

The Hidden Opportunity: Identifying Fume Hood Hibernation Candidates

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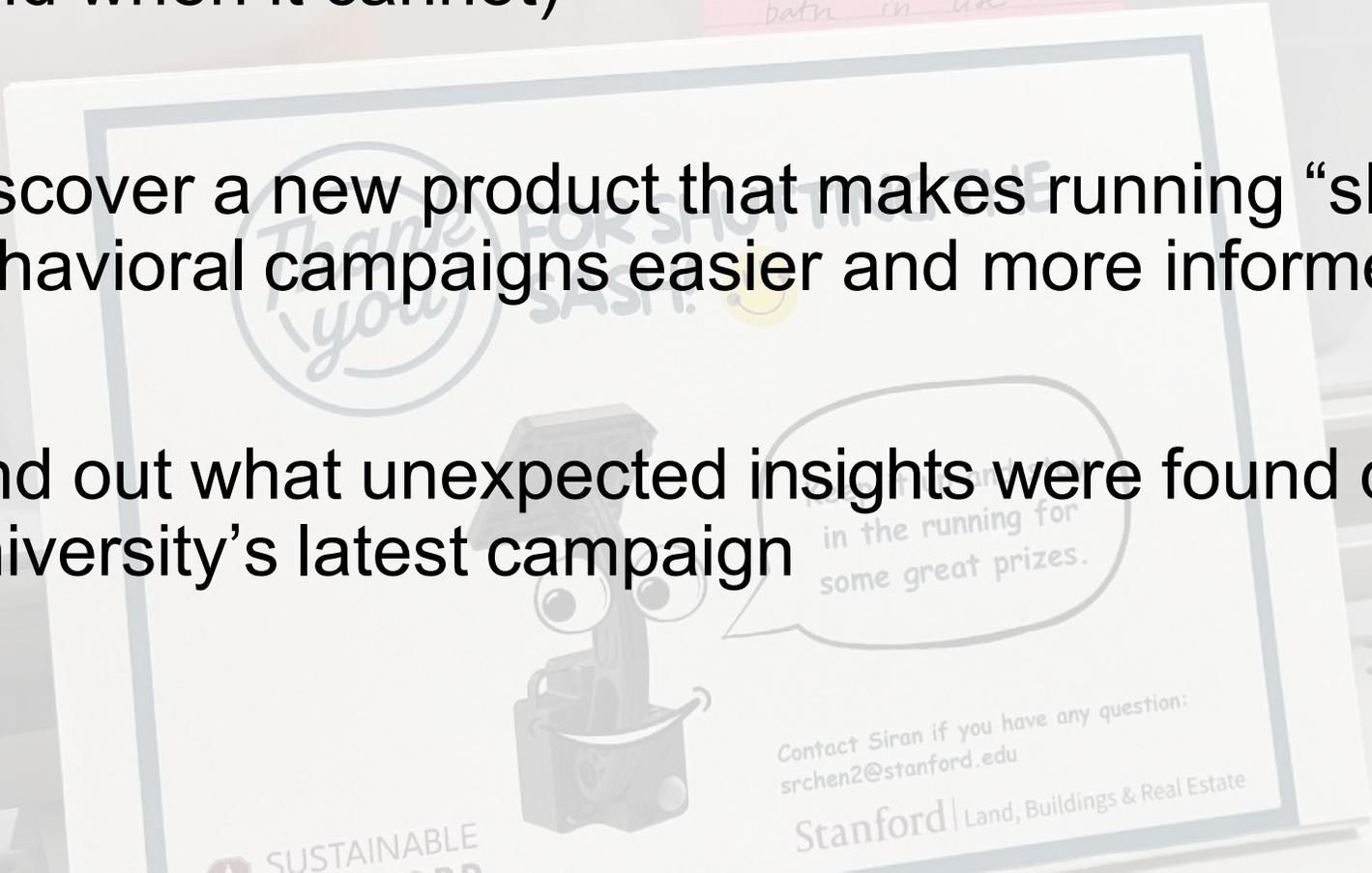


