

Caltech Green Labs Action Plan 2024



Caltech

Green Labs Action Plan

2024

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1. Summary

The Green Lab Action Plan aims to provide a framework for Caltech to achieve climate and sustainability goals. The Institute has committed to supporting sustainable practices, including facilitating the Green Labs in their endeavour to make labs more sustainable and efficient.

Green Labs supports Caltech's sustainability commitments. As labs are estimated to produce over [5.5 million tons of plastic waste a year](#), it is increasingly important for labs to become more sustainable. To meet this goal, Green Labs is promoting reduction, reuse, and recycle programs for plastics and other types of waste in labs on campus, as well as green chemistry to reduce the hazardous waste production in the Institute. Green Labs also supports Caltech's goals to reduce emissions from fossil fuel combustion, commuters, and travel. Further, Green Labs supports efforts to reduce water usage on campus by recycling water where possible, changing flora on campus to be more water-friendly, and reducing lab burden on water through actions like only running autoclaves when loads are full. Other actions Green Labs aims to support include sustainable purchasing, encouraging all of Caltech to purchase items such as 100% recycled office supplies, and working with vendors to reduce the cost of sustainable consumables and equipment such as ultra-low-temperature freezers.

Green Labs aims to focus on developing behavioural changes throughout campus by providing resources and Guides with helpful and targeted information in six key areas: 1. Energy Efficiency, 2. Water Conservation, 3. Waste Reduction, 4. Sustainable Procurement, 5. Communications and Outreach, and 6. Resource Development. As this is the first Action Plan developed for Green Labs, this document will help serve as a guide for Caltech to develop sustainable laboratory practices without compromising scientific integrity. Implementation will require engagement of the entire campus, and will bridge work done by the Biosafety Offices, Health and Safety Offices, Facilities, Sustainability, and the Resnick Institute. This allows normalization of sustainable practices while increasing the safety, efficiency, and sustainability throughout the entire campus.

2. Introduction: About Green Labs

As biologists, we are challenged to protect our environment and advocate for sustainable practices to protect the very thing we study: life on Earth. Caltech Green Labs aims to meet this challenge by proposing lab practices that are energy efficient and resource efficient, without compromising research objectives. This group aims to create an equitable and inclusive space, where we can incentivise a discussion among staff, students, and faculty, and utilize their talents to promote innovation and normalization of sustainable laboratory practices. The Caltech Green Labs group ultimately aspires to be a resource for sustainable lab practices including energy efficiency, water conservation, green chemistry, waste management, sustainable purchasing, and sustainable education. These resources will strengthen the Caltech community and further the Institute's goal to positively impact the community at large.

Goals:

- Demonstrate Caltech's commitment to promote sustainable and inclusive environment
- Work with BBE and Caltech to better integrate and adopt sustainable practices, especially in research groups
- Improve general knowledge and transparency of existing campus sustainable practices and resources
- Increase awareness, advocacy, and education about sustainable initiatives and best practices
- Participate in sustainable events held on Caltech campus
- Establish a Green Labs website
- Develop a Green Labs Guide
- Pilot sustainable initiatives within appropriate research groups and report findings
- Decrease energy and water usage
- Reduce waste production, especially of single-use plastics in labs
- Decrease hazardous waste production and promote innovation by engaging in green chemistry
- Encourage sustainable purchasing

3. Green Labs Certification and Engagement

Green Labs encourages all labs to participate and be recognized as champions of sustainability. In this way, participants will not only be benefiting the environment, but will also be making their labs more innovative, efficient, cost-effective, and safe. Participating labs will gain greater access to resources and networks dedicated to sustainability. Green Labs members will also be able to assess their labs with comprehensive tools that provide greater understanding of how your lab works, evaluate where your lab is already achieving sustainability goals, and assess areas where your lab has the potential to become more efficient and sustainable.

Interested labs are assessed through an [easy survey](#), with points given for sustainable practices. This informs your lab’s initial Green Lab Score. After various categories are assessed for strength or weakness, labs are encouraged to make adjustments. Once adjustments have been completed, labs are scored again, and this final assessment informs your final Green Labs Certification Score. When you submit your final assessment, your lab is given a “Certified Green Lab” plaque!

In January 2023, we began our Certification journey with just 2 labs Certified. As of January 2024, there were 14 labs Certified, with that number growing every month!

Benefits of voluntary participation:

- Access to exclusive events
- Free recycling bins and energy-efficiency stickers
- Reduce overhead costs
- Increase research efficiency
- Reduce carbon footprint and pollution
- Recognition for sustainability efforts on grants
- Strengthen team building and community
- Prolong equipment life
- Greater access to sustainability resources and funding
- Recognition as lab sustainability champion
- Increase scientific innovation
- Enhance lab visibility and attractiveness to students

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Green Lab Certification Dashboard

Current Level	Gold
Total Points	25
Points Needed to Achieve Next Level	5

Leaf Level	Points Required
Bronze	5
Silver	15
Gold	25
Platinum	30



What categories are you strongest/weakest in?

