BY MARKET SECTOR - LABS



TRANSFORMATION FROM DISCRETE ICONS OF SUSTAINABILITY



TO AN ENERGY LITERACY ABOUT SYSTEM PERFORMANCE



CONNECTING PERFORMANCE AND DESIGN STRATEGIES

			Proje	ect Inform	nation																					Sustain	able Des	ion Stra	tegies														
	1					1.							6	111	8		-	10		-	See 19					SUOI		8		5	11T	1111		111	110				200		문	5	2
				ũ		0 Jies		ç		5 /	- 1	ades	lazi	0 0	unite o	-	all of the	emp	0	Heat Heat	- Of	VENO	al	tair	hes	Bu	Sast Clear C	E of	5	A AN	the state	out as a	10	E	of sta	Tree	But	9	pul	ts.	ring ture	A Cu	Com
	2	5	5	GS	Bet	and	tu/s	scho	8	uctio	Ne.	Shu Bur	Se Ge	ate ang	VA	sate R: R:	Co	L H S	atin	N LO	ipe al		E Ve	d S b	LPC	Cy inter	in Same	He See	ma	Kio	Ves	Fina	wa:	viste	aplan plan	A la	101	azin V	D H H	e tal	Na	inis la	tus ble
	ral Info	8 8	00 cest	80	Tar	Str	BB.	edu	M	10 M	egi	Sha	Gla Gla	En En	Y B	Sw	560	VAN A	He	Ner Ner	at h	e Flan	Val	Ling one	Page 2	Din	W H	Cal	Ther P	Unitru	er Ha	N-F	Stat	ards Day	us ds	Gar Gar	N G NG	to a date	tin the	Sh Pp	d v b	al F	138
	ner	d he	M De	Scc B (X.0	LEED	rot	E	2	N) QAN	2 7	tat 1	ack ack	bed s	thy In	BY CO	ELO L	Allan	N-T	ant	ball o	de la	te de s	an P P	N- H	e e	- Sal	Pice and	T De L	Colar Solar	SE	wab	low low	Sto	105v	an one	State of the state	Mow	Bene	Reloce		AN DE O	late	Pda Pda
	8	Sta	5	6494	9	d D D	2	EUI	3	LPD % Carbon	S	Trip	Frit		ope	herr AC	HI	er S ate	Child	LE RE	1000	Sm S m	Enur Porta	neu	Tas	ayle	Not Hot	on Ver	Sol	Sec.	Citer of	ate late	G in Bo	Ra	- a Bab	Cto or	Nol	The	P P P P P P P P P P P P P P P P P P P	ele	Oua	Par al	CVG CVG
				A		Nur	00		6 T	20	2 1	Sola E	4 0	AT N	Fier	Farz	Lat to h	- tot	- A	He He	100	Dec	AQ	-Con	E E	O	- Dest	to of	8	Ceo Di Do	Na Sa	No No	5	=	Sin	PH BO	2	-	High	a	- CO	No	a le
						n n							Ŧ		ŭ.		-	± 1		*	뜻뜻			-		000	4	3		De						0 a			LIK -	1111	1×	2	W
Meditech, Fall River	d	Fice 2004	2005	new 12		5			6																	M																	411
Columbia Cormer		ab 2005	5 2006 6	new 68	S		278																															a la					
Brandeis	1	ab 2005	5 2007 1	new 10	i		331									1.1	1			100			CDE.																PL I				
Umass - ISB, Amberst		ab 2005				72	289	-22%	have 1	and 1	-									100			6_0																				
Frick, Princeton		ab 2005				88	431	-9%	0.9 -7	-25% //2	2								_								-	_															
Hershey Cancer URI CBLS		alt 2006 ab 2006				12	315	150	1																	-					-					in all							4
Wheaton		ab 2000	2008	new 24	G	30	315	-13.5													-					1																	
Georgetown		ab 2006					220	-41%		4																																	
Harvard Aliston	1	ab 2006	2009 1	new 105	4 G	41		- AND																																			
Penn St. Childrens	he	attr 2007	2009	new 25	o c	5																111				-			-									100	ALC: N		4		
U Mass Clinical Ed	ht	att 2007	2009 1	new 25	S	8																	100	0 20					1000														
Bridgewater	1	ab 2008	3 2009hc	1+n 21	S	36	188	-46%																	S				100														ALC !!
Galway CTRF Clinic	lab +	hei 2009	2009 1	new 51	REEAN	1 34					1															1																	
