

241213 Meeting Minutes

Attendees: Chris Kalaw, Henry P, James Linton, Annie Lam, Jaasiel Alvarez, Alyssa Player, Dennis Ko, Tasha Cammidge

This month, [RSVP here](#) to order drinks: [Einstein Bros!](#) [In your RSVP](#), please type in the drink you would like and we'll share bagels and shmear. **The deadline for submitting your food order is Thursday 9am.** I will 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. **Please remember to bring your laptops.** 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](#) and our [Coffee, Breakfast, and Dessert Guide](#)

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
- Reached 1000+ signatures!

Green Labs Monthly Tip: Holiday-proof your lab!

- Power down or unplug all non-essential equipment
- Switch off power strips
- Turn off video displays
- CLOSE YOUR FUME HOODS!!
- Turn down thermostats to lowest settings if possible
- Shut windows tightly and lower blinds
- Check your faucets and report any leaks to x4717
- Water your plants
- Turn off lights
- Close gas lines tightly and check equipment hooked up to supply lines carefully



Updates

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

Updates – Pilot Programs

- FUNDING IS AVAILABLE – SEE PILOT PROGRAMS WEBSITE
- Lomi Composter Pilot
 - 8 total on campus!
 - 263 kg of dirt (1402 kg (or 3091 lbs!) food waste)
 - Donation of \$345 worth of supplies!!
- Pipette Tip Box Recycling
 - 2,217 pounds (4,830 gallons or 18,283+ liters) of plastic waste diverted
- -70°C/-80°C Comparison Pilot
 - 5 labs involved, collaborating with NIH
- PolyCarbin (recycled pipette tip boxes for pilot)
 - Initial order replaced 31 pounds of crude oil and reduced 122 pounds of CO2E via sustainable procurement
 - AP (October): Sent 2 boxes 1 full box of coloured plastic, one clear, metric says 27 lbs recycled, 23 lbs circularized, 4955 gallons water conserved, 27 lbs CO2 emissions reduced
 - AP (December): sent off another box of coloured plastic, 34 lbs of plastic recycled, 12,793 water conserved, 70 lbs carbon emissions reduced
- Styrofoam recycling pilot
 - DIVERTED 5 DUMPTSTERS FULL IN NOVEMBER!!
 - DIVERTED 5 DUMPTSTERS FULL IN DECEMBER!!
 - [Sign the petition!](#)
 - [Technical bulletin from I2SL](#)
 - [LCA of Styrofoam](#)
 - [How to do LCAs](#)
 - AP: Reminder to remove tape from boxes (CK: waste managers are doing this also)
 - **AL: AP and JA have been removing tape themselves 😞 #eco-warriors!**
 - TCL will make signage for NO TAPE for next time
 - TC: I'll also send new email in January for no tape to BBE on the day
 - AL: we'll make sure to post the new signage for NO TAPE for next time on the bins, too!!
 - CK: Bagging them not in dumpsters, went to the bin in BI and it was bagged
 - CK: want folks to put them into the bags, will drop off bags to TC before the next pickup and she will disseminate them to the groups, put up a bag for folks to put them into as an example
 - TC: to CK – can you send an updated budget for each dropoff? Need to know how long we can support the program! Perhaps until June 2025? Then we should sit down to see what can be done to make it a permanent program!!
- Fume hood sensor project
 - Around \$1,570 savings per fume hood on average!! GG writing up now for our 21 fume hoods
- [Caltech Green Labs Marketplace](#)
 - Set for release in January!! VK and SK are working on linking it to google sheets
- 2024 [Freezer Challenge](#)– next year make a higher priority!
 - January 1 – July 1
 - 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!
- Will provide internal prizes, AND a popsicle party in the summer!

