

Coalition for Smarter Buildings

ADJUSTED CAPITAL EXPENDITURE COSTS TO MAKE U.S. COMMERCIAL BUILDINGS SMARTER

By Primary Ownership and Performance Level

Costs are for provision + installation of data systems, sensors, software and data-related hardware only, and do not include base equipment such as HVAC, lighting, etc. or other component software systems such as IWMS, etc. Costs shown include subcontractor level + adjustment for (public or private) program mgmt and acceleration.

							Adjustment Factor	2.25					
							Avg/blg	16,400 SF	\$1,800	\$12,900	\$24,000	\$41,500	\$129,200
							CAPABILITIES LEVEL						
							LEVEL 1: INDEPENDENT MONITOR & VERIFICATION	LEVEL 2: CONTINUOUS REMOTE MNGT	LEVEL 3: ENERGY GRID- INTERACTIVE BLGS	LEVEL 4: MULTI-SYSTEM INTERACTIVE BLGS	LEVEL 5: AUTONOMOUS BUILDINGS		
							Subcontractor cost	0.05/sf	0.35/sf	0.65/sf	1.13/sf	3.50/sf	
							Adjusted costs	0.11/sf	0.79/sf	1.46/sf	2.53/sf	7.88/sf	
TABLE 1. ADJUSTED COST TO FUND 100% OF U.S. COMMERCIAL BUILDING STOCK													
Includes: office, retail, service, education, religious, assembly, health care, public safety, warehouse, lodging and multi-family > 3 stories													
BUILDING GROUP BY PRIMARY OWNERSHIP			% OF GSF	# Blgs (K)	GSF (M)	Percent of GSF FUNDED	# Blgs (K)	GSF (M)	COST IN \$M				
							100%						
FEDERAL BUILDINGS	3%	278	3,192	100%	278	3,192			359	2,514	4,668	8,080	25,137
STATE & LOCAL GOV'T BUILDINGS	21%	791	20,013	100%	791	20,013			2,251	15,760	29,268	50,657	157,599
PRIVATE COMMERCIAL BUILDINGS	76%	5,092	73,807	100%	5,092	73,807			8,303	58,123	107,943	186,825	581,234
TOTALS	100%	5,918	97,012	100%	6,161	97,012			10,914	76,397	141,880	245,562	763,970

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CONNECTED COMMUNITIES PROJECTS

	# Projects	# Blgs	GSF (M)	Percent of GSF FUNDED	# Blgs	GSF (M)	
Average Project	1	20	4		20	4	
Subtotal All Projects	225	4,500	900	100%	4,500	900	5,103

TABLE 2. ADJUSTED COST TO FUND A PORTION OF COMMERCIAL BUILDING STOCK

Includes: office, retail, service, education, religious, assembly, health care, public safety, warehouse, lodging and multi-family > 3 stories

							CAPABILITIES LEVEL						
							LEVEL 1: INDEPENDENT MONITOR & VERIFICATION	LEVEL 2: CONTINUOUS REMOTE MNGT	LEVEL 3: ENERGY GRID- INTERACTIVE BLGS	LEVEL 4: MULTI-SYSTEM INTERACTIVE BLGS	LEVEL 5: AUTONOMOUS BUILDINGS		
							Subcontractor cost	0.05/sf	0.35/sf	0.65/sf	1.13/sf	3.50/sf	
							Adjusted costs	0.11/sf	0.79/sf	1.46/sf	2.53/sf	7.88/sf	
TABLE 2. ADJUSTED COST TO FUND A PORTION OF COMMERCIAL BUILDING STOCK													
Includes: office, retail, service, education, religious, assembly, health care, public safety, warehouse, lodging and multi-family > 3 stories													
BUILDING GROUP BY PRIMARY OWNERSHIP			% OF GSF	# Blgs (K)	GSF (M)	Percent of GSF FUNDED	# Blgs (K)	GSF (M)	COST IN \$M				
							20%						
FEDERAL BUILDINGS	3%	278	3,192	20%	56	638			72	503	934	1,616	5,027
STATE & LOCAL GOV'T BUILDINGS	21%	791	20,013	20%	158	4,003			450	3,152	5,854	10,131	31,520
PRIVATE COMMERCIAL BUILDINGS	76%	5,092	73,807	20%	1,018	14,761			1,661	11,625	21,589	37,365	116,247
TOTALS	100%	5,918	97,012	20%	1,232	19,402			2,183	15,279	28,376	49,112	152,794

