

240308 Meeting Minutes

Attendees: Kate Malecek, Henry P, Jaasiel Alvarez, Giada Spigolon, Honami Tanaka, Ben Ben, James Linton, Vijaya Kumar, Tasha Cammidge, Tatiana Solovieva

This month, we are ordering food from [Porto's Bakery](#) for this Friday's meeting! [In your RSVP](#), please vote on your favourite pastry and we will order based on popular demand – there is also an option to order a drink if you choose! **The deadline for submitting your order is Thursday 9am**. I can also bring a kettle so we can boil hot water and I will bring some yummy hot chocolate packets and tea bags for folks to enjoy! If you prefer, BYOT. For bonus sustainability: folks can bring their own cups and/or utensils and/or plates as an alternative to our usual compostable ones!

Will update [Restaurant Guide](#) (released in October) and our [Coffee, Breakfast, and Dessert Guide](#) (posted in December!)

- Notes: delivery fee of \$3.99 after first order, non-compostable straws BUT all paper packaging

Introductions ...

[Million Advocates for Sustainable Science](#) Petition

- International Institute for Sustainable Laboratories (I2SL) along with My Green Lab are petitioning to change funding granting agency policy to promote sustainable research
- By signing the letter you can help transform how science funding organizations set expectations for efficiency, resiliency, and sustainability in the way scientific research is conducted
- KM: suggested we could promote this in our newsletters, and post posters, could promote over Earth Month

Green Labs Monthly Tip:

Chemical Inventories!

- Reduces over-purchasing of chemicals (saves \$\$)
- Reduces amount of chemical waste in your lab
- Can use [chemical inventory logs](#) to keep organized (include things like location, size of bottle, brand, etc to make chemicals easy to locate)
- Complete yearly (or more!) for best benefits
 - Update SDS online database at the same time!
 - Make sure dates are added to chemicals when opened
- Ensure hazardous waste is disposed of properly and within 9 months of first use!
- Identify reagents that are expiring or hazardous, and see if they can be [swapped out for less hazardous chemicals](#) ([green chemistry!](#))

Updates!

- **15 Certified labs!! WHOOOO**
 - Please get CERTIFIED TODAY! To get certified, finish the easy, 30-minute [Green Labs Certification](#) and submit it to sustainability@caltech.edu.
 - Certified Labs-exclusive event planned for April!

- Lots of media lately
 - o [California Tech Article “Caltech Orange Needs a Hint of Green”](#)
 - o [Caltech Weekly Article “Caltech on Path to Decarbonize”](#)
- We should use this energy from the campus to encourage sustainable practices!!

Updates – Pilot Programs

- Lomi Composter Update
 - o GSA update...! Composting in the Catalina’s
 - o BI: Bronner Lab/Imaging Core added
 - o 131 gallons of dirt (492 L) from 655 gallons food waste (2462 L)!
- Pipette Tip Box Recycling
 - o 2258 gallons of plastic waste (1072 lbs!) diverted
- -70°C/-80°C Comparison Pilot
 - o 5 labs involved, collaborating with NIH
- Styrofoam Recycling
 - o Waiting to hear from BBE about space for a 40 yard bin!
 - o [SIGN THE PETITION!!](#)
 - o [Technical bulletin from I2SL](#)
 - o [LCA of Styrofoam](#)
 - o [How to do LCAs](#)
- Resources
 - o [Sustainable Restaurant Guide available online](#)
 - o [Sustainable Coffee, Breakfast, and Dessert Restaurant Guide!](#)
- Do we want to do a Lightning Talks Event?
 - o Yes
 - o TC: BUT since April is already packed, let’s postpone until September so we can discuss the -70/-80 comparison results, and tie it into #LabWasteDay (Sept 20)
- What do we want this Newsletter to focus on?
 - o ~~Lightning Talks~~, Spring Clean Event, Certification?
 - o All topics above are good, TC will make one accordingly
- Presenting to the Lab Managers March 15th!
- [Spring Clean Event ongoing](#)
- SWAG!



- o
- 2024 International [Freezer Challenge!](#) January 1 – July 1, 2024
 - o This was the tip last month, but it is worth revisiting!
 - Our lab did the scoresheet in under an hour

- Opportunity for us to get funding to go to I2SL conference for free.....!!! if we do well in the competition, so please sign up and do the challenge, most of us are already doing this work so it would be great to get credit for it!
- Labs compete to improve freezer efficiency, sample accessibility, reduced risks, cost-savings, and energy-savings for their lab's cold storage!
- Fun, free program
- Scored on different categories (like defrosting freezers or inventorying)
- Awards given at I2SL for the winners!
- Could provide internal prizes also?

Social Media Campaign – Jaasiel Alvarez

- Do you have time to [film a short video](#) or [write a blog post](#) I2SL is asking for videos or blogs, and there is a \$500 stipend available!
- Letters to the editor California Tech (<https://tech.caltech.edu/about/>)
- JA presented her slides (see Drive for details) and made a case for social media at Caltech
 - Main points: JA will reach out to other groups with social media on campus and other universities to come up with plans of action and contingencies in case of trolls or viral posts
 - TC will make a doc where we can share ideas for social media posts, and use it for next time to make some content
 - Division of labour to make sure no one person is overwhelmed, especially as concerns answering questions
 - Questions:
 - TC: Time commitment?
 - JA: Spread out the work, have it set up so we do several posts in a single session so they can just be sent out at the correct time (say 2x a month on Friday)
 - JA: Have several people making posts, or people making posts on specific topics (for eg JL could make a post on the -70 comparison)
 - Can use previously existing flyers, have a working session to create content (like fact sheets)
 - KM: Contingencies? (in case of viral post or trolls)
 - JA: Will reach out to other social-active groups (WiBBE, Stanford, etc) to see what they do and if they have any advice
 - HP: Which social media platforms?
 - JA: Start out slow with just Instagram, then can branch out to other groups
 - BB: also do other things like vendor shows or setting up a booth (like one for clubs?)
 - HP: there is a club day at beginning of term we can participate in
 - TC: we will also set up booths for any events we do (like ones we've done in the past like the lightning talks, WiBBE or CCE plant parties etc)
 - JL: video encouraged?
 - JA: yes, video seems to be the most accessible, especially because most age ranges show usage on YouTube, so it would be cool to have a mixture of video (like short ones showing a freezer cleanup

transformation or countdowns for events etc) alongside infographics of posters etc

- VK: contact any existing Caltech social media accounts directly to identify if there are any Caltech policies on social media accounts, see if this exists in writing to make sure Green Labs is aware and abides by all policies
- JA: create list of topics that could be posts ([TC will create a folder in the Drive for this](#))