Galway Library	0	ad 2009	2009	new ou	DEEAN	1 25					+													-		1 m					-		- 1										4
Galway Science Critr Harvard Meselson		ab 2009 ab 2009				1 30			1																		-																1
Harvard Northwest	1	ab 2005	2009 1	tout 22	G	10			6. 7																										-								
Fogg Art Museum		ad 2007				40		7	0.7 7	-56% 27	17									100						1					The second	1101											
Thomas Jefferson	he	alt 2008	2010	new 23	G	28															100																			FILL			
Brock	1	ab 2009	2010	new 14	S	10			1	-						1111		1 1 1					10 10 10																		Action		
Childrens Boston		altr 2009								-33% 21																			1														
Hudson Valley CC		ab 2005					166			-17% 15										- Company					-																		
Sherman Fairchild		ab 2009							0.9 3											a sugar																							
U Mass Greenhouse		ab 2005				31	228	-34%	0.9 7	-36% 41	1					-						-			-									-									
URI Pharmacy 290 Congress		ab 2009 fice 2010				24		-9/30	0.7 -3	anes																																	
Tuffs Necropsy Lan		ab 2010			0	5			10 3			-				- n	TIF									H					-				-		H				4		
Penn St. BRL		ab 2008			s	20	151	63%	0.9 -2		54																-																
Connecticut College	1 3	ab 2009	2011	eno 44	G					-17% 30																															ATT		
Dana Farber, Smith Lab		ab 2010				7		1000	1.4 -	-3%											1000	117																					
Dartmouth Hitchcock		altt 2010					148																																				
Meditech, Freetown		fice 2010						-35%	0.8 -2																																		4
Columbia 2nd Ft. Core	1	ab 201	2011 1	tout 23	C	17			1.2 -1	14%																1						111						-			ALLE		
Harvard Bauer Duke		ab 201			P	50	40	.889.	1.0	E MAN	1.100											-			State of the local division of the local div				-														
GW		ad 2008				17					5								-							1		PIP															
Amherst		ab 2010				51									-				-		100		100											and the						- Inlet			
Ipsen, Milford	1	ab 2016	2012	new 62	S					-17%																	10010					100											
VAB MH	he	alt 2010	2012 ac	+n 67	G	31	127	-47%	0.9 -1	10% 3						1 210	1 1 2																										
VAB SCI		alt 2010								-33% 30	0											1 1 1				100										000			Contraction of the				
VA West Haven, Endosco		att 2010				8			0.9 -2								1			an	1111				N_N-				100														ABB
Alexandria	lab *	off 2011	2012 0	new 37	G		117			R	5																																4
VA West Haven, Lab	1	ab 2011	2012	new 17		6	278	-25%	0.9 -2	25%													1. 1. 1. 1. 1.															1000				1.11	4
						-						and the	inter the			in the last	1 ale	in the local data		- tok	and the second	111	-		-	100	-	and the	1		and the second			in the second	- Inter			-	111		- Inter		and the second
Sorted %									6			4%	3%	5%	3%	340	140 W.B	3%	7% 6%	44	1.0%	121	6% 1%	8%	6% 5%	1 4 8	6%	6%	2 2 2 3	223	5%	6%	× 6	%S	8%	3%	1%	4%	No Stat	242	4%	4%	446
	1 1	_		1			-	1_1	÷			0000	lala()	1244			st. inia	Cold -	www.	an	saa	1.1.1.			0400	100	a - 43	0000		h-h-lml	aa,			- ca ca e	100	12		10 19 10	Sec. 1	CHICK	L MAR	80. ISP	1263

