



10-year status report

Filtered Fume Hoods

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Learning Objectives

- **What** a “filtered” fume hood is and is not
- **Benefits** of using filtered hoods
- **Applications** for filtered hoods



That's a lot of conditioned air!

- Estimated 750,000 ducted fume hoods operating in the USA
- In general, operating 24/7
- **Utility cost approximately \$4.2 billion/year**



So, let's slay the
lab's biggest
energy hog!

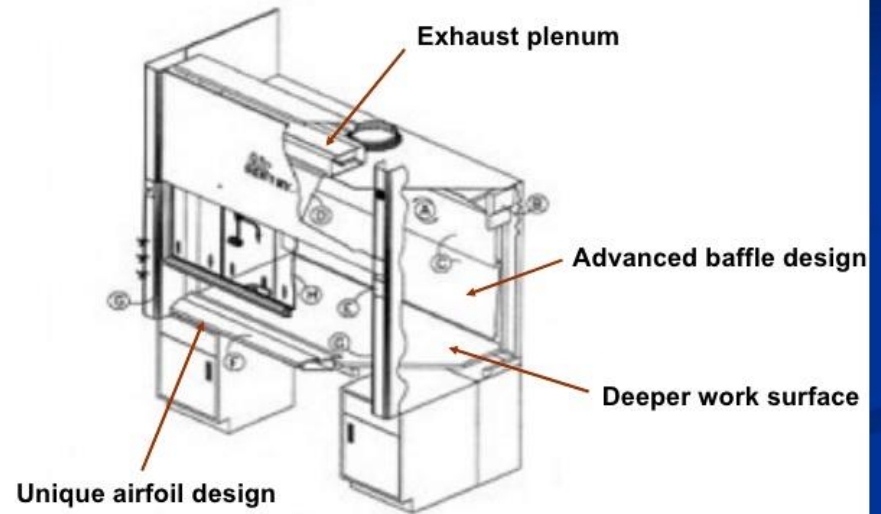


18 years ago . . .

- BIG change to fume hoods
- Still controversial
- **Low Flow**

Low Flow (High Performance) Fume Hoods

Utilize fume hoods that are designed to operate safely at lower face velocities, i.e., 70 FPM rather than 100 FPM.



10 years ago . . .

- Filtered fume hoods
- Emphasizing safety and sustainability.



DRIVER #1

- Pollution is pollution, regardless of dilution!
- Where does fume hood exhaust go?
- What is your future liability?



Driver # 2:

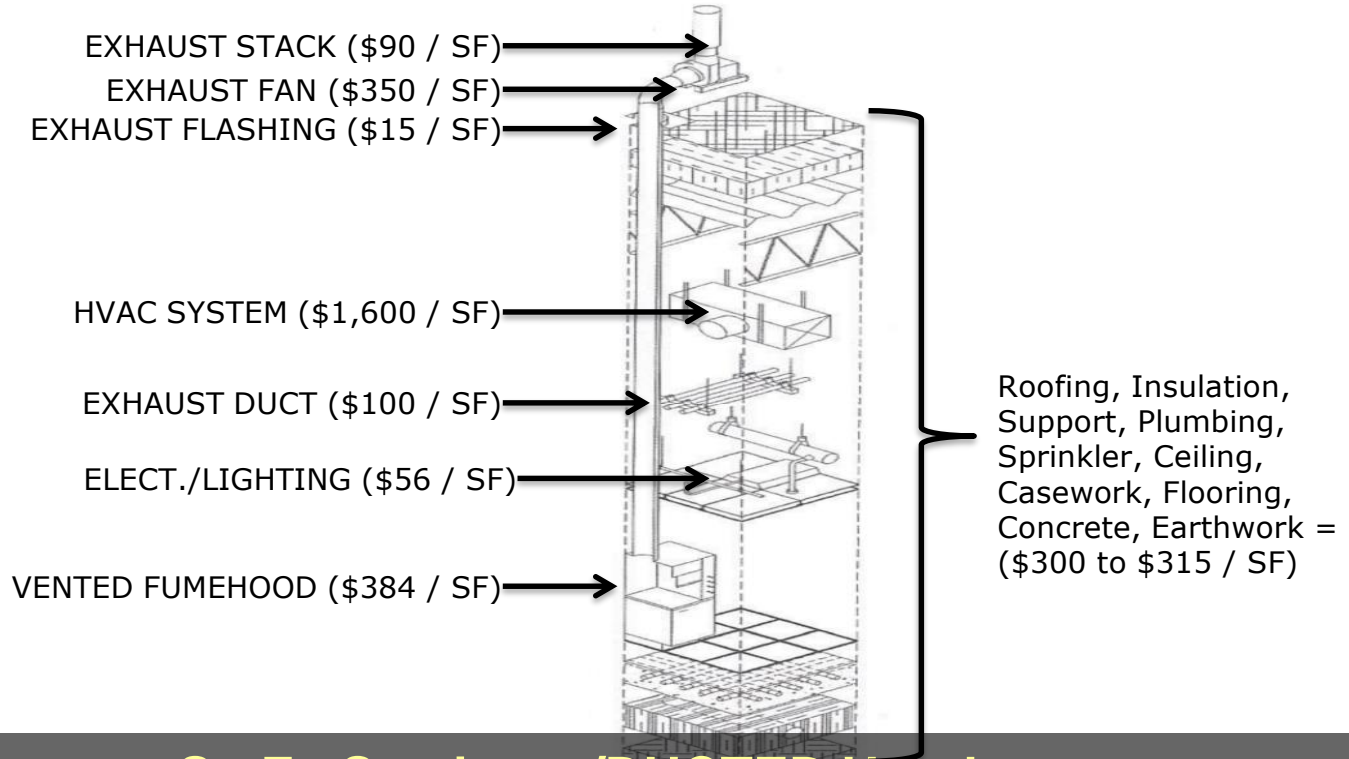
Energy savings



Driver #3: Mechanical systems

**TOTAL COST PER
SQUARE FOOT:
\$2,907.75**

**6-FOOT HOOD:
15 SQFT=
\$43,616!**



Cost per Sq.Ft. Section w/DUCTED Hood

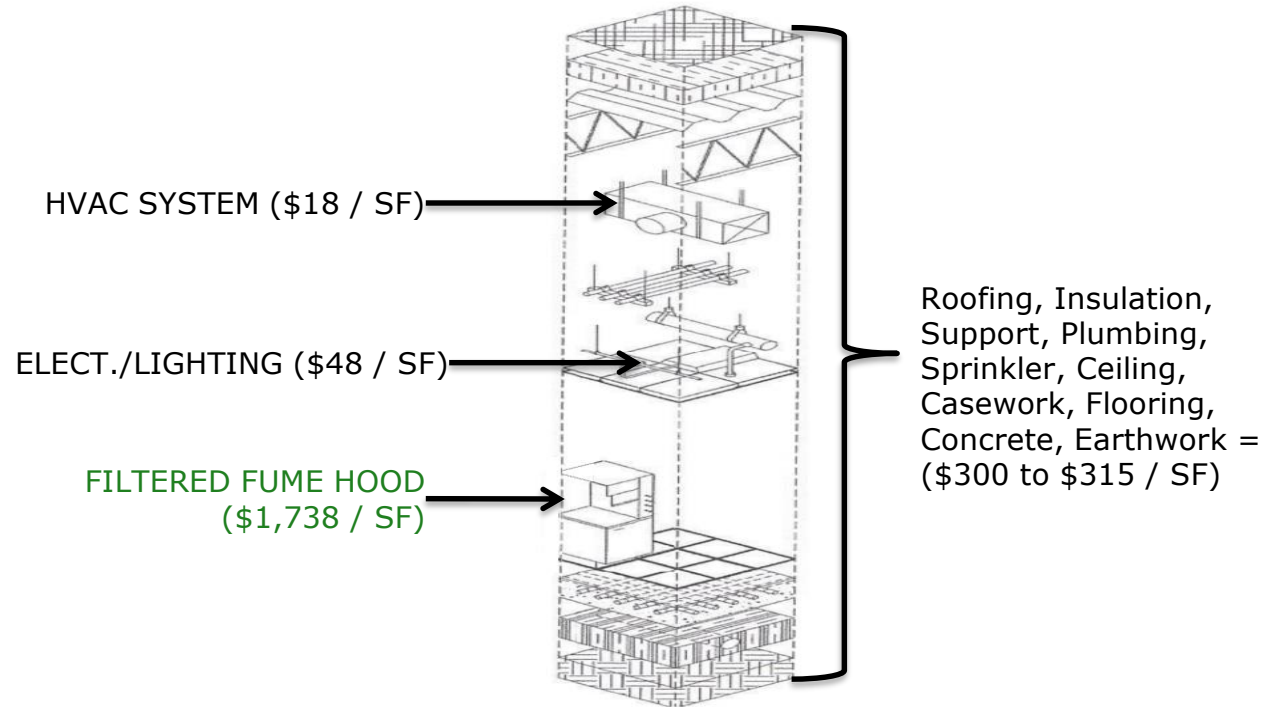
Images & Data credit: Brewer Construction, Houston, TX



