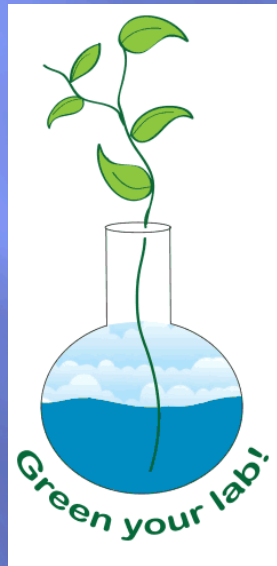


Greening Labs: The importance, the impacts, and some suggestions



Kathy Ramirez-Aguilar, Ph.D.
Green Labs Program Manager
University of Colorado – Boulder

Why labs?

Labs have a large footprint

Univ. Research Labs	SqFt Portion	Energy Portion
CU-Boulder ('10-'11)	20%	43%
Stanford	20%	50%
UC-Davis	33%	~75%

Resources: Shannon Horn, CU-Boulder Facility Management Engineering; Susan Vargas, Stanford Energy Manager, Allen Doyle, UC-Davis Office of Sustainability

Abundance of opportunities just waiting to be addressed



Conservation has not part of the culture

RESOURCE USE NOT INCLUDED IN:

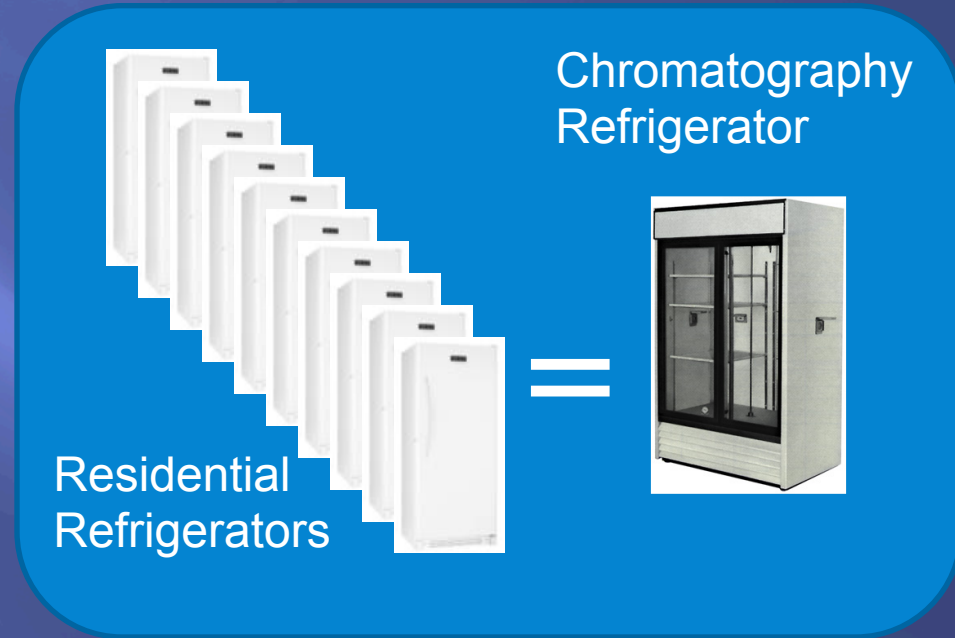
- Research decisions
- Dissemination of information
- Purchasing decisions



Green Lab Programs aim to incorporate conservation into the culture.

Scientists make decisions that...

- impact existing building operation & consumption
- drive future research facility needs



Great opportunities for conservation

House = 25 kWh/day in electricity

Ultra Low Temperature Freezer Efforts

Retiring
Sharing

Unplugging

Energy Efficient

Raise from -80°C to -70°C



Scanning Electron
Microscope &
Chiller Off



Six Diffusion Pumps
Off Nights &
Weekends
(also saving 1 million
gallons of water/year)



Being a REAL Resource to Labs ...& Lab Departments!