CONNECTING PERFORMANCE AND DESIGN STRATEGIES

9%	Triple Glazing
36%	High Performance Glazing
27%	ritted Glazir
9% EE0/	Double Skin Façade
02% 64%	Uperable Façade Hichhu Insulated
18%	Limit Glazing
18%	
9%0	I hermally Broken Envelope Commissioning
27%	Swea
27%	Increase Temp, Range
82%	Natural Ventilation
27% EE0/	No Mechanical Cooling
55% 73%	Lower Air Changes
9%	Higher Supply Air Temp.
45%	Eff. HVAC Eq
0%0 36%	Eliminate/Minimize Reheat
18%	Radiant Heating
9%	Evaporative Cooling
18%	High T Cool/Low T Heat
18%	Heat Recovery Chiller
64%	HR Enthalpy - Lab EX.
18%	HR Glycol/Heat Pipe - Labs
18%	HR Glycol/Heat Pipe - Other
18%	Geothermal
18%	Space Fan
27%	Decrease Fan Energy
18%	n Wall
9%0	Atrium Prevreneat Disnlarement Vent
0%0	d Control
0%0	conditioned St
1005	Energy - Lighting
55%	Task/Ambient
64%	1 Fixture : 2 Benches
55%	LEDS
55%	Devlicit Dimmind
	Energy - Other
91%	Low Flow Hoods
18%	on Sensol
9%	Combo Vent. Cab. & Hood
9%	Compact Massing
9%	I to FI
9%	Building Orientation Solar PV
0%0	Solar Thermal
0%0	ogen
9%	Decease Circuitry for Plug
10 /0	Energy Use NIOSK Evanced Thermal Mass

COMMON STRATEGIES FOR LOWEST EUI LABS

- Sunshading & High Performance Envelope •
- Minimize Ventilation Air .
- Heat Recovery ٠

- High Performance LightingNatural Ventilation

INTEGRATING EARLY MODELING

1) GLARE + THERMAL COMFORT

2) VIEWS TO HILLTOP

3) PEAK COOLING + THERMAL ENERGY





INTEGRATING RESEARCH









Project Detail R-23.5

Typical Detail R-4.1



CHANGING MINDS AS WELL AS PROJECTS



CONNECTING PERFORMANCE AND CONSULTANTS





SUSTAINABILITY ACTION PLAN

- Design Principles
 - Reduce Excess Capacity
 - Study Building Operation
 - First Principle Engineering
 - Harnessing Available Resources
 - Adoption of Technological Solutions
- Integrated Design Charrettes
- Energy Benchmarks & Targets
- Basis of Designs
- Shadow Studies
- Site Analysis
- Energy & Performance Modeling
- Life Cycle Cost Analysis
- Embodied Energy
- POEs



listory

Three generations, many voices, one practice. In 1932, Fred Markus and Paul Nocks started a small design frm in Bioton. Using pioneering time-andmotion studies, they heiged hospitals throughout New England take apart and retool complex, misiton-critical processes including nursing units, litchens and pharmacise. In 1960, Tom Payette joined the firm, adding a modern design philosophy to the firm's innovative process. Tom led the firm in designing a series of New England hospitals that were centered on the experience of the patient, manifested by an intimate connection to the landscape, abundant use of color and natural light to belis oneint patients and vintors. Through the promotion of this same humanistic values and fundamental design acproach, the firm broadened to focus in the following decades to include high technology buildings, bringing deep technical expertse, commitment to rigorous research and dedication to beauty to a new class of projects. Today, the practice his advanced as an intermational leader by providing planning and design services to leading institutions across the country and abroad.