**TOTAL COST PER
SQUARE FOOT:
\$2,116.75**

**6-FOOT HOOD:
15 SQFT=
\$31,751**

**SAVINGS:
\$791/SqFt of Hood
\$11,865/6-ft Hood,
27% Reduction**



Cost per Sq.Ft. Section w/FILTERED Hood

Images & Data credit: Brewer Construction, Houston, TX

NOT a ductless hood

- Single filter cannot handle acids **AND** bases **AND** solvents



A filtered fume hood

- Multiple safety factors not found in standard or ductless fume hoods



ANSI Z9.5

➤ Section 5.3.6.2 Exhaust Hood Air

➤ *Reads*

- ✓ Exhaust hood air shall not be re-circulated to other areas
- ✓ Hood exhaust air meeting the same criteria as noted in Section 5.3.6.1 shall only be re-circulated to the same work area



Multiple modules per hood for layers of safety



Unparalleled safety features

- Independent fan/filtration columns
- Redundant filters on top
- Air sensors between filters
- All electronics monitored multiple times per second
- If anything is amiss, alarm sounds



Detection at <1% Daily TLV Exposure

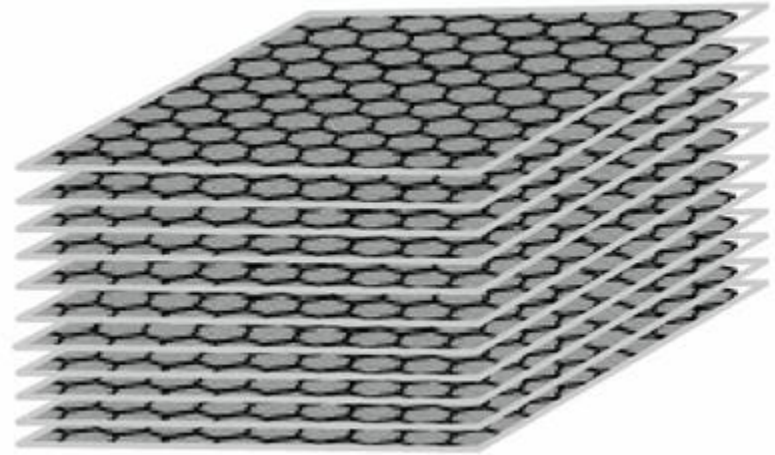
- Suite of Detectors:
 - Acid
 - Solvent
 - Lab Ambient Air
 - Temperature
 - Sash Sensor



(side view of hood)

Activation Process

- Organized structure
- Steam & Heat create spaces between carbon layers
- 15,000 ft² surface area per gram