Help with freezer failures

Help with energy efficient
selections

Equipment sharing/disposals

Source of incentives/funding

Giving scientists a voice

Research & act on ideas



CU GREEN LABS PROGRAM

Created in 2009

(by Facilities Management and the Environmental Center)

ENERGY CONSERVATION

WATER CONSERVATION

SOLID & HAZARDOUS WASTE REDUCTION

Participation is voluntary

A benefit to labs and conservation

Providing labs with a voice on conservation

Not compromising safety or research integrity

Utilize expertise of our scientists, EH&S, Fac. Man.

Cumulative Impact Since 2009

Electricity

2000 kWh/day
730,000 kWh/year

80 X



electricity

(25 kWh/day/house)

=



Water

5.0 million gal/yr

7.6/yr X



Olympic Pool
(660,000 gal/pool)

Natural Gas unknown but very significant

Cumulative Impact Since 2009

Recycling

28,000 lbs of
foam, pipette
boxes, &
plastic film

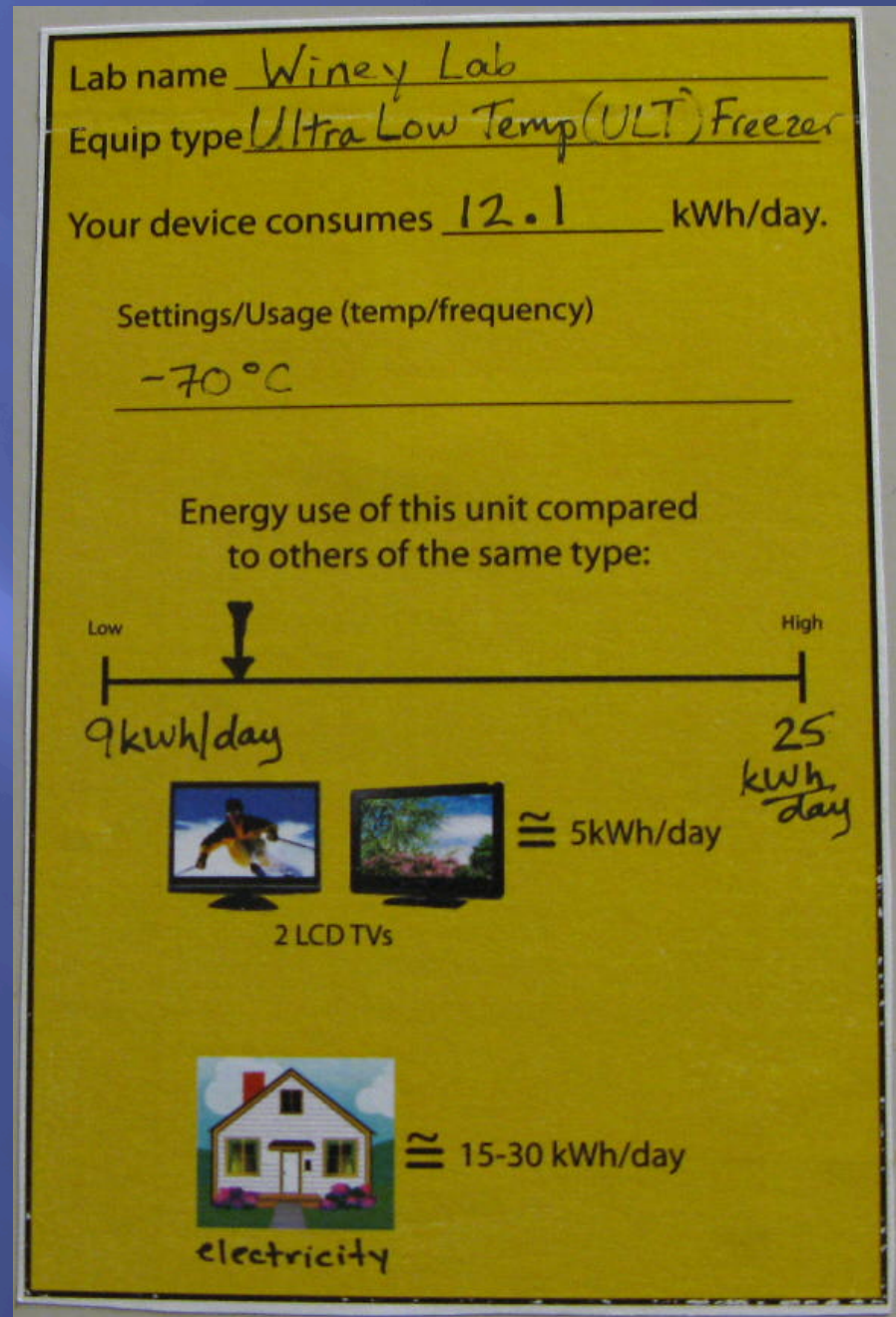


Chemical Reuse

550 gallons
of ethanol
& acetone



Metering: Data in Google Doc



Suggestions for Implementing a Green Labs Initiative

1. Raise awareness & give positive, public recognition

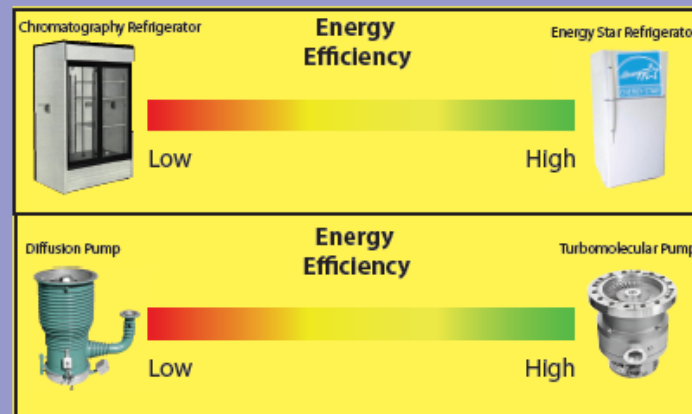
Raising Awareness

- Meetings
- Presentations
- Newsletters
- Email

- Posters & stickers have had great impact

Shopping for your lab?

Be Green &
ENERGYWISE!



Let Us Work With You to:

- Find energy efficient equipment and green lab supplies
 - Set up equipment sharing between labs (saves you \$\$\$)
 - Push for manufacturer responsibility at end of product life
 - Ensure involvement of CU Procurement with energy considerations
