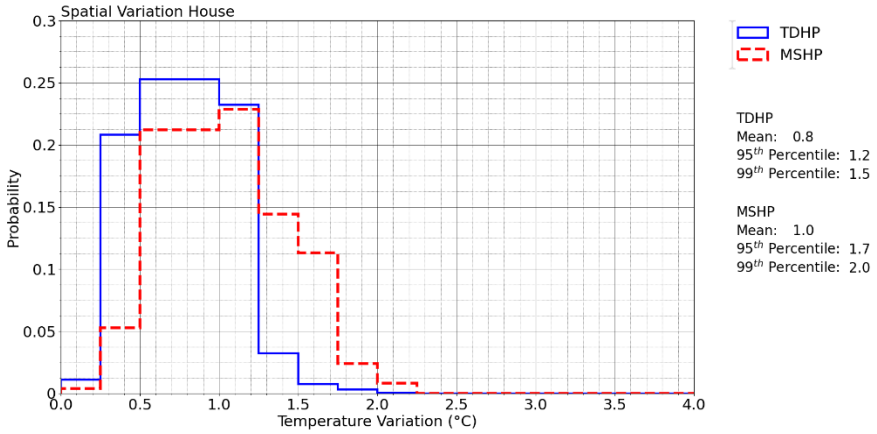
Residential Humidity Control: Ducted Heat Pump vs. Multisplit Heat Pump
By Nelson Fumo, Ph.D., Member ASHRAE; Manoj Bhandari; Jason LeRoy, Member ASHRAE

Parameters	TDHP System	MSHP System
Compressor	Variable Speed	Variable Speed
Capacity	2 Ton	2.5 Ton
SEER Rating	18	17
HSPF Rating	10	11
Refrigerant	R410A	R410A

Online Table 1: Parameters of the systems installed.

Variable	ASHRAE Standard	Accuracy
Air Temperature	Std. 55-7.3.4	±0.4°F (±0.2°C)
	Std. 70-4.1.1	±0.2°F (±0.1°C)
	Std. 113-5.1, 5.2	±0.4°F (±0.2°C)
Relative Humidity	Std. 55-7.3.4	±5% RH

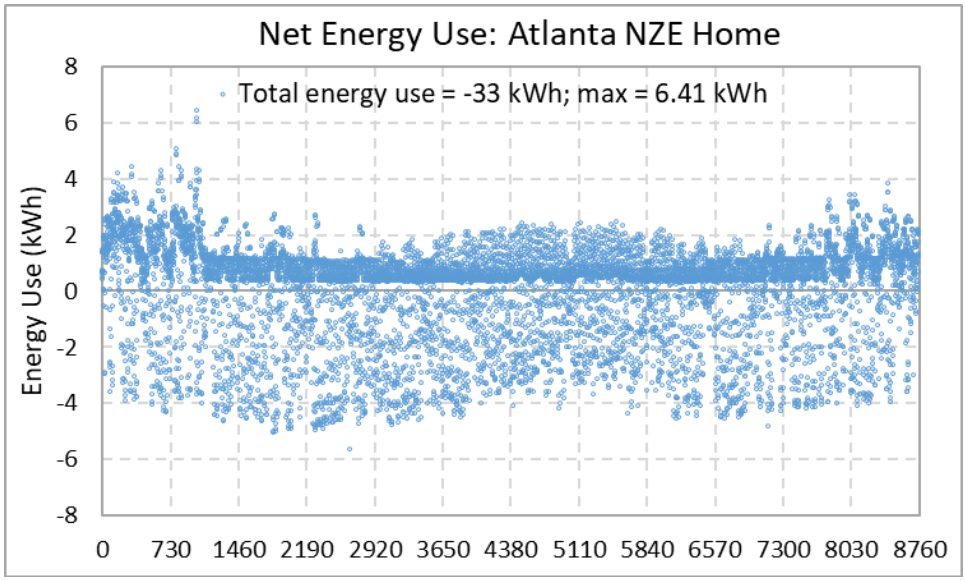
Online Table 2: Sensor Accuracy Requirements