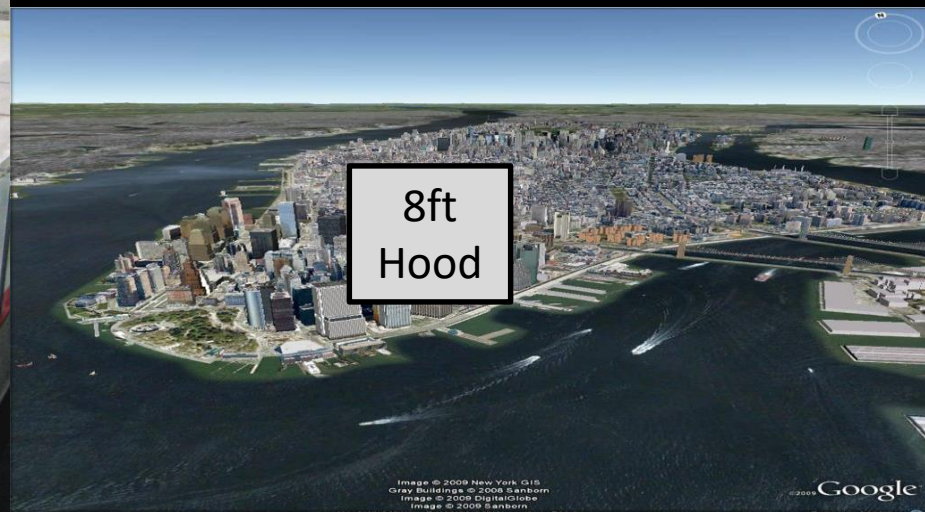
3
grams



0.3
gram



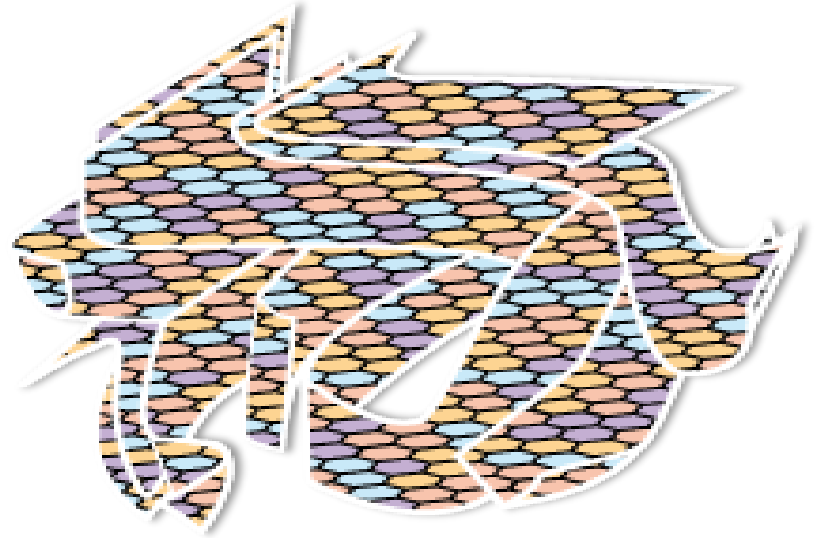
1
gram



8ft
Hood

Filters for science

- Neutrodine filtration technology retains:
 - Polar organic solvents
 - Non-polar organic solvents
 - Inorganic bases
 - Inorganic acids





Addressing Lab Sustainability



- **Reduce carbon footprint**
- Reduce operational costs
- Reduce construction cost and time
- Flexibility for changes and growth

While **IMPROVING** safety!

North America:

(550)+ GreenFumeHoods

(200)+ Projects

350,000+ CFM Saved/Yr

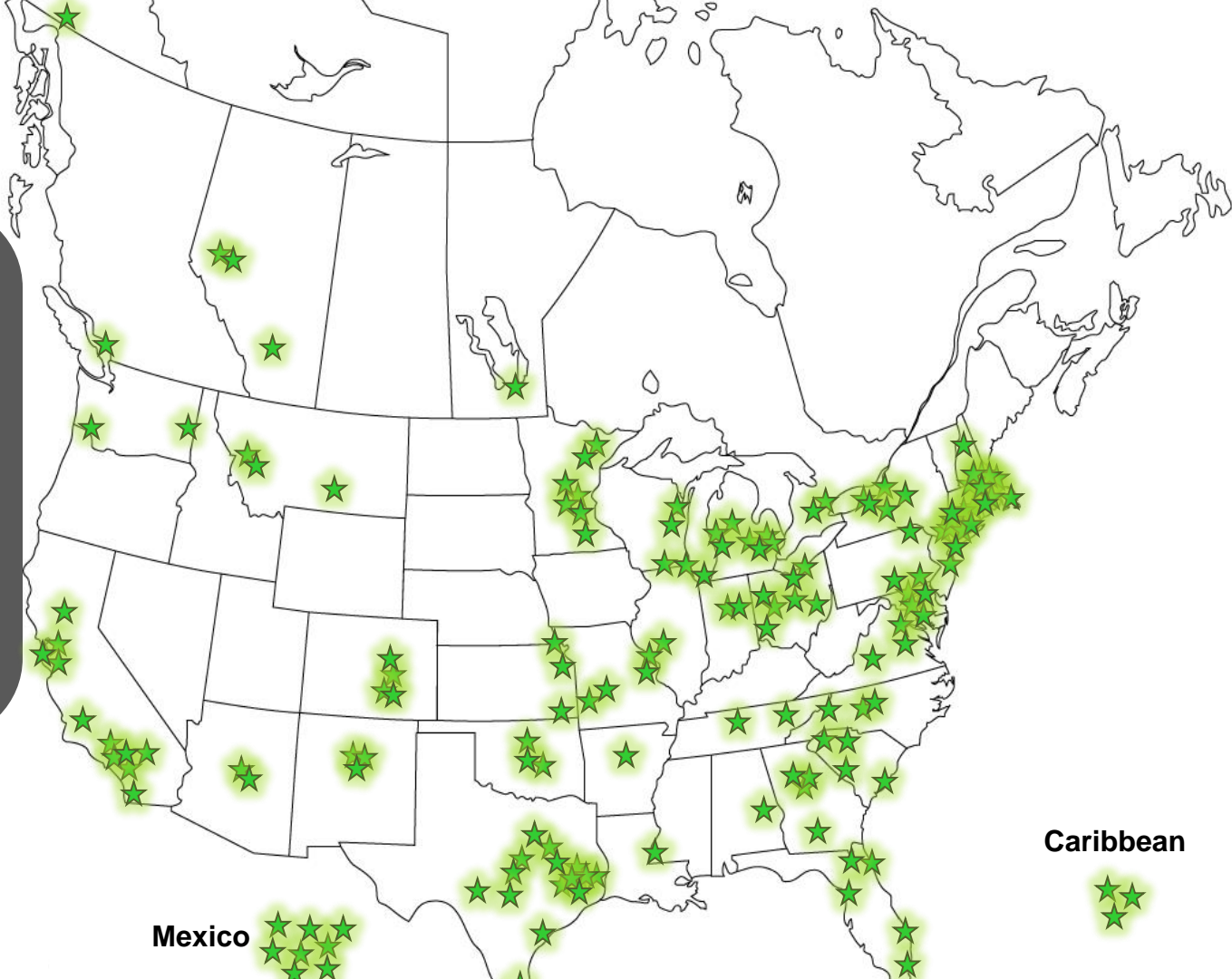
\$2+ mil Saved/Yr

Worldwide:

(1,000)+

GreenFumeHoods

(550)+ Projects



Mexico

Caribbean



University of Rochester, NY
(13) GreenFumeHoods

University of Rochester, NY

Type: Renovation, \$1.5mil, 6 months

Date: Mar-August, 2011

Application: Organic Chemistry Teaching Lab

Architect: Bergmann Associates

(13) GreenFumeHoods

(2) Ducted Fume Hoods (dispensing)

NYSERDA Rebate: \$36,600

\$136,100 Annual Operating Cost Savings

300% Increase in fume hoods





Butler University, IN
(27) GreenFumeHoods

Butler University, IN

Type: Renovation

Date: August, 2011

Application: (4) Organic and (2) General Chemistry Teaching Labs

Architect: BSA LifeStructures

MEP Engineer: Greenman-Pedersen, Inc.

(27) GreenFumeHoods

10% Reduction in Total First Costs

3 Month Reduction in Construction Schedule

\$33,000 Annual Operating Cost Savings





Marywood University, PA
(8) GreenFumeHoods

image by Ellenzweig Architects

Marywood University, PA

Type: Gut Renovation

Date: October, 2012

Application: Organic Chemistry Teaching Lab

Architect: Ellenzweig

MEP Engineer: Greenman-Pedersen, Inc.

(8) GreenFumeHoods

30% Reduction in HVAC Systems

Lower Total First Costs

\$12,000 Annual Operating Cost Savings



image by Ellenzweig Architects



McMaster University, ON
(8) GreenFumeHoods

McMaster University, ON

Type: Renovation

Date: August, 2013

Application: Integrated Science Teaching Lab

(8) GreenFumeHoods

(1) Ducted Fume Hood

70% Reduction in Operating Costs

Wharton QS Stars 2014 award-winning program



A wide-angle photograph of a modern laboratory. The room features several white fume hoods with large glass viewing windows, arranged along a long wooden workbench. The workbenches have a light-colored wood finish and are equipped with white ergonomic chairs. The ceiling is a white grid with recessed fluorescent lighting. In the foreground, a computer monitor sits on a desk. The overall atmosphere is clean and professional.

