

Tulane Sash Management Education Campaign

Findings & Results

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Tulane University has not had any previous programs addressing the energy use of laboratories. The “Fume Hood Sash Management Implementation Guidelines” provided by the Lawrence Berkeley Labs gave us a road map for a first project: starting with a week of measuring how far open fume hood sashes are open, conducting our own educational campaign, and then measuring the results. The mission was to get lab users to *Shut the Sash*.

Fume Hood 101

First, we needed to learn more about which fume hoods to focus on. We met with Environmental Health and Safety staff, who described the different types of fume hoods and where they are located. Most of Tulane’s fume hoods are “Constant Air Volume,” meaning that they pull through a constant volume of air, even when the sash is closed. Closing the sash on these fume hoods does not save energy, but it can be important for safety reasons. Variable Air Volume (VAV) Fume Hoods shut down the flow of air when the sash is closed. We learned that VAV fume hoods are located in the Israel building, the new Flower Hall labs, and the renovated labs in the J. Bennett Johnston building. Recent records indicate there are about 360 constant volume fume hoods on Tulane’s campuses. The Israel building has 48 VAV fume hoods.

Environmental Health & Safety staff provided safety reasons for closing the sashes of fume hoods:

- Keeping the sash closed minimizes turbulence (from traffic & air currents) inside the working surface of the hood
- Sash provides a safety shield that protects the user from chemical contact, inhalation exposure, fire, explosion
- Sash provides a safety shield to help contain fire, spill, explosion, etc. to prevent spread of hazard into the lab

They support encouraging lab users to close sashes. They asked that stickers not be placed on the actual sash and that we be present when the stickers are placed on the fume hoods (rather than giving them to faculty to apply themselves). The sash itself must be unobstructed.

Pre-Campaign Assessment

We recruited five faculty members with labs in the Israel building to participate. To establish a baseline, measurements were taken of the fume hoods in these labs everyday for a week at different times of the day. We also estimated the openings of nine fume hoods visible through the doors of the fifth floor Organic Chemistry lab. On average, these fume hoods were open 14 inches everyday. Some of the time, someone was working at one, but for the most part, the fume hoods were left open and unoccupied.

	% Opened	Average Opening
6 Research Hoods	80% or 24/30 observations	14 in
6 Teaching Hoods	Not recorded consistently	

Developing a Design

We contacted a Buildings Technology class in the School of Architecture and asked them to help design a sticker that would get the *Shut the Sash* message across. Z Smith, the professor, designed a problem set for the students that challenged them to estimate the energy use when the sash was left open and to design a sticker or flyer for the campaign. The variety of responses was great. Many had the statistics, some included the Tulane logo, and some had a funny punch line. After going through all the stickers, the five with the best message were chosen.

We showed the designs to graduate students in the Department of Ecology and Evolutionary Biology at their weekly "Eco Lunch." The graduate students provided great feedback about the five stickers and helped to narrow down on a final sticker. They liked the use of the footprint to express the carbon impact; they didn't like the use of a Tulane logo. Most interestingly, they encouraged us to provide the calculations behind the statements of the relative carbon footprint of a car, house, and fume hood.

Professor Smith helped develop the calculations from his class's problem set into a flyer. Out of this process, we have a sticker/flyer with a "Shut the Sash" message, and a flyer that shows the scientists the calculations.

Reaching Teaching Labs

A faculty member in Chemistry provided us with advice on reaching instructors and students in laboratory classes.

- Emphasize a safety message
- Include information in training lectures given at the beginning of the semester to lab classes.

The Campaign

Teaching Labs

- An email was sent at the beginning of the semester to the faculty who taught labs in the Israel building. It provided sample text that could be included in lab instructions.
- An email with the flyers and sticker image was sent mid-semester.

Research Labs

- An e-mail was sent out to see if we could meet a faculty or lab member to place a sticker on the fume hoods
- Flyers were posted in kitchens, bulletin boards, and other public spaces near the labs to raise awareness

Initial Results

	% Opened	Average Opening
6 Research Hoods	83% or 25/30 observations	12.17 in
6 Teaching Hoods	Not recorded consistently	

*Measurements based on close estimations

Individual Follow-up

The next step we took involved another round of communication with faculty members. We sent out individual emails offering to meet, which received a better response. Quick meetings with lab staff one-on-one gave us a chance to better explain why closing the sash was important and answer questions. We were able to place stickers on a few of the hoods and ask that they share with their colleagues the information about properly closing the sash. We received and responded to a number of questions via email about the safety of shutting the sash & overall lab ventilation.

After this round of more personalized outreach, another week of data collection from the fume hoods was conducted and results were recorded.

	% Opened	Average Opening
6 Research Hoods	36% or 11/30 observations	16.1 in
6 Teaching Hoods	34% or 12/35	12.86 in

Conclusion

After approaching faculty members a second time and in a more individualized way, we saw the number of open sashes in research labs drop from 83% to 36%.

Recommendations for Other Universities

- Communications should be issued jointly with Environmental Health and Safety. Researchers will be wary of a message that focuses only on energy savings.
- Ask your Env. Health and Safety and Facilities Services contacts to share the details of your education campaign with their entire staff, to make sure that they can answer questions from researchers.
- Be ready to address questions from lab users about how closing the sashes of fume hoods affects the overall ventilation of their labs.
- Look for opportunities to share the message face-to-face, rather than relying on emails and print materials.
- Lab operations staff are important contacts and should be briefed even as you approach p.i.'s.