We approach design as a process that combines problem-solving, research and invention. The architecture we practice is inherently multidisciplinary. Our definition of architecture embraces planning, norgamming, landscape architecture and interior design as being intimately infertivined in producing our work.

PAYETTE

IMPACT OF SETTING ENEGRY TARGET



PERFORMANCE IS PART OF OUR WORKFLOW







PERFORMANCE IS HOW WE TALK ABOUT OUR WORK



Commitment to the Environment

Committing to the future of the environment means rigorously designing our buildings through the lens of sustainability. Building science is the data-driven investigation of building systems, materials, envelope and operational energy usage in order to optimize a building's performance and minimize a building's performance and minimize its environmental impact. As stewards of our olients' resources, and with conviction in our responsibility to lead, we embrace the challenge of delivering the highest-performing buildings for our inherently demanding market sector. Take a look at how our academic science projects perform on average:

64%

42%

91% average building area with access to displayit

Our practice specializes in technologyrich and energy-intensive buildings, which are typically the highest consumers of energy on an academic campus. These specialized environments are challenging to reduce their energy usage, but because of their substantial environmental impact, the imperative is that much greater. Take a look at the energy use intensity (EUD in kBtu/1y/max of a sample of our projects and how they stack up against the neticoral average of similar buildings in the same climate zone:

Archest College, New Science Center 94 kBtu/SF 75% EUI REDUCTION

Northwastern University, Intendicophilary: Science and Engineering Complex

103 kBtu/SF 75% EUI REDUCTION

National University of Instand, Galuage Biocencies Research Building 143 kBtu/SF 71% EUI REDUCTION



HISTORY AT BERGMEYER

- Bergmeyer is a 72-person **Boston-based** general commercial firm
- Joined AIA 2030 Commitment in June 2011
- First year of reporting was due March 31, 2012
- **First Sustainability Action Plan** published Fall 2012
- Follow-up Sustainability Report published Summer 2014







SUSTAINABILITY REPORT & ACTION PLAN

A summary of sustainable efforts and reporting for the AIA 2030 Commitment 2014

SETTING A BASELINE - 2011 REPORTING - INTERIORS





GSF Meeting Target 307,758 = 61.1%

SETTING A BASELINE - 2011 REPORTING FINDINGS

Overall observations/conclusions:

- 49 total projects reported with 38 interior-only projects
- None of the whole building projects and only 9 of the interior-only projects met or exceeded the 2030 targets
- All 3 interior-only workplace projects exceed the 25% LPD reduction target

Office – Boston, MA	0.67	1.0	33.0%
Office – Boston, MA	0.56	1.0	44.0%
Office – Providence, MA	0.67	1.0	33.0%

SETTING A BASELINE - 2011 REPORTING FINDINGS

Overall observations/conclusions:

 Of the 19 total retail projects (all interior-only), the two that met the 25% LPD reduction threshold were located in institutions

University computer store	1.5	27.3%
Museum bookstore	1.5	33.3%

• The best performer was a university dining hall

University dining hall

0.59

1.5

60.9%

1.80	1.5	-20.0%
2.60	1.5	-73.3%
0.96	1.5	36.0%
1.28	1.5	14.7%
1.77	1.5	-18.0%
1.50	1.5	0.0%
3.60	1.5	-140.0%
3.90	1.5	-160.0%
3.60	1.5	-140.0%
1.67	1.5	-11.3%
2.14	1.5	-42.7%
2.28	1.5	-52.0%
1.80	1.5	-20.0%
1.09	1.5	27.3%
1.50	1.5	0.0%
1.90	1.5	-26.7%
1.20	1.5	20.0%



Interior-Only Projects

31 projects and 182,668 GSF included in analysis.