Category	Total Points Achieved	Total Points Available	Progress
Commitment	2	2	100%
Administrative	2	2	100%
Education	2	2	100%
Energy/Refrigeration	6	13	46%
Materials	6	7	86%
Purchasing	4	6	67%
Water	3	4	75%
TOTAL	25	36	69%



4. Strategy and Vision

Green Labs aims to outline an Action Plan for each of the following six areas of interest: 1. Energy Efficiency, 2. Water Conservation, 3. Waste Reduction, 4. Sustainable Procurement, 5. Outreach and Recruitment, and 6. Resource Development.

This plan establishes achievable Action Items, Implementation Strategies, and Targeted Goals for each area of interest.

In setting out goals for this year, Green Labs seeks to better provide actionable ways for Caltech labs to improve their sustainable practices. By focusing on simple, often inexpensive, behavioural changes or practices, Green Labs aims to increase innovation, safety, and efficiency, all without compromising research goals.



Energy Efficiency

Action Item	Implementation Strategy	Targeted Goal
Fume hood “Shut the Sash” program [continued from 2023]	<ol style="list-style-type: none"> 1. Fume hood data collection 2. Purchase stickers indicating what sash height it is safe to operate a fume hood 3. Investigate sash alarms that will indicate if a fume hood sash is left open too long 4. Develop educational tools to ensure education of proper use and maintenance as well as increase safety of fume hood users 	<ol style="list-style-type: none"> 1. Conduct inventory and present on website, conduct energy use analysis 2. Implementation of either sash stickers and/or sash alarms, with plans in place to ensure compliance and effectiveness 3. Development of Fact sheets and inclusion of “how-to” section in the Lab Clean Up Competition to ensure education of proper use of fume hoods and proper safety maintenance/cleaning schedule
Engage in the Freezer Challenge and other information to encourage more efficient freezer utilization [continued from 2023]	<ol style="list-style-type: none"> 1. Collect data on Caltech - 80 or other ULTs 2. Post signage about the Freezer Challenge and include information on website, present at Green Labs meeting 3. Working with facilities and building managers, inventory ULT freezers storing samples at -70°C to encourage others 4. Create a freezer defrost package (including freezer gloves, scrapers, etc.) and include in the Lab Clean Up Competition 	<ol style="list-style-type: none"> 1. Develop inventory of ULTs and update website with inventory, update BBE and website with data 2. Engage at least one lab to participate in the freezer challenge 3. Purchase freezer defrost package items and distribute as prizes

Action Item	Implementation Strategy	Targeted Goal
Energy usage education tools	<ol style="list-style-type: none"> 1. Collect resources to help labs calculate their average lab energy usage 2. Develop educational tools to encourage more efficient energy usage in labs 	<ol style="list-style-type: none"> 1. Develop spreadsheet for labs to calculate average energy usage 2. Develop at least one Fact Sheet relating to energy usage (for example: energy vampires)
Outlet timers [continued from 2023]	<ol style="list-style-type: none"> 1. Collect resources about energy savings and risks associated with utilizing timers 2. Inventory equipment utilizing outlet timers 	<ol style="list-style-type: none"> 1. Develop a pilot program for BBE approval involving the purchase, distribution, and tracking of timers 2. Produce a newsletter 3. If successful, incorporate timers into welcome package for new Green Labs members

Water Conservation

Action Item	Implementation Strategy	Targeted Goal
<p>Water restrictors [work continued from 2023]</p>	<ol style="list-style-type: none"> 1. Collect resources about energy savings and risks associated with utilizing water restrictors 2. Collect water usage measurements and compare water usage before and after installation and cost savings 3. Working with facilities and building managers, inventory taps using water restrictors 	<ol style="list-style-type: none"> 1. Develop a pilot program for BBE approval involving the purchase, distribution, and tracking of restrictors 2. Produce a newsletter 3. If successful, incorporate restrictors into welcome package for new Green Labs members, coordinating with facilities for installation
<p>Autoclave usage</p>	<ol style="list-style-type: none"> 1. Collect resources about energy savings and water efficiency 2. Collect information about lab behaviours and identify areas where labs could be encouraged to use autoclaves only when full, only run the autoclaves once a week instead of multiple times, and/or share an autoclave with another lab 3. Working with facilities and building managers, inventory autoclaves with single and multiple users 	<ol style="list-style-type: none"> 1. Produce an updated newsletter for BBE email and website 2. Develop inventory of autoclaves and update website with inventory and opportunities for sharing the resource, working alongside facilities and building managers