Framingham State University, MA
(49) GreenFumeHoods

Framingham State University, MA

Type: Addition

Date: May, 2014

Application: (8) Chemistry Teaching Labs

Architect: Ellenzweig

MEP Engineer: BR+A Engineers

(49) GreenFumeHoods

25% Reduction in HVAC Systems

\$330,000 Lower Total First Costs

\$40,000 Annual Operating Cost Savings





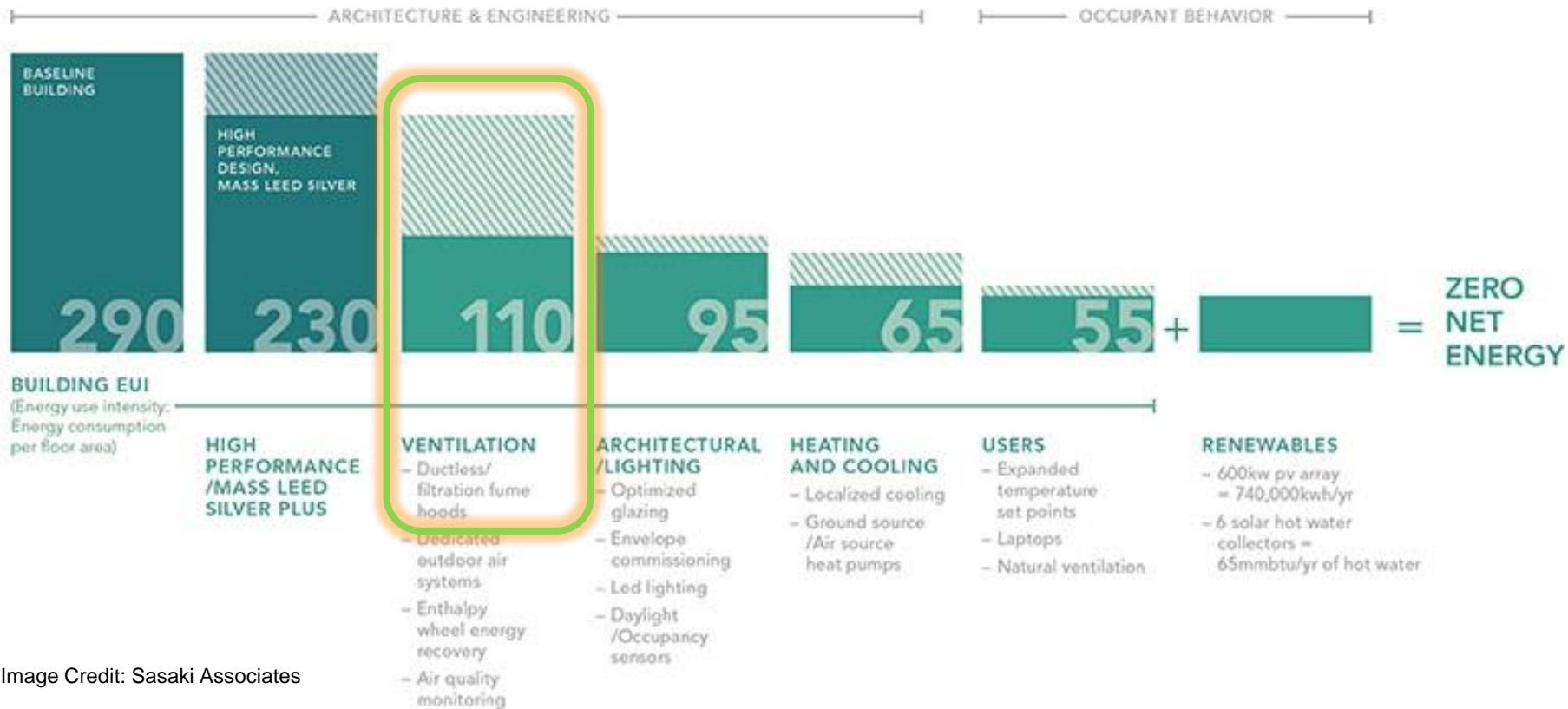
Bristol Community College – ZNE Lab Building

