GPG FINDINGS **029**

SEPTEMBER 2016

SMART CEILING FANS

OPPORTUNITY

How much electricity could be saved by raising cooling setpoints across the GSA-owned portfolio?

18.7 MILLION kWh ANNUALLY

$2 MILLION @ GSA AVERAGE OF $0.11 kWh[1]

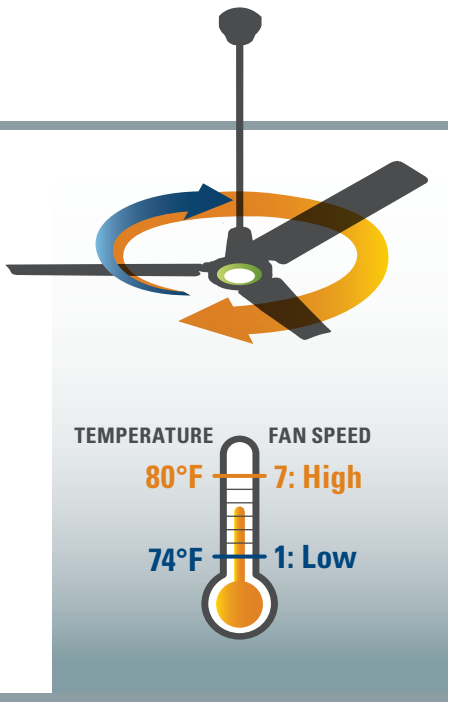
by raising cooling setpoints 2°F

TECHNOLOGY

How do Smart Ceiling Fans work?

SENSORS MEASURE TEMPERATURE AND INCREMENTALLY ADJUST FAN SPEED

TURN ON AND OFF AUTOMATICALLY BASED ON OCCUPANCY OR PREDETERMINED TEMPERATURES



M&V

Where did Measurement and Verification occur?

NATIONAL RENEWABLE ENERGY LABORATORY modeled energy savings and assessed the deployment potential for ceiling fans provided by Big Ass Solutions

RESULTS

What did modeling of Smart Ceiling Fans reveal?

4-11% ENERGY SAVINGS

WITH 4°F SETPOINT INCREASE

From 74°F to 78°F[2]

SAVINGS GREATEST IN

FIRST 4 DEGREES OF SETPOINT CHANGE[3]

<$1.50/ft² INSTALLED COST

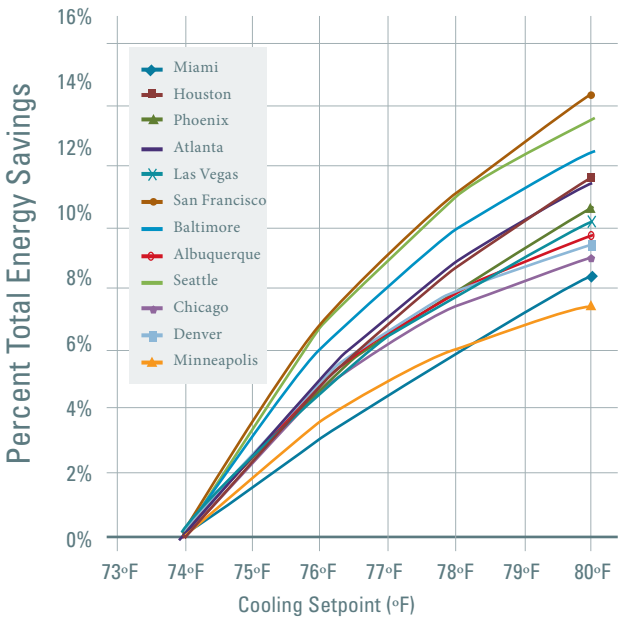
For < 10-year payback[4]

Modeled Savings for Smart Fans

Energy savings for ENERGY STAR certified fans will be roughly equivalent

Energy Savings Across Climate Zones

Savings are greatest in San Francisco



Installed Cost Needed for a 10-year Payback

Assuming a 4°F increase in cooling setpoint

Location	Energy Savings kWh/ft²/yr	Energy Cost Savings $/ft²/yr	Installed Cost for 10-year Payback $/ft²
Miami, FL	1.19	$0.117	$1.17
Houston, TX	1.41	$0.115	$1.15
Phoenix, AZ	1.47	$0.149	$1.49
Atlanta, GA	1.26	$0.131	$1.31
Las Vegas, NV	1.26	$0.119	$1.19
San Francisco, CA	1.39	$0.218	$2.18
Baltimore, MD	1.26	$0.140	$1.40
Albuquerque, NM	1.02	$0.105	$1.05
Seattle, WA	1.19	$0.095	$0.95
Chicago, IL	0.81	$0.075	$0.75
Denver, CO	0.84	$0.084	$0.84
Minneapolis, MN	0.71	$0.070	$0.70

DEPLOYMENT

Where does the white paper recommend deploying Smart Ceiling Fans?

CONSIDER FOR OPEN OFFICES

Target facilities with:

- Ceilings at least 9 feet high and interior/desk partitions less than 54 inches tall
- At least 2,000 cooling degree days and full daytime business hours
- No features, such as lighting or air conditioning, that will interfere with fan blades
- Cooling setpoint lower than 75°, and no prohibitions against raising it

[1] *GSA Green Proving Ground, Smart Ceiling Fan – White Paper,* K. Kiatreungwattana, M. Deru, J. DeGraw (NREL), August 2016, p.13
[2] Ibid, p.7 [3] Ibid, p.38 [4] Ibid, p.7

GSA

The GPG program enables GSA to make sound investment decisions in next generation building technologies based on their real world performance. **www.gsa.gov/gpg**