241011 Meeting Minutes

Attendees: Olivia Eliopoulos, Henry P., Chris Kalaw, Dennis Ko, Jaasiel Alvarez, Vijaya Kumar, Annie Lam, Alyssa Player, Miles Stone, James Linton, Tasha Cammidge, Ben Ben

This month, RSVP here to order donuts from super yummy (and completely plant-based and vegan!) Donut Friend for this Friday's meeting! In your RSVP, please type in the donut of your choice and drink (including all the fixin's) (no milkshakes or ice cream please– I can't ensure they'll make it here unmelted)! 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.**

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: Making Sustainability the Norm
- Share sustainability efforts with peers
    - Chat, lab meeting, posters, team emails
    - Ask lab members if they can think of other areas to improve
    - Discuss tricks for making protocols more sustainable
    - Justify these choices with data ("Did you know, turning off our equipment not only saves energy, but also will make our equipment work more optimally and last longer?")
    - Share resources, videos, blogs etc. that have sustainability tips and tricks with your lab on slack etc.
- Find allies in your lab and create a "Green Team"
    - Brian storm together to find areas where your lab can improve
- Lead by example
    - If lab members see you making efforts (for example: shutting off lights or equipment) they will follow you
- Reinforce choices
    - Make a maintenance or chore schedule
    - Make repairs (for example: leaky faucets) promptly

Updates
- **23 Certified labs!! WHOOOOO**
    - 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
- Lomi Composter Update
  - RSI: 3 Lomis installed in October 2024!!
  - 233 kg of dirt (1166 kg (or 2571 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
- Styrofoam Recycling pilot
  - Some issues with first diversion, but diverting LOTS – numbers to be quantified next month
  - [Sign the petition](#)!
  - [Technical bulletin from I2SL](#)
  - [LCA of Styrofoam](#)
  - [How to do LCAs](#)

- 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 Facilties, 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), Kerckoff (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 – Events
- Lightning Talks September 20 1-3pm
    - o   Huge success!
    - o   ~50 folks at the beginning
    - o   FIRE ALARM ☹
    - o   Sooo many ideas moving forward
    - o   Update our Green Labs Guide
    - o   Slides are available on the Drive
- Orientation events
    - o   Resource fair
    - o   Sustainability Hero event with the GSC

Updates – Upcoming Events
- November 6 – Styrofoam recycling day!
- RSI occupied in October!
- BBE Newsletter (October)
    - o   Styrofoam, Composting Event, Certification Challenge
- Launch of our Fact Sheets initiative?
- Lomi competition??
- November Lunch and Learn with Grenova!
- December Certification Challenge Sweet Treat Event!
- Note about QR codes….!!
    - o   TC: the program I was using became a paid subscription so all of our old QR codes don't work any longer 🙁
    - o   Opportunity to revamp the website or posters?

Green Labs Marketplace Pilot Proposal – Vijaya Kumar

- Purpose
    - o   Reduce waste by re-homing…*if no longer needed and in good usable condition*
    - o   Chemicals, reagents
    - o   Equipment
    - o   Lab ware
    - o   …

- o Help save cost of buying new
- o Help reduce sustainability cost of manufacture, packaging, transporting, disposing
- Could it work?
  - o Example from my lab
    - ▪ Rainin pipet tips incompatible with Gilson pipette…rehomed during clean-up event!
    - ▪ Stopped using non-filter tips…rehomed clean-up event!
    - ▪ Microarray era equipment…hot plates, stirrer, water bath
  - o *Similar situation in other labs too?*
  - o *How about building a web catalog?*
- Softr… a web app builder
  - o My daughter's project (Sarah Kumar)
  - o Enter data in a spreadsheet
    - ▪ Can use Google sheets + others
    - ▪ Data in columns…name, picture, description, contact info, category
  - o Choose a template to display spreadsheet data in webpage
    - ▪ Neat and organized
    - ▪ browse, filter, search
  - o No code
  - o Trusted by many
    - ▪ Harvard Business School, MIT, Google, Swiss govt
  - o Free version
    - ▪ up to 1000 entries, unlimited visitors, no log-in required
- Caltech Green Labs Marketplace
  - o

  - o Currently 10 people can access with unique emails, so we couldn't have all lab managers adding things
    - ▪ MS: could you use google sheets instead? That way there is no limit to the number of users, and you can make it compatible to add images etc. The undergrads have a similar program right now, you submit something and it goes into a "purgatory" and is checked, then added to the app
    - ▪ TC: one caveat we should include is that *labs* can take items, but undergrads, for example, can't take hazardous chemicals home
    - ▪ OE – so one manager will add items? Could make a listserv similar to marketplace instead of maintaining the spreadsheet BUT this is a nicer way to browse and it means labs don't have to make snap decisions?