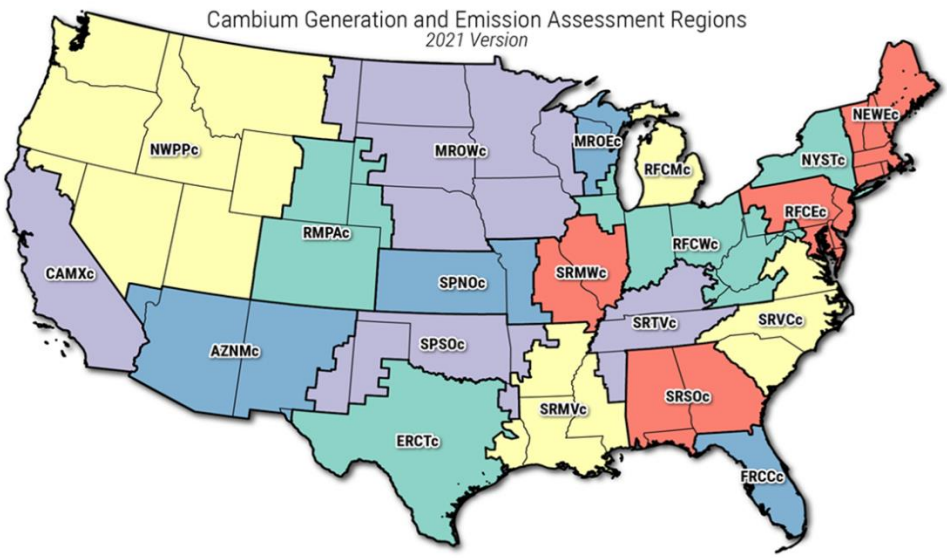
Online Figure 1: Room-to-Room Temperature Difference for the House (06/04/2021-10/13/2021).

Why is My Zero Energy Home Not a Zero Carbon Home?

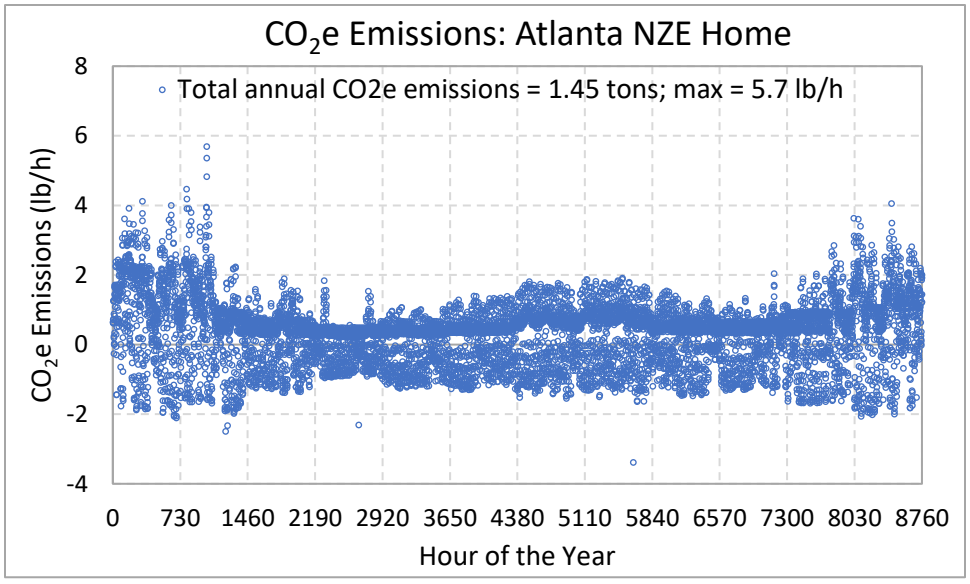
By Philip Fairey, Life Member ASHRAE; David B. Goldstein, Ph.D., Life Member ASHRAE



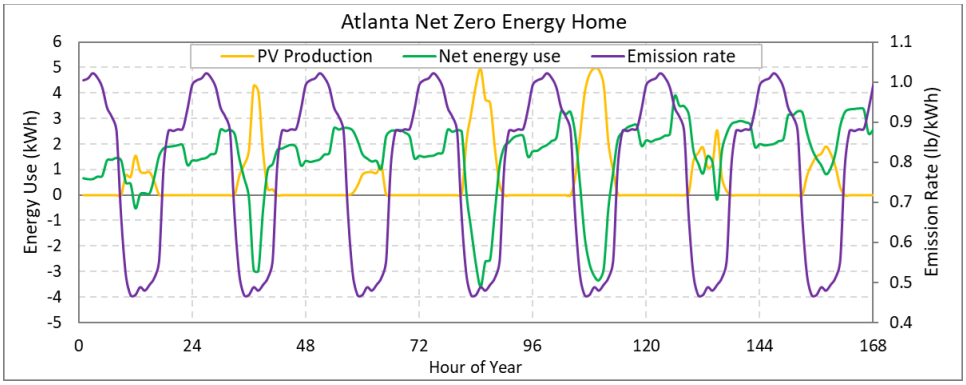
Online Figure 1. Hourly energy use for highly efficient NZE home in Atlanta, GA.