GROUP WORKED ON ENGAGEMENT PROGRAM AS DIRECTED BY KATE MALECEK

- KM presented results of initial survey results (from labs that are already Certified)
 - Found that most groups are struggling with education and electricity conservation, so that is where we will focus most of our efforts, awaiting rest of respondents also (about 30% have responded so far!)
 - KM: can make fact sheets into slides and posts (for social media) as well, to make them as easy to use and accessible to many groups
 - JL: legwork by lab managers to turn off machines,
 - KM: lab managers are the ones we affect most, are the ones who can do the energy survey
 - JA: JL's study with the numbers can be a good slide for showing impact, turn off the lights etc turning off the lights are automatic at home, change culture to be in the lab
 - KM: might not change the habits of everyone, but can have new habits develop for newer members in the lab
 - JL: notice that folks turn machines off that are new, they turn to you for information etc when they see you doing it they will do it, but older members are not going to engage as much, leave it as you find it, happens over time
 - KM: base state expectation has changed, impactful and realistic goals (badges from last time like a punch card) so what do they do to get the energy conservation sticker (show me how often you counted the water bath use or something)
 - JA: digital graphic
 - KM: work with Sami on this, JL may be the right one to write how to do an audit
 - JL: can put together some guidance and his practices, use as a jumping off point, manage expectations based on lab members, there for folks to use as a resource to change the nature in lab
 - KM: Yvette has good guidance on cold storage
 - JA: had a list of important supplies so that if a -20 goes down you have a list of important stuff
 - KM: reach out with resources for what they indicated in the survey, and then give them all tools they need to succeed
- Organized fact sheets and started putting together links and resources
 - TC will update coordination sheet with data and resources we already have to get us started
 - As relates to recycling fact sheet:

- Could also make a petition ? – TC will work on this and have wording updated for next meeting
 - JL: ask athens and higher-ups what is going on with recycling?
 - JA: UCLA also uses athens videos? Polymer identification on their conveyor belts, check it out
 - KM: has anyone written up Athens from the community? Might be interesting to see if they are a good vendor or not
 - For the sheet, folks want to see
 - What to do to recycle – are things are too small? Is there water in your water bottle? (if so, might not be recyclable!)
 - As relates JEDI in sustainability (Justice Equity Diversity Inclusion) subsection – perhaps for the website, not necessarily a fact sheet
 - JL: carbon costs of recycling? Agreed upon metrics for the outcomes given what the threats are? How do we rank our behaviours to deal with those threats? cost/benefits
 - KM: take it on by materials? Varies by municipality?
 - JA: language (info graphic about what equity vs equality, so what is sustainable vs etc, what does that language mean, carbon footprint. What is zero waste?) and metrics
 - KM: call out our vendors and product swaps, non-single use filters, products with greener packaging?
 - JL: greenwashing is a real issue, want it to be impactful, be up front
 - JL; working on this for next time
- Organized teaching tools
- TC and others will work to finish collecting resources in next 2 weeks, then TC will start putting them together
- See below for notes from last meeting on this topic

For next time

- Certification
 - Takes ½ hour
 - Very simple!
 - See <https://greenlabs.caltech.edu> for the form
 - Get a plaque!
 - Green Labs will give you bins and signage for your lab!
 - Only for Green Labs Certified labs
 - Stickers
 - Can order stickers through us and we will print them and drop them off!
 - Three sizes (but fully customizable) and three colours/messages (1", 1.5", 2")
 - Help encourage behavioural changes
 - Recycling bins
 - “slim jim” style
 -

- Photos!
- Work on Action Plan
- Anything Else?

Next Meeting April 12th 12pm-1:30pm Chen 240

Bring a friend and get a RocketBook!

(NOTES FROM LAST MEETING BELOW)

Reengagement Project – Kate Malecek (slides and resources posted to the Drive under Certified Green Labs Engagement and [Fact Sheet Coordination](#))

- Update the Certification form
- Efforts to reengage labs that are already Certified and improve their score, check in, see if they are keeping up with sustainable changes, what are they working on now etc
- Made docs we can collaborate on to create fact sheets
- Made some mock-ups of fact sheets
 - Can have a lot of fun with them!

From KM's slides:

- KM: the current Green Labs Certification program is managed by MC, under sustainability office, we have done a lot to promote it, some labs have had them for a year, moving forward we want to think about it more, we want to think of it in a new way, want to engage labs that have participate previously, want to survey and engage them and build them up for the future, want this plaque to mean something moving forward and to support them and mobilize them for things we and they need, provide more examples of real world real lab solutions

Survey

Check in about ongoing practices

Provide support and learn about obstacles

Use a survey to identify areas for progress that labs are motivated to pursue

- KM: survey of GL Certified labs as a way to increase engagement of those labs, also see which modules they can grow into or specific areas where we can give them a badge that they work towards a particular goal in 2024, then the plaque becomes a living document to these green practices, can continue to add notches to their belt to promote sustainable lab practices
- KM: with the survey we want to check in about their practices, how is their lab doing, who is working with them, who is an obstacle, can we provide additional support, also want to use the survey they want to move forward into working naturally with the modules
- KM: I went through the scorecards and looked at areas that labs were doing well and areas are doing not so well, common areas that we have developed resources for like green procurement (tip refills, bio gloves), cold storage (difficult to take on because of huge institutional memory)

and PI s have strong opinions on this), so we can add those to the survey and see how we can help labs do better

- KM: on second page of the survey want to add “what did GL do?” Gets folks thinking of what we did and what they have done last year. All of these things will be highlighted
 - o 12 monthly meetings
 - o Sustainable Dining guide
 - o Sustainable Coffee and Tea guide
 - o Lomi composting in BBE kitchens - yield
 - o Pipette tip box recycling with vendors - yield
 - o Lightning Talks event for Pilot Program Proposal
 - o Event with WiBBE
 - o Visit to a diagnostic lab with a pipet tip washer
 - o New certified Green Labs! - count

Modules

Direct the resources that we have developed in the past year to individuals who are poised to use them effectively

Generate ongoing attention to the certified status plaques

Generate real lab accounts of approaching and working through different sustainability issues

- PURCHASING may include
 - o using tip refill inserts in reused tip boxes
 - o choosing items with low waste packaging
 - o using biodegradable gloves
 - o consolidating orders to reduce shipments
- COLD STORAGE may include
 - o maintaining fridge and freezer inventories
 - o using high density storage boxes and racks
 - o consolidating into fewer freezer racks when possible with regular clean out of unneeded samples or expired reagents
 - o performing preventative maintenance (de-icing, brushing, and filter cleaning)
- RECYCLING & WASTE may include
 - o efforts to divert landfill waste to recycling or reuse
 - o engaging vendors about their packaging, including taking back Styrofoam or cold packs
 - o donating lab supplies that are no longer needed to others
- ENERGY CONSERVATION may include
 - o efforts to estimate energy use
 - o promoting powering off unnecessary equipment
 - o investing in Energy Star appliances
 - o closing fume hood sashes when not in use
 - o switching ULT freezers from -80C to -70C
- EDUCATION OF LAB may include
 - o incorporating sustainability information and guidelines into lab training
 - o promoting compliance with your lab's existing sustainable practices with signage and announcements
 - o engaging with sustainable programming at Caltech, or Green Labs Group programs!
- OTHER may include

