The Future of Lab Benchmarking

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Learning Objectives

- Identify the potential uses of benchmarking data for labs and those that are in use by the community today
- List a variety of metrics by which lab buildings can be compared
- Understand the stated benchmarking needs of lab professionals today
- Contribute to the discussion on the future trajectory of lab benchmarking

The I^{2}SL Benchmarking Working Group

- Genesis: future of Labs21 tool
  - Funding
  - Maintenance
  - Ownership and hosting
  - Aging interface
- Mission: to maximize the value of benchmarking in lab sustainability
  - Not just about the Labs21 tool
  - Whole-building benchmarking
- Group meeting Wed afternoon – all welcome!

i2sl.org/working/benchmarking.html

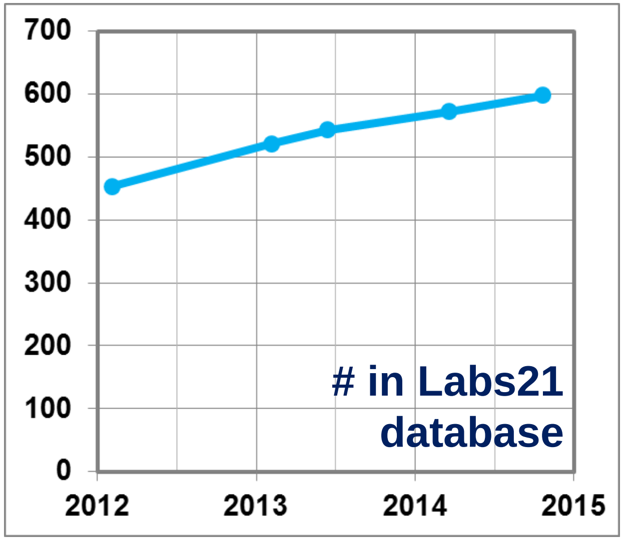
Benchmarking trends

- Increased demand:
  - Disclosure ordinances
  - LEED EBOM
  - ASHRAE audits
  - ASHRAE bEQ
- Tools becoming sophisticated:
  - Portfolio Manager/Energy Star
  - Building Performance Database
  - EnergyIQ
- There is a future

Benchmarking trends for labs

- Not much in last 10 years
  - Many institutions benchmark internally
  - Private datasets held by designers, consultants, energy monitoring companies
  - Plenty of confusion about lab EUIs

- Labs21 tool only real resource
  - Lab-specific filtering
  - Sustained tool usage



- Energy Star coming for pharma

Where do we go from here?

1) How is benchmarking data used?

- Scoping
- Ranking
- Research
- Industry trends
- Target setting
- Design criteria

Where do we go from here?

2) How *should* data be used?

- Labs are tricky
- Functional requirements vs. inefficiencies
  - Type of lab
  - Climate zone
  - Lab area

?

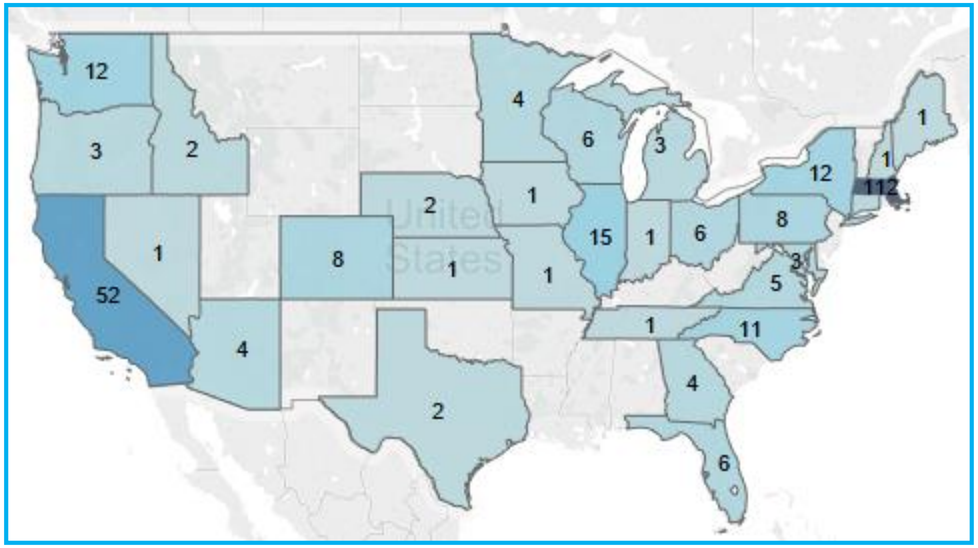
  - # fume hoods?
  - Tight humidity limits?
  - Local code restrictions on ACH?
  - Pneumatic controls

