

Can a Sustainable Scientist have a Carbon-Neutral Lab?

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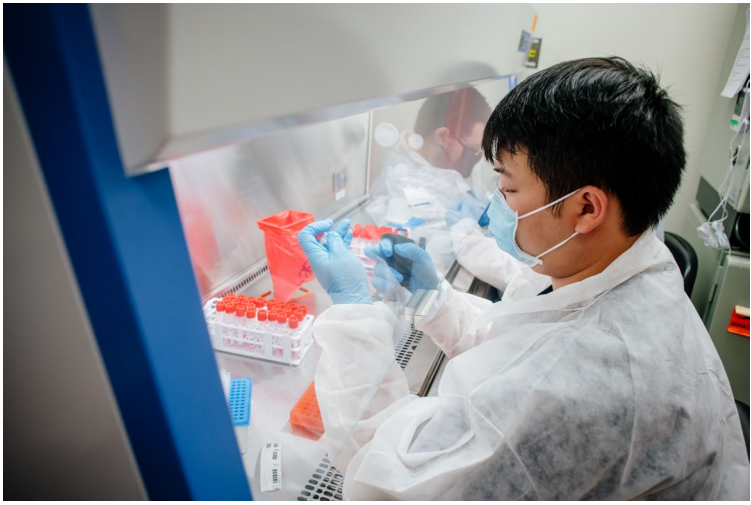
Learning Objectives

- Understand that committing to green chemistry practices can reduce the needed airflow in laboratory
- Understand that endorsing a hazard assessment and ventilation tune-up is one of the most effective ways a lab occupant can support climate neutrality
- Understand that ventilation risk assessment distinguishes fume hood risk from open bench space risk
- Understand that a risk assessment combines the hazard levels and amounts of the chemical inventory with the practices and equipment in the lab

What is Carbon Neutrality?

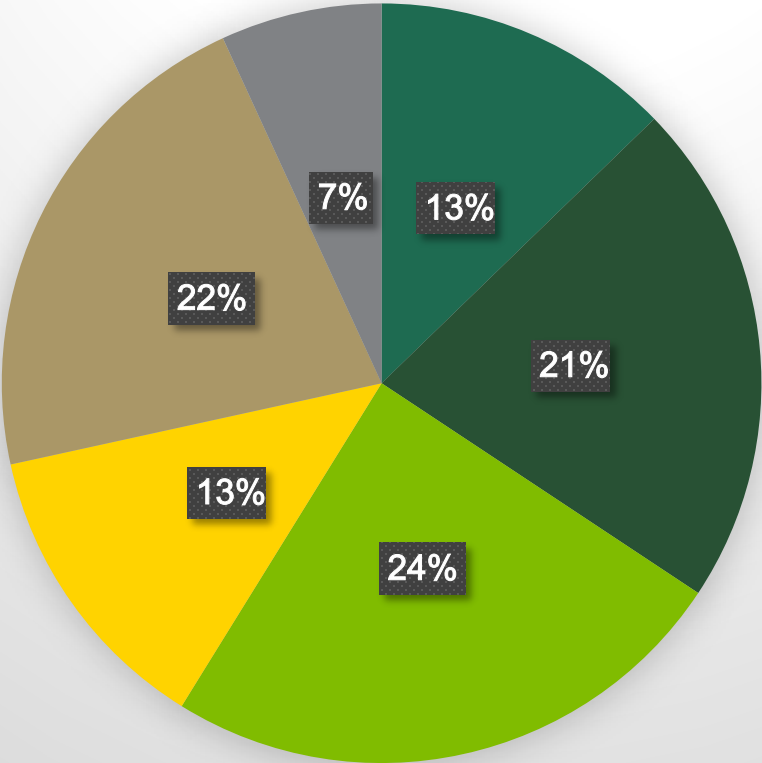
- Carbon neutrality is the concept of operating a building (or lab) without having a net output of carbon. *Ideally*, a building or lab would emit less carbon than it sequesters.

- So, is it even possible for a lab to be carbon neutral?



