Lab Benchmarking Symposium

Introduction

Alison Farmer
• Describe state of lab benchmarking today
• Introduce the I²SL Lab Benchmarking Working Group
• Reveal latest updates to Labs21 Benchmarking Tool
• Hear your feedback on next steps
Defining Benchmarking

• Whole building energy benchmarking
• Comparing buildings’ energy consumption

• Contextualizing
• Prioritizing
• Ranking
• Certifying
Benchmarking for Lab Buildings

- Important
- In demand
- Difficult!
  - Complex and varied functional requirements
The Labs21 Benchmarking Tool

- Online crowdsourced database:
  - Lab building energy usage
  - Lab-specific functional requirements
- Released in 2002
- Developed by LBNL for Labs21 program

- Select a peer group of buildings from database and compare energy usage
- Volunteers from I²SL community
- Formed in 2014
- Mostly focused on Labs21 Benchmarking Tool
  - Preservation
  - Understanding usage and needs
  - Maintenance
  - Upgrades
- Group meeting Wednesday 1pm – all welcome
• Kept the lights on!

• 2015 Lab Benchmarking Survey

• New regression analysis of tool data

• Website upgrades

• Identified future potential upgrades
Thanks to all group members!

Special thanks to:

• Presentation team: Jacob Werner, Hadley Stolte
• Website team: Hadley Stolte, David Cohen
• Regression and survey analysis: Tim Deak
• FAQs team: Michelle Ruda, David Landman
• Secretary: Michelle Ruda

• From LBNL: Paul Mathew, Travis Walter, Dan Fuller
Symposium Agenda

Jacob:
• The demand for lab benchmarking
• Lab benchmarking datasets and tools

Alison (subbing for Hadley):
• The Labs21 tool: history and data
• Industry demand for improvements
• Upgrades made so far

Alison:
• Possible next steps
• Open discussion
Symposium Agenda

Jacob:
• The demand for lab benchmarking
• Lab benchmarking datasets and tools

Alison (subbing for Hadley):
• The Labs21 tool: history and data
• Industry demand for improvements
• Upgrades made so far

Alison:
• Possible next steps
• Open discussion
Evolution of the Labs21 Benchmarking Tool
Learning Objectives

• Describe how to access the latest lab data from the Labs21 peer group database

• Identify how to avoid the most common mistakes made by tool users

• Master the newly added features of the Labs21 benchmarking tool

• Demonstrate the benefits of the I²SL/LBNL collaborative efforts on lab benchmarking
Labs21 Benchmarking Tool: Purpose

- Benchmarking by data filtering
- Select a peer group of buildings for comparison
  - Lab area ratio
  - Lab type
  - Lab use
  - Lab occupancy hours
  - Climate zone

- Compare energy use intensity with peer group
• Developed by LBNL for Labs21 program
• Public since August 2002

http://labs21benchmarking.lbl.gov
• Currently ~40 new buildings per year
• Half of data is less than 5 years old
• Spread across country
• The usual concentrations
• 6 from Missouri!
Labs21 Benchmarking Tool: Dataset

- 122 million sf of buildings
- 58 million sf of lab space

5-10% of total!
Labs21 Benchmarking Tool: Dataset

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5-10% of total!
Labs21 Benchmarking Tool: Dataset

Lab Use

- R&D: 66%
- Teach: 10%
- Manuf.: 4%
- Comb./Other: 20%
Labs21 Benchmarking Tool: Dataset

- Large spread of energy intensity
- Average source EUI: 630 kBtu/sf/yr
- Average site EUI: 319 kBtu/sf/yr
- Median lab area: 41%
• Rich dataset

• Unprecedented in size

• Enormous potential

• But not perfect…
Many have used the tool at least once

Common reasons for not using tool:

- Unaware of existence
- Confusing interface and output
- Data perceived to be limited and old
- NMJ
Only 10% of those with data submit it