Many possible directions

- Automatic data transfer
- Update regression analysis
- Live submetering data
- Publish annual report
- Granular BMS data
- Update Labs21 tool user interface
- Longitudinal benchmarking
- Incorporate in BPD
- Actionable outputs
- Paywalls and incentives
- International expansion
- Rankings (e.g. Energy Star)
- Leveraging utility efficiency programs
- API for data export to other tools

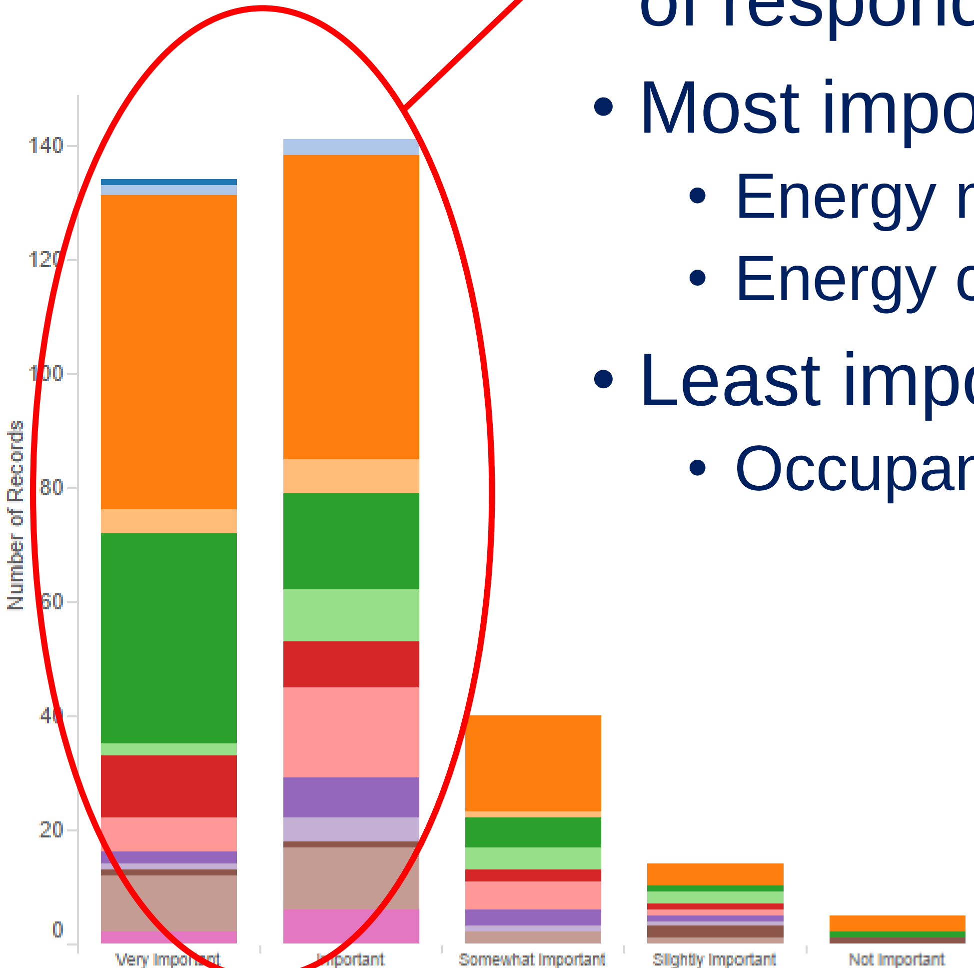
We asked you:
The benchmarking survey

- March-May 2015
- 376 responses:
  - Many facilities, design arch/eng, consultants
  - Most from USA