- Compared to Year 1 our LPD was off the chart (actually, it wasn't even on the chart)
- As reported, spaces that had passed COMcheck were far over the allowable code limits







The AIA 2030 reporting form doesn't allow for the retail display space allowances that the code does

Additional Interior Lighting Power Allowance = 1000 watts + (Retail Area 1 × 1.0 W/ft²) + (Retail Area 2 × 1.7 W/ft²) + (Retail Area 3 × 2.6 W/ft²) + (Retail Area 4 × 4.2 W/ft²),

- Retail Area 1 = the floor area for all products not listed in Retail Areas 2, 3, or 4;
- Retail Area 2 = the floor area used for the sale of vehicles, sporting goods, and small electronics;
- Retail Area 3 = the floor area used for the sale of furniture, clothing, cosmetics, and artwork; and
- Retail Area 4 = the floor area used for the sale of jewelry, crystal, and china.



COMcheck Software Version 3.9.1 Interior Lighting and Power Compliance Certificate

90.1 (2007) Standard

Section 1: Project Information

Project Type: New Construction Project Title : SPANX

Construction Site: 8097A TYSONS CORNER CENTER SPACE J1AU(C) TYSONS, VA Owner/Agent:

Designer/Contractor: Don Penn Consulting Engineer 635 Westport Parkway, Suite 300 Grapevine, TX 76051

Section 2: Interior Lighting and Power Calculation

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B x C)
Retail:Sales Area	986	1.7	1676
Allowance: Furniture, clothing, cosmetics highlighting / Fix. ID: FA-58 LED	450(a)	2.6	1170(ь)
Allowance: Furniture, clothing, cosmetics highlighting / Fix. ID: FC LED	175(a)	2.6	455(b)
Allowance: Furniture, clothing, cosmetics highlighting / Fix. ID: FE	210(a)	2.6	546(b)
Allowance: Furniture, clothing, cosmetics highlighting / Fix. ID: FF-1	10(a)	2.6	26(b)
Warehouse:Fine Material Storage	185	1.4	259
Common Space Types Restrooms	58	0.9	52
	Supplemental	Allowed Watts(c) =	347
	To	tal Allowed Watts =	4531

We realized we needed to develop a process and then tell our engineers specifically how to do the calculations – or better yet, do them ourselves

1987 watts vs. 4531 watts

AIA 2030 Commitment Reporting Data Requirements As of February 25, 2013

Bergmeyer is committed to designing spaces that use substantially less energy, reduce greenhouse gas emissions and provide a healthy and comfortable environment. In 2011, the firm joined the AIA 2030 Commitment, thereby accepting the 2030 Challenge that all new buildings and major renovations Bergmeyer designs will be carbon neutral by 2030 and will not use fossil-fuel, greenhouse gas-emitting energy to operate. In order to reach this goal – and the interim reduction targets – a collaborative effort between architects and engineers is critical.

Currently, our projects must be designed to achieve a 60% reduction in site Predicted Energy Use Intensity (PEUI) as compared to either the 2003 Commercial Buildings Energy Consumption Survey (CBECS) or preferably, a regional average site PEUI obtained from ENERGY STAR Target Finder. For interior-only projects, a minimum 25% reduction in Lighting Power Density (LPD) from ASHRAE 90.1-2007 is targeted.

Bergmeyer collects this data annually on every project in design and reports it to the AIA for compilation into a national report.

As part of our reporting, our engineering partners are required to provide us with the following information (if applicable) at the end of both the schematic and document production phases of the project:

- PEUI in kBtu/sq. ft./yr. (for projects that perform energy modeling)
- Design energy code (for whole building or major renovation projects that don't perform energy modeling)
- LPD in W/sq. ft.(for interior-only projects)

We look forward to working with you to achieve our 2030 Commitment goals on this project.

2013 AIA 2030 COMMITMENT RESULTS



- Only 8 of 30 retail projects met or exceeded the 25% reduction target
- Once again, commercial and institutional projects were able to get us over the 25% threshold

Interior-Only Projects

39 projects and 205,735 GSF included in analysis.



GSF Meeting Target 112,675 = 54.8%