

How Do We Measure The Performance Of A Building?

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"It is an immutable law in business that words are words, explanations are explanations, promises are promises but only performance is reality." Harold S. Geneen, CEO of International Telephone and Telegraph, 1959-77

The answer to that question would seem pretty obvious. We measure the performance of a building based on its energy consumption, comparing its consumption against some base minimum energy performance such as the ASHRA E/IESNA Standard 90.1. The larger the improvement over the base energy performance the higher the building is performing. If a new building has exceeded the estimated base performance by 42% or an existing building by 35% (LEED criteria for optimizing energy performance) they have reached the highest level of building performance. But what if an existing building has exceeded the base energy performance by 35% but is unsafe, unprofitable or isn't satisfying its occupants? Is it still a high performance building?

Energy consumption and sustainability are critical in buildings, but the view that only energy defines a building's performance is myopic. Given the high energy awareness that statement may sound like heresy. But the fact is that most buildings are too complex to be evaluated on just energy consumption. If you were shopping for an automobile, would you base your buying decision solely on miles-per-gallon or kilometers-per-liter of gasoline? If so we'd all be driving single-seater cars with 4-cycle engines. Building performance needs to be defined broader, more holistically. Aside from energy and sustainability we need to examine other factors of a building's performance. While energy and sustainability are important unto themselves, they influence or affect some of the other building performance factors. These factors may include the following:

Financial Metrics

It may seem crass to shift from saving the environment to money, but all buildings from modest houses to the tallest skyscrapers have financial aspects. Buildings are a business with whole industry sectors dealing with design, construction, management and investments in buildings. Financial concerns cut across the lifecycle of a building; the construction or acquisition cost of the building, the buildings operations costs and the asset value of the building.

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While there's not a standard similar to ASHRE/IESNA to benchmark minimum financial performance of a building, there is data on comparable buildings which could be used to at least judge whether the building is above or below average financial metrics of similar buildings. For example the Building Owners and Managers Association (BOMA) annually publishes the Experience Exchange Report which based on data collected from thousands of buildings. The report allows users to examine expenses and income for similar type buildings in a common locale or submarket. The examination of basic balance and income reports for a building for profit and loss, increases or decreases to income, expenses and asset valuation can be used to judge financial performance. Also, while energy and sustainability initiatives have a social and resource conservation basis, the impetus for many is financial. That is a large part of the motivation behind conservation, alternative energy sources, demand response and so forth is to save money.

Security and Life Safety

Buildings must provide the physical protection of its occupants and assets. This includes protection from crime, vandalism, terrorism, fire, accidents and environmental elements. Typically a security threat assessment of the building is conducted and then measures are identified and deployed to deter, detect, delay, mitigate, or notify of any attempt to injure, damage, modify or remove an asset or person. These measures are put into place in three ways: the building systems, architectural countermeasures and security operations. The building systems needed to provide security and life safety include fire alarm, video surveillance, and access control and intrusion detection. Architectural countermeasures include landscaping, doors, lighting, vehicular standoffs and air intake. Building security operations include emergency preparedness, training, policies, patrols and so forth. So the security performance of a building is measured on regular threat assessments of the building, optimal operation and testing of the security related systems, prudent use of architectural countermeasure and a fully functional security operation. Security and life safety are affected by many different factors such as location and age of the building, composition of the building occupants, climate, economic conditions and education levels. Data on the number and type of security incidents in the building, trends in incidents, crime statistics for the area, and occupant surveys can be used to evaluate the security performance of a building.

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Operational

Efficient and effective operation and maintenance of a building is critical to its performance. It includes a variety of tasks: space planning, work order processing, energy management, asset management, management responsiveness, systems performance, provision of specific space needs and requirements, verification of results against targets, cleaning, training of staff, management of contractors, etc. Data from organizations such as