- Remember...your decisions and dollars have impact!**

CU Green Labs is Here to Help!

CU Green Labs Contact:
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Facilities Management
Office of Sustainability
Environmental Health and Safety
Environmental Center
UNIVERSITY OF COLORADO BOULDER





Give Your Compressor a Break!

Increase the temperature of your ULT (Ultra Low Temperature) Freezer to -70°C

-70°C
 ↑
 Extend Freezer Life
 ↓
 -80°C

=



2-4 kWh/day saved
 same as a LCD TV

Save Energy While Extending Freezer Lifetime

- Increasing the temperature means the compressor does not have to work as hard.
- Since the compressor works less, there is reduced risk for compressor failure.
- 34 ULT freezers at CU-Boulder and 40 at UC-Davis are already at -70°C or warmer.

Join These CU-Boulder Labs That Are Already at -70°C

- | | | | | |
|------------------|-----------------|---------|----------|----------|
| -Anseth | -Copley | -Martin | -Schmidt | -Taatjes |
| -Blumenthal | -Ehringer/Marks | -Moore | -Shen | -Winey |
| -Chen/Junge | -Garcea | -Poyton | -Smolen | -Xue |
| -Collins/Stitzel | -Han | -Seals | | |

For info on samples that labs are storing at -70°C or warmer go to ecenter.colorado.edu/greenlabs

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 Kathy Ramirez
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 303-492-5562



You wouldn't leave your oven on at home Why do it in lab?



8 kWh/day



LCD TVs

Put your oven on a timer

Timers automatically shut off your oven according to the schedule you set

Check out the labs that already have timers!

