A pilot program at the University of Colorado Boulder to rent space in **local, shared ultra-low temperature freezers**

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Objectives

Learning Objective 1: Know the benefits of moving toward shared equipment in shared spaces for research

Learning Objective 2: How CU Green Labs was able to obtain funding for our pilot

Learning Objective 3: Understand our experience establishing a shared ultra-low temperature freezer program at CU Boulder including fees

Learning Objective 4: Challenges we faced in setting up a shared equipment resource

Ultra-low temperature (ULT) freezers at CU Boulder

- 150 units spread out over a >700 acre campus
- Mostly owned by individual labs; informal sharing occurs sometimes

http://photography.colorado.edu/res/sites/pdb/index.html

- Known nationally for having ~50% of freezers at -70 °C
- $$$ incentives from FM for purchase of energy efficient ULT freezers
- Engaged scientist population

Why does CU Green Labs care?

ULT Freezers:

Large energy consumers

Take up lab floor space

Costly for building ventilation

Expensive to purchase

CU Boulder has ULT freezers consuming anywhere from 6.7 to 30.8 kWh/day!

On average, a house consumes ~25 kWh/day

This is similar to energy consumptive ULT freezers

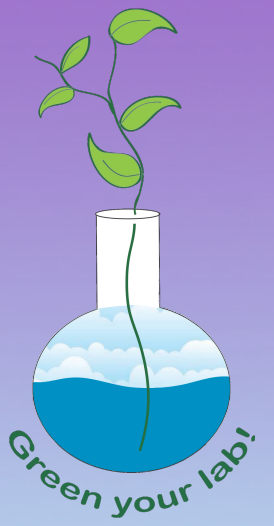
http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3 (US Dept of Energy)

Ownership culture for ULT freezers with some labs is not unique to CU Boulder

Desire to protect and preserve often irreplaceable scientific samples

BUT:

There are so many benefits to sharing lab equipment!

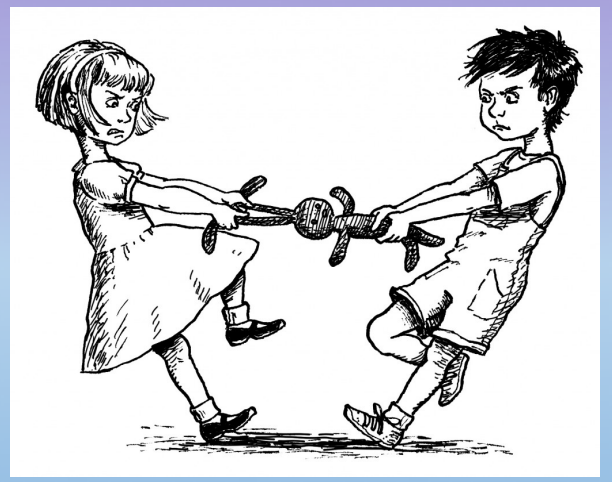


- Saves researcher funding
- Saves time by facilitating researcher access
- Attracts talent
- Promotes collaboration
- May reduce laboratory plug loads by avoiding redundant equipment = better space utilization
- Can save departments funds in the form of smaller start up $$
- Compliance with Code of Federal Regulations (CFRs)
- Right thing to do and in line with CU Boulder sustainability culture & goals

Common challenges with ULT freezers:

?

UNKNOWN OWNERSHIP OF SAMPLES



SHARING CAN MAKE PEOPLE NERVOUS

http://www.wazala.com/blog/2014/05/the-sharing-economy-and-you/

Goal of Pilot Program

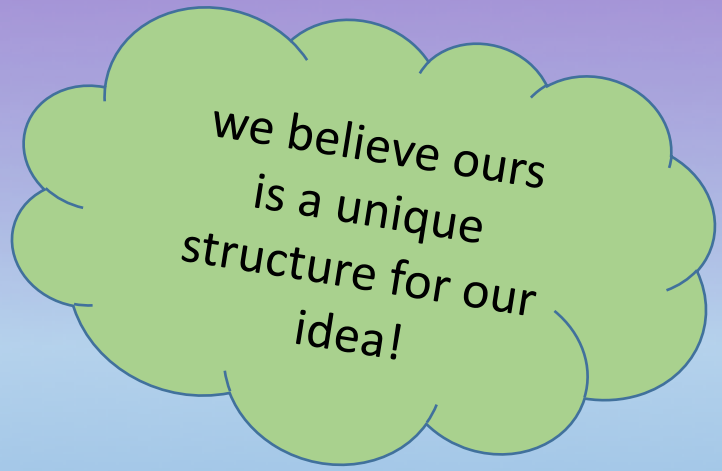
Establish shared, managed ULT freezers in close proximity to scientists and charge a fee for the use of space in each freezer.