CITY ANALYSIS 2006

U.S. PRIVATE SECTOR
General EER

Washington, DC/VA
SUBURBAN ALL SIZES

	TOTAL BUILDING RENTABLE AREA					TOTAL OFFICE RENTABLE AREA				OCCUPANCY INFO.		
	# BLDG	18,882,476 SQ. FT.				18,487,266 SQ. FT.				AVERAGE	BLDG	
	#	DOLLARS/SQ. FT.	MID RANGE			DOLLARS/SQ. FT.	MID RANGE					
	BLDG	AVG	MEDIAN	LOW	HIGH	AVG	MEDIAN	LOW	HIGH			
INCOME												
OFFICE AREA	71	21.99	23.43	19.10	35.30	27.78	27.24	24.02	30.19	SGFT/OFFICE TENANT	16110.31	65
RETAIL AREA	14	3.98	1.90	1.00	4.26					SGFT/RETAIL TENANT		
OTHER AREA	6	3.98	1.90	1.00	4.26					SGFT/OFFICE WORKER	267.16	48
TOTAL RENT	73	27.62	27.24	24.58	30.82					SGFT/MAINTENANCE STAFF	101007.9	58
GROSS PARKING INC	45	1.53	1.39	.48	2.13					OFFICE OCCUPANCY (%)	95.53	65
TENANT SERVICES	44	.46	.29	.10	.87					RETAIL OCCUPANCY (%)	55.53	16
MISCELLANEOUS	38	.34	.13	.04	.27					YR-END RENT	30.87	54
TOTAL INCOME	74	28.82	28.47	25.51	31.31					GROSS PARKING INC(TOTAL \$)	666.53	40
EXPENSE												
CLEANING	71	.96	.97	.86	1.14	.96	.96	.86	1.15	PARKING RATIO (STALLS/1000SF)	2.51	63
REPAIR/MAINT	77	1.74	1.70	1.40	2.09	1.74	1.72	1.40	2.09	RENTABLE/GROSS SGFT	0.93	71
UTILITIES	74	1.87	1.85	1.55	2.09	1.89	1.84	1.55	2.09	RENTABLE/USABLE SGFT	1.11	57
ROADS/GROUNDS	74	.17	.14	.12	.26	.17	.14	.12	.27	TOTAL BTUS	97.08	14
SECURITY	65	.25	.20	.09	.26	.26	.20	.09	.26	CAPITALIZATION THRESHOLD (\$)	19409.54	29
ADMINISTRATIVE	74	1.34	1.34	1.01	1.65	1.26	1.41	1.01	1.71	BUILDING HOURS	64.12	62
TOTAL OPER EXP	68	6.34	6.34	5.49	7.83	6.49	6.48	5.53	7.81			
FIXED EXPENSE	76	2.66	2.58	2.34	2.77	2.72	2.83	2.37	2.80			
TOTAL OPER/EXP	70	8.77	8.76	7.76	10.19	8.98	8.80	7.90	10.22			
DIR LEASING EXP	37	1.53	1.05	.71	1.95	1.55	1.10	.71	1.95			
AMORT LEASING EXP	5	1.16	.50	.43	1.19	1.16	.50	.43	1.19			
PARKING EXP	22	.49	.19	.12	.34	.50	.19	.13	.34			
DETAIL												
OFFICE RENT			FIRELIFE SAFETY	.07	68	SEC EQUIPMENT				TRAVEL		
BASE RENT	26.50	72	GEN EXTERIOR	.15	75	SEC OTHER	.06	16		DIR-COMMISSIONS	.43	27
PASS-THROUGHS	1.46	41	GEN INTERIOR	.22	76					DIR-BUY OUT		
OPER ODOT EDCAL	1.26	29	CONTRACT	.52	23	ADMINISTRATIVE				PROF FEE	.08	21
BASE RENT EDCAL	.27	15				PAYROLL	.28	69		DIR-TENANT MIP	2.27	26
LEASE CANCEL	.21	6	UTILITIES			ALLOC ADMIN	.26	3		DIR-OTHER	.06	8
RENT ABATEMENT			ELECTRICITY	1.73	72	MGMT FEE	.71	75		AMORT COMMISSION	.49	6
			GAS	.09	28	PROF FEE	.06	58		AMORT-TENANT MIP		
			FUEL OIL	.01	35	GEN OPC EXP	.16	73		AMORT-BUY-OUTS	1.33	3
CLEANING			PURCH STEAM			BMP EXP	.21	39		AMORT-OTHER		
PAYROLL	.82	71	PURCH CH WATER			OTHER ADM EXP	.29	47				
ROUTINE CONTRACT	.04	69	WATER/SEWER	.10	75					PARKING		
SPEC CONTRACT	.10	21				FIXED EXPENSES				IN-HOUSE	.44	7
SUPPL/MAT/MSG	.06	69	ROADS/GROUNDS	.13	74	REAL ESTATE TAX	2.23	77		CONTRACT	.41	24
TRASH REMOVAL	.06	69	RDD/ODD LANDSCAPE	.09	48	BLDG INSURANCE	.31	70		SNOW	.01	6
			RDD/ODD GARAGE	.02	68	PIERS PROPERTY TAX	.24	36		SHUTTLE	.03	4
REPAIR/MAINT	.80	76	RDD/ODD SNOW	.13	12	OTHER TAX	.15	32		TELECOMMUNICATIONS		
ELEVATOR	.14	77	RDD/ODD OTHER	.02	68	LICENSE FEE	.07	45		WIRE ACCESS	.07	10
HVAC	.30	77								ROOF TOP	2.65	19
ELECTRICAL	.07	77	SECURITY	.19	6	LEASING EXPENSES				TOTAL INCOME	2.25	24
STRUC ROOF	.03	40	SEC PAYROLL	.22	62	PAYROLL	.24	25		TOTAL EXPENSES		
PLUMBING	.03	68	SEC CONTRACT	.22	62	ADV/PROMOTION	.04	25				