- Describe another way in which your lab has addressed sustainability

-

Future initiatives

Create awareness about issues that may require broader mobilization to address - such as recycling transparency or Styrofoam recovery

Conversation re modules:

- WW: want to talk to PIs, have them talk about sustainability as a goal, if we as grad students, our targets are research, concerns of taking time away from research, should not be primary focus, if they can get the idea and push from up to downwards would be easy
 - KM: what do you mean?
 - reply to KM: gloves and purchasing decisions come from PIs and education and how to use instrument and preserve energy, changing from -70 to -80, PIs have more say those decisions
 - KM: true that the PIs are responsible for the people in their labs, but most labs PIs don't care where you buy tips or if you organize freezer, lab managers do, PIs don't have time don't care,
 - WW reply: in some labs PIs are responsible
 - KM: some PIs are responsible but can still mobilize staff and students, it is their immediate space and they care
 - WW: need better incentive is that we say we are saying to be more energy savings, increasing productivity, if you can convince them of increased productivity energy and costs are not important, but productivity is important)
 - KM: you can find samples faster in a cleaner freezer, can build that in, people may answer that on the survey, being wasteful is making us more productive, lab meeting slides that show that and will target the PIs, but hesitate that they are the major pull, have to have them convinced and supportive,
 - WW: if the PIs don't care the culture nothing will change
 - KM: lab managers make purchases and maintain the spaces etc, grad students are busy but still believe that things can be better but PIs don't, PIs should be part of it but no PIs submitted a certification, trainees and staff did),
 - TC: when we talk to the PIs we will be sure to change the language to make it more convincing to them, the work we do and the resources we make are mostly targeted to lab managers, grad students etc, but when we do talk to PIs I agree the messaging is different, perhaps WW can provide feedback on what they think their PI will take more seriously? We can go over slides together?
 - TC: also, note that labs do NOT have to adopt sustainable practices like tip washing – if labs don't want to no one is forcing them! We want to make it easy for labs to participate and for it to not impact their workflows at all, so for example, the tip box recycling program adds no time to anyone's day (except the person who brings it down to the recycling bins, which takes less than 5 mins a month for me), you are either throwing the boxes in the recycling bin in your lab or into a garbage bin in your lab, so this action does not impact productivity

- JA: (directed to WW) from a grad students perspective, what would incentivise more PIs to care?
 - WW: from a GS standpoint is how you can conveniently act green, how does that help, for example tip washing, if you switch from using brand new boxed tips to washed tips, but have to fill in the tips manually that will take time in that case you have to do that work
 - JA: could present a built-in process, manual tip stuff is a pain, we can say we want to change the behaviour, idea of using the tips and re-racking by hand, the current idea is that the machine will do that (re-rack the tips for you, so no extra labor burden on labs)
 - WW: going to be friction because you are changing the protocol, not good if you are introducing something new, unless there is a good reason to change it, challenging
 - HT: another GS perspective, a lot of people do care about sustainability and won't go out of their way, but if given the choice between a sustainable option and not most will choose sustainable choices, we in our lab have a great lab manager, and we are given that option, and also for composting a lot of people aren't aware but I can remind people, you can make a choice to compost they do
 - Yvette: My PI is very indifferent to these options
 - KM: tip washer is biggest ask, time to do something about the waste that does not cause such upheaval in your lab, can still do smaller actions that have a big impact if they are not convinced by the data from the tip washers
- KM: getting back to the module program and they survey, we want to gather more information on the ground like how are their initiatives going, currently GL is providing a lot of resources and don't know what their impact is, need to reengage them,
 - WW: education ground is hardest, I am the GL rep in our lab, TBH don't have that much time to educate everyone in the lab, need to find 5 min video that could educate them
 - TC: we can work on that, making it more accessible for folks
 - KM: want help drafting slides, fact sheets, emails, we can put resources into templates to start the conversations and that will help with education,
- KM: first idea is to send out the survey, then break up the work, maybe there will need to be fewer modules, subgroups responsible for all the modules are ready to go, take on a little bit at a time, links, pictures etc to make the module, the goal is to be done at end of spring, push for Earth month (could be later)
- KM: want to talk about the stickers, they have to look good to be motivated, might be an area where we engage Sami who did the logo, the plaque does not have the logo, so our stickers have the logo so it is associated with the group
 - TS: make it a game, have an additional plaque with punches in the scorecard
 - KM: very open to that design, makes it more interactive,
- JA: punch card starts clean slate that lasts a longer period of time, stickers have the year that you achieved the goal
 - KM: aligns with tickers on the plaque, at Huntington you get stickers when you sign the updated the policies, signal that they have signed the handbook etc, durability, very strong visual impression,

- KM: how do we prove that they have done it? write-up with a paragraph what did you do, how did you decide to do it, what difference did it make, plans to maintain etc
 - o WW: add photos if they want
 - o KM: documentation, first person account, adds weight to the accomplishment
 - CR: incentivise people to be involved
 - KM: right, give a number of that gives people accountability

- TC: Do we want to divvy up the work a little and choose a focus for next time? Could make it a working meeting?
 - o TC: I am interested in the vampire energy fact sheet, found some cute resources, could customize it to be for labs, found cute ones other groups did with vampires and their capes
 - HT: could we make them fold?
 - TC: YES super cute, could have them on tables etc around BBE
 - o WW and JA: interested in writing for newspaper
 - o JA : interested in incorporating videos to the fact sheets, for example we could do one for green purchasing, could have a 30 second video, or how to make sure your products are sustainable, what that looks like on TechMart, in addition to the fact sheet, link the QR code on the sheet
 - o KM: want to graduate the fact sheets to training for Green practices, tied to the flip book
 - o KM: green purchasing is easiest to achieve
 - WW: but education is hardest
 - o YGF: Cold storage management is hardest, facilities have cold storage management, she even has templates to minimize the opening of freezers, she thaws the -20s every year, those are the things we need to target, are feasible, should do it anyway for organization, align with research goals, when it is breaking down you can pull out the highest priority ,
 - KM: could write a lab manager testimonial about preventative maintenance, put together the things that Yvette manages she has templates and
 - o KM: recycling and waste management have the most resources already, not a lot we can do to change the system,
 - JA could do some public shaming, put data on the blue bins
 - TS: we don't want it to be confrontational or discouraging, hard to commit later on if policies change
 - YGF: not had success being publicly shameful, want it to be non-confrontational and collaborative, won't get anything done otherwise,
 - TC: we have established trust so we should use that, make it more collaborative and supportive (like this is how it is now, but in the future we can change it to this! Or highlighting the work GL has already done to divert etc)
 - KM: styrofoam or plastics recycling programs are good but can't change how we interact with vendors, this is something to work on for future
 - o Electricity conservation
 - TC: this year we want to get going on shut the sash initiatives

- KM: ordering power meters that labs can borrow for their lab to estimate their kWh and costs, make an instruction fact sheet
- KM: if James was here he could talk about the -70/-80 project, could focus on that also
- Education of lab members
 - WW: Group meeting announcement slides, fact sheets easy to print out
 - KM: Would 1 on 1 meetings be effective?
 - Can develop fact sheets, signage, slides etc, and work to graduate the fact sheets to training for GL practitioners

Styrofoam Stuff:

Styrofoam commitment for vendors

Dear (vendor),

We are writing to you today to voice our support for transitioning shipping packaging from currently non-sustainable options, such as Polystyrene (Styrofoam) boxes or packing peanuts, to more [sustainable](#), [recyclable](#), or [compostable](#) options that are [just as effective](#) as Polystyrene.

