

Better Buildings Webinar Series

We'll be starting in just a few minutes....

Tell us...

What topics are you interested in for future webinars?

Please go to **slido.com** and use event code **#DOE** to submit your responses.



Smart Tools for Smart Labs

March 2, 2021

3:00 – 4:00 pm EDT



Rachel Shepherd

U.S. Department of Energy

Agenda

1

Introductions & Polls

2

Live Demo of the Smart Labs Toolkit

3

CU Boulder Presentation

4

Closing Remarks

Please go to www.slido.com

using your mobile device, or by opening a new window

Enter Event Code

#DOE

We'd like to learn more about you!

Please go to www.slido.com and enter code **#DOE** to respond

Better Buildings Smart Labs Accelerator

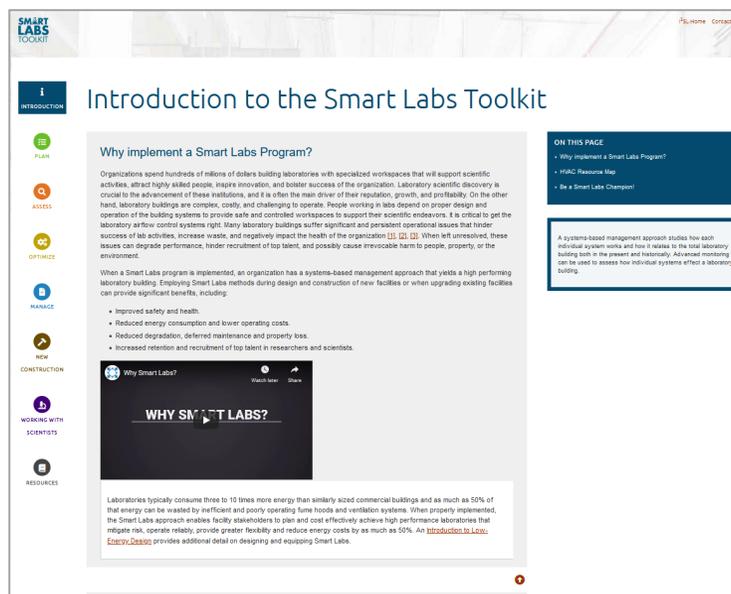
Accelerator Results

Accelerator partners worked to develop standardized approaches to overcoming common barriers to energy efficiency in laboratories.

- As a result, partners saved **103 billion BTUs** and realized an **average portfolio improvement of 11%**, on track to surpass a 20% energy reduction goal in 10 years.

Smart labs Accelerator Toolkit

- Within the SLA toolkit, you can find guidance materials and tools to help put together a team, assess laboratory functions, and optimize operations.



Today's Presenters



Rachel Romero
NREL



Amanda Kirkeby
NREL



Shannon Horn
University of Colorado Boulder



Kathryn Ramirez-Aguilar
University of Colorado Boulder

Poll 4

We'd like to learn more about you!

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National Renewable Energy Laboratory



