

241011 Meeting Minutes

Attendees: Chris Kalaw, Dennis Ko, Jaasiel Alvarez, Vijaya Kumar, Alyssa Player, James Linton, Tasha Cammidge, Ben Ben, Christiana Erendira, Ping Dong, Emily Shi.

This month, [RSVP here](#) to order food from Green Labs favourite: [Mendocino Farms!](#) [In your RSVP](#), please type in the meal of your choice and drink (limit of \$20 per person)! **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](#)

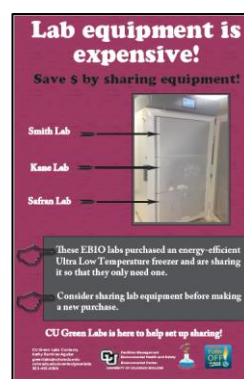
Introductions ...

[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: Share Equipment

- Share equipment among labs by organizing a sharing system
 - Google Calendar, Sheets signup, or clustermarket are good ways to do this
- This is an excellent opportunity to reduce the environmental impact of research
 - Labs avoid unneeded electricity and water loads
 - Reduce need to house instrumentation twice
 - Reduce HVAC and other utilities expansion to support extra equipment
 - Minimizes production, transport, and disposal of redundant equipment
 - Untapped potential to share everyday equipment (for example: a printer or thermocycler), as most equipment sharing schemes are organized around high-cost or utility-heavy instruments
- Opportunity for experts or directors of shared equipment facilities to provide expertise and training
- Increases access of equipment to labs who may not have the space or budget to afford it, even if it is an everyday piece of equipment



Updates

- **23 Certified labs!! WHOOOOO**
 - 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 Update
 - 8 total on campus!
 - 263 kg of dirt (1317 kg (or 2903 lbs!) food waste)
 - Donation of \$345 worth of supplies!!
- Pipette Tip Box Recycling
 - 4,242 gallons of plastic waste (1,938 lbs!) 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: 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
- Styrofoam recycling pilot
 - DIVERTED 5 DUMPTSTERS FULL!!
 - [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)
 - VK: on vacation next month, need help posting signs at beginning of week (TC can help)
- [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!

Fume Hood MASH/STS Summer Program

- Caltech Green Labs summer program will be a combination of two programs: 1) [this study from MIT](#), and 2) [this program by CU Boulder](#). We hope to build and install sensors, educate users, and run a fun reward-based campaign for users who show the greatest commitment and improvement.

- GG (our intern!!) will be running this program over the summer
- Plan is approved by Facilities, EHS, BBE and Sustainability AND SAFETY!
- Genevieve has made updates to the original model and has made 24 sensors!
- Installed 21
 - o BI (2), Noyes (2), Kerckhoff (1), Broad (10), Schlinger (2), Chen (1), Keck (2), Linde (1)
- Turning on buzzers next week or the week after?
 - o If issues we will just track height data
- Make more for future use? Maybe a working session
- Idea to incorporate data collection, so the first few weeks of the pilot would be making the sensors, then installing them without the buzzers, collect data for 2 weeks, then turn on sensor buzzers for 1 week, then have the competition for 2 weeks
 - o Genevieve has made several updates to the original model
- Saw real behavioural changes! GG is writing it up and doing analysis now!

Updates – Social Media

- [Follow us on social media](#)
 - o 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!
 - o Letters to the editor California Tech (<https://tech.caltech.edu/about/>)
 - o JA presented her slides (see Drive for details) and made a case for social media at Caltech
 - o [TC will create a folder in the Drive for this](#) so we can collaborate and make sure we are covering interesting topics

Updates – Past Events

- This past month:
 - November 6 – Styrofoam recycling day!
 - **5 dumpsters full dropped off today!!!!**
 - RSI occupied in October!
 - BBE Newsletter (October)
 - Styrofoam, Composting Event, Certification Challenge
 - Composting Challenge September-December
 - Website re-vamp (get it?!)
 - Launch of our Fact Sheets initiative!
 - Included slides based on our sheets, don't have email prompts yet?
 - What topics do we want to work on for next year?
 - Will these help Certified labs reach their goals?

