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
We’d like to learn more about you!

Please go to [www.slido.com](http://www.slido.com) and enter code #DOE to respond
Why Smart Labs?

- Safety
- Cost Savings
- Energy Efficiency & Sustainability
- Resilience and Managing Change
A Smart Labs program enables world class science through the design and operation of safe and efficient high-performance labs.
The Smart Labs Process

smartlabs.i2sl.org
The Toolkit Resources

- Step-by-Step Guidance
- Tools
- Training Videos
- Resources
- Partner Case Studies
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.

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**
  By developing an understanding of the building's characteristics and the current operating procedures, one can identify priorities and set realistic goals.
Take Action!

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
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.
• Safety, Risk, Culture

Engineering and Energy
• Safety, Risk, Functionality, Resilience, Efficiency, Culture

Green Labs and Sustainability
• Efficiency, Sustainability, Culture and Partnerships

Facility Operations
• Functionality, Resilience, Safety and Culture

Research and Study
Validate Assumptions
Establish Standards
Baseline Programs

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Lab Building Specific Example of Preventative Maintenance to Reduce Service Calls

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Continuous Commissioning Program

Building Service Hours

- Buildings that are 10 years old or greater Re-CX recommended

<table>
<thead>
<tr>
<th>Building Name/Number</th>
<th>Service Hours</th>
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<tbody>
<tr>
<td>Ekeley</td>
<td>1400</td>
</tr>
<tr>
<td>Visual Arts Complex</td>
<td>1200</td>
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<tr>
<td>Atlas</td>
<td>1000</td>
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<tr>
<td>Wolf Law</td>
<td>800</td>
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<tr>
<td>Ketchum</td>
<td>600</td>
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<td>IBS</td>
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<td>Center for Community</td>
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<tr>
<td>Baker-Hall</td>
<td>100</td>
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<tr>
<td>Champion's Center</td>
<td>50</td>
</tr>
<tr>
<td>Smith</td>
<td>30</td>
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<tr>
<td>Andrews</td>
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<tr>
<td>Coors Event Center</td>
<td>20</td>
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<tr>
<td>East District</td>
<td>10</td>
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<tr>
<td>CASA/ASTRO Physical Research Lab</td>
<td>5</td>
</tr>
<tr>
<td>SEEC/Macallister Building</td>
<td>10</td>
</tr>
<tr>
<td>SEEL</td>
<td>5</td>
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</tbody>
</table>

SERVICE HOURS

In House | Hybrid | External
Exploring Potential for 2 ACH (unoccupied)

Safety Awareness
Sustainability and Energy focused Culture

Improved Chemical Inventory

New Technology

Continuous Commissioning

Continuous Improvement Partnerships

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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
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 Shier | 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 Sbns Cultural Shift Through a Lab Equipment Sharung Program at University of Colorado](...).
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.

“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/ecenter/greenlabs/lab-equipment-space-sharing](http://colorado.edu/ecenter/greenlabs/lab-equipment-space-sharing)

CU Boulder Case Studies

Biochemistry Shared Cell Culture Facility

- **$288,000 less for equipment**

BioCore Shared Instrumentation

- **30% less space**
- **$800,000 less in new construction**
- **$195,000/year direct costs**
- **$58,000/year indirect costs**
- **$900,000+ in avoided equipment purchases so far**
- **4 Departments**
- **100 Lab Groups**
- **4000 instruments tracked**
- **90 permanently shared**
- **370 redistributed to labs**
- **$900,000+ in avoided equipment purchases so far**
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
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?

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Better Buildings, Better Plants SUMMIT
A VIRTUAL LEADERSHIP SYMPOSIUM

REGISTER NOW! betterbuildingsolutioncenter.energy.gov/summit
<table>
<thead>
<tr>
<th>Webinar Title</th>
<th>Date</th>
<th>Time</th>
<th>Recording Link</th>
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<tr>
<td><strong>2020-2021 Better Buildings Webinar Series</strong></td>
<td></td>
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<tr>
<td><strong>Building Resilient Communities:</strong> State and Local Perspectives</td>
<td>Tue, Sep 15, 2020</td>
<td>3:00 - 4:00 PM ET</td>
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<tr>
<td><strong>Innovative Energy Efficiency Financing in Public Housing</strong></td>
<td>Tue, Sep 22, 2020</td>
<td>3:00 - 4:00 PM ET</td>
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<td><strong>C-PACE Financing Turns 10:</strong> Impacts, Challenges, and What Comes Next</td>
<td>Tue, Oct 6, 2020</td>
<td>3:00 - 4:00 PM ET</td>
<td>WATCH RECORDING</td>
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<td><strong>Wastewater Treatment 2.0:</strong> The Next Phase of Energy Efficiency and Recovery</td>
<td>Tue, Oct 20, 2020</td>
<td>3:00 - 4:00 PM ET</td>
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</tr>
<tr>
<td><strong>Planning for Resilience in Multifamily Housing:</strong> A Portfolio-Wide Approach</td>
<td>Tue, Nov 17, 2020</td>
<td>3:00 - 4:15 PM ET</td>
<td>WATCH RECORDING</td>
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<tr>
<td><strong>Scaling Impact:</strong> Multi-Building Approaches to Carbon Reduction</td>
<td>Tue, Dec 1, 2020</td>
<td>3:00 - 4:30 PM ET</td>
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<tr>
<td><strong>Save Energy and Money with the Building Envelope Campaign</strong></td>
<td>Tue, Dec 8, 2020</td>
<td>3:00 - 4:00 PM ET</td>
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<td><strong>Beyond Energy Savings:</strong> Quantifying the Additional Benefits from Energy Efficiency</td>
<td>Tue, Jan 12, 2021</td>
<td>11:00 AM - 12:00 PM ET</td>
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<tr>
<td><strong>One Size Does Not Fit All:</strong> Lessons Learned from Financing Large and Small Energy Retrofits</td>
<td>Tue, Jan 19, 2021</td>
<td>3:00 - 4:00 PM ET</td>
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<tr>
<td><strong>Climate Risk Assessments:</strong> Evaluating Building Sites for Portfolio Resilience</td>
<td>Tue, Feb 2, 2021</td>
<td>3:00 - 4:00 PM ET</td>
<td>WATCH RECORDING</td>
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<tr>
<td><strong>Perspectives on Resilience:</strong> Insurance and Credit Underwriting</td>
<td>Tue, Feb 9, 2021</td>
<td>3:00 - 4:00 PM ET</td>
<td>WATCH RECORDING</td>
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<tr>
<td><strong>Leveling the Slope:</strong> Helping State and Local Governments Reach Their Energy Goals</td>
<td>Tue, Mar 16, 2021</td>
<td>3:00 - 4:00 PM ET</td>
<td>REGISTER TODAY</td>
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<tr>
<td><strong>You Have a Data Center – Now What? Stories from the Field</strong></td>
<td>Tue, Apr 6, 2021</td>
<td>3:00 - 4:00 PM ET</td>
<td>REGISTER TODAY</td>
</tr>
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</table>

Subscribe to our email list to stay up-to-date on the latest Better Buildings webinars.
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.
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.

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- Follow along with slides

Learn more at: https://betterbuildingssolutioncenter.energy.gov/webinars-on-demand

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)
- Building Envelope/Enclosure Commissioning and Retro-commissioning (2017)