Rachel Romero



Amanda Kirkeby



Smart Labs Toolkit

National Renewable Energy Laboratory (NREL)
Amanda Kirkeby | Rachel Romero



Energy
Efficiency
&
Sustainability



Safety



Cost
Savings

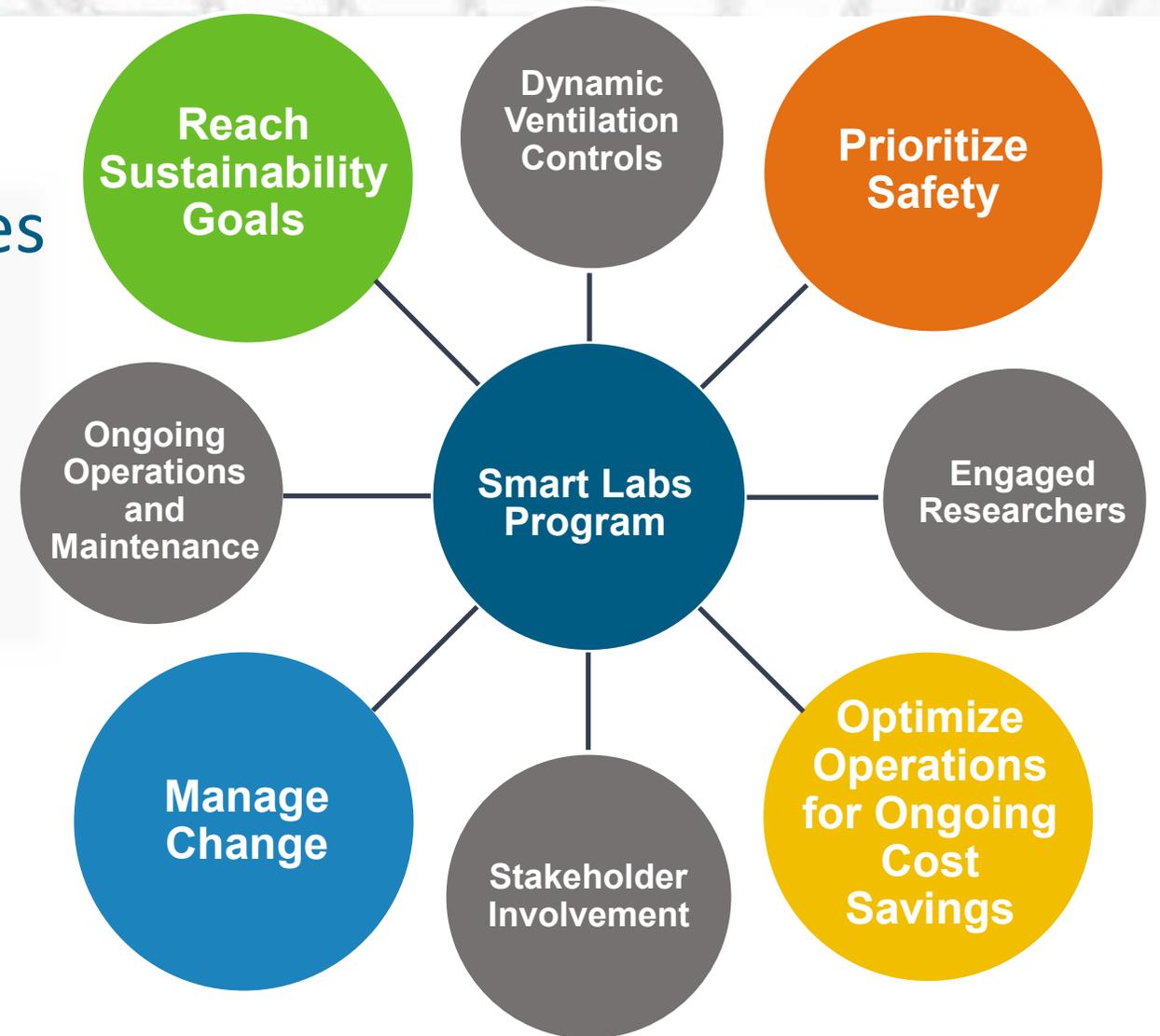


Resilience
and
Managing
Change



i

A Smart Labs program enables **world class science** through the design and operation of **safe and efficient** high-performance labs.

**Optimize safety****Reduce costs****Improve energy efficiency****Maintain high performance laboratories**

The Smart Labs Process

i



smartlabs.i2sl.org

The Toolkit Resources

i



Step-by-Step
Guidance



Tools



Training
Videos



Resources



Partner
Case Studies



INTRODUCTION

Smart Labs Toolkit



PLAN

The Smart Labs Toolkit describes a systematic process that helps laboratory owners and operators plan and cost-effectively achieve safe, efficient, and sustainable laboratories. This Toolkit was developed by several contributors and includes results of best practices and lessons learned from the [Better Buildings Smart Labs Accelerator](#).



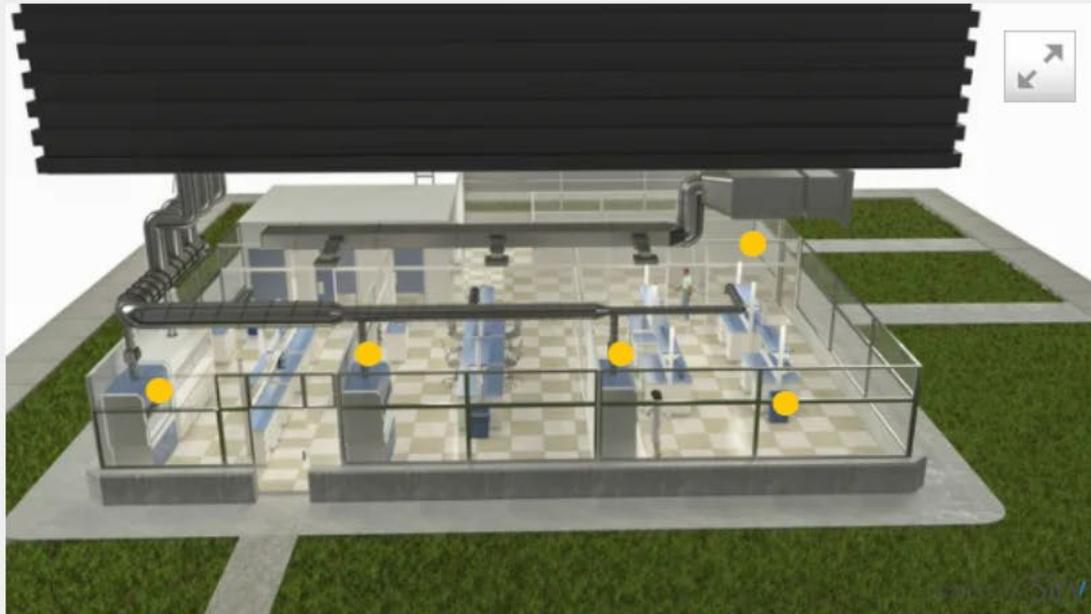
ASSESS



OPTIMIZE



MANAGE



Click on each dot in the graphic to learn about Smart Lab components that increase safety, reduce hazards, and increase energy efficiency.

GET STARTED

- **Be a Champion**

All successful projects have a champion who identifies opportunities to make buildings safer and more efficient. The champion helps identify opportunities and coordinate the process to implement the changes, including how the project will be funded, how the changes will be made, who needs to be informed, and who needs to be involved. Once a project is completed, the champion verifies that everything is working as intended.

- **Start With One Building**



Visit the Toolkit at smartlabs.i2sl.org



- ❑ Use tools, worksheets, and guidance available in the Toolkit
- ❑ Request support from DOE to develop a Smart Labs Program



Poll 5

We'd like to learn more about you!