Credit: Vikram and Tim

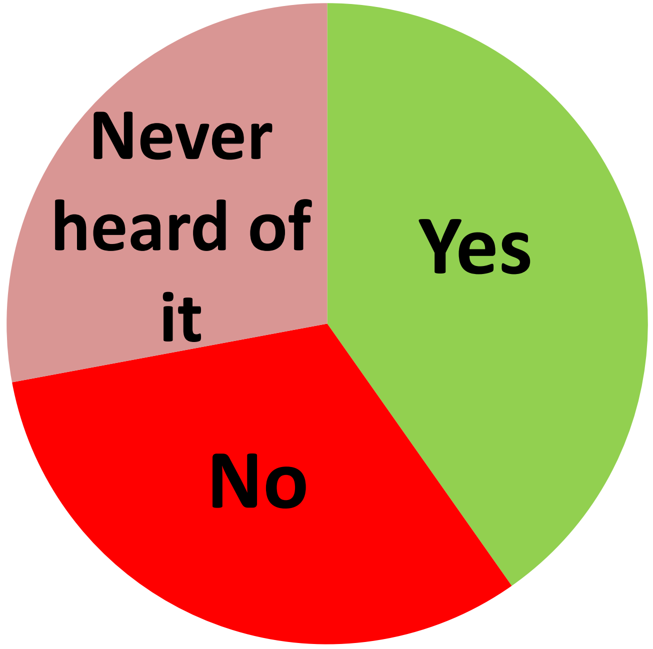
You care about benchmarking



- Important or very important to 80% of respondents
- Most important to:
  - Energy managers
  - Energy consultants
- Least important to:
  - Occupants

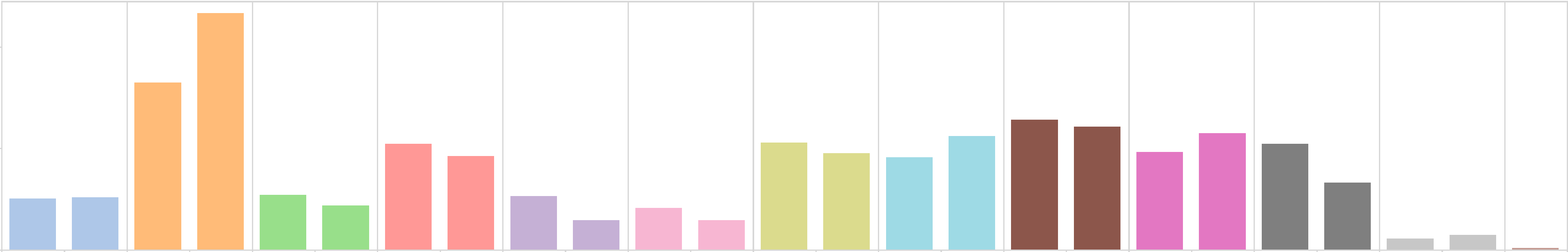
Some of you use the Labs21 tool

- Most usage:
  - Energy consultants
- Less usage:
  - Facilities and owners
  - Design arch/eng
- Least usage:
  - Occupants
  - Vendors



Data use cases as expected

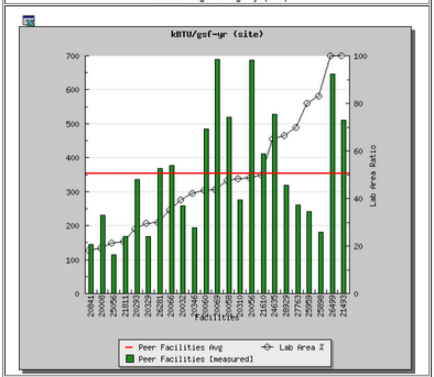
- Labs21 tool uses match overall benchmarking uses
- Commonly claimed uses:
  - Comparing energy performance against peers
  - Supporting business case for energy projects and efficient design
  - Quantifying typical loads for design
  - Encouraging occupants to conserve
- Only 3% said LEED EBOM



There's some confusion

- Common reasons for not using Labs21 tool:
  - Unaware of existence
  - Confusing interface and output
  - Data perceived to be limited and old
  - NMJ

Total Building kBTU/gsf-yr (site)



Lab area ratio: 0.00-1.00 | Occupancy hours: Both
Lab type: Chemical, Biological, ChemicalBiological
Lab uses: Research/Development, Combination/Others, Teaching
Climate Zones: 3C
Measured data: Yes Estimated data: No

Benchmark Statistics for Peer Facilities

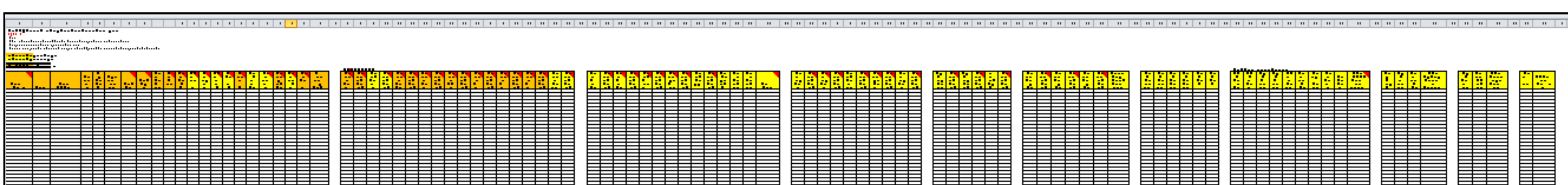
Metric	Min	Avg	Max	Count
Total Building kBTU/gsf-yr (site)	113.53	352.46	689.77	23