Updates – Social Media

- [Follow us on social media](#)
 - 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
 - [TC will create a folder in the Drive for this](#) so we can collaborate and make sure we are covering interesting topics
 - Jaasiel : could do a post about the Styrofoam – share your photos!!
 - TC: will update pic to show how many followers we have on the slides

Updates – Past Events

- This past month:
 - November 13 Teaching Lab presentation to I2SL
 - December 4 – Styrofoam recycling day!
 - **5 dumpsters full dropped off last month**
 - **Chris has an update!**
 - Composting Challenge September-December
 - **REMINDER: GRADUATE STUDENTS PLEASE FILL OUT THE SUSTAINABILITY SURVEY!!**

We need your voice! The GSC Sustainability Committee is gathering valuable feedback on sustainability initiatives and challenges on campus, and we want to hear from YOU. This quick 10-minute survey is your chance to help shape the future of sustainability at Caltech.

Take the survey here: <https://forms.gle/EFyZ94E3yCBrguqp7>

(Please use your @caltech.edu account to access.)

Complete the survey by Sunday, 12/15, and the first 100 respondents will have the chance to enter our raffle to win one of 23 Caltech dining gift cards worth \$10 each.

Why should you participate?

- Make an impact: Your anonymous input will directly inform campus planning efforts and help guide discussions with the Caltech Sustainability Advisory Council.
- Help us help you: Share your ideas to improve sustainability initiatives that matter to you.
- Win: Who doesn't love free stuff?

We also invite you to join the conversation on the #sustainability channel on the GSC Slack (<https://caltechgsc.slack.com/>) to stay involved.

Thank you for taking a moment to share your thoughts and for supporting sustainability at Caltech!

Warm regards,

Christopher Yeh & Elena Priesen Reis
Co-chairs, Caltech GSC Sustainability Committee

Updates – Future Events

- Coming up:
 - December 16th Lunch and Learn with Grenova and Lab Managers group!
 - December Certification Challenge Sweet Treat Event!
 - January (?) Marketplace Launch?
 - Clean Up Event January – April 2025
 - International Freezer Challenge Jan. – July 2025
- Note about QR codes....!!
 - Opportunity to revamp the website or posters?

Flip Book Presentation – Jaasiel Alvarez

- See slides on Drive
- DK: envision putting them?
 - JA: magnets on fridge, or wall
- TC: could also add a section for fume hoods, qr code for GL, safety recommendations etc
 - AP: qr code for videos or visual aids on separate page, cool video of how fume hood works etc
- TC will make it a doc for folks to work on for April – print off mockup then?
 - CK: wants to help get it finished by April, TC to coordinate with him also
 - JA: put up by January and we can discuss and then claim topics then
- AP: digital version that lives on the website
- JL: identify safety officers in each lab, direct and remind people, more likely to be utilized
- JA: didn't want this to be too text-heavy, put pictures in instead, fill up the space left that way instead
- JA: add in #s for plastics that are recyclable here, collaborate with CK

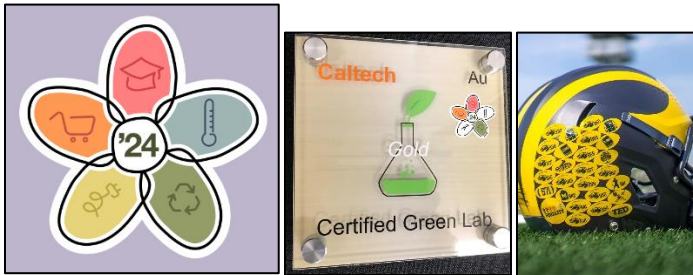
Waste Audits Initiative – Protocols and Waste

- Notes from last time below
- Spreadsheet audit tool
 - Did anyone try this out?
- Need anything else?
- Updates to our Spring Clean Events Page?
- TC: will post on website and would love feedback and will adjust as needed in 2025

Green Labs Certification Updates

- Proceed with stickers, or do we want to go with the banner / football helmet sticker version?
 - Folks voted to stick with sticker
 - Want one sticker that is larger than mockups, that is changed out every year on RH
 - Then smaller stickers indicating if folks achieved all 5 goals every year on the LH side

- What else will help labs already Certified succeed?
 - What do YOU folks want to see next year?
 - DK: More CCE labs Certified
 - TC: also want to get back onto CCE newsletter – we were not able to participate the last time as they insist we are only a BBE group 😞
 - DK: will talk to the DOO about this!
 - DK: might also ask if CCE can provide funding for the group, too
 - DK: modify website so we can see stats of which divisions are certified
 - TC: will do
- Green Offices Certification?
- Green Events Certification?



