

WHAT DO YOU THINK OF WHEN YOU THINK PASSIVE HOUSE?



Lo-Cal

SASKATCHEWAN

SMITH

PAS·SIVEHAUS /'PASIVHOUSE/

Passive house (German: Passivhaus) is a voluntary standard for energy efficiency in a building, which reduces the building's ecological footprint. It results in ultra-low energy buildings that require little energy for space heating or cooling.



PASSIVE HOUSE INSTITUTE US

noun

Highly Regarded, Industry-Leading, Sustainable Building Rating System.

applicability

All Building Types





PAS·IVEGEBÄUDE /'PASIVBUILDING/

noun

The unsuccessful combination of the German words for Passive and Building together



PASSIVGEBÄUDE INSTITUTE US

noun

Potential naming opportunity for cutting-edge organization dedicated to Passive Buildings in the United States with no apparent acronym.











ENERGY USE IN THE BUILT ENVIRONMENT

RESIDENTIAL

Residenti	ial Segme	ents - All				Co.A.	
RECS Building Type (with	Wall						
height)	Structure	Vintage bin	_		Mapbox OSN		
Single-Family Detached	Wood Frame	<1940	8,745K	1,986			
Decorned		1940-79	27,981	(1,834			
		>1980	27,872	< 2,541		_	
	Masonry or Steel Erame	<1940	1,761K	1,989			
	Steermanne	1940-79	9,426K	1,813			
		>1980	7,861K	2,493			
Mobile Home	N/A	<1940	22K	2,641			
		1940-79	2,182K	1,106			
		>1980	5,820K	1,317			
Single-Family	Wood Frame	<1940	542K	1,702			
Attached		1940-79	1,509K	1,368			
		>1980	3,390K	1,756			
	Masonry or	<1940	499К	1,717			
	Steel Frame	1940-79	970K	1,427			
		>1980	843K	1,706			
Multi-Family	Wood Frame	<1940	770K	2,862			
with 2 - 4 Units		1940-79	1,156K	2,799			
		>1980	872K	3,354		1	
	Masonry or	<1940	338K	2,996			
	Steel Frame	1940-79	506K	2,905			
		>1980	303K	3,406			
Multi-Family	Wood Frame	<1940	61K	15,148			
with 5+ Units		1940-79	327K	19,826			
(1-3 stories)		>1980	509K	26,482			
	Masonry or	<1940	46K	14,061			
	Steel Frame	1940-79	258K	25,784			
		>1980	238K	25,558			
Multi-Family	Wood Frame	<1940	33К	38,479			
with 5+ Units		1940-79	23К	45,303			
(4+ stories)		>1980	29К	82,149			
	Masonry or	<1940	28К	102,385			
	Steel Frame	1940-79	33К	129,206			
		>1980	18K	137.307		f i i i	
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electricity	electricity_cooling		Number - f	Ave. Building Floor	Avg. thermal end- Aggregate t		
onsite fu	el water hea	tina	buildings	Avg. Building Floor Area (ft2)	(kBtu/ft2)	site energy (TBtu/yr)	
wood_hei	ating				((
electricit	v_heating						
onsite_fu	el_heating						

COMMERCIAL





	Number of housing units (million)	Site energy co	onsumption ¹			Energy expenditures ¹					
	Total U.S. ²	Total (trillion Btu)	Per household (million Btu)	Per household member (million Btu)	Per square foot (thousand Btu)	Total (billion dollars)	Per household (dollars)	Per household member (dollars)	Per square foot (dollars)		
All homes	118.2	9,114	77.1	30.3	38.4	219.34	1,856	728	0.92		
Census region and division											
Northeast	21.0	1,984	94.4	38.1	45.2	47.66	2,269	915	1.09		
New England	5.6	547	97.3	40.3	44.5	14.31	2,541	1,054	1.16		
Middle Atlantic	15.4	1,436	93.4	37.3	45.5	33.36	2,169	866	1.06		
Midwest	26.4	2,486	94.3	37.8	41.4	46.42	1,760	706	0.77		
East North Central	18.1	1,755	97.0	38.1	43.1	31.88	1,762	693	0.78		
West North Central	8.3	731	88.3	37.0	37.8	14.54	1,757	737	0.75		
South	44.4	3,064	68.9	27.3	35.6	85.19	1,917	758	0.99		
South Atlantic	23.5	1,584	67.5	27.0	33.8	46.09	1,963	787	0.98		
East South Central	7.2	498	69.2	27.5	37.0	13.72	1,907	757	1.02		
West South Central	13.8	981	71.3	27.6	38.1	25.38	1,843	713	0.98		
West	26.4	1,581	59.9	22.3	33.4	40.06	1,518	565	0.85		
Mountain	8.5	631	74.1	28.7	36.9	13.94	1,638	634	0.82		
Mountain North	4.2	357	84.0	31.4	38.7	6.74	1,586	593	0.73		
Mountain South	4.3	274	64.3	25.8	34.9	7.20	1,688	678	0.92		
Pacific	17.9	949	53.1	19.4	31.5	26.12	1,461	534	0.87		
Census urban/rural classification ³											
Urban	94.7	7,181	75.8	29.9	39.2	167.97	1,773	700	0.92		
Urbanized area	82.2	6,239	75.9	29.7	39.1	146.57	1,782	698	0.92		
Urban cluster	12.5	942	75.2	31.4	40.4	21.40	1,710	714	0.92		
Rural	23.5	1,933	82.4	31.6	35.5	51.37	2,190	841	0.94		