Polystyrene has [massive effects on our planet](#) and [does not biodegrade](#). It is made from fossil fuels that are non-renewable and chemicals that can leach into and [contaminate our environment](#). Animals [ingest this material](#) and can be poisoned or killed. Polystyrene is considered a possible carcinogen by the [National Institutes of Health](#). This material is [not able to be recycled](#) in Pasadena and its sale and distribution has been [banned](#) in Pasadena as of [April, 2023](#).

We as scientists are acutely aware of [the negative impact](#) our research often has on the environment. By working towards a more sustainable future, and by asking for more sustainable resources for our research, we are eager to add fuel to this proverbial fire to continue the success of our sustainable programs and initiatives.

Numerous vendors are choosing to adopt more sustainable practices and sustainable shipping packaging. We purchase products from you regularly and by making sustainability a priority, you will allow us to confidently source our laboratory reagents and materials.

If your team is not able to transition to sustainable shipping packaging immediately, we would like to request a send-back program so that your company can reuse Polystyrene packaging. This would benefit your company as you will have to produce/purchase fewer Polystyrene shipping containers. This will benefit our campus as the end-of-life waste challenges of this non-recyclable material will not be a burden on our custodial and waste disposal teams, which currently are not able to recycle the material.

Thank you.

Styrofoam petition

We, the staff, students, and faculty at Caltech, sign below to support the reduction of Polystyrene (Styrofoam) waste at Caltech.

Polystyrene has [massive effects on our planet](#) and [does not biodegrade](#). It is made from fossil fuels that are non-renewable and chemicals that can leach into and [contaminate our environment](#). Animals [ingest this material](#) and can be poisoned or killed. Polystyrene is considered a possible carcinogen by the [National Institutes of Health](#). This material is [not able to be recycled](#) in Pasadena and its sale and distribution has been [banned](#) in Pasadena as of [April, 2023](#).

Signers of this petition commit to asking vendors to reduce their reliance Polystyrene and transition to more [sustainable](#), [recyclable](#), or [compostable](#) options that are [just as effective](#) as Polystyrene, and/or participating in send-back programs to re-use their Polystyrene containers. Signers will also commit to aggregating our orders when possible, choosing vendors that offer more sustainable shipping solutions, and investigating Polystyrene recycling, reduction, or re-use programs on our campus.

We as scientists are acutely aware of [the negative impact](#) our research often has on the environment. By working towards a more sustainable future, and by asking for more sustainable resources for our research, we are eager to add fuel to this proverbial fire to continue the success of our sustainable programs and initiatives.

Please sign below to show your commitment to this initiative.

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We are asking labs to commit to:

1. Asking vendors to reduce their reliance Polystyrene (Styrofoam) and transition to more [sustainable](#), [recyclable](#), or [compostable](#) options that are [just as effective](#) as Polystyrene.
2. Asking vendors to offer send-back programs to reuse their Polystyrene containers.
3. Where possible, asking labs aggregate or reduce our purchases that rely on Polystyrene, and/or to choose vendors that offer more sustainable shipping solutions.
4. Investigating Polystyrene recycling, reduction, or re-use programs on our campus.

We as scientists are acutely aware of [the negative impact](#) our research often has on the environment. By working towards a more sustainable future, and by asking for more sustainable resources for our research, we are eager to add fuel to this proverbial fire to continue the success of our sustainable programs and initiatives.

We as scientists are acutely aware of [the negative impact](#) our research often has on the environment. By working towards a more sustainable future, and by asking for more sustainable resources for our research, we are eager to add fuel to this proverbial fire to continue the success of our sustainable programs and initiatives.

Please sign below to show your commitment to this initiative.

Email for vendor without stockroom:

I hope you're well. I am the lab manager for the Prober Lab, and I am helping to coordinate the Green Labs group at Caltech. One of the projects we are working on is reducing, reusing, and recycling shipping materials, especially Polystyrene (Styrofoam) and ice packs on our campus. NEB is an ideal case as we place a large number of orders from you, and your team is already working on Polystyrene packaging replacement (though this transition is not complete). If we can work with your team to establish a Polystyrene and ice pack reduction/reuse program, as outlined below, we hope to implement similar changes with other vendors using this program as an example. Green Labs would also love to highlight all the sustainable work NEB is doing, and partnering with you to get this program off the ground is a great way to do that in a way that benefits both Caltech and NEB.

As such, we are hoping to encourage the complete transition of NEB's utilization of Polystyrene packaging to more [sustainable](#), [recyclable](#), or [compostable](#) options that are [just as effective](#) as Polystyrene. We understand, however, that your team may not be able to transition to sustainable shipping packaging immediately. In the meantime, we would like to see if your team would be willing to participate in a send-back program so that your company can reuse Polystyrene (or other) packaging and ice packs. Alternatively, would it be possible for your team to establish a drop-off point on campus to return and reuse Polystyrene (or other) packaging and ice packs? Lastly, we wonder if your team would be amenable to order aggregation? If so, what would this entail on your end (ie. Are you willing or able to collaborate with a stockroom/mailroom that has -80C and/or -20C access or storage? Is your team able to aggregate orders and ship them out once or twice a week? Can the your shipping department handle such a system?) and what would you need from purchasers (ie. Would we have to put the address of a stockroom instead of our lab into TechMart?) to indicate participating (or non-participating "rush") orders?

This program would benefit your company as you will have to produce/purchase fewer Polystyrene (or other) shipping containers and ice packs. Furthermore, your group would reduce the number of shipments to campus, thus reducing shipping costs for NEB. As such, to incentivise labs to participate in this program, do you think NEB would be able to provide a discount or other incentives?