- Will discuss the below table next time, went through quickly this time

Goals for Green Labs Resources for Certified Labs completed, incomplete, partially complete

Module	Goal	Resources offered by GL	Did we accomplish this goal? How?
Green Purchasing	Increase adoption of sustainable consumables and lab appliances, including low waste/low packaging alternatives	-Recommended products and vendors, -information on energy star certified appliances, -information on Tech Mart Green designation.	3x fact sheets, resources on Clean Up Event webpage
Cold Storage Management	Increase adoption of cold storage inventories to reduce unnecessary footprint, increase compliance with practices that promote energy efficiency and cold storage lifetime	-70C ULT campaign, -Freezer Challenge resources, -Lab Cleanup Event including cold storage inventory resources, -cold storage maintenance fact sheet	- -70 ULT campaign ongoing, results next year - Could do more for the freezer challenge in 2025 -Lab Clean Up Event includes lots of cold storage resources - 2x fact sheets
Electricity Conservation	Increase awareness of energy usage in lab spaces and adoption of practices to reduce unnecessary consumption	shut the sash campaign information, -power off guidance stickers, -power meters for estimating usage and costs at the point of consumption	-STS campaign information forthcoming -stickers are a WIP – printer is not working right now ☹️ -power meters and worksheet could be a good pilot program in 2025!
Recycling and Waste Management	Increase adoption of vendor take back programs for materials that can be reused or recycled. Increased accounting for waste	Tip box recycling program, -styrofoam recycling program, -signage for waste streams, -LEAP Donation Collection Event, -petition for recycling transparency and improvements at Caltech,	-pipette tip box recycling only reaches those who use 2 vendors, but other vendors not willing to work with us, think of other solutions? -Styrofoam program ongoing, data collection in process -signage for waste streams – work with Chris Kalaw and use our own

	when planning lab meals for organizing lab supplies.	-Green Labs Dining Guide	-LEAP is impossible to get in touch with, but found Bob Bell who can do repairs? -Petition for recycling transparency- work with Chris Kalaw -Green Labs food guides on website, is this sufficient?
Education of Lab Members	Increase awareness of sustainability issues in lab spaces and support for green practices	-group meeting announcement slides, -restaurant guide for group events, -1:1 meeting for development of action plan, -various fact sheets, -slides and signage	-some slides available from fact sheets -restaurant guides available -cannot do 1:1 meetings as yet, but if FTE then yes -fact sheets are finished, more could be made -slides and signage working with fact sheets

What should requirements be for

- What should requirements be for:
 - Education
 - Create and present on 1 (2?) topics during lab meeting and give GL the slides for other labs
 - Purchasing
 - Put together a writeup or slides etc. on a product and why it is sustainable, why you are switching etc
 - Energy
 - Energy audit?
 - Recycling
 - Waste audit?
 - Cold storage
 - Above and beyond freezer defrost, perhaps divesting significant amounts or participate in the freezer challenge?
- TC: Ran short of time, will discuss next time in more detail, but remember to brainstorm! Want these to be harder to achieve so that labs engage all year

Plans for 2025

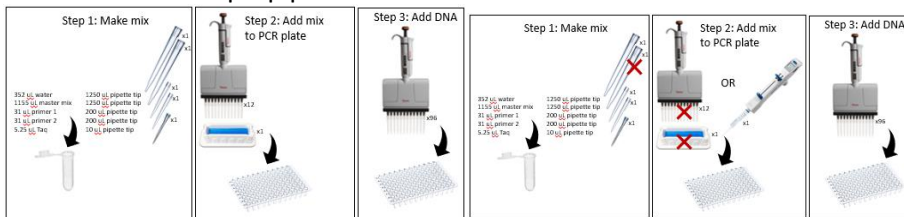
- Want to hear from YOU about next year!