2015 Residential Energy Consumption Survey: Energy Consumption and Expenditures Tables



Broad Category	Primary Function	Further Breakdown (where needed)	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)	Reference Data Source - Peer Group Comparison
	Ambulatory Surgical Center		138.3	62.0	CBECS - Outpatient Healthcare
	Licenited	Hospital (General Medical & Surgical)*	426.9	234.3	Industry Survey
	Hospital	Other/Specialty Hospital	433.9	206.7	CBECS - Inpatient Healthcare
L la altheana	Medical Office*		232.8	97.8	Industry Survey
Healthcare	Outpatient Rehabilitation/Phy	sical Therapy	138.3	62.0	CBECS - Outpatient Healthcare
	Residential Care Facility		213.2	99.0	Industry Survey
	Senior Living Community*		213.2	99.0	Industry Survey
	Urgent Care/Clinic/Other Out	patient	145.8	64.5	CBECS - Clinic/Outpatient
	Barracks*		107.5	57.9	CBECS - Dormitory
	Hotel*		146.7	63.0	CBECS - Hotel & Motel/Inn
	Multifamily Housing*		118.1	59.6	Fannie Mae Industry Survey
	Prison/Incarceration		156.4	69.9	CBECS - Public Order and Safety
Lodging/Residential	Residence Hall/Dormitory*		107.5	57.9	CBECS - Dormitory
	Residential Care Facility		213.2	99.0	Industry Survey
	Senior Living Community*		213.2	99.0	Industry Survey
	Single Family Home		N/A	N/A	None Available
	Other - Lodging/Residential		143.6	63.6	CBECS - Lodging
Manufacturing/Industrial	Manufacturing/Industrial Plan	t	N/A	N/A	None Available
Mixed Use	Mixed Use Property		89.3	40.1	CBECS - Other
	Medical Office*		121.7	51.2	CBECS - Medical Office
Office	Office*		116.4	52.9	CBECS - Office & Bank/Financial
	Veterinary Office		145.8	64.5	CBECS - Clinic/Outpatient
Parking	Parking		N/A	N/A	None Available

SKIN-LOAD DOMINATED BUILDINGS

A SKIN-LOAD DOMINATED BUILDING HAS THE LARGEST PROPORTION OF SPACE CONDITIONING ENERGY LOADS DETERMINED BY THE BUILDING ENCLOSURE.



Figure 4. Skin-load dominated buildings benefit the most from high-performance building enclosures, and can take the best advantage of passive control strategies.

INTERNAL-LOAD DOMINATED BUILDINGS



Buildings that have high occupant densities and high internal gains from lighting and/or equipment are considered internal-load dominated buildings

Figure 5. The energy performance of internal-load dominated buildings is strongly influenced by the window-to-wall ratio, effective U-value and solar heat gain coefficient of the glazing, and the airtightness of the building enclosure. Heat recovery for ventilation air and lighting system efficiency are the two most critical considerations for active building systems in these types of buildings.

BARRIERS TO ENTRY

PERCEPTION

phius

It says it in the Name...Passive House. It isn't Passive Building After All

FIRST TO MARKET

It's nice to be green...but that doesn't mean I need to be First

TESTED

You are going to make me test my building. It's probably gonna fail....AND It's going to cost me!!!

AUTHENTIC

The "original" Passive House is meant to use only internal and solar gains to heat the building, that doesn't really work. Is it really Passive House if you add systems into it?



SOLUTION

DISPEL PERCEPTIONS/ EXPLAIN THINGS

Illustrate areas where the smart application of the Tenets of Building Science can be applied, ultimately representing savings in both costs and emissions

ILLUSTRATE TRACK RECORD

Passive House has been around for at least 50 years, it has been around for as long as building science has existed.

COST SAVINGS

Reduce expenses for building electricity, heating and air conditioning

IT JUST MAKES CENTS (DOLLARS AND CENTS)

Building a tight, well-insulated envelope will lower the life cycle operational costs of the building











FIRST PROBLEM ENGINEER'S PROPOSED DESIGN



WHAT THE ARCHITECT ENVISIONED



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ORIGINAL IDEA



Current Plan





STILL WORKING ON THE MODEL

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SUMMARY

Phius works for Non-Residential Buildings

Windows are less of a driver in an Internal Load Dominated Building

- Less Expensive
- Helping to limit another Barrier to Entry



THANK YOU

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