Please go to www.slido.com and enter code **#DOE** to respond



Shannon Horn



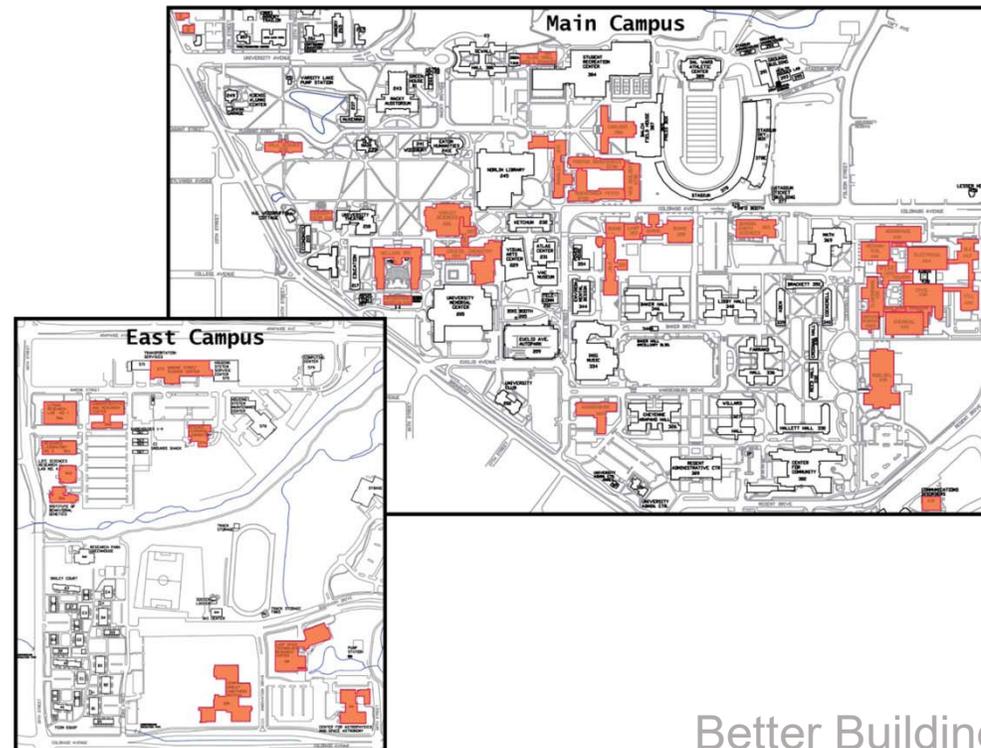
Kathryn Ramirez-Aguilar, PhD

Background/Introduction

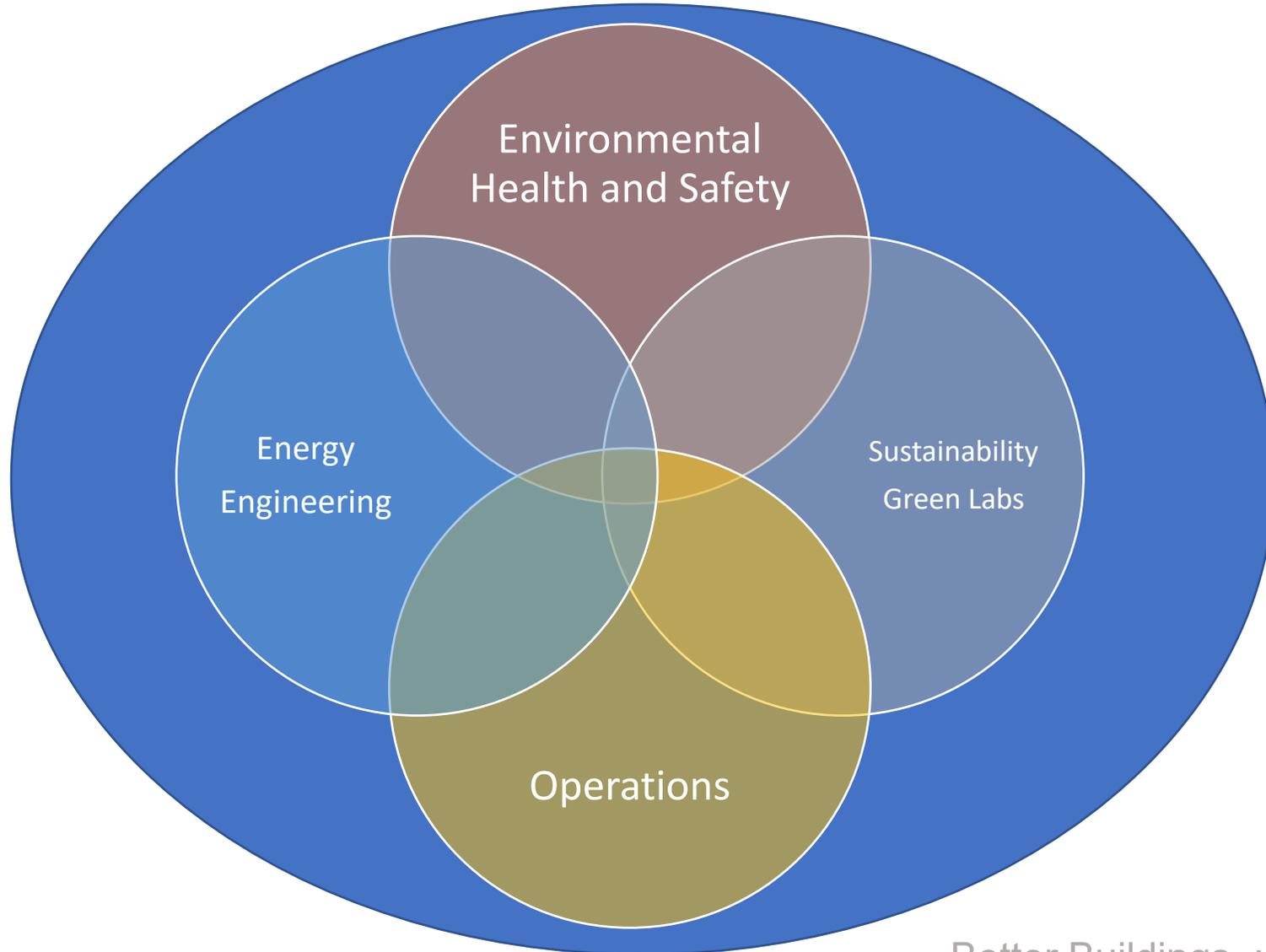
The University of Colorado Boulder has ~2.7 million square feet within major laboratory buildings.