This program will also benefit our campus as the end-of-life waste challenges of these [non-recyclable](#) and [non-biodegradable](#) materials will not be a burden on our custodial and waste disposal teams, which currently are not able to recycle Polystyrene or ice packs. Polystyrene has [massive effects on our planet](#)

and is made from fossil fuels that are non-renewable and chemicals that can leach into and [contaminate our environment](#). Animals [ingest this material](#) and can be poisoned or killed. Polystyrene is considered a possible carcinogen by the [National Institutes of Health](#).

As such, Caltech is eager to begin a reduction/reuse program like this and NEB is an ideal case for implementing such a program. We are also investigating recycling programs for Polystyrene, but first and foremost we want to investigate reduction/reuse. Please feel free to pass this email along to anyone on your team able to help us begin this program. We are also happy to set up a meeting to discuss this program further, just let us know when works best for your team.

All our best,

Green Labs

Fume Hoods

- Consume 3.5x as much energy as a house
- Many examples of things like 6 foot long fume hood in a tiny room!
- Sash intelligence **reduces energy use by 75%** and is safer for users
 - o Automatic closures and alarms
 - o Sticker indicators



- - Caltech has 713 +/-20 fume hoods
 - Jesse Flores, Mary Obbink, Kari Myers, Alex Sanchez, Seth Fink, Javier Valencia
 - Much of the data is missing (installation date, age, vendor/model)
 - Only 116 are alarmed (16%)!
 - MIT study
 - [MIT added Motion and Sash Height \(MASH\) alarms](#) to ~50 fume hoods (\$20-\$50)
 - Saw a significant decrease in sash height after alarms added!
 - Estimated energy cost savings
 - \$410.74 per fume hood (3,734 kWh/year)
 - Steam and chilled water, adding an additional \$748.26
 - Total of \$1,159/fume hood
 - Extrapolate that to CA energy costs:

- \$743.07/fume hood
 - Add in steam and chilled water costs
 - \$1,491.33/fume hood/year
 - (assuming same values as MIT of \$748.26)
- 713 fume hoods (-116 alarmed*)
 - Cost \$29,850 (\$50 each)
 - Saving \$443,612 - \$890,324
 - (*presuming proper use)
- Inventory updates
 - Help facilities monitor fume hoods
 - Help find older models that are using more energy that can be updated to newer models
- Make and/or install alarms or sash height stickers
- Monitor fume hood sash height
 - Shut the Sash initiatives
 - Increase exposure to safer practices
 - Increase compliance and safety

ULT Freezers

- ~150 (+/-15) ULTs on campus
 - Jesse Flores, Tim Winiacki, Tan Benjakalyakorn, and Ernest Katacha
 - Data incomplete!
- Average of 11.16 – 19** kWh/day if at -80°C
 - (**likely underestimation due to aging models requiring more energy, may be as much as 25 kWh/day, or as much as a home!)
- At -80°C \$0.19 per kWh
 - \$116,052 - \$197,648
- At -70°C saved 30% energy (on average)
 - \$81,236 – \$138,353
- SAVINGS of \$34,816 – \$59,294 per year
 - Understand hesitancy to change temperature to -70, but resources available suggesting -70 is a safe storage temperature
 - <https://news.mit.edu/2017/putting-the-freeze-on-lab-energy-waste-0809>
 - <https://www.freezerchallenge.org/sample-storage-temp-info.html>
 -
- Inventory updates
 - Help facilities monitor freezers
 - Help find older models that are using more energy that can be updated to newer models and incentivize!
- Encourage (each lab will have different solutions!)
 - Adjustment to -70°C to save 30% energy (on average)
 - Divestment by asking labs to inventory supplies and get rid of old samples/legacy freezers
 - Trade-in to more efficient models

- Studies on sample stability (with NIH)

Autoclave Share Program

- Facilities only tracking 6 (6!) autoclaves, rest are unknown!!!!
- Chen has autoclaves on every floor
 - Ubiquitous
 - Used for 1-7 hours/day
 - Some issues with water pressure
- Are models available with water regulators that reduce water use
 - Cold water is continuously sent down the drain below an autoclave just in case hot condensate is flushed down the drain too
 - Water regulators/misters prevents the cold water necessity, **reducing water use by 99%**
- Improvements include replacing steam-jacketed models with non-steam jacketed models
 - **70% less water use, 19% less energy use**
 - Green Labs working on running the autoclaves less often

AUTOCLAVE RUN SCHEDULE

RUN AUTOCLAVES ONLY WHEN FULL!
SCHEDULE AUTOCLAVE RUNS WITH YOUR
NEIGHBORS - WATER CONSERVATION PROTECTS OUR
OCEANS



Day	Lab	Time
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

Caltech
green
labs



Check out the Green Labs
website for more tips and tricks
to make your lab more
sustainable!



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Equipment/Glassware/Chemical Exchange Program

- Prevent over- or unnecessary-purchasing
- Beneficial for teaching laboratories
- More equitable usage of resources
- Reduces reliance on supply chains that can lead to shortages
- Currently just an online spreadsheet
 - Hope to ask for space once more established (our initial requests were denied)
- Can also utilize other spaces to donate like LEAP program

Vivarium Composting

- ~4000-6000 cages at any time
 - o Bedding changed every week, 120 g each time
 - o **Over 37,440 kg bedding / year**
- Currently it is removed from cages and sent to dump
- Solutions exist to compost this waste!
 - o Since it is not integrated is much more difficult to implement

Other project updates not discussed in the meeting

- Grenova Tip Washer Pilot Project
 - o KM: Grant due in October worth 150K, website has descriptions of old projects they have funded, metrics (like carbon, water, energy) are favoured, and they want to know what aspect this study offsets (even though tip washing is not necessarily research, we do move the needle on water and energy etc use)
 - o KM: we are visiting a labcore in a few weeks to see operation in action, hopefully they can advocate for the machine, we want to hear about their experiences
 - o We are looking into getting one like in the picture (below) with 2 storage units with UV sterilization, a washer below, and carboys on the bottom rack
 - o KM, Jaziel, VK, TC contributed
 - o RSI mostly for chemistry mostly for research,
 - o Validated to wash tips, hope they will see it as applicable
 - o Use liquid handler in BI during non-science hours to run the Grenova tip washer
 - o Comments:
 - JL: Will want to demonstrate non-filters are fine
 - KM: Part of our campaign, test for qPCR
 - CR: change rhythms and rerack might need to be part of campaign, track time of putting them back in the rack vs dumping them,
 - KM: multichannel users might be easier to incorporate this for
 - KM: even folks who use liquid handlers might be a market
 - JL: need to be in racks not just dumped out?
 - o KM: correct, need to be re-racked
 - KM: need to wash in batches of similar brands and types together to maximise washes, another factor in our campaign

Plans for 2024 - Sending out an [anonymous Google Forms](#) sheet for folks to provide feedback also!

All answers here are anonymized and given in normal text. **Questions are bolded.** Feedback is left normal.