Click titles of columns below to sort
Data for your facilities are highlighted | Estimated data are indicated in *italics*

Facility	Lab Type	Year	kBTU/gsf-yr (site)	Lab Area Ratio	Occupancy hours per week	Climate
20841	ChemicalBiological	2011	143.52	18%	126	3C
20008	Biological	2001	229.49	19%	72	3C
25056	ChemicalBiological	2014	113.53	21%	70	3C
21811	Chemical	2009	167.72	22%	80	3C
20293	ChemicalBiological	2008	336.17	27%	168	3C
20329	Biological	2009	167.07	30%	168	3C
26281	ChemicalBiological	2007	367.99	30%	50	3C
20066	ChemicalBiological	2003	377.44	35%	72	3C
20032	Chemical	2002	258.84	39%	144	3C
20346	Biological	2009	194.01	42%	108	3C
20060	ChemicalBiological	2004	485.47	43%	72	3C
20069	Chemical	2003	689.77	44%	72	3C
20058	ChemicalBiological	2003	518.45	47%	72	3C
20310	Chemical	2006	275.52	48%	65	3C
20056	Biological	2003	686.9	48%	72	3C
21610	ChemicalBiological	2009	410.5	50%	45	3C
24635	ChemicalBiological	2011	526.79	65%	80	3C
28929	Biological	2013	317.99	66%	80	3C
27763	ChemicalBiological	2012	260.42	70%	60	3C
25959	Biological	2011	240.8	80%	72	3C
25898	Biological	2011	181.74	83%	50	3C
26499	Biological	2011	646.76	100%	168	3C
21493	Biological	2009	509.78	100%	40	3C

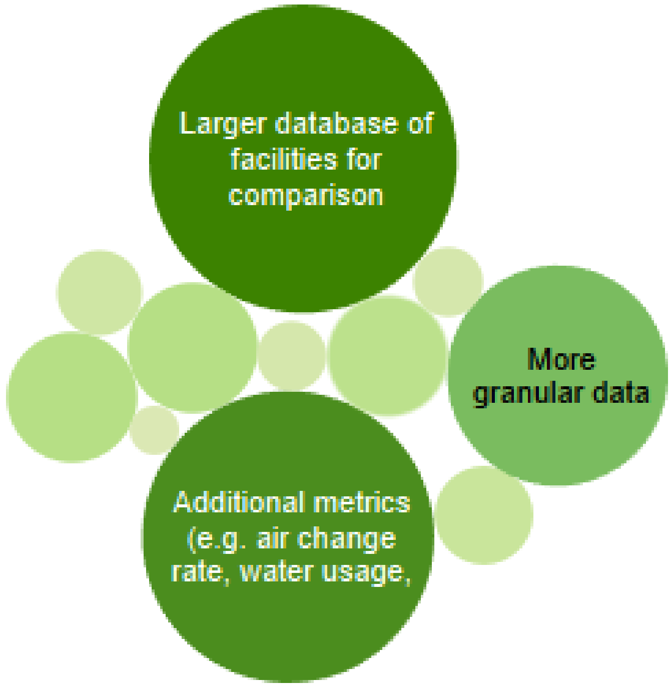
Benchmark Your Lab (login req'd)

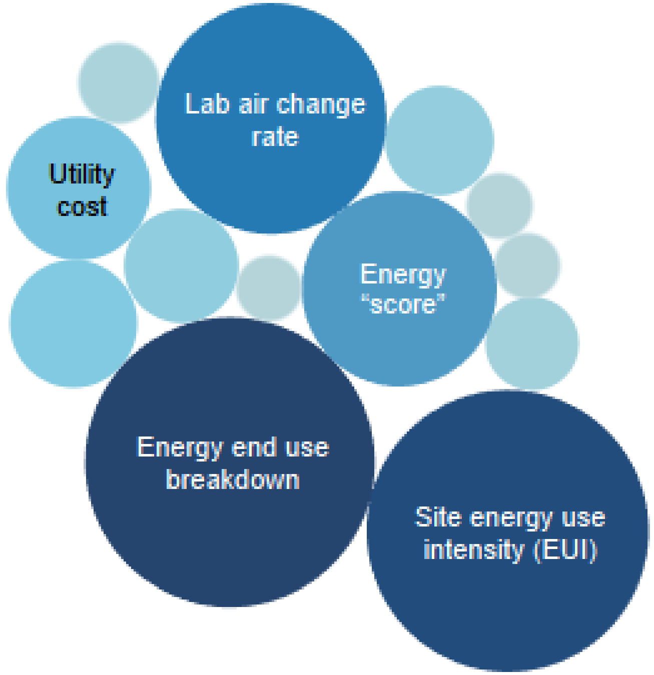
View Data (as guest user)