- TC: also at the end we can donate items to the LEAP program (Caltech Y) potentially
  - JA: google forms also has an output into a spreadsheet, could incorporate it into that
  - JA: one issue I see is the transportation of larger items, so maybe having a contact in Transportation who can help
    - JL: folks can also submit a Facilities Request for the item to be moved through access page
  - JA: also incorporate requirements for decontamination, making sure that the items are in working condition etc, to ensure smooth transition to a new lab
  - DK: there is a listserv in CCE for moving barcoded items
    - JL: there is a simple form to fill out to transfer assets with barcodes to other labs
  - AP: would this be embedded into the GL website?
    - TC: yes, we would incorporate it into the Cleanup program page
  - Pilot
    - Will run along side next lab clean-up event
    - March 2025, for 4-6 weeks
      - Ask labs to submit donation items if in good working condition
      - Item stays with donor and goes directly to new home
      - Work involved:
        - maintaining the spreadsheet…adding and removing items
        - Audit…Tasha?
        - Decide on future plans depending on response
    - TC: propose a soft open in January to test it out amongst ourselves, then fix any issues in Feb, then launch officially in March – April?
    - CK: I would love to help, I can take this on, create resources for it etc.
      - (TC will connect VK and CK)
    - JA: Sarah should get CREDIT for this work
      - TC: YES, I will add her to the website as a collaborator

-70/-80 Comparison Pilot Project Update – James Linton

- See slides posted on the Drive
- Discussed results from year-long study, shows evidence that the -70 is not significantly different from the -80 for proteins, microbes (bacterial stabs), and animal cells
- Collaborating with UVA on a larger publication potentially, so this will have a larger impact
- Want to work with other labs and introduce concept of reduced overhead costs to convince faculty and lab managers to change temperatures of their ULT freezers, it will come with the added benefits of reduced costs AND longevity of equipment
- Can we talk to the faculty or lab managers?
  - TC: YES (see discussion below*)
- ALSO: JL proposed small funding grants for mini projects (like the -70/-80 comparison) so we can gather data and present to the faculty to institute real change

- Evidence-based changes encouraged by us collecting data through simple smaller experiments
- For example:
  - When Holding A PCR Reaction Post Cycling, The Assumption Is That Colder Is Better
    - 2 processes can occur to reduce success of experiments:
      - **Depurination**: Hydrolytic cleavage of the glycosidic bonds connecting the purine bases (guanine and adenine) to the DNA backbone. This occurs with rate constants of approximately **3.0×10^{-11} s^{-1}**, leading to abasic sites in DNA
      - **Hydrolytic Deamination**: This process mainly affects cytosine, converting it to uracil, and occurs more rapidly in single-stranded DNA or at base mismatches in duplex DNA. Deamination of cytosine has a **half-life of about 30,000 to 85,000 years** at physiological conditions, but it's faster in more accessible configurations.
  - At What Rate does dsDNA hydrolyze at 25 Celsius?
    - We have a PCR designed to generate a 500 bp amplicon product. We start with 10,000 copies of a template and cycle 40 times, based on the number of amplicon we expect, if we store this DNA at room temperature, how long will it take to degrade 0.0001% of amplicons by depurination?
    - That means it takes 38.6 days for there to be only 0.0001% change of base pairs
    - Test this in a real lab
- OE: there are lots of opportunities in BBE to give talks, for example the BBE Spring Party (TC: KM presented there this year!!), BBE retreat, bio lunch (email Liz A to contact and see if you can present there)
- DK: can we create a reel from the lightning talks event or these presentations? Folks like learning this way, especially on social media
  - TC: check out I2SL's community of practice, with resources for making labs more sustainable https://www.circulareconomy.i2sl.org where we could post these (they have some funding to create talks to share etc.!)
  - Collaborate with LT presenters to see if they would be ok sharing and filming their talks! DK will clip them into something, could share on social media?
  - AP: is there a larger Caltech social media presence? Some way to increase our following?
  - JA: yes, Caltech admissions is a big one, most departments have social media
    - AP: could we get them to repost our posts etc? To increase our exposure and or do collaborative posts?
    - JA: yes, could also support our events
    - TC: also we advertise on the Caltech Institute Calendar