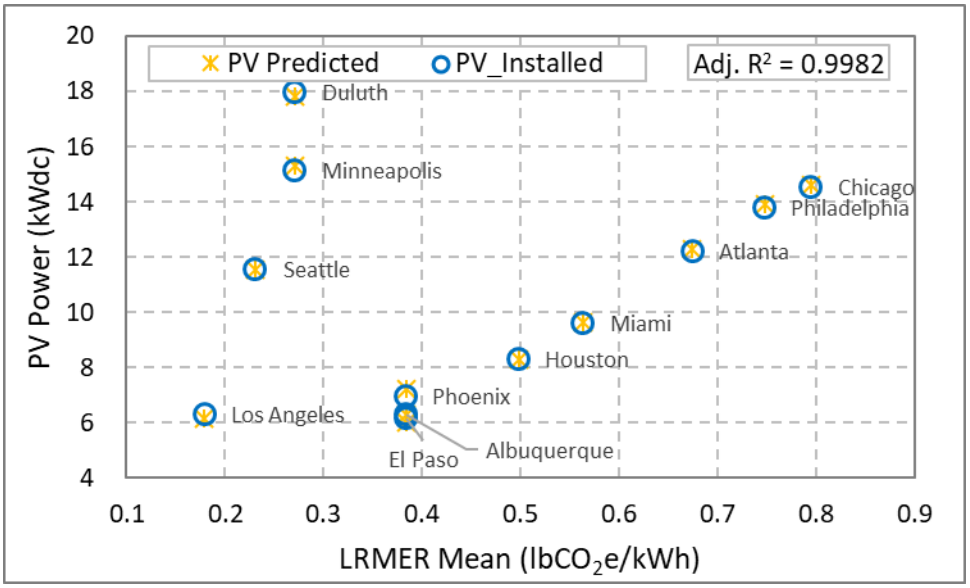
Online Figure 2. Map of 20 Cambium Generation and Emission Assessment Regions.



Online Figure 3. Hourly CO_2e emissions for Atlanta NZE home showing that total annual carbon emissions remain at 1.45 tons for this NZE home.



Online Figure 4. PV production, net energy use and the grid emission rates for the Atlanta NZE home for the first week of the year.



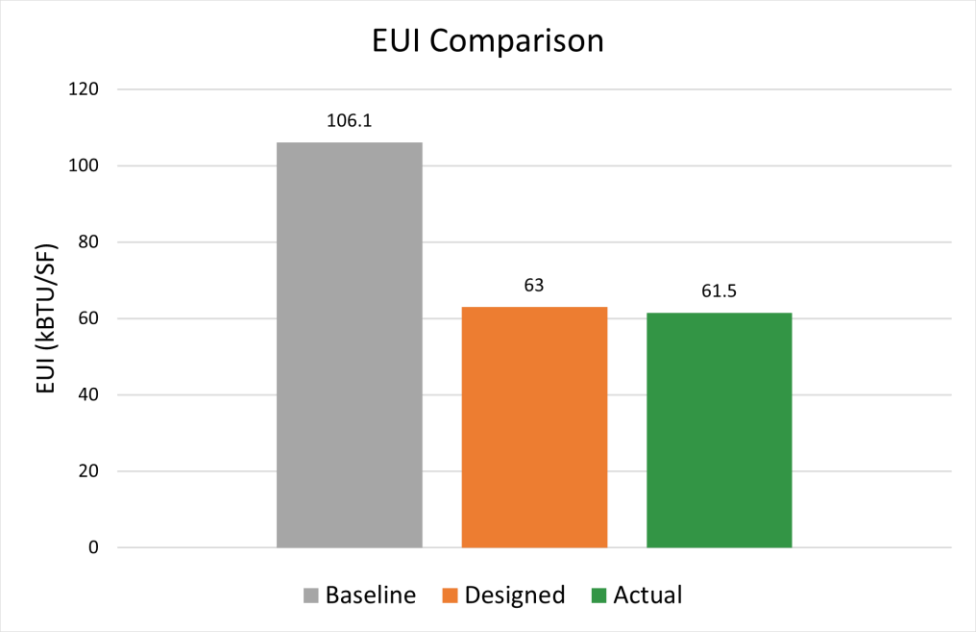
Online Figure 5. Required PV power to achieve net zero carbon showing actual installed PV power and predicted PV power for twelve locations.