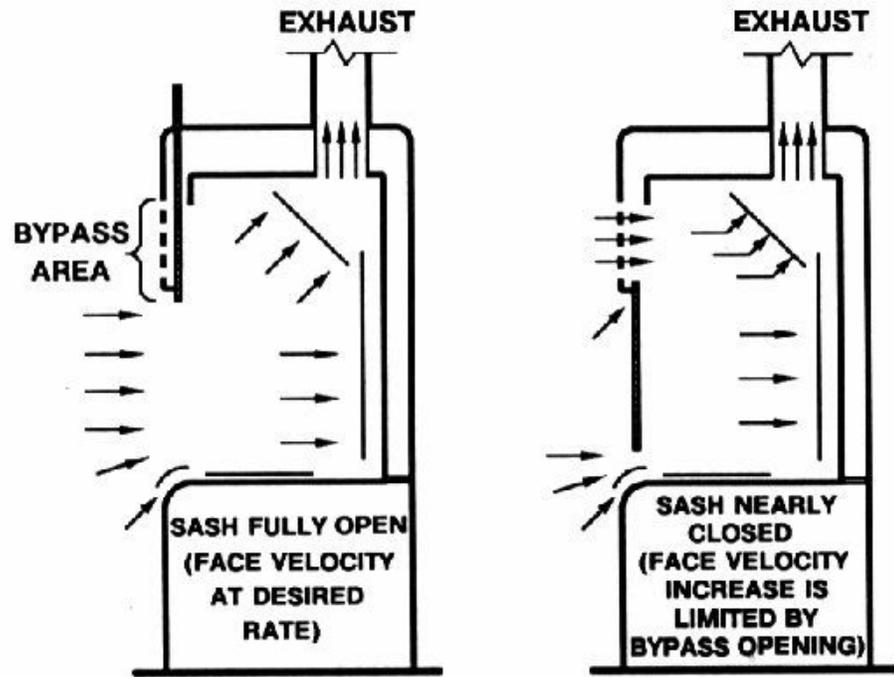
Siran Chen, MS Env Eng 2025
AY: 2024-2025

Learning Objectives

- Understand when shutting the hood sash can save energy (and when it cannot)
- Discover a new product that makes running “shut the sash” behavioral campaigns easier and more informed
- Find out what unexpected insights were found during Stanford University’s latest campaign