Reminders

- Graduate students please fill out the Sustainability Survey
- Chris has an update on the Styrofoam pilot!
- Happy Holidays!
 - Printed extras of these posters if folks want to take to post in their buildings?
- Next meeting January 10

Waste Audits: Protocol Audits (from last time)

- TC modified a PCR prep protocol like so:



Item	Old	Old x 20 x 52	Plastic waste (g)/year	Cost	New	New x 20 x 52	Plastic waste (g) / year	Cost
2 ml tube	1	1040	1175.2	41.6	1	1040	1175.2	41.6
PCR plate	1	1040	20696	2194.4	1	1040	20696	2194.4
1250 uL pipettes	2	2080	1489.28	62.4	1	1040	744.64	31.2
200 uL pipettes	14	14560	3800.16	436.8	2	2080	542.88	62.4
10 uL pipettes	97	100,880	13164.84	3024	97	100,880	13164.84	3024
Repeater pipette	0	0	0	1383.2	1	1040	2840.24	1383.2
Reservoir	1	1040	9002.24	592.8	0	0	0	
Totals			49,327.68	\$6352			39,163.80	\$6736.8
DIFFERENCE							-10,163.88 g	+384.80
Emissions (~6 kg CO2 emissions per 1 kg plastic):			295,966.08 g CO2				234,982.8 g CO2	
DIFFERENCE							-60,984 g CO2	(=removing 1 car from the road for 5 days!)

- shows cost increase (slight!) but LOTS of carbon emission and plastic savings!
- [6 kg CO2 emissions per 1 kg plastic](#)
- [\(Removing 1 car from the road reference\)](#)

Another lab sent us this:

Optimization of **2 steps** in AAV production protocol to minimize plastic usage

Adeno-associated viruses are produced in HEK293T cells

Entire protocol of 7 steps, with 2 steps where cell media needs to be changed

Media change generates a lot of biohazard plastic waste, due to need to avoid contamination (contamination of media stock, and cross-contamination of other AAV prep)

Original protocol

1. Remove cell media from dishes
2. Replace with pre-warmed fresh media
3. In each compartment, discard media, change serological pipette between each plate/dish

Greener protocol

1. Collect both media into 250ml or 500ml conical tubes (instead of 15cm plates) and leave during harvesting phase
2. Remove serological pipette
3. Replace with pre-warmed fresh media
4. No need to change serological pipette between each step or change pipette for each media change
5. Use conical tubes for large dishes, cell suspension

For ten 15-cm dishes (standard size AAV preparation) the original use nearly 25 ml serological pipette time for each plate, on each media change step

For ten 15-cm dishes (standard size AAV preparation) the original use nearly 25 ml serological pipette time for each media change step

Lab does an estimated 400 such preps per year (based on number of 15cm plates purchased, accounting for cell expansion phase)

Original protocol	Greener protocol
• 8000 25ml, serological pipettes per year	• 800 25ml, serological pipettes per year
• 13 kg waste, or ~ 100 kg biohazard plastic waste	• ~ 10 kg biohazard plastic waste
• Box of 200 25ml serological pipettes is \$125, so \$1000 per year	• \$100 per year
• Updated protocols can be shared immediately, e.g. on protocols.io	• Capturing plastic emissions by 240 kg CO2 a year = removing a car from the road for 1 month!
• This is just addressing 2 steps of lengthy protocol	

Chen et al., *Nat Biotech*, 14, 170

- Showing both cost savings and CO2 emissions and plastic waste and hazardous waste savings!
- **TC created a tool for doing a waste audit, would like help working out kinks, will post on Drive? Go over next month?**
 - o AP: use “space” not room on the sheet
- **TC created how-to guide, could make part of the Clean Up event, ask for help editing! Will post on Drive, go over next month?**

