025

DECEMBER 2015

SOCIALLY DRIVEN HVAC FOR PERSONAL CONTROL

OPPORTUNITY

How is temperature typically controlled in commercial buildings?

SET TO A PREDETERMINED RANGE OR "DEADBAND"

Does not account for individual thermal preferences

Wastes energy by over-conditioning, particularly in unoccupied spaces

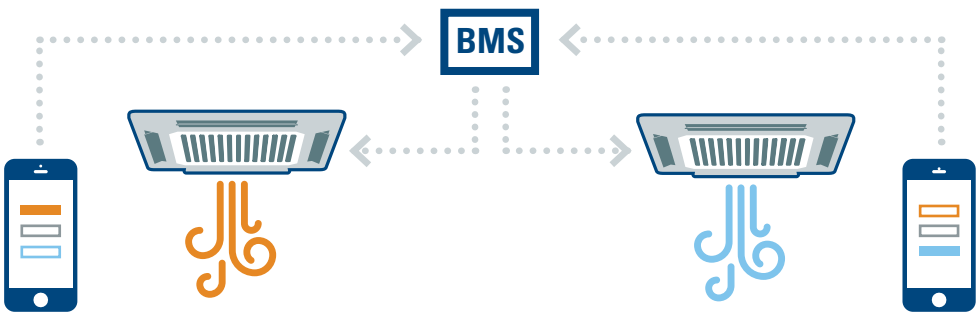
TECHNOLOGY

How does Socially Driven HVAC Optimization work?

USES DIRECT INPUT FROM OCCUPANTS IN TEMPERATURE MANAGEMENT

TRACKS USER PREFERENCES OVER TIME, FINE-TUNES THE DEADBAND

Optimizes energy savings by widening the deadband when there is no occupant input



M&V

Where did Measurement and Verification occur?

OAK RIDGE NATIONAL LABORATORY assessed socially driven HVAC optimization provided by Building Robotics at the Federal Building and U.S. Courthouse in Phoenix, Arizona

RESULTS

How did Socially Driven HVAC Optimization perform in M&V?

20%
COOLING ENERGY SAVINGS
47% heating savings
Over typical GSA facility[1]

59%
REDUCTION
in hot and cold calls[2]

83%
OCCUPANTS
more satisfied with thermal conditions[3]

Modeling Demonstrates Energy Cost Savings per Square Foot[§]

Calculations do not include O&M savings, energy savings from reducing the use of personal fans and heaters, or gains in occupant productivity that may result from increased thermal comfort

Location		Large Office - 498,500 ft² Cost Savings ($/ft²/yr)		Medium Office - 53,630 ft² Cost Savings ($/ft²/yr)		Small Office - 5,500 ft² Cost Savings ($/ft²/yr)	
CLIMATE ZONE	CITY	2° Shift[1]	4° Shift[2]	2° Shift[1]	4° Shift[2]	2° Shift[1]	4° Shift[2]
1A	Miami, FL	$0.06	$0.13	$0.14	$0.30	$0.23	$0.48
2A	Houston, TX	$0.06	$0.12	$0.10	$0.20	$0.16	$0.32
2B	Phoenix, AZ	$0.07	$0.13	$0.12	$0.24	$0.18	$0.38
3A	Atlanta, GA	$0.08	$0.15	$0.12	$0.23	$0.18	$0.35
3B-coast	Los Angeles, CA	$0.11	$0.15	$0.15	$0.27	$0.22	$0.50
3B	Las Vegas, NV	$0.06	$0.15	$0.09	$0.21	$0.16	$0.29
3C	San Francisco, CA	$0.09	$0.16	$0.11	$0.19	$0.17	$0.34
4A	Baltimore, MD	$0.09	$0.16	$0.12	$0.22	$0.15	$0.30
4B	Albuquerque, NM	$0.05	$0.10	$0.08	$0.15	$0.13	$0.27
4C	Seattle, WA	$0.09	$0.16	$0.10	$0.16	$0.12	$0.18
5A	Chicago, IL	$0.06	$0.10	$0.07	$0.12	$0.10	$0.19
5B	Boulder, CO	$0.06	$0.10	$0.07	$0.13	$0.11	$0.18
6A	Minneapolis, MN	$0.05	$0.09	$0.06	$0.11	$0.10	$0.18
6B	Helena, MT	$0.06	$0.10	$0.07	$0.11	$0.09	$0.15
7	Duluth, MN	$0.06	$0.10	$0.06	$0.10	$0.09	$0.15
8	Fairbanks, AK	$0.09	$0.12	$0.09	$0.14	$0.11	$0.19

[§]Current socially driven HVAC subscription fees up to $0.60/ft²/yr, depending on installation size and duration of service [1] 70°-75° to 68°-77° [2] 70°-73° to 68°-77°

DEPLOYMENT

*Where does M&V recommend deploying Socially Driven HVAC Optimization?**

PRIORITIZE WHERE THERMAL COMFORT IS AN ISSUE

Savings will be greatest in facilities that are only intermittently occupied and have narrow deadbands and high energy costs

[1]Socially Driven HVAC Optimization Federal Building and U.S. Courthouse Phoenix, Arizona, Dan Howett (ORNL), October 2015, p. 17 [2]Ibid, p. 41
[3]Ibid, p. 22 *Subject to evaluation and approval by GSA-IT and Security.