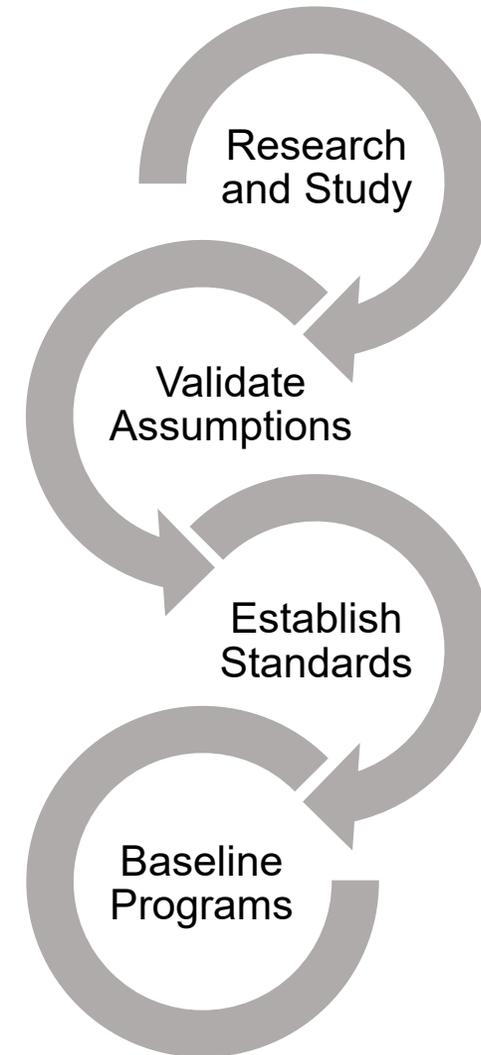
This accounts for ~22% of the total campus square footage and ~43% of the total annual energy consumption of the entire campus.

All lab buildings were built in different eras with different philosophies of safety, design, science, and functionality. Lab Air Change Rates contributes anywhere from 18% to 40% potential savings.

