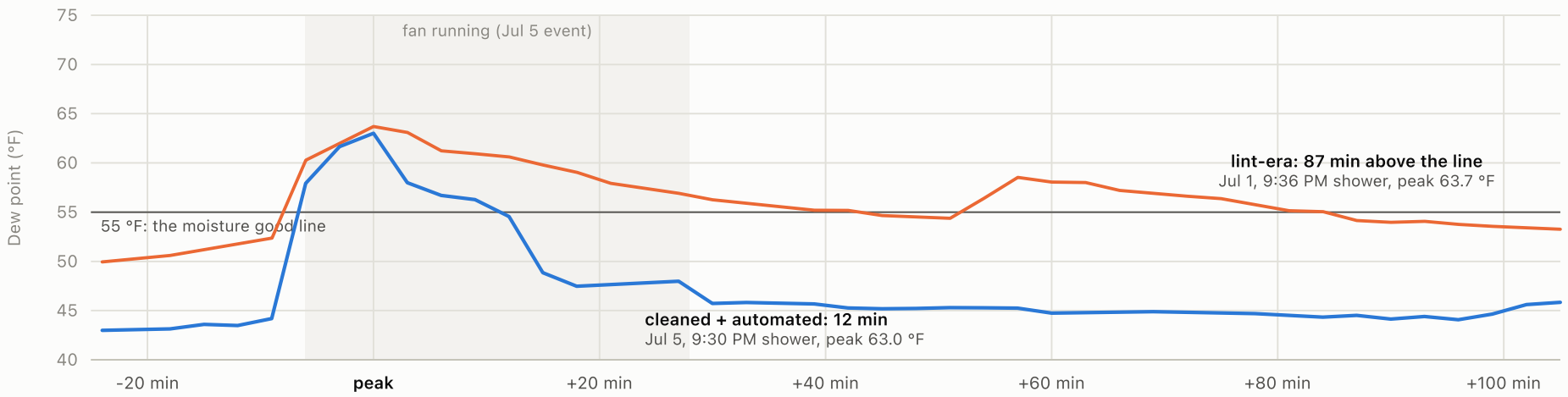
Two exhaust fans, a hidden layer of lint, and the shower that proved the fix

Single-family home, southern Wisconsin · master bathroom · two Overture Room Sensors and two smart-plug-controlled skylight exhaust fans · June 30 to July 13, 2026 · all times Central

The sensors kept reporting the same thing: after every shower, moisture hung in the room far longer than working exhaust fans should allow. On the yardstick used throughout this study, minutes from the dew point peak until the room holds below 55 °F, showers were taking 18 to 87 minutes to clear. The two skylight fans sit fourteen feet up, reachable only by ladder, and their condition cannot be seen from the floor. When they came down on July 5 for cleaning and a smart-plug install, the west fan was packed with lint: vent, inlet grille, and fan wheel all fouled. That same evening produced the proof below. A shower nearly identical to July 1's cleared in twelve minutes instead of eighty-seven, with the fan started by the room sensor itself, in the same three-minute poll as the trigger crossing.



July 1 shower, lint-era fans (dew point peak 63.7 °F) — July 5 shower, cleaned fans plus sensor automation (peak 63.0 °F) — Shaded band: fan running

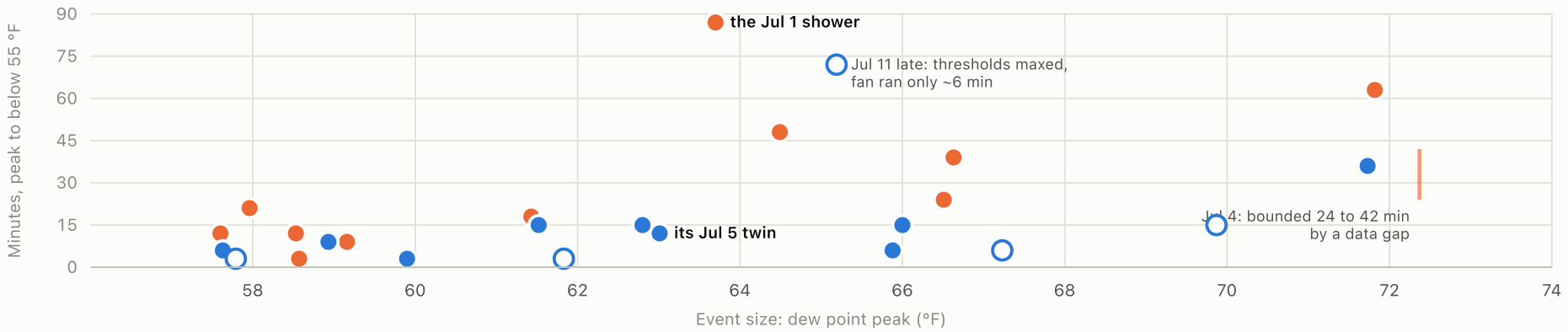
87 → 12 min
moisture hang time, two near-identical showers three days apart

12 / 12
trigger crossings that started the fan within one 3-minute poll

2.9 ×
faster recovery at shower strength, median 43.5 to 15 minutes

14 ft
up: where the fans sit, ladder-only, condition invisible from the floor

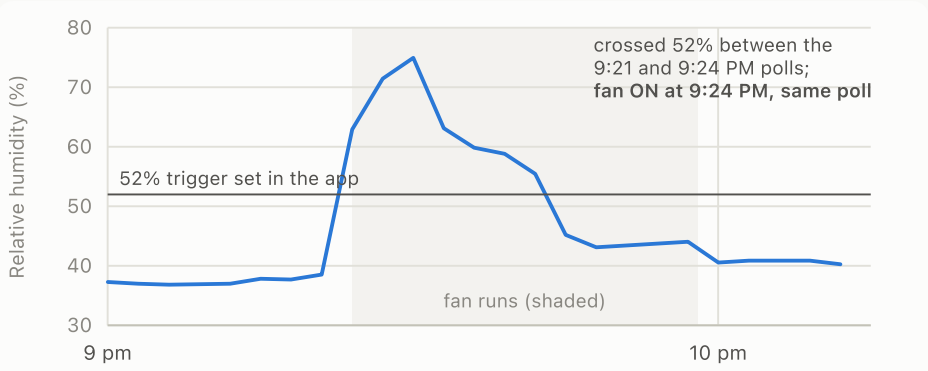
Every shower, one honest yardstick



● Lint-era events, before July 5 ● Cleaned fans plus automation ○ Trigger raised to maximum, July 11 on

Each dot is one real moisture event, scored the same way. Bigger showers take longer, which is why the honest comparison is like for like: at shower strength, peaks of 60 °F and above, the lint-era median was 43.5 minutes and the worst case 87. With cleaned fans and sensor-triggered automation the median fell to 15 minutes.

The trigger, to the poll



What this means for your buildings

Exhaust fan maintenance state is invisible. Nobody climbs a ladder to inspect a fan that still makes noise, and a fouled fan makes exactly as much noise as a clean one. It shows up in the data as one thing only: recovery time getting longer.

The hollow markers above are the counterfactual. The trigger thresholds were deliberately raised to maximum for a test, the July 11 late-night shower stayed under the raised trigger, the fan ran about six minutes, and hang time went straight back to 72 minutes.

Clean fans alone are not the fix, and automation alone is not the fix. The pair is. Across the full test window, 12 of 12 trigger crossings started the fan within one three-minute poll.

Purge metric: minutes from the dew point peak until the room holds below 55 °F for three consecutive 3-minute polls. Two Overture Room Sensors at 4 ft and 18 in. Site anonymized.