Long Term Goal

Show that this is a model that can really work on our campus and beyond. A shared culture instead of an ownership culture develops for ULT freezers and other equipment on our campus. Sharing becomes the norm!

Background Research for Pilot Program

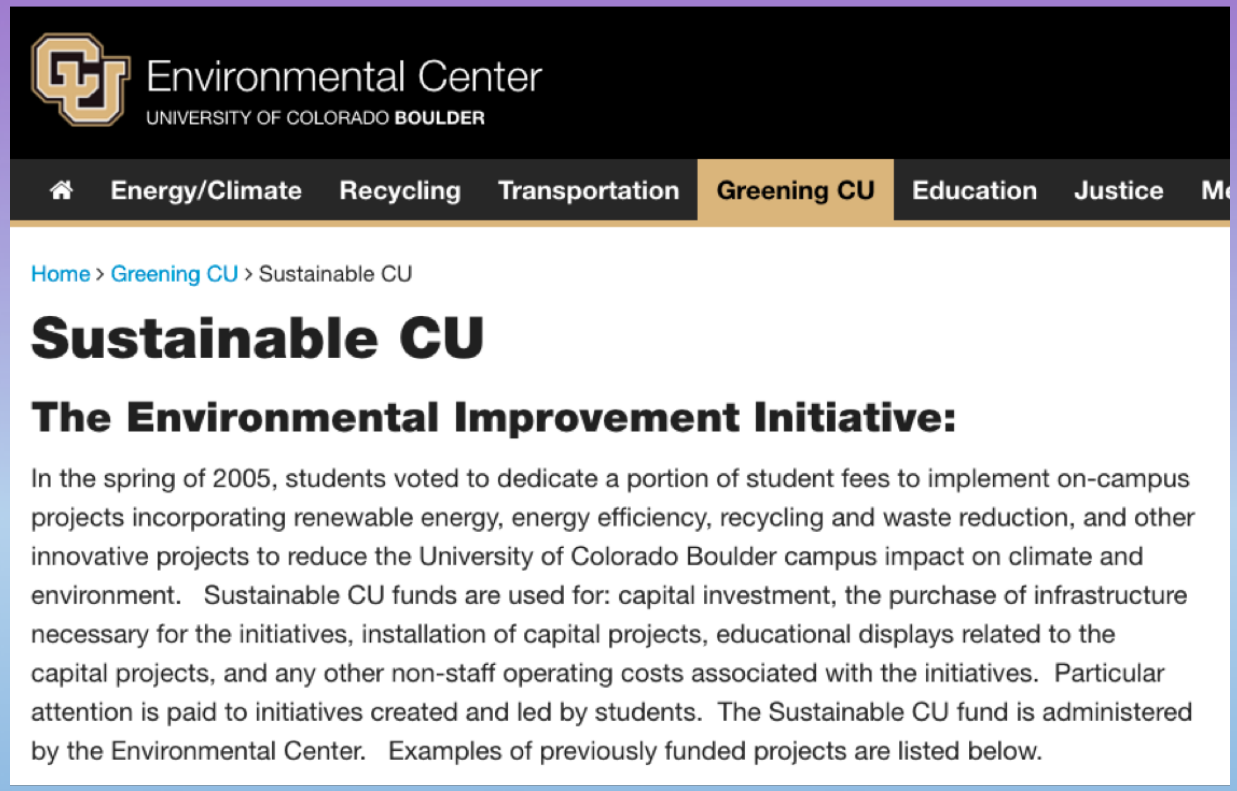
- Emails and phone calls with colleagues across nation
  - Cost for storage
  - Location
  - Access
  - Budget
  - Ownership