Electricity Use in Average Laboratory

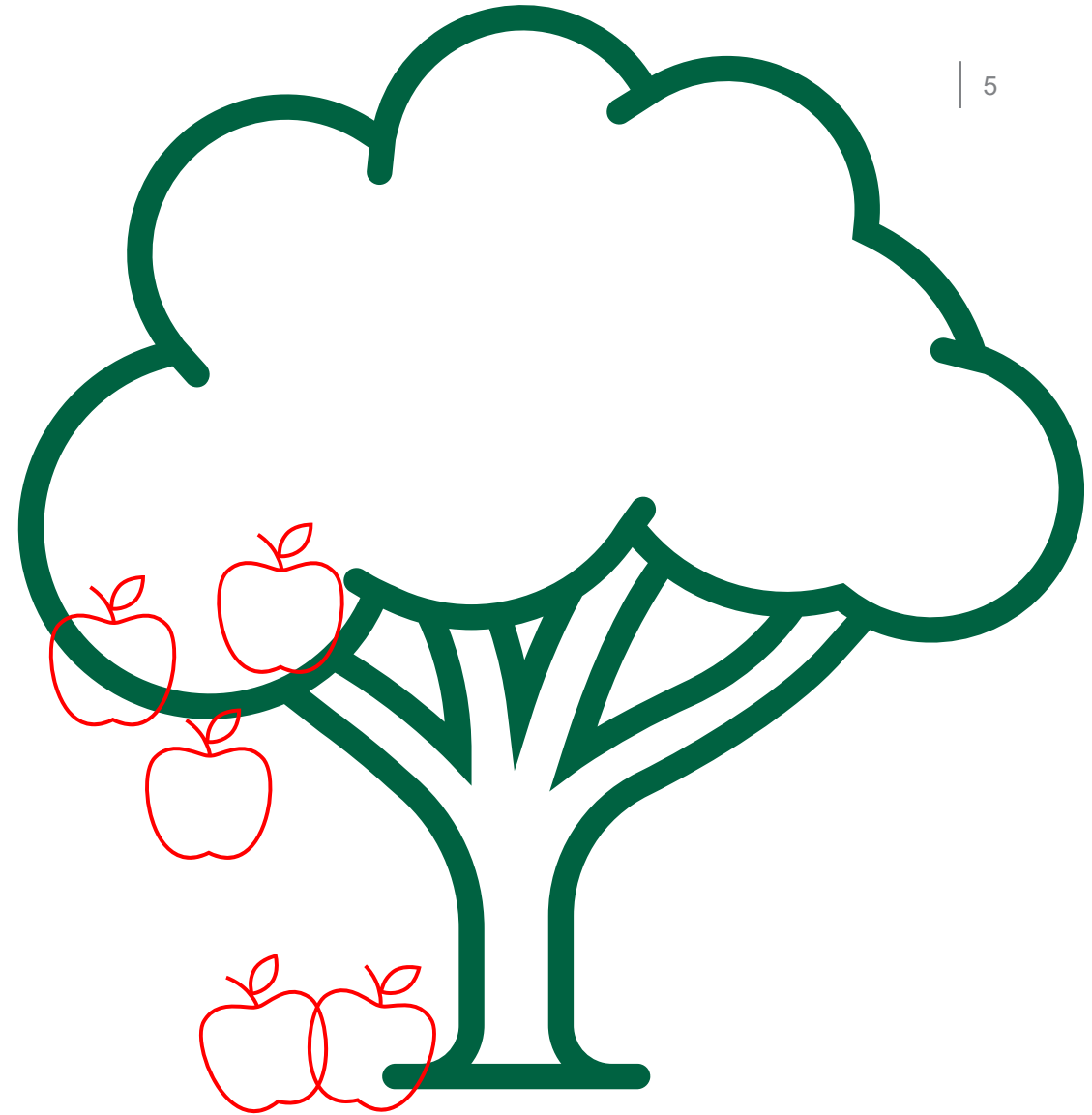
Electricity Composition



- Lights
- Plug Load
- Heating
- Cooling
- Fans
- Other

Taking Necessary Steps toward Carbon Neutrality

- Starting from scratch and working to decarbonize the lab prior to encouraging behavioral changes makes decarbonization significantly more difficult
- Forget focusing on low-hanging fruit, pick up the fruit that's fallen on the ground!



Steps Towards a Decarbonized Lab

1. Avoid using resources as much possible.
 - Don't compromise safety for decarbonization or encourage researchers not to use safety resources.
2. Maximize efficiency of resource use as much as possible.
3. Limit resource use as much as possible.

Avoiding Fume Hood Use

Green Chemistry:

- Identify chemicals used by labs that require fume hood use
- Receive chemical inventories from Green Lab Program participants
- Use the DOZN Tool from Millipore Sigma to recommend safer and greener alternatives for substitute



Maximizing Efficiency of Fume Hood Use

Social Conditioning in Labs:

- Deploy stickers to remind individuals to 'Shut the Sash'
- Integrate EHS protocols and sash shutting into Green Labs Program Presentations (and vice versa)
 - Don't store chemicals or equipment in hood unless actively in use
- Encourage researchers to share hoods instead of using their own hood

Limiting Fume Hood Use

9/14/2022 UAB CAMPUS 10:43 AM
Panel Point Log Report : BBRB FUME HOOD TIMERS

Selected Points: BBRB.3.ET311C-1.FH.PM.ALM.TMR, ...
(49 Points)
Selected Panels: *
Filter: All Points

Name:Suffix	Address	Description	Value/State	Status	Priority
BBRB.3.ET311C-1.FH.PM.ALM.TMR	-Virtual-	()	1499900.00	-N-	BN15
BBRB.3.ET335A.FH.PM.ALM.TMR	-Virtual-	()	0.00	-N-	BN15
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BBRB.3.ET369B-1.FH.PM.ALM.TMR	-Virtual-	()	1850580.00	-N-	BN15

You Can't Manage what You Don't Measure:

- Monitor fume hood occupancy and sash height
 - Alarm when open & unoccupied
- **Actually** use data to make changes to protocol
- Shut down fume hoods that are no longer operable
- Temporarily shut down fume hoods that are expected to require significant maintenance
 - Being unusable for two weeks warrants temporary shut off periods

Electrify Everything!

