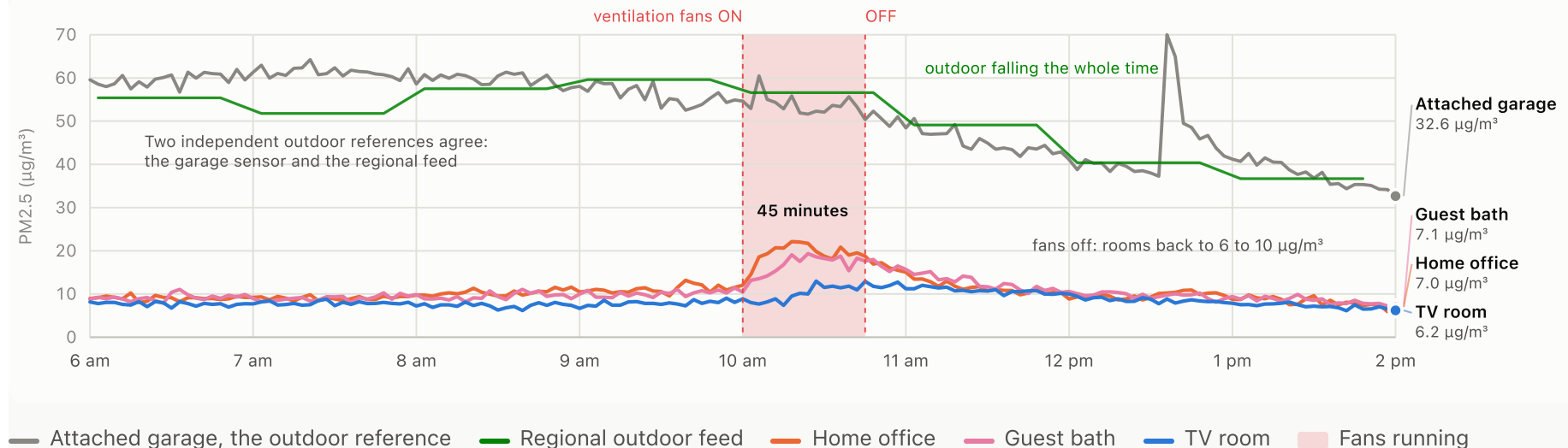


Forty-five minutes of ventilation, in the middle of a smoke plume

Single-family home, southern Wisconsin · seven Overture Room Sensors and two smart-plug-controlled supply ventilation fans · July 18 to 20, 2026, regional wildfire smoke · all times Central

Wildfire smoke crossed the upper Midwest on July 19. Outdoor fine particles at this address went from $2.6 \mu\text{g}/\text{m}^3$ the previous day to $59.6 \mu\text{g}/\text{m}^3$ by 9:48 AM. The house did well. With the ventilation fans off, the living space held 6 to 9 $\mu\text{g}/\text{m}^3$ while the attached garage, an unconditioned space sitting at outdoor conditions, ran at $55 \mu\text{g}/\text{m}^3$. About one seventh of outdoor, purely from the envelope. Then at 10:00 AM both supply ventilation fans ran for forty-five minutes, and the sensors recorded what that costs. Office fine particles rose 93 percent while the outdoor level was *falling*.



60 $\mu\text{g}/\text{m}^3$

outdoor fine particles at the plume's peak, up from $2.6 \mu\text{g}/\text{m}^3$ the previous day

1/7

of the outdoor level was all the living space saw while the fans were off

+93 %

office fine particles during 45 minutes of ventilation, 11.5 to 22.1 $\mu\text{g}/\text{m}^3$

7 of 7

sensors rose while the fans ran, and every one recovered once they stopped

Why this is a measurement and not a coincidence

The outdoor level was going down, not up, for the whole event. The regional feed peaked at 59.6 $\mu\text{g}/\text{m}^3$ at 9:48 AM and fell steadily to 40.4 $\mu\text{g}/\text{m}^3$ by noon. Every sensor in the house rose during the forty-five minutes the fans ran, and fell after they stopped. Nothing in the weather explains a rise indoors while the source outside is weakening. The fans were the only thing that changed.

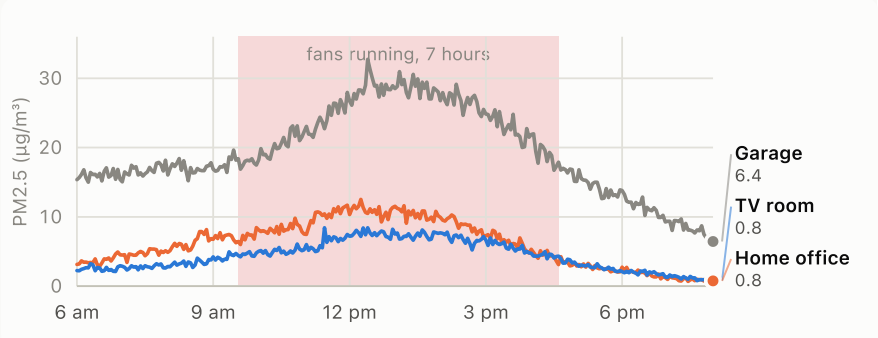
Sensor	Before	Peak	Change	By noon
Home office	11.5	22.1	+93%	9.4
Guest bath	10.4	19.4	+86%	9.9
Master bath, sensor 2	6.7	11.8	+78%	5.5
TV room	8.0	13.0	+62%	8.7
Master bath, sensor 1	7.9	12.3	+55%	6.7
Kitchen	10.1	14.2	+41%	8.4
Attached garage	54.7	60.5	+11%	40.2

Fine particles in $\mu\text{g}/\text{m}^3$, July 19. The garage barely moves, because it was already at the outdoor level. It is the control, and the six conditioned sensors all moved toward it. Two sensors share the master bath and agree.

Then it happened again the next day. On July 20 the same two fans ran seven hours straight, 9:33 AM to 4:36 PM, against a much milder outdoor load of 9 to 15 $\mu\text{g}/\text{m}^3$. The office climbed from 7.3 to 12.5 $\mu\text{g}/\text{m}^3$ and the TV room doubled. By early evening, with the fans off, every sensor in the living space was between 1.0 and 1.5 $\mu\text{g}/\text{m}^3$ and still falling. Smaller dose outside, smaller rise inside, same shape, clean release.

Both halves of the answer are already in the box. An Overture Room Sensor measures fine particles every three minutes. An Overture Smart Plug switches the ventilation fan. The same pairing that starts a fan on a carbon dioxide call can hold it off on a particle call, so a house ventilating for fresh air does not spend a smoke event importing the plume.

July 20: seven hours at a lower dose



The office and TV room track the garage upward while the fans run, then fall to about 1 $\mu\text{g}/\text{m}^3$ once they stop.

The design conclusion

A ventilation fan is doing its job when it runs. It is answering a call for carbon dioxide or for moisture, and it has no way to know what is in the air it is pulling in. **Ventilation control needs an outdoor-particle input, and this is the measurement that sizes the argument.**

Seven Overture Room Sensors at roughly 3-minute polling; fine particles are PM2.5 in micrograms per cubic meter. Outdoor reference is the attached unconditioned garage sensor, corroborated by the regional weather feed for the same postal code. Site anonymized. © 2026 Overture, LLC.