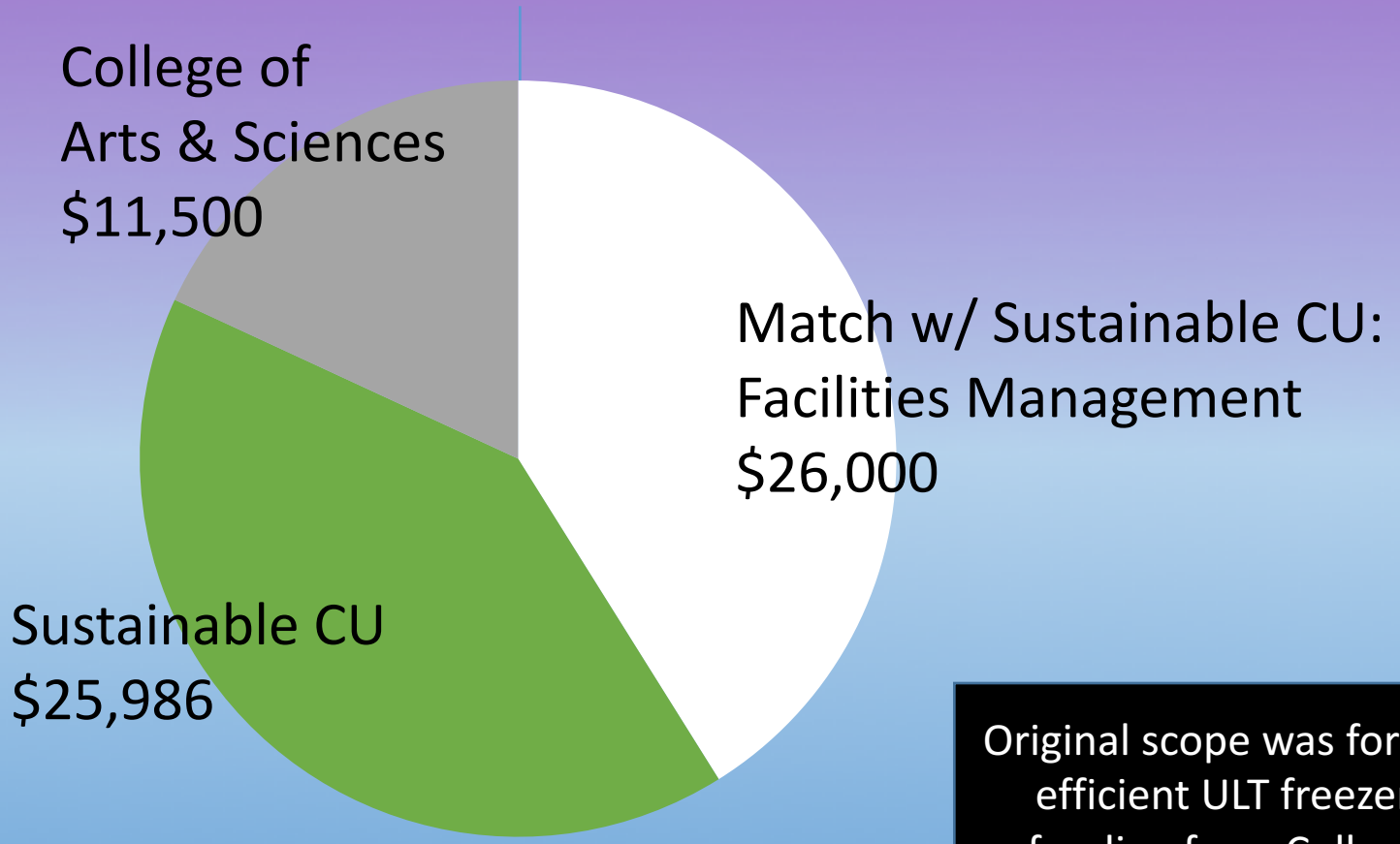
- Poll of researchers at CU Boulder to gauge interest in a shared ULT freezer program
  - Received some interest! → which buildings?
  - Received feedback that some scientists think it is a good idea, but they wouldn't use it

Focuses of our Application

- Addressing cultural change for research
- Reduction in buying power for federal $
- Ours is a unique idea: innovative!
- CU Boulder goals for energy reduction
- Projected energy savings
  $9,000 - $17,000 savings over 10 years
- Social equity: climate justice and effective use of taxpayer dollars