- Electrification is a key component of achieving carbon neutrality in laboratories
- Although direct fossil fuel use in a lab is not commonplace, indirect fossil fuel use is common
- A significant amount of natural gas is used in the generation of steam



Avoiding Autoclave Use

User Surveys & Protocols:

- Mount clipboards on autoclaves across campus
 - Collect and aggregate user data
- Engage with researchers that were unnecessarily autoclaving
- Provide guidelines for placing autoclaves in standby mode when not in use

Avoiding Fossil Fuels in Autoclaves

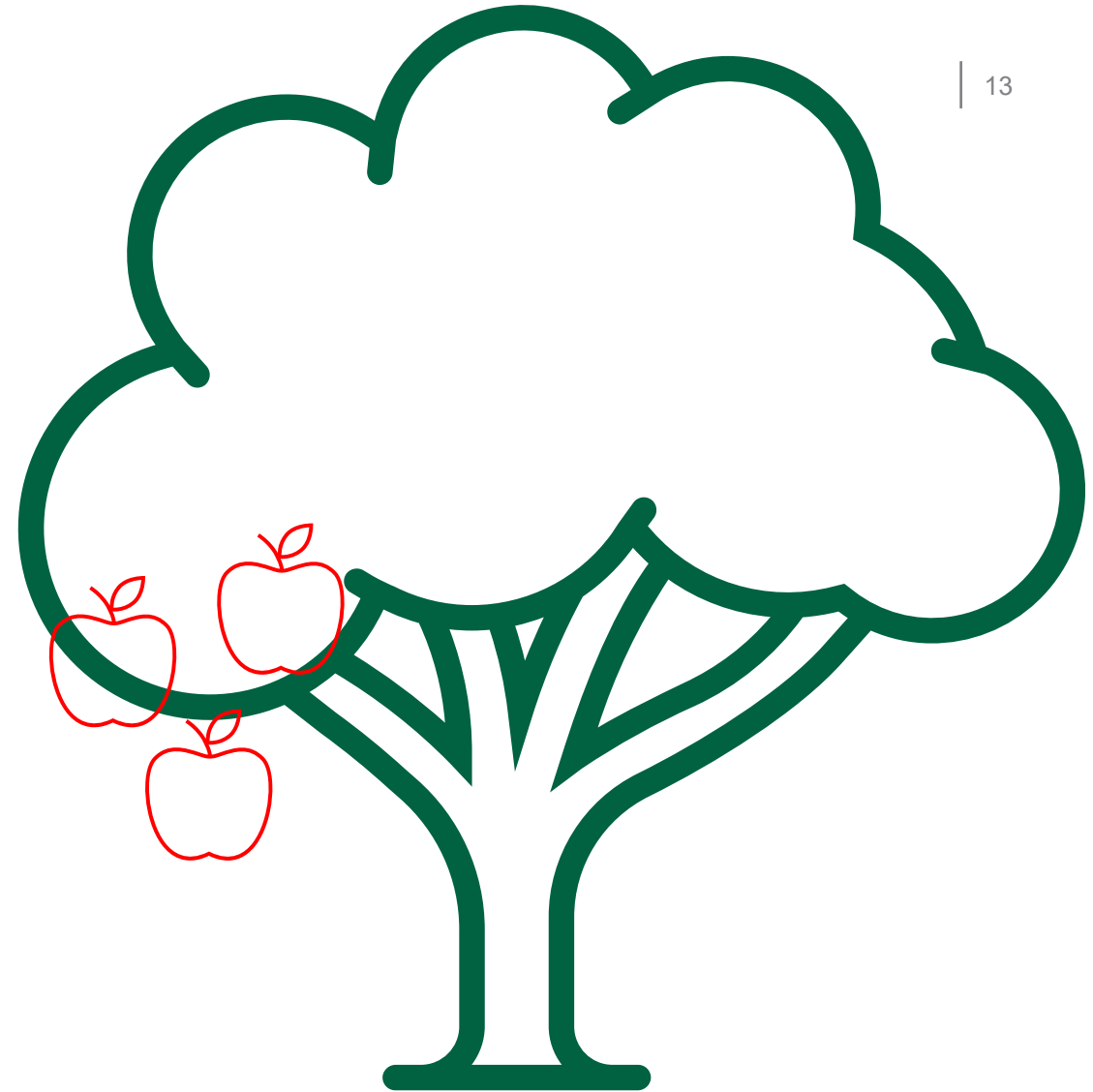


Steamy Situation:

- Many autoclaves run on house steam powered from natural gas
- Transitioning away from natural gas powered steam plants isn't always an option
- Changing to non-steam jacketed autoclaves is a good solution!
 - Allows for electric steam generation within the chamber without compromising research integrity

Low-Hanging Fruit

- Working towards decarbonization in laboratories is challenging and resource intensive
- We must decarbonize labs to solve the climate crisis
- Harvest the energy from the fruit on the ground to grab harder-to-reach fruit



Questions?

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