Notes from 230908:

- **Does anyone else want to give an update on an ongoing project?**
- **How do folks feel about our group?**
 - o **Does it need a different structure?**
 - o **Are emails effective? Are meetings?**
 - o The group thinks monthly meetings are good, could make it every 6 weeks or skip one if needed though
 - o Monthly meetings help everyone stay on track and remind them to get work done on projects
 - o Updates at the beginning of the meeting are good, but we could prioritize them or chose a single one to focus on
 - This might give others a chance to present and have a more in-depth discussion of our ongoing projects rather than the surface-level of the updates
 - TC will email around the week before to see if anyone wants to present, take 15 mins or so to present it properly and then discuss
 - Could leave more time to float ideas and discuss, don't want to be too rigorous, folks like that the meetings are fluid and we have time to talk about the projects in depth, don't over-structuralize it
 - o Emails
 - Sometimes too long
 - Might put a TL;DR at beginning, then keep rest of the email since some folks are interested
 - Could work on underlining or colour-coding emails
 - Highlight main point at beginning then move on to larger email below
 -
- **What projects from 2023 worked well? Which ones need some work?**
 - o Lomi
 - o Pipette box
 - Need to make it apply to more vendors, in 2024 may take data collected and see if BBE/facilities is willing to incorporate this into their workflows and take responsibility for this waste, asking the reps to do it indefinitely seems like a bad plan
 - Want to get more vendors on board as well (as discussed above, with Rainin etc)
 - Make it accessible to all of campus
 - o -70/80
 - Only know how it is going after 1 year, so working on getting samples
 - o Certification (discussed below)
 - o Grenova (discussed above)
 - o Keeping a line to DW is useful, talk to him twice a year or so to keep him updated, metrics on these projects crucial so TC will continue to monitor and report
 - o MC on board for initiatives but he has more of a facilities angle, try to get him on board with taking these projects to the next level
- **What can we do better to encourage Green Labs Certification?**
 - o **What has held folks back?**

- Need to maintain certification, so focussing on re-up project to keep labs engaged in years after initial certification
 - Could have program where they submit new form (or same form) and get a sticker of participation to show they have done it year after year
 - Try for representatives in each lab, related to safety training/safety officers
 - DW didn't like this idea, but we want to broach it again, those members could come to the meeting and incorporate changes into their labs
 - Should try to target safety officers in each lab to incorporate sustainability, point them to recycling etc, promote green behaviours
 - Could make a flip book (like the emergency response guide) for every lab, or a postcard version of the Guide
 - Events useful to keeping up engagement of new labs, barrier low, good amenities to labs that are certified
 - Trainees may be intimidated about participating, especially if they are not involved in purchasing, and Lab manager might be busy
 - Line to senior staff crucial, if they are behind it it is more likely to succeed, reach out to them more directly and make it clear that junior researchers can participate
 - **What do folks want to focus on for 2024?**
 - Getting safety officers involved in this process
 - Folks really liked the postcard idea!
 - Lab manager can assign that job to someone,
 - Want more EHS involvement, incorporate GL into safety training somehow (maybe reach out to Breena since sometimes folks have trouble reaching other EHS members)
 - More PI involvement
 - Presenting to PIs, probably next Feb, need to make more signage and make them more aware of the program to decrease barrier or disinterest
 - Targeted emails to PIs
 - Expand the program, especially to Chemistry
 - Want to post signs in Crellin, Noyes, Church etc
 - Present to PIs in Chem (and in BBE) and maybe elsewhere?
 - Maybe present to Chem GSA?
 - Contact Paula Martinez for getting into the Chem newsletter
 - Use the Admins network (who do they report to?) maybe Ann Mao
 - RSI involvement
 - Capitalize on the fact that the building is opening in 2024
 - Make them walk the walk
 - Talk to faculty in RSI, having a person in their organization involved with GL will get us a seat at the table? And also get the word out about our work
 - Talk to Dianne Newman, and others, to spread the word also
 - Come to them with DATA, especially those related to costs, energy audit needs to be made available and put at the forefront
- (ran out of time, so next questions saved for next time!)

Notes from 231013

- **What goals should we have for our group in 2024? What about in our labs?**
 - Sustainability Committee
 - We need to be more involved, BY knows someone on the council and might be a good advocate/connection, BY will reach out
 - Discuss things like the social cost of carbon?
 - We are still using 30% coal power to power campus, new buildings are on fuel cells
 - Tyrrell not willing to commit to percentage reduced , but we could advocate for that in our recommendations (discussed below)
 - [Sustainability report](#)
 - Has lots of our pictures and programs but we are not cited 😞
 - Follow up with Max about this
 - Caltech is riding our coattails and virtue-signalling, taking credit for our work
 - Sustainability survey! For anyone
 - **From BY: GSC sustainability survey: <https://forms.gle/sDD8BcBGHr5sE57o6>. This survey will be open from Monday, 10/9, through end-of-day on Sunday, 10/22.** Anonymous summary statistics from this survey will be shared publicly, including with the [Caltech Sustainability Advisory Council](#) to inform campus planning efforts.
 - In the email summary TC will include language if we want to coordinate, put language below also
 - Green Labs will send David Warren recommendations at end of year
 - NS: Getting PIS to sign the recommendations will make a huge difference
 - Ask Dianne Newman, Pamela Bjorkman, David Prober...
 - RSI – CGSC mailing list?
 - Slow start, no new labs joining, just shared lab spaces for existing professors
 - Could talk to Nate Glasser – scientist at RSI, Newman Lab, will direct the center
 - Dianne Newman also good contact
 - Are events for the opening being planned and how can we help? We should capitalize on this!!
 - What is the status of normal Caltech recycling
 - Especially plastics recycling
 - TC: Caltech struggling to pay custodians, so recycling is not happening as reliably as it should, custodians overwhelmed (not just custodial, but also facilities, OLAR, etc)
 - We can advocate for better pay and more hires
 - We can also advocate to get a better vendor to accept our waste, one that prioritizes recycling
 - BY: EHS handling surprise inspections in Chem – same in BBE?
 - TC: no, we get notice
 - KM: Could be there are previous violations they are checking up on
 - BY: Chemistry use guide – being developed in some labs
 - GL could make something, but it is a lot of work! Specific to labs
 - KM: redundant maybe with the resources on the EHS websites?

- Want to collaborate with getting better safety training for officers esp for green practices
 - Can advocate for every lab to have a sustainability officers and incorporate and engage certified labs especially
 - JL: Joan has a list for sending out stuff to target safety officers, can use that to reach safety officers
 - Green Labs flipbook (similar to the Emergency Response Guides)!!
 - See notes from last time, JA suggested these for posting in labs
 - KM: Good 2024 idea
 - Certification
 - BY: Links are broken in the cert form 😞
 - TC: we will work on updating it in 2024
- **Is the Green Labs Guide useful? What do we want to add to the 2024 version?**
 - **Is the website useful? What things do we want to add/change in 2024?**
 - **Final thoughts/comments/suggestions?**

Suggested Responses for the [GSC Sustainability Survey](#): due before 10/22

Do you have any other comments/thoughts/suggestions related to sustainability in housing and energy?