Funding Received for Project



Original scope was for three energy efficient ULT freezers but with funding from College of A&S, a fourth freezer could be purchased

Total Project Budget: $63,396

Considerations

Location

Amps	2 Pole 3 Wire Grounded 250v	3 Pole 4 Wire Grounded 125/250v
15 A	6-15R	
20 A	6-20R	14-20R
30 A	6-30R	14-30R
50 A	6-50R	14-50R
60 A		14-60R

Electrical

Freezer Manager

Most Energy Efficient ULT Freezers on the Market

STIRLING ULTRACOLD

Thermo SCIENTIFIC

Any promos, trade-in deals?

Communication w/ Dept Chairs

LIABILITY

QUARTZY

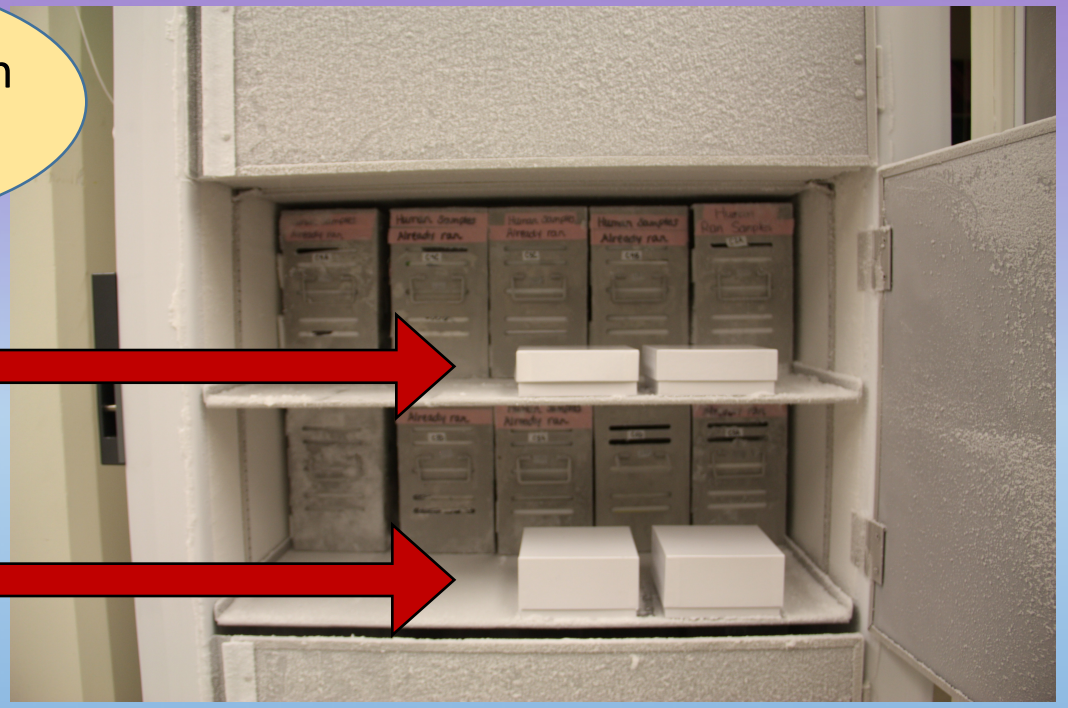
Inventory System

Freezer Monitoring System

Working to establish a fair rental rate for space

- Controller's Office
- Completed a Rate Sheet
  - 6 yr depreciation
  - Rates for different size boxes
  - Units of sale per freezer
  - Picking the rate
- Speed type
- Scientists can use any funding source to pay for space in our freezers

25¢/month/2 inch tall freezer boxes



37¢/month/3 inch tall freezer boxes

20¢/month/bulkier, non-freezer box items

Why charge a fee at all?