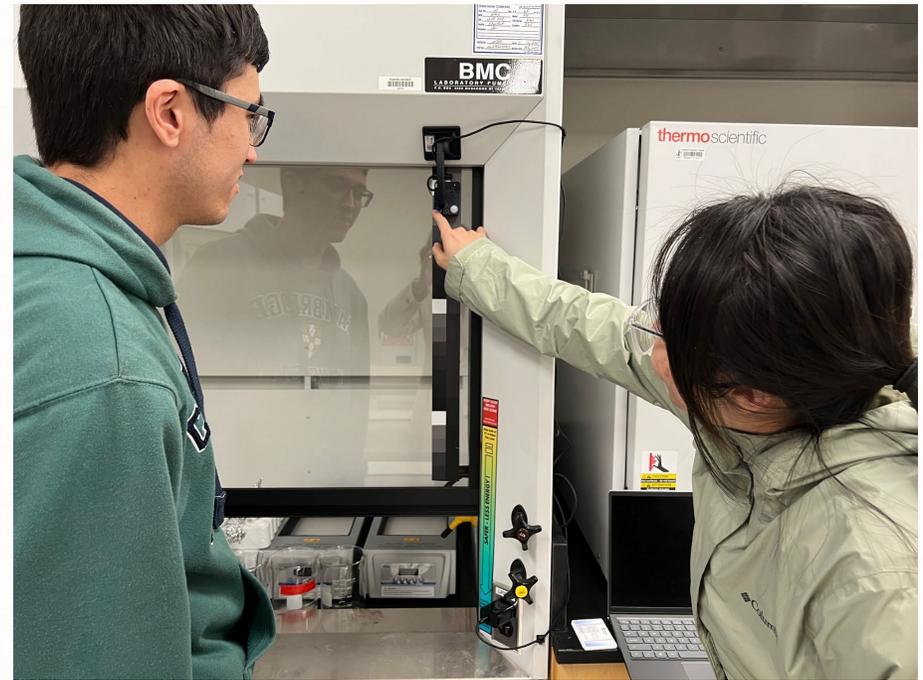
Nitric acid (HNO₃)
bath in use





<https://ehs.oregonstate.edu/LVSG-FH-type>

WHY LABS? WHY HOODS? WHY NOW?