- | | | | |
|-----------|----------|-------------|-------|
| Hoenger | Gin | Campeau/Day | Noble |
| Caruthers | Bierbaum | George | |
| Bryant | Zhang | Bowers | |

Turn off your oven manually between uses

Even better than timers in some cases for larger energy savings

Join these labs in manually shutting off your oven!

- | | | |
|----------|-------------|----------|
| Collinge | Campeau/Day | Townsend |
| Bowers | Pardi | |
| Bryant | Gin/Noble | |

Lower the temperature of your oven

Join these labs who have already turned down their temperatures!

- | | |
|---|---|
| Hoenger (10°C decrease) | Sammakia (4 ovens, 40°C decrease each) |
| Beirbaum (50°C decrease) | Gin/Noble (2 ovens, 30°C and 40°C decrease) |
| Schwartz (30°C decrease) | |

Consolidate and unplug extra drying ovens

Save even more energy with these labs!

- | | |
|----------|----------|
| Adams | Schwartz |
| Odorizzi | Sammakia |

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Our most effective place to hang posters

Also in bathroom stalls.



Suggestions for Implementing a Green Labs Initiative

1. Raise awareness & give positive, public recognition
2. Build the culture- engage lab occupants & leaders

One reason we are having impact

LAB ECO-LEADER

a volunteer interested in encouraging the efficient use of resources in his/her lab and department

BENEFITS:

- Insider
- Knowledgeable about their particular lab
- Always present in lab



How we've been building this network?

PERSONAL TOUCH!

Eco-Leaders lining up
other Eco-Leaders

Taking advantage of
the moment

Word of Mouth



Truth is... there are many lab members that
care about their consumption.

Hiring Grad Students to Lead

GREEN LABS TEAM LEAD

paid grad student leading Eco-Leaders & working on efforts within his/her own department or building

- Passionate insiders
- Important department members
- Have chair support
- ~5 hours per month
- Influential voices



Contests make participation fun! and grab people's attention

Raffle Contest for Gift Cards of \$125

- VAV fume hoods
- Large Plug Load Off
- Fridge/Freezer Maintenance
- Autoclave
- Drying Oven
- Biological Freezer Temperature