- Scientists don’t pay the electricity bills directly for their lab buildings
  - Having a fee communicates that there is a cost to ULT freezer space
- Encourages labs to keep an inventory of their samples & conduct regular cleanouts
- Allows CU Green Labs to recoup some costs
  - Repairs, replacement at end of life

Late July 2016: No publicity yet, but one freezer $^{2}/_{3}$ full

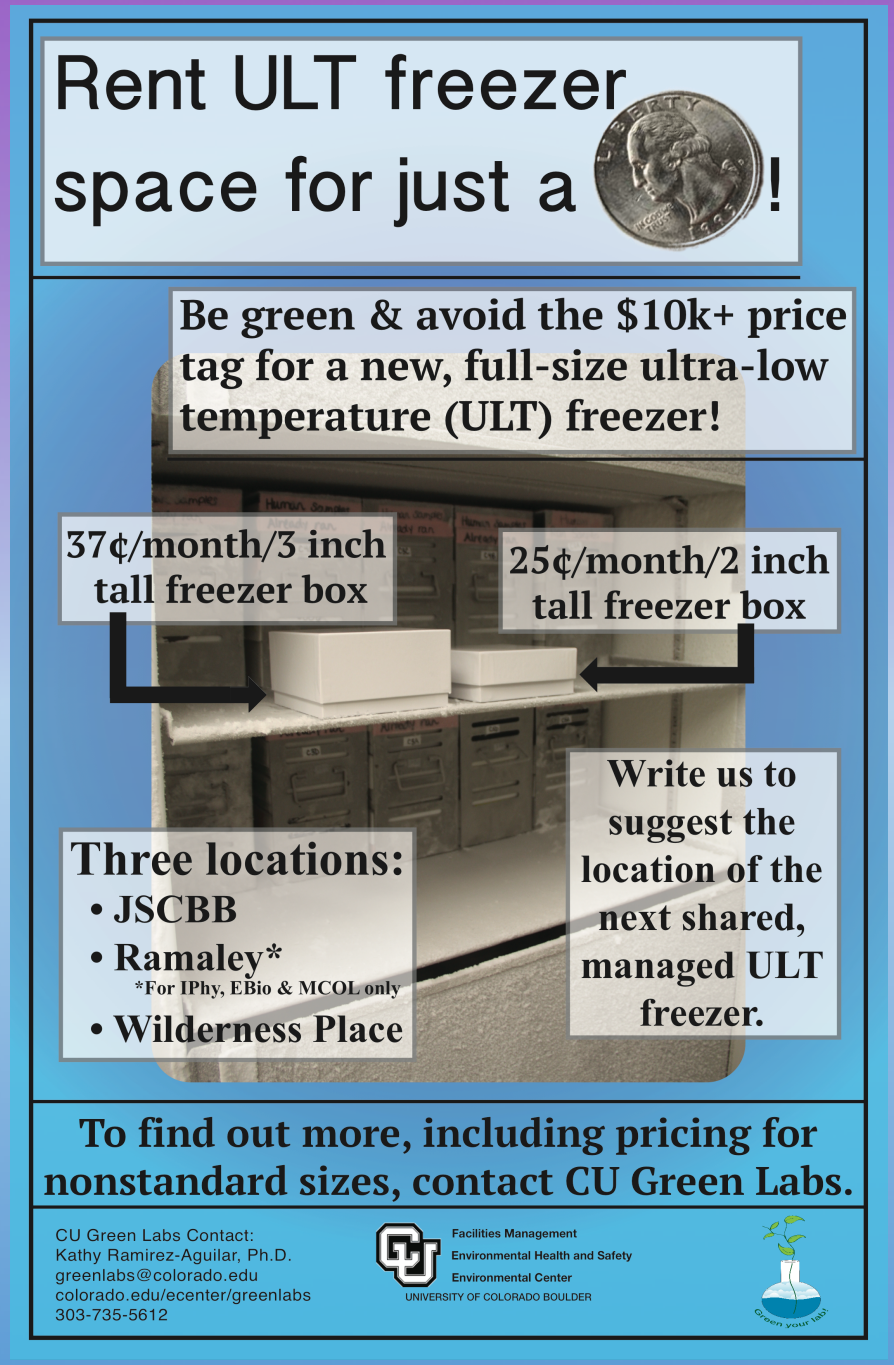
- One IPHY Lab
  - ~2 shelves
- One IPHY Lab
  - ~2 shelves
- One EBIO Lab
  - planning for ~1 shelf

Hence, need for 4th freezer!