*Income calculation based on office rentable sq. ft.; Expense calculation based on total bldg. rentable sq. ft.

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BOMA and the International Facility Management Association (IFMA) allow building owners to compare the operations of their building with other comparable buildings to evaluate their building performance. For example, IFMA can provide information on gross and rentable square footage by industry type and facility use, square footage per occupant, janitorial costs and staffing, maintenance costs, roads and grounds costs, utility costs, life and safety costs, emergency and disaster planning costs, FM information technology costs, employee amenities costs and best practices. So one way to evaluate the operational performance of a building is to gather operational data on the building and compare it to the operational metrics of similar buildings.

Productivity and Satisfaction of Building Occupants

Buildings enable their occupants to work, play, meet, shop, sleep, eat, socialize, educate, learn, and a host of other things. So one of the performance criteria of a building should be how well it succeeds in enabling its occupants. This involves the comfort of the occupants, both physically and psychologically. The physical part is straightforward involving thermal comfort, appropriate lighting for the occupants' activity, the occupant's control of the lighting and air distribution, the

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workspace layouts and the technology systems available to the occupants to make their tasks easier. These technology systems may be systems for digital signage, Wi-Fi, in-building cell phone coverage, asset location systems, audio video systems and so forth. The physiological effect may relate to the building's image, appearance and aesthetics.

Another measure of building performance is the productivity of building occupants. The largest effect on productivity over the last several decades has been technology and the Internet which reduce the time to access information, perform tasks and communicate. The workspace itself also plays a very important role. In a 2008 Workplace Survey conducted by Gensler, they found that effective workplace design directly correlated to improved business performance. Gensler created a Workplace Performance Index that accounted for the criticality of the work mode, the time spent on the work and the effectiveness of the space for the particular work mode (work modes are activities such as collaboration, focus and concentration, learning and socializing). They accounted for the physical attributes of the space: layout, lighting, air, storage, furniture and access/privacy. What they found was that top-performing companies had workplaces with higher performance indices. They also found employees with workplaces with higher performance indices had greater job satisfaction and organizational commitment and were more engaged with their organization, all very positive to the businesses and organizations. The metrics and methodology of evaluating the satisfaction and productivity of building occupants has been developed, and at the core it is a survey of people that use the building. The feedback from people using a building, whether they are office workers, shoppers or teachers is invaluable input to building operations or the design of the next building.

It would be nice if there was a whole building performance methodology as quantitative as ASHRAE/IESNA 90.1 is for energy performance. Short of that, building owners will need to use comparable data, interviews, observations, surveys, tests, and demographic and financial data to evaluate other building performance factors. Note that there may be other measures to consider in a building's performance than the ones covered and other methodologies to develop those performance metrics. The point is that while energy performance is certainly an important one, the vision needs to be broader and more holistic.