- No time
- No permission
- Unaware of tool
- NMJ
- Dataset not worth it
Survey results: Desires

More Data
• More buildings
• More detail / metrics

Favorite metrics
• Site EUI
• End use breakdown
• Air change rate
Other Issues

• Spoiled data entries
  • Unit conversion errors
  • Misunderstandings
  • Data rejected from peer group

• Hosting and funding
Issues Addressed

Issues
- Perception of age
- Perception of limited data
- Confusing interface
- Frustrating interface
- Data submission errors
- Data quality issues
- Funding gaps
- Aging servers

Solutions
- Interface upgrade
- Display # buildings
- Improved FAQs
- Live data checks
- Select all climate zones
- WG could validate data
- Outreach and promotion
- Server upgrades
The New Look

“2002”

benchmarks

“2016”
The purpose of this benchmarking database tool is to allow laboratory owners to compare the performance of their laboratory facilities to similar facilities and thereby help identify potential energy cost savings opportunities. The tool will allow benchmarking with energy use metrics (e.g. BTU/sf/yr) as well as system efficiency metrics (e.g. W/cfm).

To benchmark a facility, you will need to input facility characteristics (e.g. lab type, gross area) and energy use data (e.g. annual electricity use). Although measured data is preferred, estimated data may also be provided. The data you provide will remain anonymous to other users of the database.

Note: You will be prompted for a username and password in order to enter data and benchmark your lab. You may input data over multiple sessions. If you only wish to view the data, without inputting data for your lab, login is not required.

- Acquire a username and password, or edit your existing profile
- Bulk data input spreadsheet (to input 5 or more facilities)
- Guidance on how to use this tool for LEED-EB

Frequently Asked Questions
Welcome to the Labs21 Benchmarking Tool!
Use this tool to compare the energy use of your lab buildings with that of similar facilities in the US. The tool's database contains owner-submitted data from an ever-growing number of lab facilities.

Buildings in database: 639
Last database update: July 2016

Enter Data
Enter your data into the database. Your facilities appear in output reports. Username and password required.

View Data
View data already in the database. Output reports show database facilities only. No login required.
Live Data Checks

Gross Area (sq. ft.)*

Lab Area (sq. ft.)*
(Area requiring 100% outside air)

% Biological

% Chemical

% Physical

% Other

Continue

labs21benchdev.lbl.gov says:
Lab area entered is less than 100 square feet. Please verify lab area
4. Lab Use
- Research/Development
- Manufacturing
- Combination/Others
- Teaching

5. Climate [Climate Code, Climate Type, Representative City]
(Click here to see map of climate zones)
- 1A, Very Hot - Humid (Miami, FL)
- 2B, Hot - Dry (Phoenix, AZ)
- 3B, Warm - Dry (El Paso, TX)
- 4A, Mixed - Humid (Baltimore, MD)
- 4C, Mixed - Marine (Salem, OR)
- 5B, Cool - Dry (Boise, ID)
- 6B, Cold - Dry (Helena, MT)
- 8, Subarctic (Fairbanks, AK)
- 2A, Hot - Humid (Houston, TX)
- 3A, Warm - Humid (Memphis, TN)
- 3C, Warm - Marine (San Francisco, CA)
- 4B, Mixed - Dry (Albuquerque, NM)
- 5A, Cool - Humid (Chicago, IL)
- 6A, Cold - Humid (Burlington, VT)
- 7, Very Cold (Duluth, MN)

6. Measured and Estimated data
- Measured
- Estimated

[Buttons: Reset Values, Continue...]
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- Research/Development
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5. Climate [Climate Code, Climate Type, Representative City]
   (Click here to see map of climate zones)
- All Climate Zones
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- Measured
- Estimated
Output Plot: Before
• Labs21 tool is a unique, valuable, and free resource

• Updates and upgrades:
  • Successful collaboration between I²SL and LBNL
  • More work is needed!