Updates – Future Events

- Coming up:
 - November 13 Teaching Lab presentation to I2SL
 - December 4 – Styrofoam recycling day!
 - Lomi competition thru December
 - 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?

Welcome to Chris Kalaw – our new Materials and Recycling Coordinator!

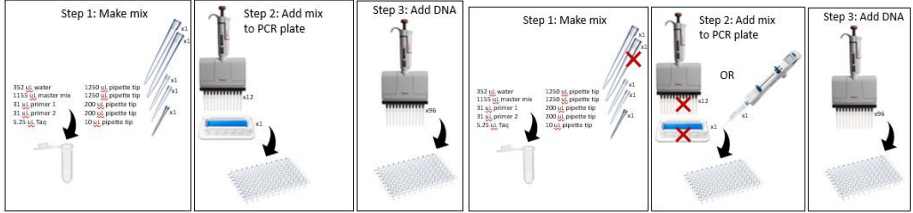
- CK: Working mostly on waste management, training the new team, finally feeling settled after being here for a month
 - o Been going to undergrad dinners to understand what is happening, do they take the compost to Browne (no – why not? Is it because there is no waste, is it too much work?), want to make a survey based on these observations, and a checklist for the student waiters to help organize stuff for the programs,
 - o Also working with dining services to remove single use disposables
 - o Working with Procurement to implement new policies
- DK: events, can we request recycling bins? CK: zero waste events policy that sets a standard for that, dining services etc.
 - o CK: sustainability plan to set up policy to ensure that it is completed, president will sign off on it
- TC: new recycling streams?
 - o CK: new vendor now, Allen company, really maximize recycling rates as they give us money back, push for recycling and getting bins up signage up, ahaving folks sort properly on the back end, republic would not give us rebates, overages for bins being open etc.
- PD: when you get a box the janitor will recycle the box, but can we ask them to take the Styrofoam for us?
 - o CK: new or not the custodians know where to go, cardboard boxes we are really good on, Styrofoam links from VK – TC will send IntCo
 - o TC: also for the pilot didn't want to overburden the custodians with extra work, so while pilot ongoing this is the strategy
- PD: Who do you have on the team now?
 - o CK: possible GL coordinator , recycling lead, recycling assistant, temp, and additional worker, Max (6 total)
- VK: Styrofoam compactor?
 - o CK: might not be feasible but will look into
- JA: since we switched vendors should we be better about sorting now with the new vendor?
 - o CK: YES, some high-value things are being specifically looked for
 - o CK: Caltech has a weird bin system
- JA: mentioned video from UCLA – TC to share with CK
- DK: in offices have a catchall bins, 3 bins system in offices?
 - o CK: understood in the sustainability department, education issue, folks are really stuck on only having one bin in offices!
- CK: Additionally, I just received an email from a company that we are exploring to work with for on-site composting. The main rep there asked if we have "...any PhD student candidates that might be interested in a research study involving soil microbiology. We are working closely with Dr. Elaine Ingham from the Soil Food Web School and the Association of Compost Producers on

this topic. There is great potential for Caltech to engage in this emerging scientific practice and be a player in this emerging space." Let me know if this is something we research on campus and if there is a possibility for study in this area.

- o DK: pass this along to my PI to see
- o JA: Trevor Nolan gave a talk at BBE retreat on GMO plants, he may be a good resource

Waste Audits: Protocol Audits

- 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 is 7 days, with 2 steps where cell media needs to be changed
- Media change generate a lot of biohazard plastic waste, due to need to avoid contamination (use/replace of media stock, and cross-contamination of other AAV preps)