Sample Second Email Text to Research Labs

Dear Prof. XX,

We have not seen a good response to our flyers encouraging lab users to “Shut the Sash” of their fume hoods to save energy, so we wanted to reach out by email as well. An explanation of why it closing the sash of a fume hood is important is below. Could you share this email to your lab team? If you have any questions, or if there are any opportunities for me to speak briefly about this project with your team or your department, such as at a meeting or talk, please let me know!

Thank you!
Liz Davey

Dear Israel Building Lab Users,

We are writing to encourage you to close the sashes on your fume hoods when they are not in use. This important habit reduces energy use and increases overall safety in your lab.

The “Variable Air Volume” fume hoods in the Israel Building use much less energy when closed than when open. Fume hoods are large energy consumers because they pull heated or cooled, dehumidified air out of the building. By shutting the sash on your lab’s VAV hood, you will greatly reduce the building’s overall heating and cooling use.

Closing the sash of your fume hood has safety, environmental and budget benefits:

- Closing the sash provides a safety shield from chemical contact, inhalation, and fire explosion.
- One open sash has the same carbon footprint (energy use and impact on climate change) as a house
- By lowering one sash, you can help reduce Tulane’s energy bills by over \$1500.

We have posted flyers with our calculations in the building. (Copies are attached.) Please contact us if you would like “Shut the Sash” reminder stickers to place on your fume hood. And let us know if you have any questions or suggestions. We hope you will make it a regular habit!

Thank you,
Ava Zimmerman
Environmental Studies ‘14

Liz Davey
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Sample Beginning of Semester Email to Lab Instructors

Dear Prof. XX,

I work on the university's environmental sustainability programs. To help save energy, I am writing to ask if you could include instructions to close the sashes on fume hoods in your classes that meet in the Israel labs. During the fall, I met with Prof. XX, who suggested that this message could be presented lectures at the beginning of the semester training students in lab safety procedures. I have written some text (below and attached) that could be read or pasted into instructions (with editing you see fit).

Later in the semester we will have some flyers and stickers that could be posted to help reinforce this message. If you have any questions or suggestions, please let me know.

Thank you!
Liz Davey

Shut the Sash!

While you are working at a fume hood, the sash should be closed as far as possible. This protects you from possible exposure to chemicals.

Whenever you aren't working at the fume hood, please shut the sash completely. The "Variable Air Volume" fume hoods in the Israel Building use much less energy when closed than when open. Fume hoods are large energy consumers because they pull a lot of heated or cooled air out of the building. By shutting the sash on your lab's VAV fume hood, you will greatly reduce the energy used to heat and cool the Israel building.

Closing the sash of your fume hood has a huge environmental impact. One fume hood with an open sash has the same carbon footprint as a single-family home and twice the carbon footprint of the average U.S. passenger vehicle. By shutting the sash of one fume hood, you can save as much as 10 tons of CO₂ emissions per year

When you leave the lab, be sure that the sashes are closed on all the fume hoods.

SHUT THE SASH!



DO YOU REALLY WANT YOUR CARBON FOOTPRINT TO COMPETE WITH BIGFOOT?

Working for a Sustainable Tulane, Please Help Us Save Our Planet!
Please CLOSE THE SASH when not using this Fume Hood! green.tulane.edu

Calculating the Energy, Cost & Climate Impact of an Open Sash

A lot of energy is used cooling and heating the air drawn out by a fume hood with an open sash.

Here are the numbers used to calculate the impacts for a fume hood left open year-round in New Orleans

	Quantity
Air flow to provide 100 ft/min face velocity through a 5' wide fume hood with sash open 1.5 feet	750 cubic ft/min
Annual energy used to heat each cubic foot/minute to room temperature	36,260 Btu/cfm
Annual energy use to heat air drawn out with sash open 1.5 ft	27,195 kBtu
kBtus heat generated by 1 CCF natural gas (w/ efficiency of heating system factored in)	70 kBtus
Annual CCFs natural gas consumed to heat air for one hood	388 CCF
Annual cost for this natural gas at a price of \$1/CCF	\$388
Lbs CO2 emitted per CCF natural gas	12 lbs
Tons CO2 emitted by burning gas to heat air for one hood	2.3 tons
Annual energy use needed to cool each cfm to room temperature	169,200 Btu/cfm
Annual energy use to cool air drawn out with sash left open 1.5 ft year round	126,900 kBtu
kBtus cooling created by each kilowatt hour electricity used at Tulane's central chiller plant	10 kBtu
Kilowatt hours electricity consumed to cool air for one fume hood left open 1.5ft year round	12,690 kWh
Annual cost for this electricity at a price of \$0.10/kWh	\$1,269
lbs CO2 emitted by utility per kWh delivered, regional average	1.3 lbs
Tons CO2 emitted to cool air for one 5' wide fume hood left open 1.5' year round	8.2 tons
Totals for heating+cooling	
Annual cost to provide the heated /cooled air exhausted by a 5' wide fume hood left open 1.5'	\$1,657
Annual CO2 emissions associated with providing this heated / cooled air	10.6 tons
Comparisons	
Annual greenhouse gas emissions per passenger vehicle per Year	5.1 metric tons CO2E
Total CO2 emissions for energy use per single-family home	11.6 metric tons CO2

Single-family home emissions calculated by EPA by adding up national average energy use per single family home for electricity, natural gas, liquid petroleum gas, fuel oil and kerosene. Vehicle emissions calculated for 2007 by the EPA using weighted average combined fuel economy of cars and light trucks of 20.4 miles per gallon and an average vehicle miles traveled of 11,720 miles per year.

For EPA estimates, visit <http://www.epa.gov/cleanenergy/energy-resources/refs.html>