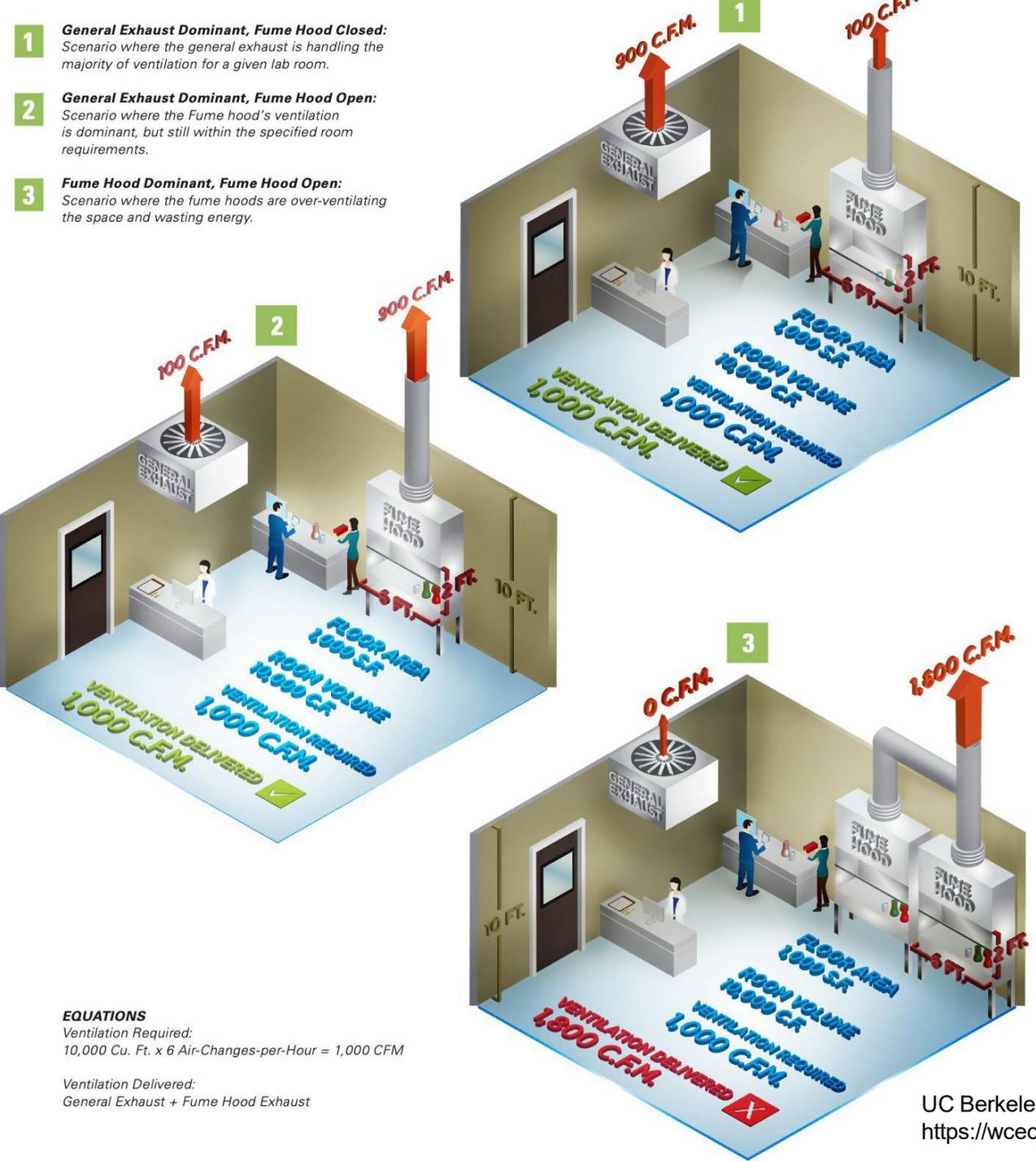


- Fume hoods are powerful tools for scientific discovery
- But a single fume hood can use as much energy as 3.5 homes

1 General Exhaust Dominant, Fume Hood Closed:
Scenario where the general exhaust is handling the majority of ventilation for a given lab room.

2 General Exhaust Dominant, Fume Hood Open:
Scenario where the Fume hood's ventilation is dominant, but still within the specified room requirements.

3 Fume Hood Dominant, Fume Hood Open:
Scenario where the fume hoods are over-ventilating the space and wasting energy.



EQUATIONS
Ventilation Required:
 $10,000 \text{ Cu. Ft.} \times 6 \text{ Air-Changes-per-Hour} = 1,000 \text{ CFM}$

Ventilation Delivered:
General Exhaust + Fume Hood Exhaust

Big Challenge Invisible Waste

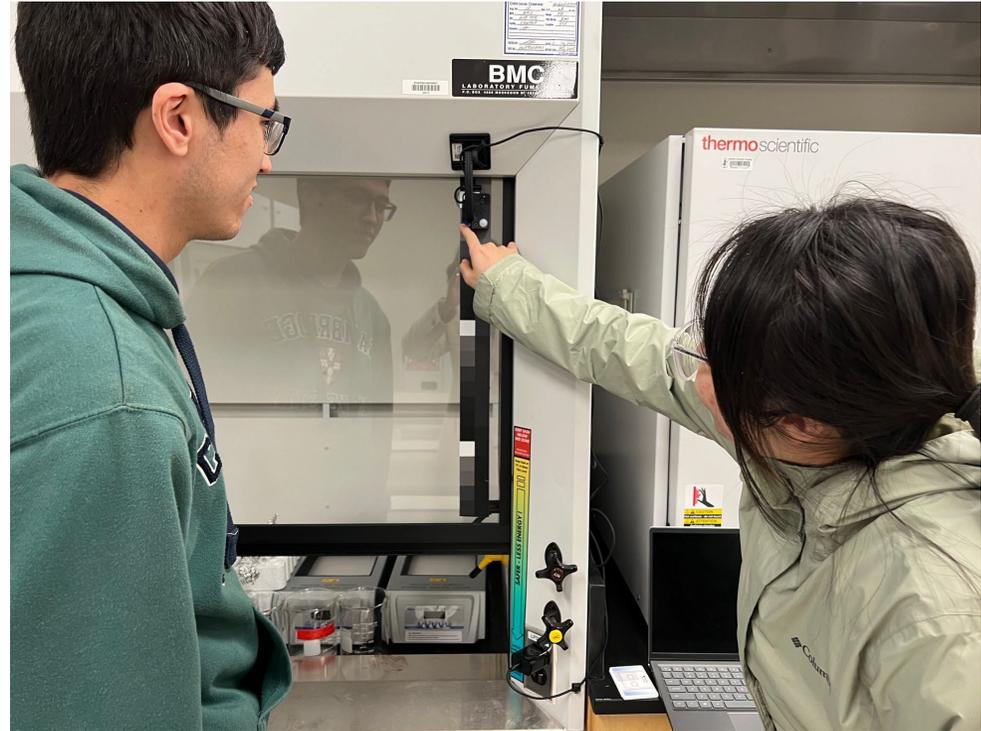
- Open sashes = energy loss + safety risks
- Low motivation to change behavior when effect not visible and no feedback
- Long-lasting changes in habits and culture – can it happen?