Retro-Commissioning A Hospital for Sustainability, Cost Savings
By Matt Wade, P.E., Member ASHRAE

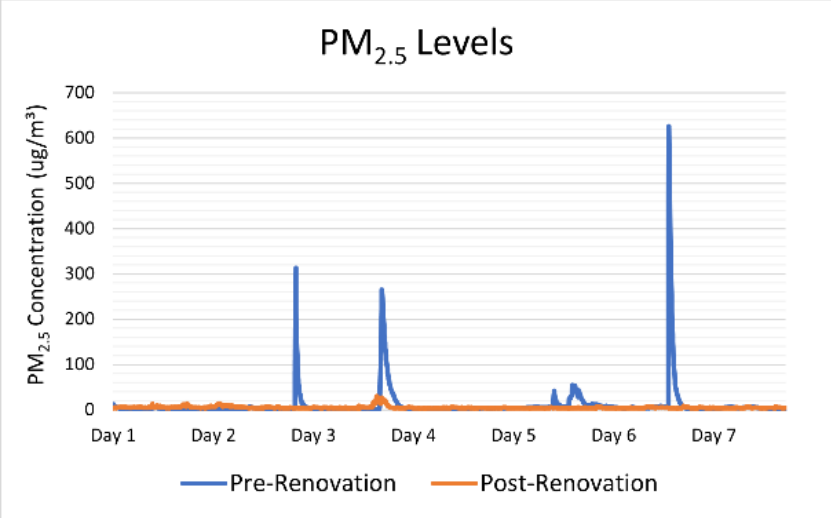
Benchmark	Lourdes	EPA Median Property
Lourdes Site Energy Use Intensity (EUI) (KBTU/ft²)	252 (11% higher)	228
Lourdes Source Energy Use Intensity (EUI) (KBTU/ft²)	520 (11% higher)	469
Lourdes Total GHG Emissions ($MTCO_2e$)	10,955	9,870
Lourdes Energy Cost ($/ft²)	$5.68	$4.90

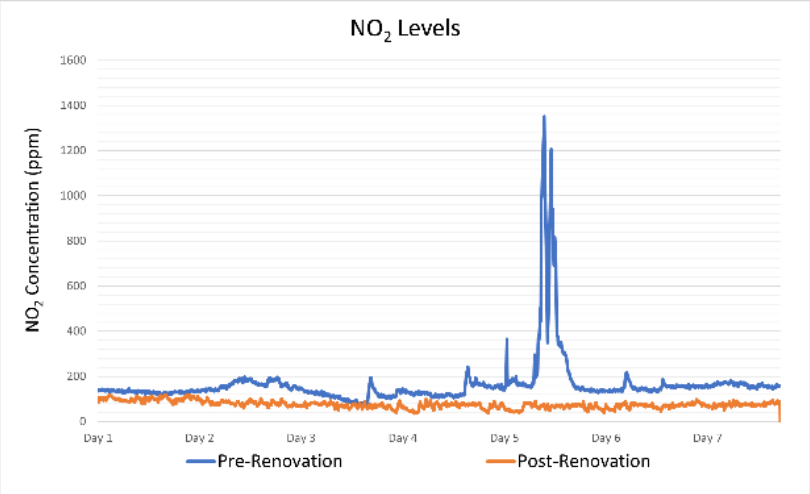
Online Table 1. Lourdes' benchmarks compared to median property values set by the Environmental Protection Agency (EPA).

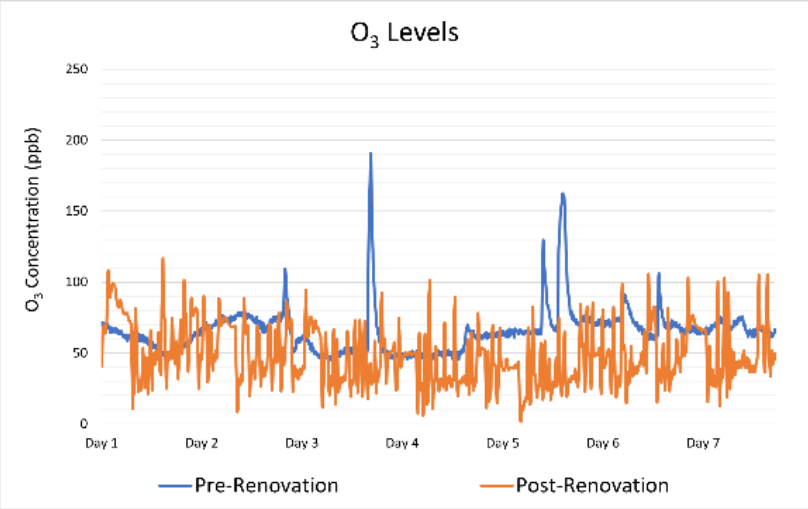
Sustainability, Wellness In a Historic University Residence Hall
By Lee Harrelson, P.E., Associate Member ASHRAE, Tracy Steward, Member ASHRAE, and Tyler Larkin, P.E., Associate Member ASHRAE