These labs are still in the process of getting their samples into our freezer racks, setting up online inventory, etc. Once sorted, we will be charging on a per box basis.

Advertising & Outreach

- Email communication
  - Eco Leaders
  - Safety Proctors
  - Principal Investigators
  - Partners/Collaborators
- Department listservs
- Posters
- Announcements at meetings



Determining Responsibilities

Shared ULT Freezer Program Checklists

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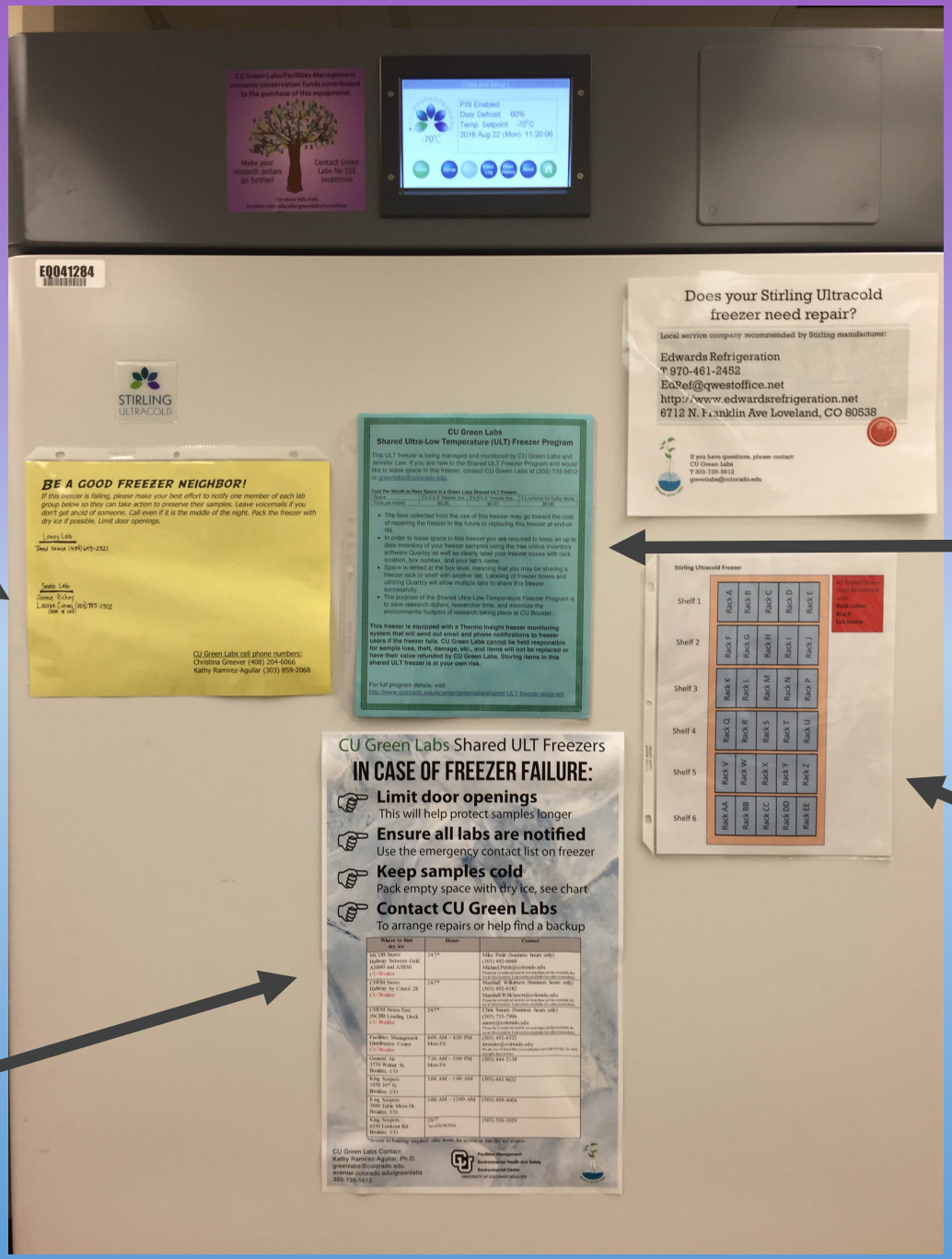
fx Date Completed & Initials