Tech 🧑💻 + People 🧪 =
Change 🤯💥



 **Sashimi**

 **Sustainabli**
gosustainabli.com



Behavioral Campaign



A SINGLE FUME HOOD CONSUMES AS MUCH ENERGY AS 3.5 HOMES.

CLOSING SASHES CUTS WASTE, BOOSTS SAFETY, AND SUPPORTS STANFORD'S SUSTAINABILITY GOALS.

SHUT THE SASH COMPETITION

Location: Green Earth Sciences
Duration: April – May, 2025

1. Most Improved
2. Top Performer

I'm Sashimi.
Don't be too surprised if you see me in your lab

SASHIMI'S WATCHING THAT SASH...

Behavioral Campaign:
With the help of Sashimi by Sustainabli, we're keeping track of when fume hoods are left open. Low sashes = better performance. 🏆

Join the effort to save energy and compete for great prizes!

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DON'T FORGET!

DON'T FORGET THE SASH!

Thanks for participating in the Shut the Sash Competition!
Make sure your sash is fully closed when you're not actively using the hood. Every closed sash brings your lab closer to the top!

Contact Siran if you have any question: srchen2@stanford.edu

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SASH LEFT OPEN - LET'S FIX THAT!

Oops! I noticed this sash was left open unattended.

CLOSING IT HELPS SAVE ENERGY AND IMPROVES LAB SAFETY. There's still time to turn it around and win big!

Contact Siran if you have any question: srchen2@stanford.edu

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Thank you FOR SHUTTING THE SASH! 😊

Keep it up and stay in the running for some great prizes.

Contact Siran if you have any question: srchen2@stanford.edu

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Feedback "tickets" proved effective.

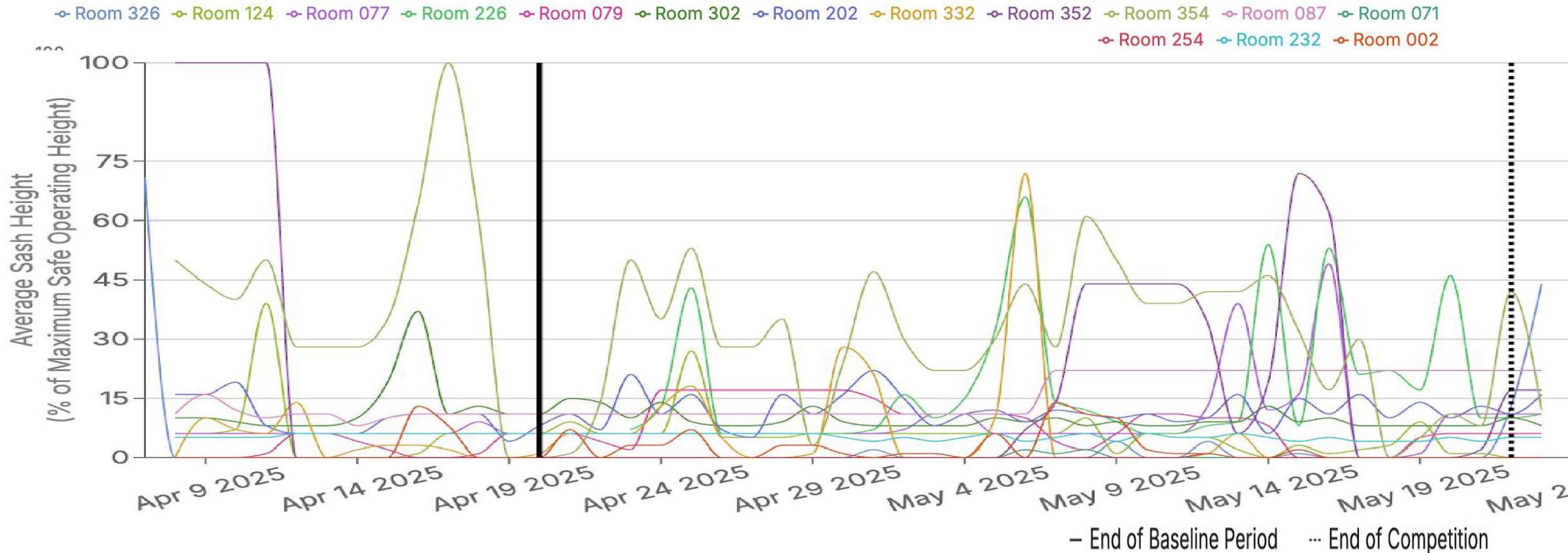
Shut the Sash Competition @ Green Earth Sciences