1. How are you going to ensure rehousing or recycling of old stoves if they are replaced with electric stoves?
2. Could buildings on campus could increase temperatures slightly during the summer, and decrease slightly during the winter so that it is less of a burden to heat/cool (and rooms aren't FREEZING all summer!)
3. Does Caltech have commitments to zero carbon/carbon neutrality also?
4. Are there other sustainability commitments or climate action plans Caltech has committed to? (For example: LEED certification requirements for new buildings, reducing scope 1 and scope 2 greenhouse gas emissions, reducing SOV commutes to campus, etc)

Do you have any other comments/thoughts/suggestions related to food sustainability?

1. It would be nice to host events that are more sustainable or zero-waste at Caltech. Could this be a service that can be made available in the future?
2. Could we partner with local restaurants to encourage sustainable events on campus that do not use Caltech catering?
 - (For example: we could partner with sustainable restaurants nearby. We could ask them to offer us a discount for Caltech employees/staff/faculty. We could also ask that when they deliver our food we they use only

sustainable/compostable cutlery or containers? Could there be a container return program with some of these restaurants?)

3. Can Caltech commit to purchasing food from local or sustainably certified sources (including ethically sourced coffee beans etc)?

Do you have any other comments/thoughts/suggestions related to waste and composting?

1. We would like to recycle Styrofoam and other shipping waste.

2. If we are able to get compostable cutlery, are there places on campus where we can easily access compost bins? If not, could this be made more readily available across campus?

3. How does campus deal with plant waste from the gardens/grassy areas? Is it composted?

- Personal note about carbon offsets: I do not believe these are effective. Recent [studies](#) ([studies](#)) (and [shows!](#)) indicate that this is a way for large companies to be “let off the hook” instead of actually changing their habits and making workflows more sustainable, since they are relying on a third-party organization to plant trees or something else, which many do not end up doing.

Do you have any other comments/thoughts/suggestions related to transportation?

e.g., feedback about ZipCars, mobility/accessibility concerns, etc.

1. Are there initiatives to reduce SOV commutes to campus?

2. Are remote workdays being encouraged? If PIs expect workers/students to come in, are there resources we can provide to show that Caltech is promoting a hybrid/remote workplace?

3. I understand not everyone can take transit to work, especially those with accessibility issues -- are there programs available to help those who must drive due to these mobility/accessibility issues?

Any final suggestions / comments? Ideas for sustainability improvements on campus?

1. I am part of Caltech Green Labs and many of our goals align with yours, can we collaborate?

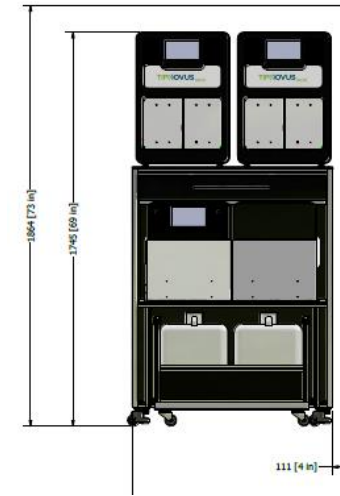
2. Reach out or check out Caltech Green Labs!

3. Can we encourage better recycling practices at Caltech? Currently, not very much of our waste is recycled as the vendor we work with does not support recycling of many products.

4. Can we get Styrofoam recycling on campus?

More information:

- Grenova model



- $-70^{\circ}\text{C}/-80^{\circ}\text{C}$ Comparison Pilot
 - From Lightning Event - Manisha Kapasiawala
 - Collect samples from several interested labs
 - Determine a robust way to compare samples
 - Store in both a -70°C and a -80°C and compare over multiple years
 - Gradinaru lab has a -70°C ?
 - From last meeting
 - JL: he raised this idea with David Warren at the BBE event, we could present the data to the community to convince them with data, using machines with similar ages and same location
 - KM: Jesse Flores may have ability to look at tracking to account for blips in temperature
 - NS: Maz lab would be interested in supplying samples
 - JL: could use sterlings in Freezer Farm (TC, JL, and NS offer their -80s)
 - JL/KM: could keep samples in -20 for a control, use a TX/TL control, do protein, DNA etc, every 6 months take a sample and test it, and just extrapolate data from there
 - We moved on to add to the Drive document
 - Testing
 - Need controls of things that will fail
 - Ask about timing for failure protection
 - Schedule testing schedule for samples (some once a month for 6 months, once in 6 months, and once on year) depending on sample type
 - Include results for 6 months tests in 2024 second quarter newsletter
 - Possibly work into a publication for lab managers or something, help convince PIs, but political
 - Series of magnets or posters for advertisement
 - Make a figure for cost savings on website
 - Ben Bekey found resources online that he will share with group
 - (TC thinks it was this)

- TC will share resources to group and ask that folks continue to plan out the project so it can be underway by August?

Lab	Samples	Timeline	Confirmation Tests
Elowitz	Protein (stored at -80)		Binding on reporter cell lines
Elowitz	Glycerol stocks (perhaps several samples for freeze-thaw)		Plate same volume from same prep for each condition
Elowitz	Cell lines (slow freeze) with replicates (4 for each condition)		Thaw and count viability
Murray	Cell lysate		TX/TL assay
Murray	DNA		TX/TL assay
Sternberg	Worms samples		
Mazmanian	Fecal samples		Sequenece
Prober Lab	Competent cells (perhaps several samples for freeze-thaw controls, do one tube no thaws for 6 months, one tube thaw every month for 6 months)	One tube every 6 month for 6 months and then after 6 more months, one tube at 6 months and one year only, one tube at one year only	Plate on LB and count, could transform
Karethikeyan	Metabolites? DNA/RNA, soil samples, environmental samples? Kept at -70		
Beacon	Kept at -70, different brand than Sterlings		



FALL 2023

GREEN LABS COMPOSTING CHALLENGE

Date: SEPTEMBER – DECEMBER **Who:** CALTECH LABS

Each floor in Chen and the third floor in Broad will compete to turn the most food waste into compost dirt during Fall 2023.

Green Labs will provide a lunch party for the floor that makes the most compost dirt! Second and third prizes will also be provided!



BEFORE → **AFTER**

Download the 30-minute Green Labs Certification Form today and submit it to sustainability@caltech.edu to get Certified today!

Or check our [website](#) for more information about the Lomi, or find Green Labs tips to make your lab more sustainable!

Add your food waste or coffee grounds to compete and start composting today!

Sustainably printed on 100% recycled paper!



NOV. 30TH

GREEN LABS CERTIFICATION CHALLENGE

Date: FRIDAY, NOVEMBER 30TH **Who:** CALTECH LABS

Certified labs will be rewarded with a Certified Green Labs Plaque, and access to exclusive events and swag (including free recycling bins and efficiency signage and stickers).