END OF MEETING

From last time(s):

Green Event Initiative

- Maybe launch this in 2025
- Some good program examples include [UCLA](#) and [Yale](#)



- Carbon counter
 - o GG will try to build
 - Has chips with different colours, and labels for each city/street to determine distance, each slot is a different method of commute (walk, bike, car, etc).
 - o **GG would like help if anyone is interested!**

Waste Audits Initiative

- What are [waste audits](#)?
 - o Recording what is in waste bins, recycle bins, solvent waste containers
 - o Record what is wasted after a protocol or kit
 - Would love to have a lab offer up a protocol and see if we can modify it
 - Volunteers?
 - KM: able to bring bead cleanup protocol for next time – uses a lot of tips!!
 - o For example: my lab does PCRs and we aspirate water THEN master mix, so we can reuse the same tip (which halves our tip usage for the master mix prep!)
 - o We also reuse conical tubes for reagents, and repeater pipette tips for aliquoting reagents
 - o CC: capturing air pollution? Emissions, water, air, soil, lab waste from experiments

- KM: power meter initiative; green chemistry related to solvent substitution, and reduce pollution
- Why conduct waste audits?
 - Understand volume of waste and determine priorities, or target specific protocols etc, determine what we can change
 - Can be useful to show your lab if they are properly recycling, and determine why things are not being recycled and adopt signage, different sized bins, etc. to help make it easy and simple to recycle properly
 - If recycling bins are too contaminated with non-recyclables, custodial just tosses the whole bin!
 - [MIT study](#)
 - Change how we purchase
 - Can contact our suppliers and ask for alternatives with less waste, or that are more recyclable eco-friendly
 - Reduce packaging and shipping
 - Consolidate orders/suppliers within the lab or between labs
 - Purchase in bulk
 - Right-size purchases
 - Reuse packaging like coolers
 - Collaborate with other labs or universities to see if they have alternatives that create less waste, share our best practice tips
 - Research and find alternatives (for example, replacing single-use plastics with glassware)
 - Recycling waste
 - Including solvent waste recycling or plastic recycling!
 - [Kimberly Clark](#), [Terracycle](#), and [Medline](#) all offer **glove recycling programs**.
 - [Corning](#) offers flexible **package recycling programs**.
 - VK: encourage labs to stop wasting so much
 - MM: SAVE MONEY
 - KM: can we have the new Materials and Recycling Coordinator come give a talk?
 - TC: will ask! Great idea! Maybe for Feb or something?
- How to conduct a waste audit?
 - KM: 2 ideas from above: protocol adjustments and waste streams, labs are more likely to do waste stream ones, so we focus on that for now
 -
 - Step 1: Inform custodial and lab of the effort
 - [Waste audit template form](#)
 - [Example checklist](#)
 - KM: how much time? Talk to custodian and lab, record for 1 day or 1 week, context of lab cleanup at that time could calculate cost of things they are throwing away esp expired reagents that are over-ordered (page 1)
 - Step 2: Keep waste for a day/week/protocol
 - VK: Broad categories, 3 bins or 5 bins, gloves, plastics paper (page 2) during event (within reason, for biohazard bins can estimate) so all waste from those categories goes into those specific bins and weigh it afterwards
 - OR divide out the waste from each category (recycling, trash, hazardous waste/solvent waste, etc.) and track
 - Step 3: DOCUMENT (photos?)