Waste Reduction

Action Item	Implementation Strategy	Targeted Goal
<p>Increase access to recycling programs and transparency of current waste diversion practices</p>	<ol style="list-style-type: none"> 1. Collect resources about recycling 2. Work with vendors to develop takeback or reuse programs 3. Work with facilities or outside vendors to develop strategies to recycle lab waste 4. Ask Caltech to provide transparent accounting of current waste practices 	<ol style="list-style-type: none"> 1. Produce an updated newsletter for BBE email and website 2. Implement a recycling program across multiple buildings in BBE 2. If successful, investigate expanding the recycling programs campus-wide
<p>Styrofoam and ice packs</p>	<ol style="list-style-type: none"> 1. Collect resources and develop a petition to ask Caltech to reduce vendors' reliance on Styrofoam as a shipping material, and use of ice packs in shipping 2. Investigate feasibility of recycling Styrofoam and ice packs in LA and implement a pilot program to recycle if feasible 	<ol style="list-style-type: none"> 1. Launch a petition and collect at least one signature 2. If enough interest and if feasible, work with facilities to develop and implement a recycling program for Styrofoam 3. Launch a short-term pilot, including updated signage for easy adoption 4. Monitor for duration of pilot and reassess, adjust signage as needed
<p>Encourage sustainable food options at BBE and lab functions [work continuing from 2023]</p>	<ol style="list-style-type: none"> 1. Investigate what kinds of foods are favoured at BBE and lab functions 2. Investigate sustainable food alternatives and advertise them on our website, especially favourability of vegetarian options if they are given as default 	<ol style="list-style-type: none"> 1. Produce a newsletter and resources on our website about sustainable food items and vendors 2. Encourage BBE to adjust policy encouraging sustainable food practices, including possibly asking that vegetarian options be default 3. Monitor for one year and reassess, adjust online options
<p>Reuse or reduction programs</p>	<ol style="list-style-type: none"> 1. Investigate reuse or reduction of lab consumables (such as pipette tips, conical tubes, etc) 	<ol style="list-style-type: none"> 1. Provide guidance or a newsletter on this topic, add to Guide 2. Encourage labs to adopt behaviours that will reduce waste

Sustainable Procurement

Action Item	Implementation Strategy	Targeted Goal
Education [continuing from 2023]	<ol style="list-style-type: none"> 1. Collect resources and develop a sustainable purchasing guide based on lab needs with helpful hints 2. Develop strategies for wet labs, dry labs, and teaching labs 3. Work with procurement to develop strategies for promoting sustainable purchasing 	<ol style="list-style-type: none"> 1. Produce a guide and with resources and tips for eco-friendly purchasing, and post online 2. Work with purchasing for implementation 3. Monitor for one year and reassess, adjust guide as needed and poll purchasers/lab managers to see if there are other things we could add or request purchasing to work with us
Vendor outreach and event(s)	<ol style="list-style-type: none"> 1. Reach out to vendors known for eco-friendly products and ask if they would participate in an eco-friendly event 2. Work with Caltech procurement and BBE to have an event focused on eco-friendly purchasing 	<ol style="list-style-type: none"> 1. Work with BBE to advertise and run an event focused on sustainable purchasing 2. Collect purchaser comments and investigate needs for the future during the event to improve utility
Vendor incentives and opportunities	<ol style="list-style-type: none"> 1. Investigate incentive programs for purchasing sustainable products (that are perhaps more expensive than traditional products) 	<ol style="list-style-type: none"> 1. Partner with BBE procurement and vendors to establish Caltech-wide discounts on sustainable products 2. Monitor usage of quotes or discounts and adjust according to polls or comments

Action Item	Implementation Strategy	Targeted Goal
Expand and find a permanent location for the equipment and chemical share program	<ol style="list-style-type: none">1. Poll purchasers and lab managers on what kinds of equipment they would like to share2. Develop an equipment and chemical share tool/program	<ol style="list-style-type: none">1. Partner with purchasers and lab managers to develop a tool or email to share chemicals and equipment2. Monitor usage and adjust as needed