*Source: U.S. Dept of Energy Commercial Buildings Energy Consumption Survey, 2018. Number of buildings and GSF by Primary Ownership scaled from CBECS 2012 and Federal Real Property Council's Federal Real Property Report, 2005.

PERFORMANCE LEVEL DEFINITIONS

1 INDEPENDENT MONITORING & VERIFICATION	1-way meter access for owners, operators
2 CONTINUOUS REMOTE MANAGEMENT	2-way remote mgmt of key systems
3 ENERGY GRID-CONNECTED BLGS	2-way connection to electric utility grid
4 MULTI-SYSTEM INTERACTIVE BLGS	Multi-system interoperability and interactivity
5 AUTONOMOUS BLGS	Autonomous operations

Mid price-point scope

15-min Interval data from (3) utility/blg level meters, EnergyStar integration
 2-way Remote Mngt for HVAC + 2 other key systems (each in own silo app)
 Enrolled in manual-initiated Demand Response for HVAC + 2 other key systems
 Interoperable data platform for multi-system specialized experience, operations and mgmt apps
 Automated, interoperable data platform for multi-system specialized experience, operations and mgmt apps

Coalition for Smarter Buildings

SUBCONTRACTOR CAPITAL EXPENDITURE COST TO MAKE U.S. COMMERCIAL BUILDINGS SMARTER

By Primary Ownership and Performance Level

Costs are for provision + installation of data systems, sensors, software and data-related hardware only, and do not include base equipment such as HVAC, lighting, etc. or other component software systems such as IWMS, etc.
 Costs are at the SUBCONTRACTOR level, and do not include (when applicable): building owner staff costs, general contractor or other program mgmt, federal, state or local gov't oversight, or acceleration costs