- DK: do folks use inventory systems? If you have overbought, don't find it you buy more, so focus on right-sizing protocols or purchasing
 - KM: no pattern of expiry dates for reagents, no "smell test" if something is expired if it will work, asking manufacturer for evidence of expiry
 - MM: OLAR sends back food that has short expiry date and get new, ask for at least 3 month date or something like that, incorporate into purchasing procedure?
- Step 4: Tell lab of the results
 - What to do with data?
 - Recommend reuse where possible
 - Refuse (consolidating orders, talking with vendors about wastage)
 - Recycle (use tipone etc that have recycling programs on campus OR products that are able to be recycled)
 - KM: provide for spring cleanup, opportunity to advertise for programs we already have and GL guide etc., if complete it they can come to the lab cleanup party, give us data too on brands of gloves and tips etc. aspects of recycling policy, filing things incorrectly, data about behaviour compliance , bring to EHS that they don't know how to recycle
- Work with members to offer recommendations
 - VK: Where do you think you can reduce volume of waste for your lab? Make a summary page on the site, post ideas, lessons learned and what do you think other labs could benefit from (ethanol prep)
 - MM: "Tips for tips" "More tips for Less Tips!" (VK)
 - Can also update our recycling signage
 - Suggest lab meeting updates / QC / Check-ins
 -
 - Some other resources:
 - [University of Bristol Plastics Guidance](#)
 - Article – [Reducing Plastics in an Microbiology Lab](#)
 - Article – [UCLA Lab Waste Survey](#)
- Can we create a protocol / resources to help labs conduct one? Do we want to?
 - Yes?! TC will work on making a document for next time
 - TC and KM will bring protocols that we can examine and see if there are ways to optimize
 - KM: tie into the cleanup event?
 - KM: will let us use the data they send (if they send us pictures) on what brands folks purchase etc.

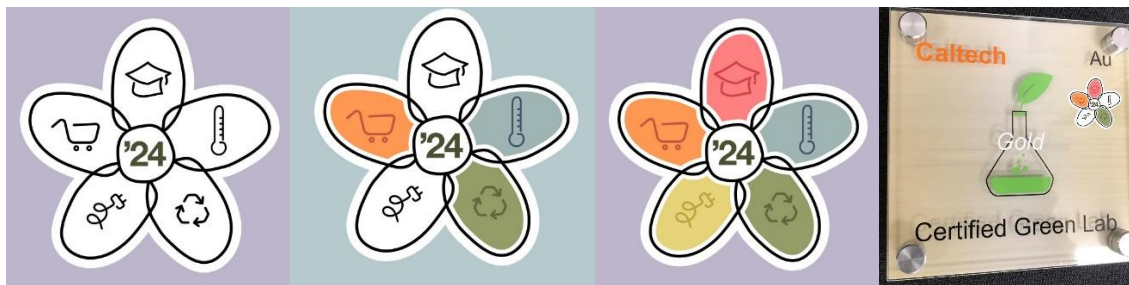
Fact Sheets Updates

- Rough drafts will be posted to the [Drive](#) for:
 - Energy Vampire *
 - Lynchpin fact sheet?
 - Energy Star
 - KM: like the upright version of the graph, it is easier to read
 - Fume Hood
 - Recycling

- Cold Storage
 - Purchasing
 - TechMart Green Designation
- Spent rest of time working on engagement resources
 - KM: make sure we say that it is from the Survey, adding to website
 - KM: bring the posters to the LT event and have people vote!!

GROUP WORKED ON ENGAGEMENT PROGRAM AS DIRECTED BY KATE MALECEK

- STICKERS!!
 - MS presented ideas to the group, pictures below



- From last meeting:
 - TS: very cute
 - TC: can even use sticker paper we already have to print them
 - MS: will have the one with the white background be the main sticker, then add coloured patch stickers as requirements are met for each category (5 from previous meetings, including education, cold storage, recycling, energy efficiency, purchasing)
 - MS: modelled after the original GL logo designs
 - TC: is this motivational? – group nodded YES
 - CH: what happens when you get all 5? Could make the middle sparkly or gold or something
 - TC: or holographic!
 - MS: yes, the middle could definitely be used, it is boring now
- From this meeting:
 - BB: website mods for each leaf (have each leaf and a definition on the website)
 - AP: have a leaf for every event, add it to the poster or something
 - DK: helmet stickers from football players helmets
 - KM: also in the future can give “stickers” for each lab website, put on our website too etc.
 - KM: perhaps once launched, we have a deadline for changes, announce winner of “Most Changes” or “Best Lab” or something at certification party
 -