Communications and Outreach

Action Item	Implementation Strategy	Targeted Goal
Outreach [continued from 2023]	<ol style="list-style-type: none"> 1. Write newsletters of our work for the BBE and CCE quarterly emails 2. Post newsletters and resources online 3. Coordinate with IonCaltech and Caltech Weekly to post newsletters there as well 4. Investigate other outreach avenues such as Slack, Facebook, or Instagram 	<ol style="list-style-type: none"> 1. Assess visibility and access to information and adjust as needed 2. Create website with all resources (after approval of BBE) 3. Assess traffic and work with BBE newsletter, IonCaltech, Caltech Weekly etc to enhance visibility
Green Labs Certification Program [continued from 2023]	<ol style="list-style-type: none"> 1. Encourage members to participate in the Green Labs Certification program 2. Assess the spreadsheet and see if there are obvious barriers to completing the certification 	<ol style="list-style-type: none"> 1. Post links to Sustainability website GLCP 2. If necessary, implement changes to make certification easier 3. Goal of adding 1 new lab by 2025
Reengagement for Certified Labs	<ol style="list-style-type: none"> 1. Develop re-engagement program for already-Certified labs to assess how they are doing, and areas where they want to improve 2. Encourage users to participate in specific sustainability goals, where specific goals and tasks are rewarded 	<ol style="list-style-type: none"> 1. Send out a survey to check in, along with their old Certification checklist, to assess areas where they continue to do well and areas where they want to improve 2. Develop sticker program to reward users that complete specific sustainability goals
Hosting Events and Presentations	<ol style="list-style-type: none"> 1. Host events useful for engaging the community, grow our listserv etc 2. Encourage participation in Events by having lunch/treats as an incentive 3. Engage PIs, staff, graduate students, and post-docs 	<ol style="list-style-type: none"> 1. Host at least one event useful for growing our community 2. Engage the community and ask for input into our program (such as during another Lightning Talks Event) 3. Present to both the Lab Manager's working group and the PIs, and host events engaging students and staff such as those with WiBBE or the GSC

Resource Development

Action Item	Implementation Strategy	Targeted Goal
Continue to develop and update a website [continued from 2023]	<ol style="list-style-type: none"> 1. Collaborate with members to consolidate relevant resources and post information (including Aciton Plan, Green Labs Guide, newsletters, signage, meeting minutes, calendar of events, useful resources, and group contacts) in one easy-to-find location 2. Create a user-friendly website with easily accessible resources alongside Caltech IT 3. Ensure accountability and monitoring tools are available 	<ol style="list-style-type: none"> 1. Work with BBE and sustainability to consolidate and post resources as completed and approved 2. Adjust website as resource library grows and continue to ensure information is easily accessible 3. Accountability and monitoring will be conducted by the Green Labs group and BBE and reported annually
Update and develop an Action Plan for 2024	<ol style="list-style-type: none"> 1. Develop an Action Plan to be posted on our website 2. Include relevant areas of interest and information about the group and our plans 	<ol style="list-style-type: none"> 1. Work with BBE and Sustainability to develop and implement an Action Plan for 2024 2. Post online when complete and work with BBE, IonCaltech, and Caltech Weekly to post information regarding development of this plan and establishment of our group
Develop Fact Sheets	<ol style="list-style-type: none"> 1. Investigate what areas labs may need more information about 2. Put together resources and post on website (perhaps during “working lunches” 	<ol style="list-style-type: none"> 1. Develop Fact Sheets on various topics (for example: energy vampires) and post around campus and on website

Action Item	Implementation Strategy	Targeted Goal
Update the Green Labs Guide for 2024	<ol style="list-style-type: none"> 1. Gather Caltech- and California-specific resources to develop a Green Labs Guide with all categories described above included, to be posted on the website 2. Develop strategies for wet labs, dry labs, and teaching labs 3. Include information on sustainable office purchasing throughout 	<ol style="list-style-type: none"> 1. Produce and publish a Green Labs Guide in modules 2. Work with BBE and Sustainability to develop a finalized completed Guide for Fall 2024 3. Monitor and assess effectiveness after one year by asking lab members not involved in Green Labs to assess success, adjust Guide as needed
Update Recycling Signage [continued from 2023]	<ol style="list-style-type: none"> 1. Develop universal lab-specific signage for various kinds of recycling bins 	<ol style="list-style-type: none"> 1. Work with facilities to assess and implement 2. Assess effectiveness and accept feedback 3. If effective, will include in welcome package
Hire a full-time Green Labs Coordinator by 2025 [continued from 2023]	<ol style="list-style-type: none"> 1. Ask BBE to start collaborating with other Divisions and Sustainability to set aside funding for a full-time GLC 2. Compile resources and ideas for how this person can facilitate GL initiatives across Caltech 	<ol style="list-style-type: none"> 1. Hire a GLC by 2025 2. Roles would include collaborations with all Divisions, EHS, security, procurement, new faculty, etc

5. Monitoring and Reporting

Each strategy outlined in this Action Plan will be implemented and monitored by Green Labs. This group is focused on changing behaviour in laboratories on campus to encourage normalization of eco-friendly lab practices and culture at Caltech. Each data-driven Action Item will be assessed and reported to the Caltech community.

Progress and updates will be reported annually to the Sustainability Office. Each Action Item will be evaluated for success, and advice will be given as needed, in future years as to how to improve.

6. Green Labs Members

Adrian Colazo	Haomin Wang	Manxuan Zhou
Amogh Johri	Henry P	Needhar Kondapaneni
Amina Kinkhabwala	Haixu Shen	Noor Naji
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7. Special Thanks

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Caltech Biosafety Offices

Caltech Health and Safety

Caltech Facilities

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