Contests with Incentives to Win

- Bright Idea Contest for Energy Savings
- National Freezer Challenge



Modified graphic from Univ.
of Toronto Sustainability
Office

Suggestions for Implementing a Green Labs Initiative

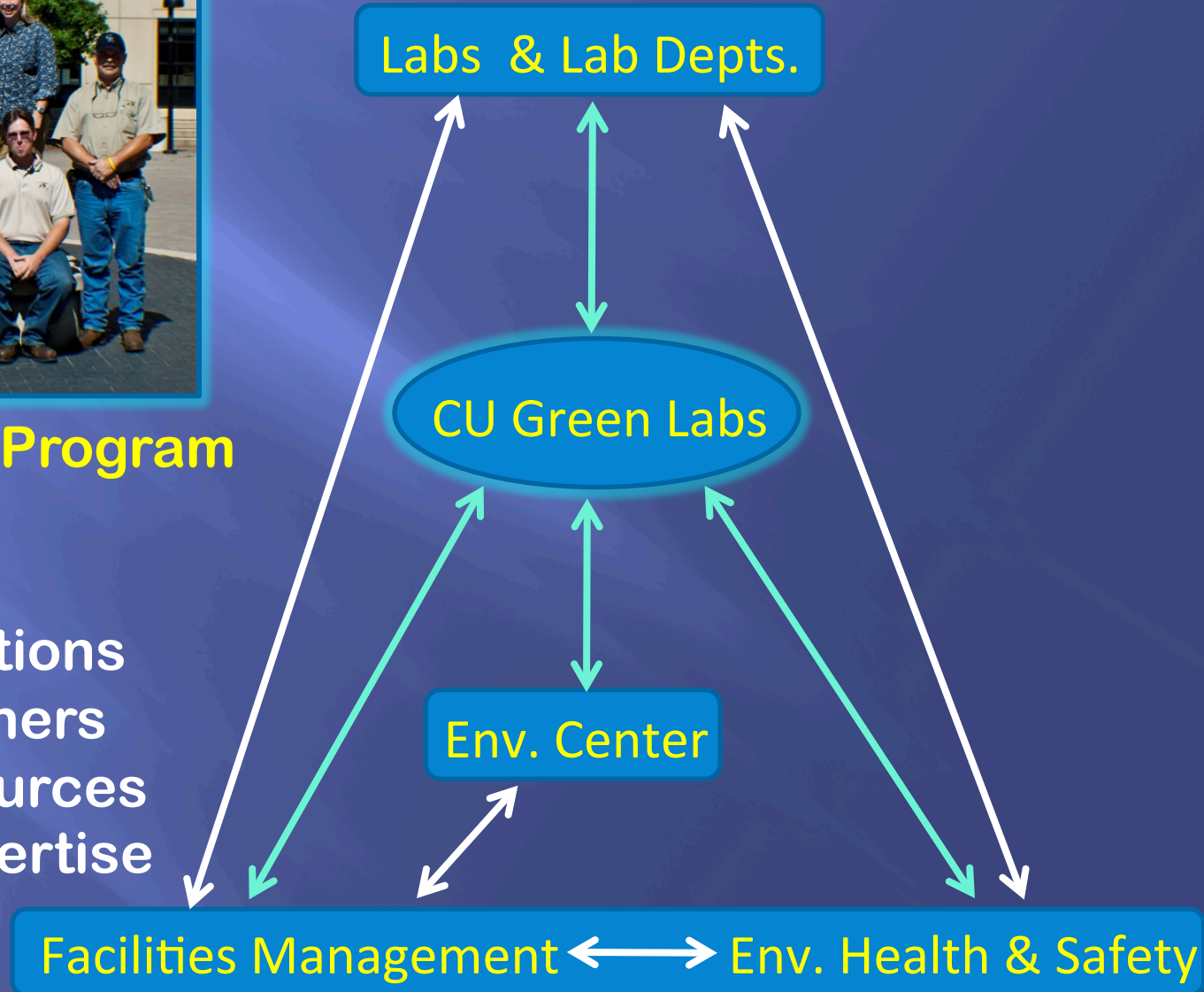
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3. Create a collaborative, team approach involving stakeholders across campus