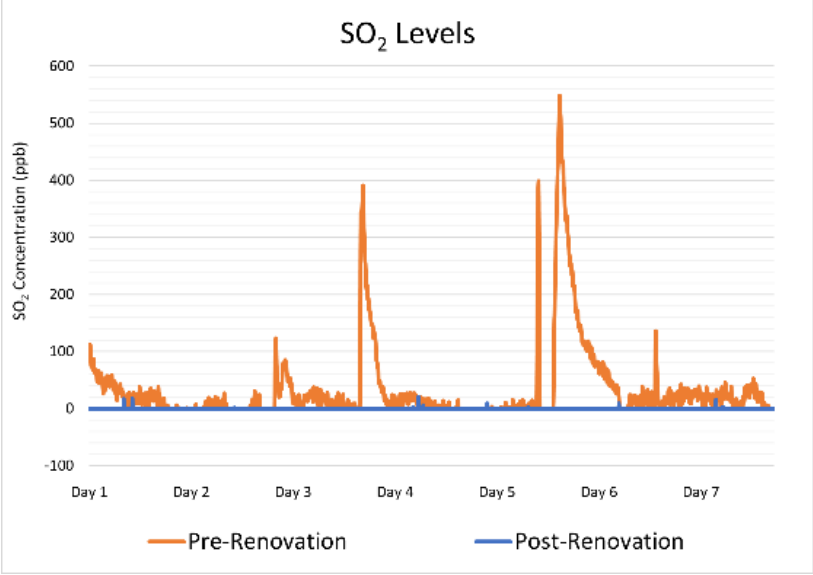


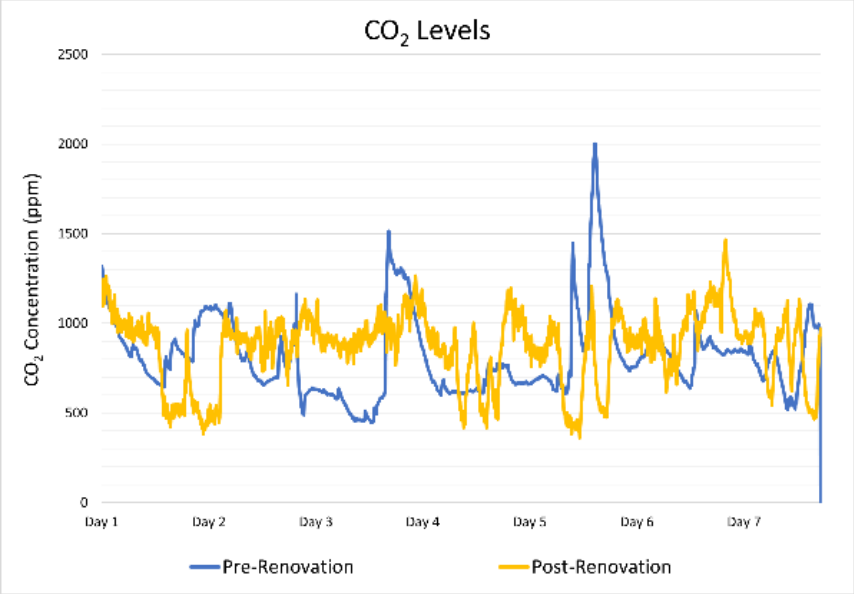
Online Figure 1. Energy use intensity (EUI) of Thurston Hall compared at baseline, design stage and in actual operating mode.




NO_2 Levels
NO_2 Concentration (ppm)
1600
1400
1200
1000
800
600
400
200
0
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Pre-Renovation
Post-Renovation


O_3 Levels
O_3 Concentration (ppb)
250
200
150
100
50
0
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Pre-Renovation
Post-Renovation


SO_2 Levels
SO_2 Concentration (ppb)
600
500
400
300
200
100
0
-100
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Pre-Renovation
Post-Renovation



Online Figure 2. Levels of PM_2, NO_2, O_3, SO_2 and CO_2 pre- and post-renovation in Thurston Hall.