What you want

- More buildings
- More detailed data



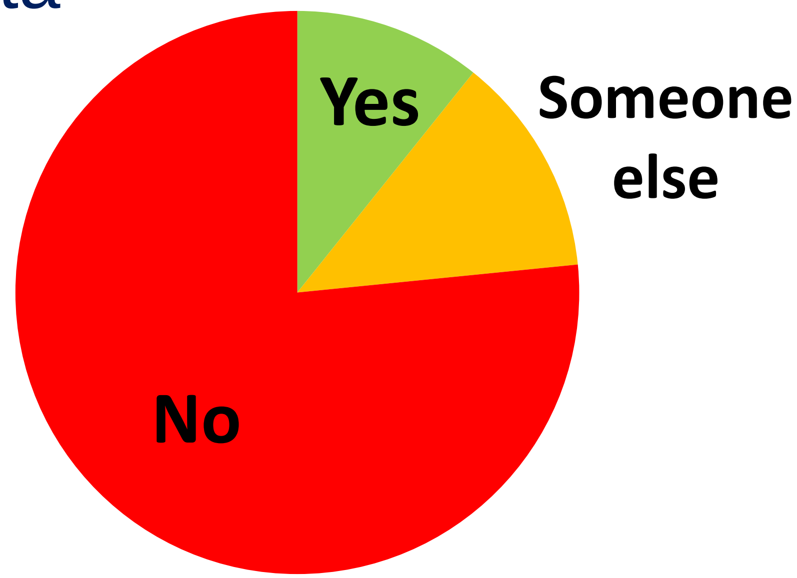


Favorite metrics:

- Site EUI
- End use breakdown
- Air change rate

What you give

- Only 10% of those with data submit it
  - **No time**
  - No permission
  - Unaware of tool
  - NMJ
  - Dataset not worth it



- 50% of those with data would be prepared to enter more
  - Really?
  - Some questions aren’t easy

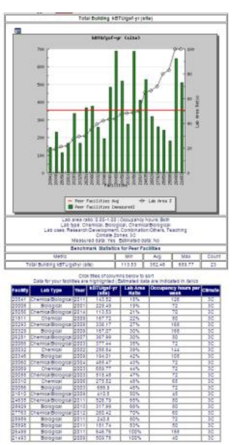
Proposal: 2 parallel paths

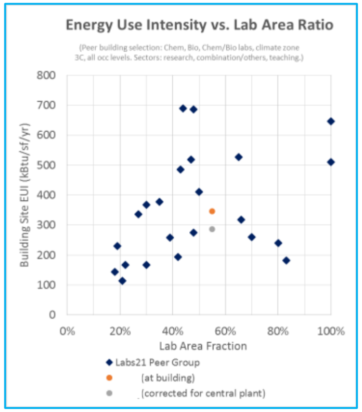
- Retain Labs21 tool for high-level scoping
  - Useful conversation starter
  - Minimal barrier to use
  - Broad participation

- Tackle other important questions separately
  - Targeted
  - Specific
  - Detailed

The future of the Labs21 tool

1. Secure hosting	LBL servers
2. Train data checkers	Working group members
3. Update and simplify interface & documentation	PHP programmer needed New regression analysis?
4. Outreach effort	I[2]SL network





Targeted investigations

- Answer specific important questions with demographic and statistical data
- Aggregate data from other studies (or case studies)
- New resources for I^2SL webpage
- Examples:
  - **End use breakdown:** collate data from lab plug load studies (Stanford, UC Irvine, UC Davis, CEEL)
  - **Lab air change rates:** collect data on institutional policies and investigate trends
  - **Total lab area in US**
  - **Do chilled beams result in energy savings?**

Questions?

Working group meeting: Wed 1:30-3:30pm

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