	A	B	C	D
1	Date Completed & Initials	Responsible Parties	Details	
2		CU Green Labs	Respond to lab finding out 1) which freezer they wish to use and 2) how much space is needed	
3		Lab	Lab lets Green Labs know which freezer they are interested in and amount of space	
4		CU Green Labs	Confirm whether there is space in a freezer for a new lab to use. If so, communicate with lab.	
5		CU Green Labs	Send lab link to shared ULT freezer webiste. Ask lab to review the website. Request speedtype, contact info for freezer alarm systems, connect with freezer manager, who from lab should have access to Quartzy?	
6		Lab	Speedtype sent to Green Labs	
7		Lab	Individuals that need Quartzy access identified	
8		Lab	Individuals that need to respond to freezer alarms identified	
9		CU Green Labs	Explain to the lab how the freezer monitoring system works for that particular freezer.	
10		CU Green Labs	Give instruction on how to label freezer boxes. Rack Letter + Box # + Lab Name	
11		Freezer Manager	Ensure the lab has access to the room with the freezer. Help them if they do not.	
12		Freezer Manager	Ensure they have the racks and boxes necessary to get their samples into the freezer. Show the lab where necessary supplies are located.	
13		Freezer Manager	Label freezer locations in Quartzy with a particular lab's name once their boxes are placed.	
14		Freezer Manager	Verify that the lab labeled their freezer boxes.	
15		CU Green Labs	Grant Quartzy access to lab members.	
16		CU Green Labs	Provide lab with Quartzy manual	
17		CU Green Labs or Freezer Manager	If the lab needs to use more space in the freezer, they need to let someone know so an admin in Quartzy can update the system with new freezer locations. Likewise, if they need to consolidate and remove items from the freezer long-term, they should contact us so we can make that space free again in Quartzy.	Ongoing
18		CU Green Labs or Freezer Manager	If a lab is leaving the freezer, find out if they want to export their Quartzy inventory so they don't lose that information. Do this before you delete their boxes in Quartzy.	Ongoing
19		CU Green Labs	Look at Quartzy the final week of every month. Determine how many boxes or liters are being used by each lab. Track this along with speedtypes to charge.	Ongoing
20		UMC Business Office	Create invoices for the labs renting space in freezers. Create invoice the first week of the month, and charge for the previous three months of use. Invoice can be paid when generated, labs can dispute charges after the fact.	Ongoing
21		CU Green Labs or Freezer Manager	Help facilitate repairs of the freezer as necessary.	Ongoing
22		CU Green Labs or Freezer Manager	Periodically scrape frost off of freezer	Ongoing
23				

Important Freezer Signage

"Be a good freezer neighbor" signage. In the event of freezer failure, make sure all labs are aware of failure. Lab member & Green Labs contact info.



Contact info for local company that can repair freezer

Summary of shared freezer program, rates, disclaimer, information about freezer alarm system

Diagram of shelf and rack labeling system for user reference. Matches system used in Quartzy

Locations where dry ice can be purchased on and off campus

Challenges

- Finding locations for freezers
- Access to buildings for those outside department
- Connecting freezer monitor systems
- Coordinating response to freezer alarms

http://ezako.com/en/top-5-challenges-telecom-operators-next-2-years/

Conclusions

So far, success with our Ramaley freezer!

Interest on our campus to move toward a more shared culture for equipment, even freezers

- Energy Manager
- College of Arts & Sciences
- Scientists
- Departments and Institutes
  - Wilderness Place
  - Sustainability, Energy, and Environment Complex
  - Jennie Smoly Caruthers Biotechnology

Acknowledgments

Colorado Chapter of I2SL
Kathy Ramirez-Aguilar – CU Green Labs Program Manager
Sustainable CU & the CU Boulder students
CU Boulder College of Arts & Sciences
Catherine Bacon – CU Green Labs Student Assistant
Elizabeth Spencer – CU Boulder Controller's Office
Glenda Schofield – UMC Business Office
Peggy Tucker-Ortega – UMC Business Office
Jennifer Shannon Law – Integrative Physiology Department
Annette Erbse – Division of Biochemistry

Questions?

We're just launching! Feel free to contact us for updates!

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