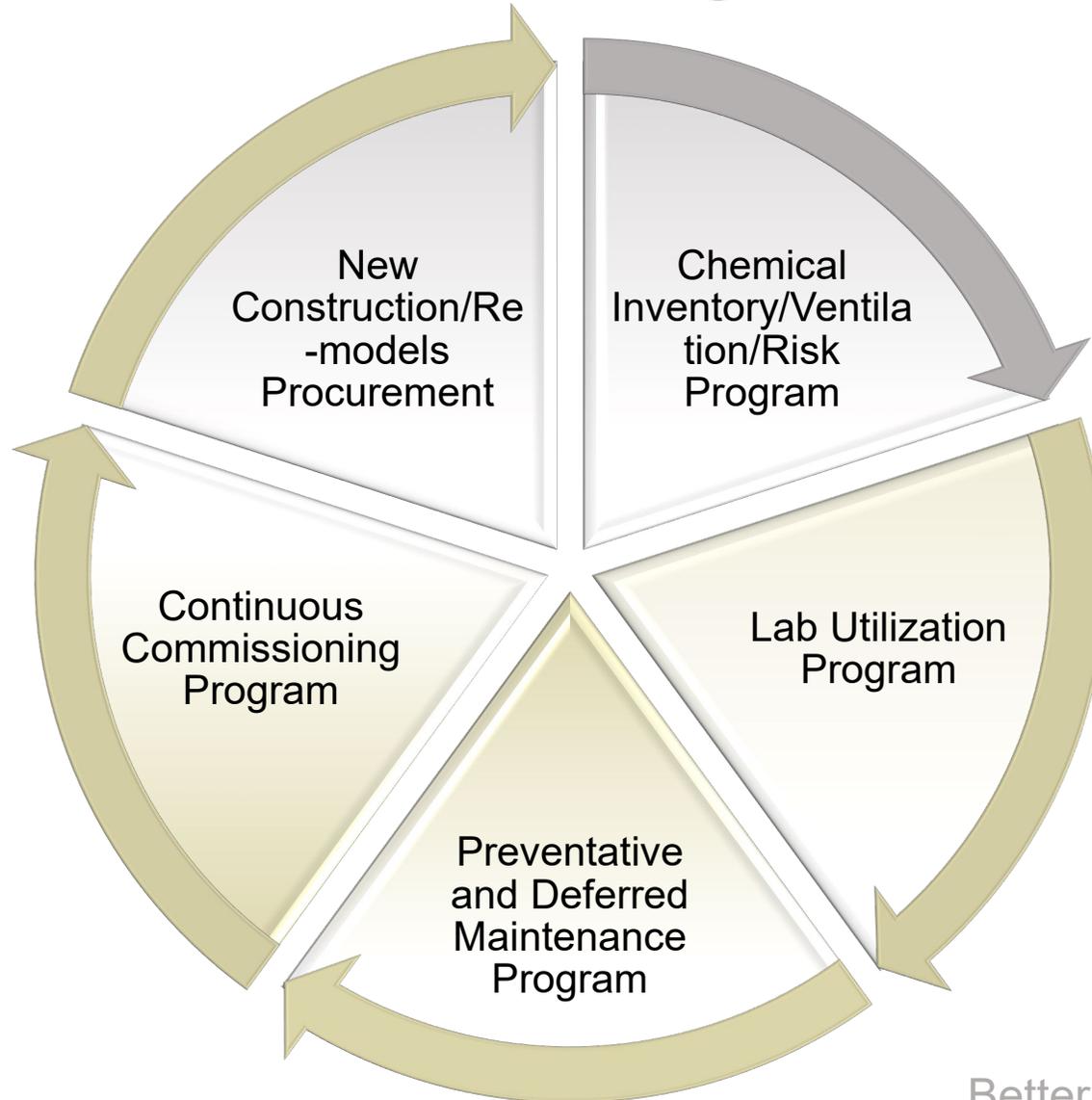


Infrastructure and Safety Core Team

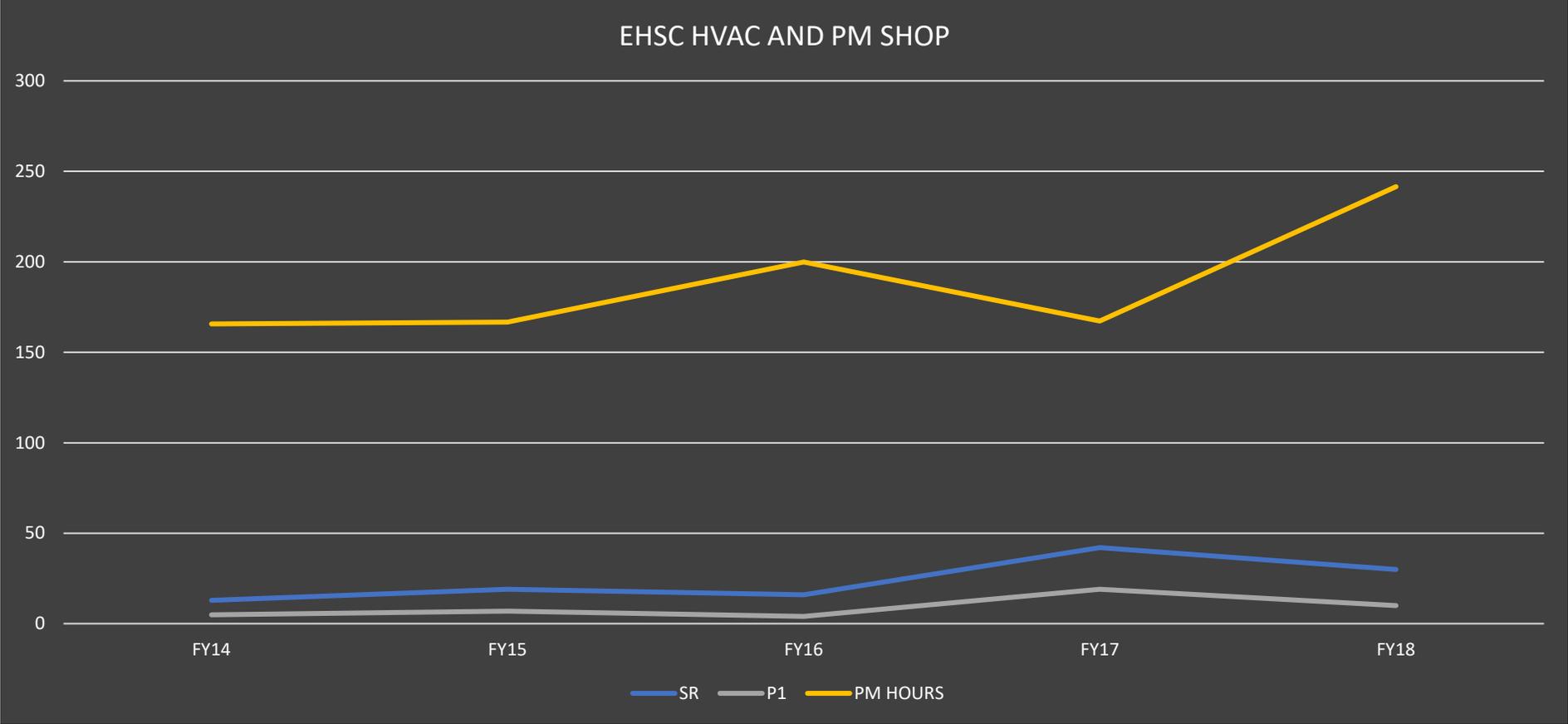




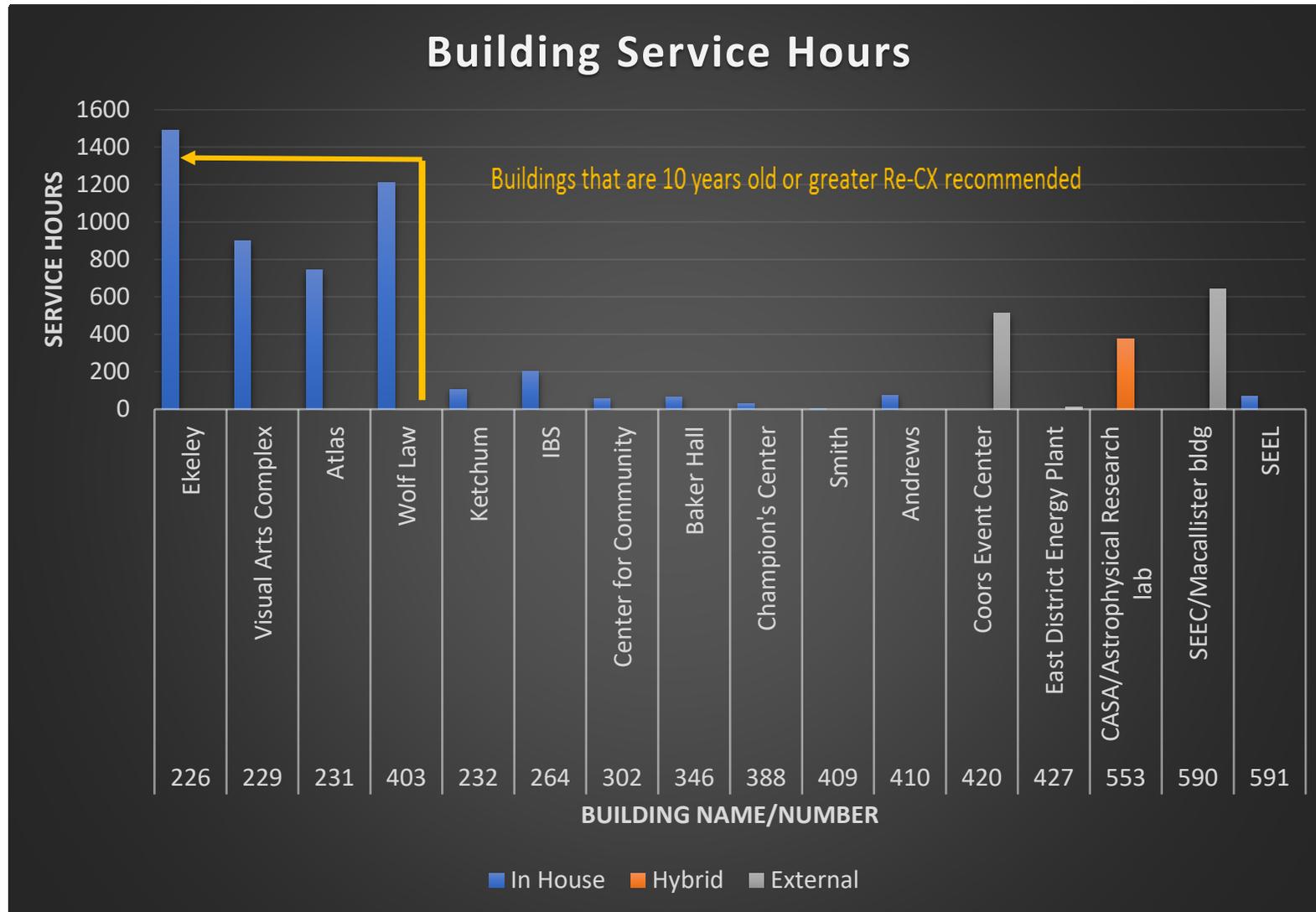
Baseline Programs

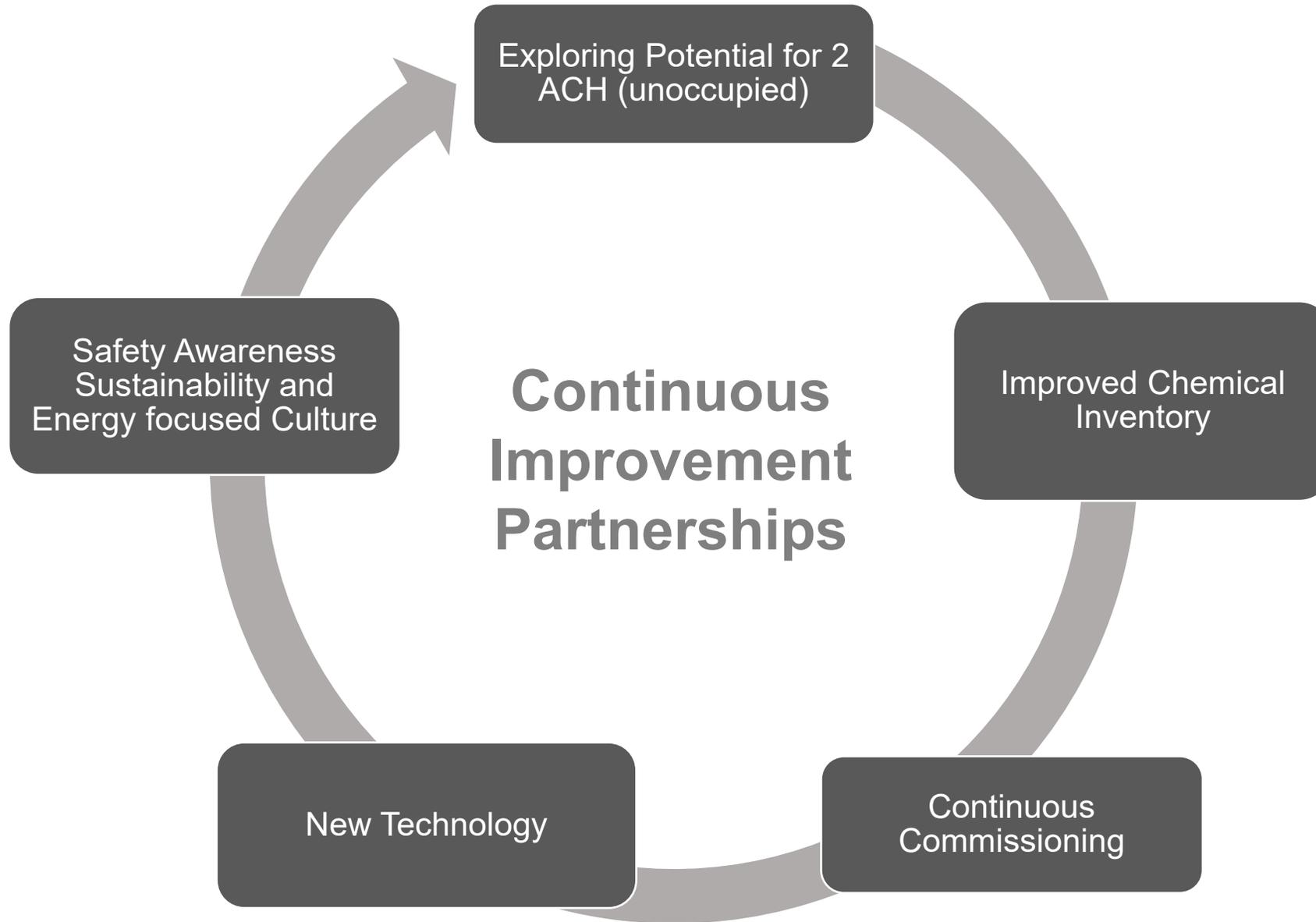


Lab Building Specific Example of Preventative Maintenance to Reduce Service Calls



Continuous Commissioning Program





Engineering ACH Optimization

- 20% Reduction in Energy consumption over the next 10 years
 - Infrastructure Investment new and Retrofit
 - VAV supply/exhaust
 - Low flow high performance fume hoods
 - Emergency Purge
 - Spot cooling
- Lab Ventilation assessments
- **Metric: 20% reduction in Energy Consumption over the next 10 years**



INTRODUCTION



PLAN



ASSESS



OPTIMIZE



MANAGE



NEW

CONSTRUCTION



WORKING WITH
SCIENTISTS

Working With Scientists and Researchers

When thinking about implementing a Smart Labs program, it is important to know the occupants and the research performed in lab spaces. Researcher safety is the utmost priority in any Smart Labs program, and a first step to ensuring their safety is through effective engagement and education. The following are tips for communicating with scientists that will encourage successful adoption of Smart Lab practices.