Baseline: April 7th - April 18th, 2025

Competition: April 19th - May 22nd, 2025

- 17 Sashimi, 14 Lab Rooms, 1 laminar flow hood withdrawn
- 6 out of 16 hoods under-used

Real-time Sash Height



- End of Baseline Period ... End of Competition

Winners & Underused

- **Most Improved:** 41% reduction
- **Best Performance:** 2 rooms (high-use) around 3% open during competition
- Underused hoods → *Hibernation Potential*

Labs	Avg % Open Before	Avg % Open After	Δ % Open
Room 226	NA	10.69	NA
Room 352	48.19	7.16	-41.02
Room 354	26.51	17.41	-9.1
Room 302	7.72	5.8	-1.92
Room 124	3.74	3.37	-0.37
Room 232	3.32	3.09	-0.23
Room 254	0	0.02	0.02
Room 071	0	0.13	0.13
Room 002	1.09	1.49	0.4
Room 202	6.18	7.12	0.94
Room 332	2.31	3.84	1.53
Room 077	3.57	5.49	1.92
Room 087	6.73	9.55	2.83
Room 079	1.22	5.57	4.35

What's Next?

Evaluate long-term behavior change and energy savings post-intervention

Extend sash monitoring to other hood-intense lab buildings across campus

Engage EH&S, lab managers, and facilities operations to hibernate under-used hoods!

Name	No. of fume hoods	Building CV or VAV?	Zone-level pneumatic or DDC?	Hoods CV or VAV?	Has zone proximity sensors?
LOKEY CHEM-BIO	158	VAV	DDC	VAV	Y
SHRIRAM CENTER (Bio-E, Chem-E)	104	VAV	DDC	VAV	Y
CHEM-H AND NEURO	82	VAV	DDC	VAV	Y?
BECKMAN CENTER	82	VAV	DDC	VAV	N
KECK (WM.M) SCIENCE BLDG	62	VAV	DDC	CV	N/A
SAPP CENTER (aka Old Chem)	54	??	DDC	CV	N/A
CENTER FOR CLINICAL SCIENCES RESEARCH	51	VAV	pneumatic	VAV	N
LOKEY STEM CELL RESEARCH BLDG	50	VAV	DDC	CV	N/A
GILBERT BIOLOGICAL SCIENCES	43	VAV	DDC	VAV	N
GORDON & BETTY MOORE	42	VAV	DDC	VAV	N
STAUFFER II - PHYSICAL CHEMISTRY	42	VAV	DDC	VAV	Y
GREEN EARTH SCIENCES	41	VAV	pneumatic	VAV	N
STAUFFER I - CHEMISTRY	40	VAV	DDC	VAV	Y

Thank You!

- **Advisory Committee:**
 - Gretchen Engbring, Office of Sustainability
 - Kevin Tu, Sustainabli
- **Collaborators:**
 - Sustainabli- Tyler Colenbrander, Kevin Tu, Oliver D'Esposito
 - Facility and Operation: Vinny Toth, Gilbert Banuelos
 - GES Lab Managers, ICLSS Group
- All participating lab users and those interested in our project!

Questions?



Our Takeaways!

What worked **well**: the method!

- Technology and behavior combination
- Short-term results

What to **improve**: direct communication!

- Indirect communication through building/lab managers
- More collaboration with other parties, more chances to communicate

What I **gained**: skills!

- Stakeholder communication and coordination
- device installation and troubleshooting



Individual Hood “Sashboard”