Chen et al., Nat Biotech. 14: 375

Original protocol	Greener protocol
<ol style="list-style-type: none"> 1. Remove all media from dishes 2. Replace with pre-washed from stock media bottles 3. Remove/contaminating stock media, change media/stock media between each plate of cells 4. Media change generate a lot of biohazard plastic waste, due to need to avoid contamination (use/replace of media stock, and cross-contamination of other AAV preps) <p>For ten 15-cm dishes (standard size AAV preparation) this would use heavy 25 mL serological pipettes (one for each plate, one each media change step)</p>	<ol style="list-style-type: none"> 1. Use pre-washed media into 250ml or 500ml, 1000 µl (1000 µl) serological pipettes (one for each plate, one during handling the media) 2. Remove/contaminating stock media, change media/stock media between each plate of cells 3. Media change generate a lot of biohazard plastic waste, due to need to avoid contamination (use/replace of media stock, and cross-contamination of other AAV preps) 4. Media change generate a lot of biohazard plastic waste, due to need to avoid contamination (use/replace of media stock, and cross-contamination of other AAV preps) 5. Same waste tubes for storage during cell handling <p>For ten 15-cm dishes (standard size AAV preparation) this would use light 25 mL serological pipettes (one for each media change step)</p>
<p>Lab does an estimated 400 such preps per year (based on number of 15cm plates purchased, accounting for cell expansion phase)</p> <p>Original protocol</p> <ul style="list-style-type: none"> • 8000 25mL serological pipettes per year • 130 each, so = 100 kg biohazard plastic waste • Cost of 200 25mL serological pipettes is \$125, so \$1000 per year 	<p>Greener protocol</p> <ul style="list-style-type: none"> • 800 25mL serological pipettes per year • 10 by biohazard plastic waste • 5000 per year • Reducing plastic emissions by 440 kg the usual for 1 biohazard 1 yr from <p>Updated protocols can be shared immediately, e.g. on protocols.io</p> <p>This is just addressing 2 steps of lengthy protocol</p>

- 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!!

- 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!)
- We also reuse conical tubes for reagents, and repeater pipette tips for aliquoting reagents
- 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

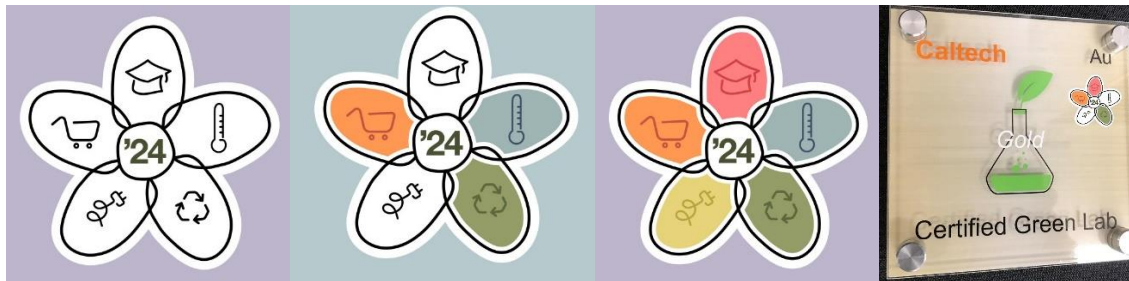
- TC and KM will bring protocols that we can examine and see if there are ways to optimize
- KM: tie into the cleanup event?
- KM: will let us use the data they send (if they send us pictures) on what brands folks purchase etc.

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
 -

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?

No working meeting this month – see everyone at the Lightning Talks Event!

Next Meeting October 11th 12pm-1:30pm Chen 240

Bring a friend and get a RocketBook!

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**Caltech
green
labs**



CALL FOR

LIGHTNING TALKS

3 MINUTE TALKS HIGHLIGHTING LAB SUSTAINABILITY INITIATIVES

Date: FRIDAY, SEPTEMBER 20TH

When: 12:30-3pm (talks start at 1pm)

Where: Chen 100

In this zero-waste event, Green Labs is providing food, sustainable giveaways, and great conversations surrounding sustainable labs!

DO YOU HAVE A SUSTAINABLE INITIATIVE you would like to implement or share that makes your lab more efficient or sustainable?

DO YOU WANT TO ATTEND this event and hear about exciting sustainable initiatives?



RSVP to our event.

All are welcome!

Presenters will be gifted a **FREE ROCKETBOOK!**



Attendees will also get entered into a fun **RAFFLE** with **GREAT PRIZES!**



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

Sustainably printed on 100% recycled paper!