Initial CU-B team structure

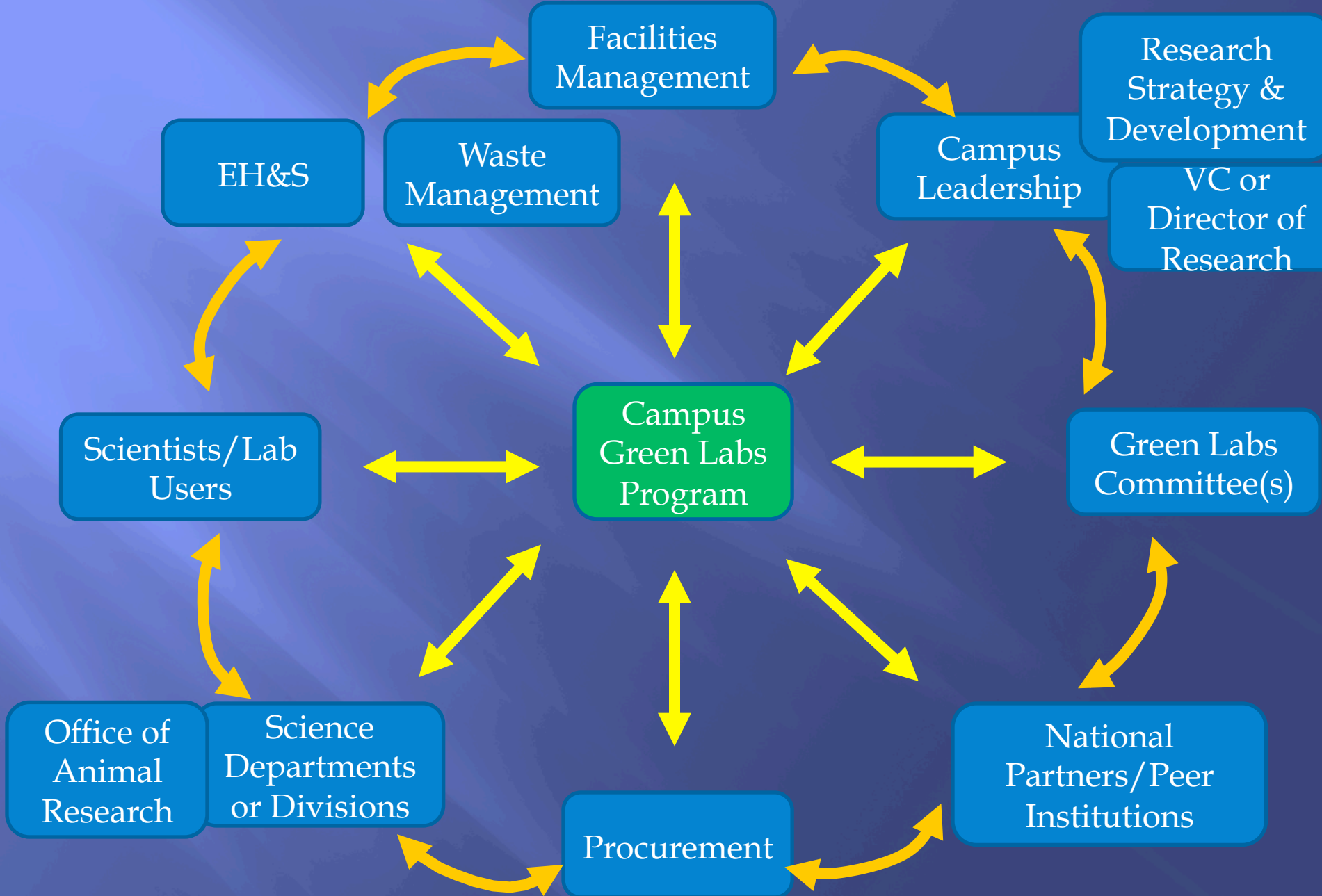


CU Green Labs Program networks:

- receive ideas
- make suggestions
- connect partners
- connect resources
- use team expertise



Additional stakeholders to include



Suggestions for Implementing a Green Labs Initiative

1. Raise awareness & give positive, public recognition
2. Build the culture- engage lab occupants & leaders
3. Create a collaborative, team approach involving stakeholders across campus
4. Connect occupants financially with their energy, water, trash, and space use.

Connecting Univ. depts w/ consumption



- Began FY '12-13
- 27 operating units
- '10-'11 electrical static baseline
- Saved \$870,000 FY '12-13 (8.35 GWh)
- Saved \$1,000,000 FY'13-'14



Electricity

Occupants
receive \$
savings



Electricity

Occupants pay \$
difference
(starting 2014-2015)

Financial Incentives for CU-Boulder Labs - stretching research funding

- Replacing inefficient equipment - up to 5 years of resource (energy) savings
- Selection of new equipment that is efficient – up to 5 years resource savings
- Vacuum pump funding to replace faucet aspirator use
- And more!



Suggestions for Implementing a Green Labs Initiative

1. Raise awareness & give positive, public recognition
2. Build the culture- engage lab occupants & leaders
3. Create a collaborative, team approach involving stakeholders across campus
4. Connect occupants financially with their energy, water, trash, and space use.
5. Participate in efforts and utilize resources available nationally and internationally

Some National and International Green Lab Groups

- Green Labs Planning Google Group
- I2SL (and also Colorado I2SL Chapter)
- S-Labs
- Energy Star for Lab Grade Refrigerators and Freezers
- DOE Better Buildings Labs Project Team
- Green Chemistry Commitment

QUESTIONS?

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