Engage Scientists and Researchers Early

Engaging scientists, including researchers, lab managers, new staff, technicians, and others involved in research operations, in the initial stages of the process is critical to ensure the long-term success of a Smart Labs program. An organization may do outstanding work to reduce the impact of a facility and provide researchers with a safe environment in which they can most effectively conduct their work, but ultimately it is scientists, the occupants, who dictate how the lab operates. Furthermore, not all researchers will be motivated or have the capacity to be involved in your Smart Labs program. Include scientists early in the process to:

- **Inform Decisions:** Researchers understand their needs better than anyone. Allow them to inform key decisions in the Smart Labs process to ensure research needs are met. Researchers may also have ideas that address issues in innovative ways.
- **Build Positive Relationships:** Including researchers in changes or updates made through Smart Lab measures will keep them informed throughout the process, leading to better adoption of practices that will lead to continued success of a Smart Labs program.

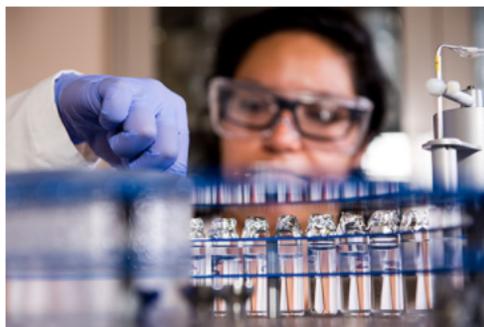


Photo credit: Andrea Starr | Pacific Northwest National Laboratory



Photo credit: Dennis Schroeder / NREL

ON THIS PAGE

- Green Lab Ambassador Program
- Green Chemistry
- Equipment-Specific Practices
- Sustainable Procurement
- Shared Equipment and Spaces
- Become My Green Lab Certified
- Bringing Efficiency to Research Grants

The benefits of working with the occupants, or scientists, can come through many different ways. Learn more in the case study on [Engaging Laboratory Researchers Stirs Cultural Shift Through a Lab Equipment Sharing Program at University of Colorado](#).

International Laboratory Freezer Challenge

2021 Competition Jan-July 2021 www.freezerchallenge.org

Reasons to participate:

- Increase energy efficiency
- Better sample accessibility
- Improved sample integrity
- Reduced costs

Challenge best practices and actions:

- Good management (preventative maintenance, inventorying, sample cleanouts)
- Temperature tuning
- Retirements & upgrades
- Cutting edge practices

**Great news for -70°C for Ultra Low Temp (ULT) Freezers!
CDC directs Pfizer vaccine storage between -60 & -80°C.**



cdc.gov/vaccines/covid-19/info-by-product/pfizer/downloads/storage-summary.pdf



freezer
challenge

“ULT freezers set to -70°C instead of -80°C use up to 40% less energy.”

Shared Research Equipment = Huge Sustainability Benefits

Many benefits of shared equipment with a manager

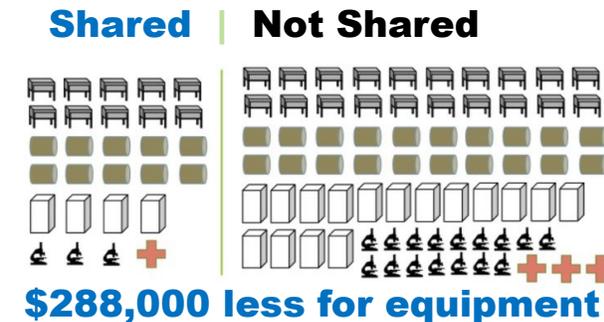
- Avoid duplicate equipment
- Energy & lab space efficiency
- Maximizing \$ investments
- Wide-spread scientist access to equipment and expertise
- Compliance with Code of Federal Regulations (CFRs) requiring sharing & avoiding duplication
- Many more...

For more info, visit:

colorado.edu/center/greenlabs/lab-equipment-space-sharing

CU Boulder Case Studies

Biochemistry Shared Cell Culture Facility



BioCore Shared Instrumentation



Bringing Efficiency to Research (BETR) Grants



- Goal is to connect efficiency expectations and sustainability to the funding of research
- Voluntarily incorporate actions for efficiency and sustainability in your grant proposals
- Visit betrgrants.weebly.com/ to learn more

Equipment Sharing

Space Utilization

Energy and Water Conservation

Assessments and Certification Tools

Applying for a GRANT?

Show sponsors you will **maximize** the impact of their research dollars with **BETR Grants!**



Bringing
Efficiency
To
Research
Grants

Include actions for efficiency in your proposal to stand out!

Q & A

Submit Questions
www.slido.com event code **#DOE**

Additional Resources

- [Smart Labs Accelerator Toolkit](#)
- [Smart Labs Toolkit Best Practices & Lessons Learned](#)
- [HVAC Resource Map for Laboratories](#)
- [Laboratory Benchmarking Tool](#)
- [My Green Lab](#)
- [Technical Resilience Navigator](#)
- [CU Green Labs Program](#)
- [Webinar: Efficient Cold Sample Storage](#)
- [CU Boulder Infrastructure and Sustainability Campus Collaborations](#)
- [UK Research and Innovation: Environmental Sustainability](#)

Poll 6

Please respond within Slido:

Suggestion Box:

What is one tool that you would find useful that wasn't included in today's webinar?

Please go to www.slido.com and enter code **#DOE** to respond

MAY
17-20
2021



Better Buildings, Better Plants
SUMMIT
A VIRTUAL LEADERSHIP SYMPOSIUM

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U.S. DEPARTMENT OF
ENERGY

2020-2021 Better Buildings Webinar Series



BUILDING RESILIENT COMMUNITIES: STATE AND LOCAL PERSPECTIVES

Tue, Sep 15, 2020 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



SCALING IMPACT: MULTI-BUILDING APPROACHES TO CARBON REDUCTION

Tue, Dec 1, 2020 | 3:00 - 4:30 PM ET

[WATCH RECORDING](#)



PERSPECTIVES ON RESILIENCE: INSURANCE AND CREDIT UNDERWRITING

Tue, Feb 9, 2021 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



INNOVATIVE ENERGY EFFICIENCY FINANCING IN PUBLIC HOUSING

Tue, Sep 22, 2020 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



SAVE ENERGY AND MONEY WITH THE BUILDING ENVELOPE CAMPAIGN

Tue, Dec 8, 2020 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



SMART TOOLS FOR SMART LABS

Tue, Mar 2, 2021 | 3:00 - 4:00 PM ET



CPACE FINANCING TURNS 10: IMPACTS, CHALLENGES, AND WHAT COMES NEXT

Tue, Oct 6, 2020 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



BEYOND ENERGY SAVINGS: QUANTIFYING THE ADDITIONAL BENEFITS FROM ENERGY EFFICIENCY

Tue, Jan 12, 2021 | 11:00 AM - 12:00 PM ET

[WATCH RECORDING](#)