(13) GreenFumeHoods

Image credit: Edward Caruso Photography

THE PATH TO ZERO NET ENERGY

Bristol Community College, John J. Sbraga Science & Health Science Building





Bridgestone Tech. Center, OH
(11) GreenFumeHoods



S O L
HARRIS / DAY
architecture

Bridgestone Tech. Center, OH

Type: New Construction

Date: October, 2012

Application: R&D Lab

Architect: SolHarris/Day Architecture

MEP Engineer: Lee Good and Associates

(11) GreenFumeHoods

(1) Floor-mounted ducted fume hood

32% Reduction in Energy Consumption

\$60,000 Annual Operating Cost Savings



image by SolHarris/Day Architecture

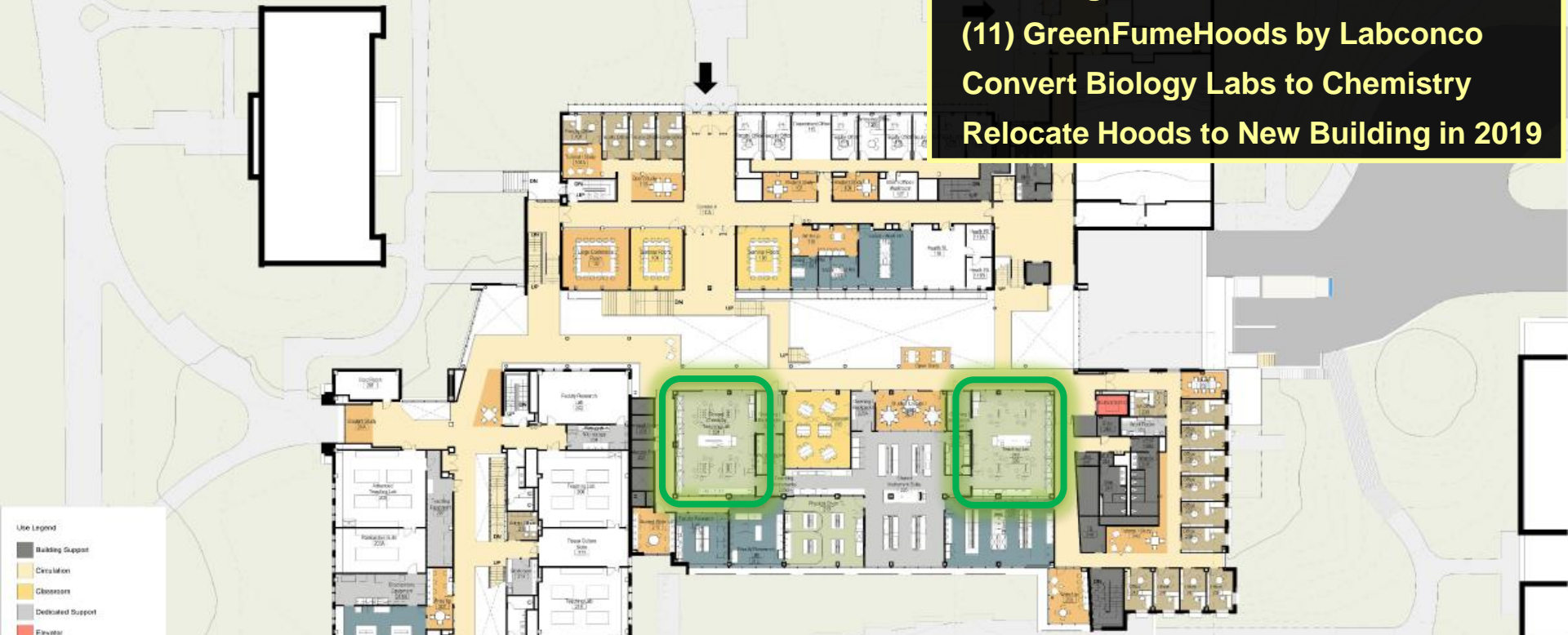


Carleton College – Integrated Sciences Facility
(11) 4 and 6-foot Protector Echos by Labconco

image by EYP

Hulings Second Floor / Olin First

Type: "Swing Space" Renovation
Date: Aug, 2017
(11) GreenFumeHoods by Labconco
Convert Biology Labs to Chemistry
Relocate Hoods to New Building in 2019



Carleton College – Integrated Sciences Facility
(11) 4 and 6-foot Protector Echos by Labconco

image by EYP



Carleton College – Integrated Sciences Facility
(11) 4 and 6-foot Protector Echos by Labconco

image by Haldeman Homme

Questions ?