		US CBCECS 2018*		Percent of GSF		CAPABILITIES LEVEL																	
				FUNDED		LEVEL 1: INDEPENDENT M&V			LEVEL 2: CONTINUOUS REMOTE MNGT			LEVEL 3: ENERGY GRID-INTERACTIVE BLGS			LEVEL 4: MULTI-SYSTEM INTERACTIVE BLGS			LEVEL 5: AUTONOMOUS BLGS					
BUILDING GROUP	% OF GSF	# Blgs (K)	GSF (M)	100%	# Blgs (K)	GSF (M)	Low	Mid	Hi	Low	Mid	Hi	Low	Mid	Hi	Low	Mid	Hi	Low	Mid	Hi		
							0.02/sf	0.05/sf	0.08/sf	0.20/sf	0.35/sf	0.50/sf	0.30/sf	0.65/sf	1.00/sf	0.25/sf	1.13/sf	2.00/sf	2.00/sf	3.50/sf	5.00/sf		
ALL U.S. COMMERCIAL BUILDINGS	100%	5,557	87,100	5,918	97,012	100%	5,918	97,012	100%	5,918	97,012	100%	5,918	97,012	100%	5,918	97,012	100%	5,918	97,012	100%	5,918	97,012
Includes: office, retail, service, education, religious, assembly, health care, public safety, warehouse, lodging and multi-family > 3 stories																							
By Primary Ownership																							
FEDERAL BUILDINGS	3%	278	3,192	100%	278	3,192	64	160	255	638	1,117	1,596	958	2,075	3,192	798	3,591	6,384	6,384	11,172	15,960		
DEPT OF DEFENSE	61%	193	1,935	100%	193	1,935	39	97	155	387	677	968	581	1,258	1,935	484	2,177	3,871	3,871	6,774	9,677		
Army	24%	89	750	100%	89	750	15	38	60	150	263	375	225	488	750	188	844	1,500	1,500	2,625	3,750		
Air Force	19%	52	603	100%	52	603	12	30	48	121	211	301	181	392	603	151	678	1,205	1,205	2,109	3,013		
Navy	18%	51	583	100%	51	583	12	29	47	117	204	291	175	379	583	146	656	1,166	1,166	2,040	2,914		
GSA	10%	17	335	100%	17	335	7	17	27	67	117	167	100	217	335	84	376	669	669	1,171	1,673		
US POST OFFICE	7%	36	234	100%	36	234	5	12	19	47	82	117	70	152	234	59	264	469	469	821	1,172		
ALL OTHER AGENCIES	22%	32	688	100%	32	688	14	34	55	138	241	344	206	447	688	172	773	1,375	1,375	2,406	3,438		
STATE & LOCAL GOVERNMENT BUILDINGS	21%	791	20,013	100%	791	20,013	400	1,001	1,601	4,003	7,004	10,006	6,004	13,008	20,013	5,003	22,514	40,025	40,025	70,044	100,063		
K-12 Schools	173	7,449	100%	173	7,449	149	372	596	1,490	2,607	3,725	2,235	4,842	7,449	1,862	8,380	14,899	14,899	26,073	37,246			
Higher Education	64	2,682	100%	64	2,682	54	134	215	536	939	1,341	805	1,743	2,682	670	3,017	5,363	5,363	9,386	13,408			
Transportation & Agriculture	0%	0	0	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Other State & Municipal	555	9,882	100%	555	9,882	198	494	791	1,976	3,459	4,941	2,964	6,423	9,882	2,470	11,117	19,763	19,763	34,585	49,408			
PRIVATE COMMERCIAL BUILDINGS	76%	5,092	73,807	100%	5,092	73,807	1,476	3,690	5,905	14,761	25,833	36,904	22,142	47,975	73,807	18,452	83,033	147,615	147,615	258,326	369,037		
TOTALS	100%	6,161	97,012	100%	6,161	97,012	4,851			33,954			63,058			109,139			339,542				
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CONNECTED COMMUNITIES PROJECTS																							
Average Project		1	20	4		20	4																
Subtotal All Projects		225	4,500	900	100%	4,500	900																

*Source: U.S. Dept of Energy Commercial Buildings Energy Consumption Survey, 2012

HOW SMART? CAPABILITIES LEVELS FOR SMARTER BUILDINGS Quick description

	Lo Scope	Mid Scope	Hi Scope
1 INDEPENDENT MONITORING & VERIFICATION	1-way meter access for owners, operators Monthly data from (3) utility meters	15-min Interval data from (3) utility/blg level meters, EnergyStar integration	Real-time interval data at circuit/major equip level, add WELL, LEED or other measures
2 CONTINUOUS REMOTE MANAGEMENT	2-way remote mgmt of key systems	2-way Remote Mngt for HVAC	2-way Remote Mngt for HVAC + 2 other key systems (each in own silo app)
3 ENERGY GRID-CONNECTED BLGS	2-way connection to utility grid(s)	Manually-activated Demand Response enrolled for whole Blg	Manually-activated DR enrolled for HVAC + 2 other key systems
4 MULTI-SYSTEM INTERACTIVE BLGS	Multi-system interoperability and interactivity	Common interoperable data platform for 5+ systems	Interoperable data platform for HVAC + 5 other systems
5 AUTONOMOUS BLGS	Autonomous operations		Platform for multi-system custom enterprise apps

	Hi	Mid	Lo
LEVEL 1: INDEPENDENT M&V	0.08/sf	0.05/sf	0.02/sf
LEVEL 2: CONTINUOUS REMOTE MNGT	0.50/sf	0.35/sf	0.20/sf
LEVEL 3: ENERGY GRID-INTERACTIVE BLGS	1.00/sf	0.65/sf	0.30/sf
LEVEL 4: MULTI-SYSTEM INTERACTIVE BLGS	2.00/sf	1.13/sf	0.25/sf
LEVEL 5: AUTONOMOUS BLGS	5.00/sf	3.50/sf	2.00/sf