- o JL: funding is an issue with this proposal, do we have strategies? Have we talked to Joan (the new DOO) about this? Would love to see this program host an experiment every month or quarter or something, to increase data
  - TC: Yes, we have talked to Joan about this (and will again soon about 2025 programming) but BBE won't support our program forever, which is why we are waiting to hear if GL can become a permanent program supported by Caltech
  - TC: we have applied for RSI Explorer Grant funding before (for the pipette tip washer) but did not get it, but this could be a new application for smaller projects
  - JA: if RSI funding doesn't work out, are there are grants outside of Caltech, some for universities (including with Power and Water or Energy departments for California), they like funding grassroots movements, so we can look at the successful programs that have been funded, including those from universities (some are targeted specifically for universities)
  - JA: could also connect education for students (especially those going through the RSI teaching labs), could they run the experiments? It would be great to get these experiments done that way and then that supports further the RSI grant funding!
    - OE: I used to TA for the intro biology classes, and the prof would love this idea to run this pilot in the teaching labs and give the data to GL
      - o TC: I will definitely reach out!
    - VK: ask other GL programs to run the pilots in parallel, add weight to the projects, come up with a common protocol maybe?
      - o TC: I will reach out to I2SL and the UAG group (a group of GL coordinators who collaborate) and see if they are interested
      - o TC: I really want to start training students here to be more sustainable and integrating programming into their coursework
  - CK: what does the output look like? Paper? Fact sheet?
    - TC: depends on what the program is, typically we do fact sheets as part of the education for the pilot and are thinking of doing "case studies" (like this one) for the results
    - JL: want them to be widely available and accessible, getting folks to come to talks would be useful, too (especially faculty and students)(see above conversations)
    - CK: also make sure the case studies include cost savings somewhere too

Fact Sheet Initiative

- TC showed the proposed page with the fact sheets, and will post the Energy Vampire one in late October, with QR code to the FS page (made the page live if folks have feedback!)
  - o AP: want to create a link tree for QR codes
    - TC: will reach out with details after meeting 😊

From last time:

Green Event Initiative

- Maybe launch this in 2025
- Some good program examples include UCLA and Yale

- Carbon counter
  - 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).
  - **GG would like help if anyone is interested!**

Waste Audits Initiative
- What are waste audits?
  - Recording what is in waste bins, recycle bins, solvent waste containers
  - 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
  - o Change how we purchase
    - Can contact our suppliers and ask for alternatives with less waste, or that are more recyclable eco-friendly
  - o Reduce packaging and shipping
    - Consolidate orders/suppliers within the lab or between labs
    - Purchase in bulk
    - Right-size purchases
    - Reuse packaging like coolers
  - o 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)
  - o 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.**
  - o VK: encourage labs to stop wasting so much
  - o MM: SAVE MONEY
  - o 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?
  - o 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
  - o
  - o 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)
  - o 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
  - o 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.
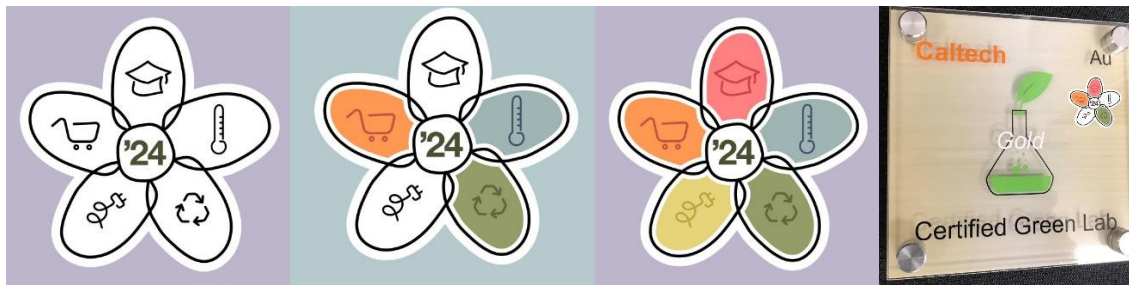

Fact Sheets Updates
- Rough drafts will be posted to the [Drive](#) for:
  - Energy Vampire *
    - Lynchpin fact sheet?
  - Energy Star
    - KM: like the upright version of the graph, it is easier to read
  - Fume Hood
  - Recycling
  - Cold Storage

- o Purchasing
- o 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!!
    - o MS presented ideas to the group, pictures below

- From last meeting:
    - o TS: very cute
    - o TC: can even use sticker paper we already have to print them
    - o 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)
    - o MS: modelled after the original GL logo designs
    - o TC: is this motivational? – group nodded YES
    - o CH: what happens when you get all 5? Could make the middle sparkly or gold or something
        - ▪ TC: or holographic!
    - o MS: yes, the middle could definitely be used, it is boring now
- From this meeting:
    - o BB: website mods for each leaf (have each leaf and a definition on the website)
    - o AP: have a leaf for every event, add it to the poster or something
    - o DK: helmet stickers from football players helmets
    - o KM: also in the future can give "stickers" for each lab website, put on our website too etc.
    - o KM: perhaps once launched, we have a deadline for changes, announce winner of "Most Changes" or "Best Lab" or something at certification party
    - o
For next time

- Certification
    - o Takes ½ hour
    - o Very simple!
    - o See https://greenlabs.caltech.edu for the form
    - o Get a plaque!
    - o Green Labs will give you bins and signage for your lab!
    - o 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
    - o

- • 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!

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?

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

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

RSVP to our event.

All are welcome!

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!