LEVELING THE SLOPE: HELPING STATE AND LOCAL GOVERNMENTS REACH THEIR ENERGY GOALS

Tue, Mar 16, 2021 | 3:00 - 4:00 PM ET

[REGISTER TODAY >](#)



WASTEWATER TREATMENT 2.0: THE NEXT PHASE OF ENERGY EFFICIENCY AND RECOVERY

Tue, Oct 20, 2020 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



ONE SIZE DOES NOT FIT ALL: LESSONS LEARNED FROM FINANCING LARGE AND SMALL ENERGY RETROFITS

Tue, Jan 19, 2021 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



YOU HAVE A DATA CENTER – NOW WHAT? STORIES FROM THE FIELD

Tue, Apr 6, 2021 | 3:00 - 4:00 PM ET

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PLANNING FOR RESILIENCE IN MULTIFAMILY HOUSING: A PORTFOLIO-WIDE APPROACH

Tue, Nov 17, 2020 | 3:00 - 4:15 PM ET

[WATCH RECORDING](#)



CLIMATE RISK ASSESSMENTS: EVALUATING BUILDING SITES FOR PORTFOLIO RESILIENCE

Tue, Feb 2, 2021 | 3:00 - 4:00 PM ET

[WATCH RECORDING](#)



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2020-2021 Better Buildings Webinar Series



LEVELING THE SLOPE:

HELPING STATE AND LOCAL GOVERNMENTS
REACH THEIR ENERGY GOALS

Tue, Mar 16, 2021 | 3:00 - 4:00 PM ET

[REGISTER TODAY >](#)

For many state and local governments establishing energy and environmental goals, the ability to make data-driven decisions about cost-effective opportunities is hindered by the data itself. To address this issue, DOE developed the State and Local Planning for Energy (SLOPE) Platform, an online tool that integrates dozens of distinct sources of energy efficiency, renewable energy, and sustainable transportation data and analysis into an easy-to-access platform. This webinar will demonstrate SLOPE's functionality and provide examples of SLOPE's application in assisting state and local energy planning.



Meet Our Better Buildings Goal Achievers



Check Out Our Workforce Development Portal

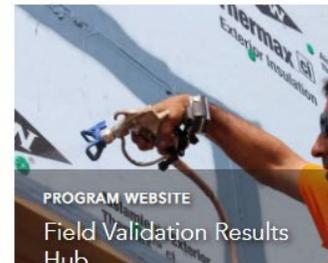
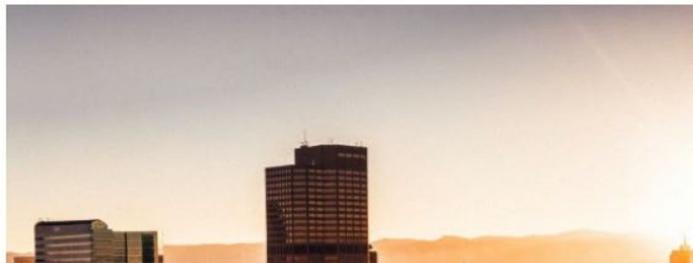


Explore The Renewable Energy Resource Hub

BETTER BUILDINGS

Better Buildings is an initiative of the U.S. Department of Energy (DOE) designed to improve the lives of the American people by driving leadership in energy innovation. Through Better Buildings, DOE partners with leaders in the public and private sectors to make the nation's homes, commercial buildings and industrial plants more energy efficient by accelerating investment and sharing of successful best practices.

Stay connected and informed: [subscribe here](#).



ON-DEMAND BETTER BUILDINGS WEBINARS



Through Better Buildings webinars, experts discuss a variety of topics from Air Management to Zero Energy. These webinars are helpful resources on key subject areas in energy efficiency, water efficiency, resilience, and more. Below are webinars we have held over previous years. For each webinar, you can watch the video recording and follow along with the slide deck. To sign up for an upcoming live webinar, [click here](#).

EXPLORE BY TOPIC

[Building Envelope](#) | [Communications & Engagement](#) | [Data Centers](#) | [Energy Data Management](#) | [Financing](#) | [Green Leasing](#) | [Health & Wellness](#) | [Industrial](#) | [K-12 Schools](#) | [Lighting](#) | [Multifamily](#) | [Plug & Process Loads](#) | [Refrigeration](#) | [Renewables Integration](#) | [Resilience](#) | [Smart Labs](#) | [Space Conditioning](#) | [Treasure Hunts](#) | [Waste Reduction](#) | [Water & Wastewater](#) | [Workforce Development](#) | [Working with National Labs](#) | [Zero Energy Buildings](#)

■ Indicates the session was a part of the 2020 Virtual Summit. To view a full list of the Summit Sessions, [click here](#).

BUILDING ENVELOPE

A building's envelope (walls, windows, roof, and foundation) accounts for approximately 30% of the primary energy consumed in residential and commercial buildings. Explore all previously recorded webinars on this topic by pressing MORE.



- [Unsealed: The Building Envelope Campaign](#) (2020) ■
- [Sneak Peek of the Building Envelope Campaign](#) (2020)
- [Addressing the Envelope: Recognizing Building Enclosure Improvements](#) (2020)
- [Innovative Wall Technologies for Commercial Buildings](#) (2019)
- [Energy Savings Impact of Airtightness in U.S. Commercial Buildings](#) (2019)
- [Building Envelope/Enclosure Commissioning and Retro-commissioning](#) (2017)

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- Watch recordings
- Follow along with slides

Additional Questions?

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<https://betterbuildingsolutioncenter.energy.gov/>



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