If your lab is Green Labs Certified by FRIDAY, NOVEMBER 30TH, Green Labs is inviting your lab to have a tasty treat and enter a fun raffle at a top-secret location only given to those most excellent and certified green labs.




Download the Certification Form today!
Event Date: Top-secret
Event Location: Top-secret
All Certified Labs are welcome!

Start your Green Labs Certification today!

Or check our [website](#) for more information about this event or find Green Labs tips to make your lab more sustainable!

Sustainably printed on 100% recycled paper!




CALL FOR SAMPLES

TO COMPARE -70°C AND -80°C FREEZERS

Dates: August 1 – December 31 (and beyond!) **Who:** ANY CALTECH LABS

Green Labs is calling for samples for a student-led study comparing samples held at -20°C, -70°C and -80°C in the Chen Freezer Farm. Samples from various labs will be tested and compared at intervals over a period of up to 5 years.

We hope that by conducting a controlled study at Caltech, we can provide evidence for labs to change their -80°C freezers to -70°C, ensuring an energy savings of up to 30%! Below are some additional resources suggesting that -70°C is a safe storage temperature for many kinds of samples. Use the QR code below to sign up to contribute a sample!



Sign up to contribute samples here. All labs are welcome to contribute samples for our long-term study!

Want to make your lab sustainable? Check out our [website](#) or download the Green Labs Certification Form!

Here are some resources suggesting that -70°C is a safe storage temperature for many kinds of samples!

Sustainably printed on 100% recycled paper!



SPRING 2023

LAB SPRING CLEAN COMPETITION

Competition: JANUARY – APRIL Participants will compete to clean their labs top to bottom by cleaning out freezers, organizing storage spaces, and taking inventory of lab supplies!

Lunch Party: MAY 1

Who: CALTECH LABS



Each participating lab will provide pictures of their cleanup by **midnight APRIL 31ST**. Prizes will be given for the biggest before and after difference, and for the "weirdest thing found".

The day after the competition ends, Green Labs is inviting all participating labs to have a sustainable lunch on us!



RSVP your lab by **Sept. 15!**
All Labs are welcome!



Or check our **website** for more information about this event or find Green Labs tips to make your lab more sustainable!



Download the Certification Form today!

Sustainably printed on 100% recycled paper!

STYROFOAM RECYCLING GUIDE

Follow EH&S Guidelines for biohazardous, radioactive, chemical, and electronic waste

ONLY CLEAN, WHITE #6 EPS FOAM



PLEASE DO NOT INCLUDE:



Check out the Green Labs website for more tips and tricks to make your lab more sustainable!



Sustainably printed on 100% recycled paper!

WE'RE PRETTY CHILL...

WE SWITCHED FROM -80°C TO -70°C



greenlabs.caltech.edu

✓ EXTENDING THE FREEZER'S LIFE

✓ SAVING ENERGY



greenlabsinfo@caltech.edu

WE'RE PRETTY CHILL...

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✓ EXTENDING THE FREEZER'S LIFE

✓ SAVING ENERGY




greenlabsinfo@caltech.edu


5 EASY STEPS TO MAKE FREEZERS LAST

KEEP YOUR FREEZER RUNNING IN TOP CONDITION AND SAFEGUARD YOUR SAMPLES

1. **ROUTINELY REMOVE ICE BUILDUP**
 - ON doors, shelves, and gaskets by gently cleaning with an ice scraper or soft cloth. Be extra careful to not damage gaskets and door seals.
 - You can rent a backup freezer by emailing Jesse Flores at floresj@caltech.edu.
2. **LET IT BREATHE**
 - A dirty filter can be cleaned by removing it from the freezer and rinsing it thoroughly with water.
 - Vacuum the cooling condenser coils to keep them free from dust and debris and ensure plenty of space for air circulation and heat exchange.
3. **CLEAN OUT YOUR FREEZERS TO SAVE SPACE AND SAVE TIME SPENT LOOKING FOR SAMPLES**
 - Past cleanouts have increased freezer space by up to 30%.
 - Keep 6" of space around, behind, and on top of your freezer.
4. **KEEP TRACK OF WHAT'S INSIDE**
 - Organized samples are easily accessible.
 - Laminated spreadsheets posted on freezer doors or barcoded inventory systems are methods that have worked for many labs.
5. **MAKE SMART PURCHASING DECISIONS**
 - Avoid purchasing a new unit by cleaning out, consolidating samples, and sharing space.
 - If you absolutely need a new unit, select an energy efficient one, and check sustainability@caltech.edu for information about rebate programs.
 - Subscribe to the Green Labs Marketplace listserv where labs can share equipment and chemicals.

Visit <https://www.freezerchallenge.org/> to register and participate in the International Freezer Challenge to win great prizes and become more sustainable!





FREEZER MAINTENANCE CHECKLIST

Freezer maintenance should be performed biannually to ensure you have the healthiest freezer possible! Check off these duties to guarantee that your freezer's life is prolonged and efficient.

DATE COMPLETED	INCOMPLETE	DETAILS
		<ul style="list-style-type: none"> • Remove accumulated dust on freezer coils with a vacuum or a gloved hand, make sure to move with the direction of the coils. Most freezers have their coils in the front of the freezer. • Remove/open the grille in the front of the freezer to access the freezer coils.
		<ul style="list-style-type: none"> • Rinse or vacuum the freezer filter every 3-4 months to ensure the ULT freezer is working as efficiently as possible. If rinsing the freezer filter, allow the freezer filter to fully dry before placing the filter back in the grille. • Remove/open the grille in the front of the freezer to access the freezer coils. • If the freezer filter needs to be replaced, email greenlabsinfo@caltech.edu for assistance.
		<ul style="list-style-type: none"> • Check door seals for any ice buildup. In the event of ice buildup, gently wipe away the ice with a cloth or soft brush. If ice has hardened, carefully chip it away using an ice scraper. Do not use any blunt objects (hammers, screwdrivers, etc.) to remove the ice, as this can permanently damage the freezer!
		<ul style="list-style-type: none"> • Defrost the freezer (applicable to ULT and -20°C freezers) annually or biannually. If the freezer has built up more than 1/8" ice, the freezer becomes much more inefficient and can compromise sample integrity. • When defrosting a freezer, make sure to allow one day for ice to thaw and melt. Use plenty of towels and ice bins to prevent flooding in the lab. • If possible, place your freezers near an air vent in your lab to allow for proper air circulation. Do not store items on top of your freezer, as this causes heat to build up behind the freezer and can overwork the compressor.
		<ul style="list-style-type: none"> • When possible, eliminate old, low-priority samples from freezers to reduce occupied freezer space. • Consult the freezer's manual for any additional freezer maintenance that should be performed.

