

# **Derivation of Federal Building Fossil Fuel-Based Energy Use Reduction Targets**

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**Prepared for the  
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**Energy and Transportation Science Division**

**DERIVATION OF FEDERAL BUILDING FOSSIL FUEL-BASED  
ENERGY USE REDUCTION TARGETS**

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## Abstract

In support of the U.S. Department of Energy's (DOE) fossil fuel-based energy use rulemaking for Federal buildings, as specified in the Energy Independence and Security Act of 2007 (EISA 2007), this concise document outlines the steps the Oak Ridge National Laboratory (ORNL) used to develop the Commercial Buildings Energy Consumption Survey (CBECS) and Residential Energy Consumption Survey (RECS) baselines for the fossil fuel-based energy use reduction targets for Federal buildings as specified in EISA 2007. The steps are described in a very general form, with the primary intent of giving the reader a basic understanding of how the CBECS and RECS baselines were developed.

## 1. Introduction

The EISA 2007 directed DOE to establish regulations that require Federal agencies to reduce their fossil fuel-based energy use at a subset of new Federal buildings and Federal buildings undergoing major renovations to meet a set of percentage reduction targets established in the Act. The statute requires that those targets be based on the energy consumption of similar buildings as measured by the 2003 Commercial Buildings Energy Consumption Survey (CBECS) or Residential Energy Consumption Survey (RECS)<sup>1</sup>. The surveys themselves, however, do not provide readily available fossil fuel-based energy use values for buildings. As a result, DOE directed ORNL to analyze the data underlying these surveys to develop baseline fossil fuel-based energy use intensities for surveyed building types.

The analysis devised and executed to accomplish this task is described in this brief. Because CBECS and RECS are surveys of real U.S. buildings, using these for the development of baseline numbers anchors the baselines to a realistic basis. This is viewed as a critical part necessary to ensure 1) that the energy use baselines developed are reliable metrics and 2) that the resulting intermediate performance targets when achieved will yield real and significant step changes in building performance relative to the existing building market.

Derivation of the CBECS/RECS baseline values is accomplished by five steps that include:

- 1) using CBECS and RECS to determine representative building total site energy use intensities by building type and climate zone,
- 2) converting these energy use intensities to equivalent building total source energy use intensities,
- 3) estimating the electric and non-electric fractions of total source energy use intensities,
- 4) determining building source-based electric energy use intensities generated from fossil fuels, and
- 5) calculating baseline building fossil fuel-based energy use intensities. These steps and

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<sup>1</sup> DOE's Energy Information Administration's Commercial Building Energy Consumption Survey of 2003 and Residential Energy Consumption Survey of 2005 are available at: <http://www.eia.doe.gov/emeu/cbecs/> and <http://www.eia.doe.gov/emeu/recs/>. DOE chose to use the Residential Energy Consumption Survey of 2005 because it includes the most recently available data and no residential survey was conducted in 2003.

the terminologies used are detailed in Section 3.

Finally, using the reduction percentages defined by EISA 2007, DOE directed ORNL to transpose the baselines into fossil fuel-based energy use reduction target tables for each interim target year. These tables are intended to be an easy reference for the user to identify their target(s) of interest based on their specific building type and climate zone.

## 2. Baseline Development Steps

The steps to develop the CBECS/RECS baselines for the EISA 2007 fossil fuel-based energy use reduction targets for Federal buildings are summarized below.

### Step 1: Generate Site-Energy-Based Building Total Energy Use Intensities by Building Type and Climate Zone

In this step, national building total energy use intensities (EUIs; units are kBtu/sqft-yr) are derived via analysis of the CBECS of 2003 and the RECS of 2005. The EUIs are site-energy based<sup>2</sup> and are national median values. The building EUI values are derived based on building types as classified by the “PBAPLUS8” variable in the CBECS database and the “TYPEHUQ” variable in the RECS database. This classification yielded over 50 different building types for the analysis (48 commercial and 5 residential). A goal of this step was to develop building EUIs by climate zone because EUIs for any given building type differ significantly depending on their climatological location.

The CBECS database, via a simple parsing method, was found inadequate to provide reliable EUI values by climate zone for a large number of commercial U.S. building types. This was primarily due to insufficient sample size when the data were parsed by building type and climate zone (discussed more in the Fossil Fuel Reduction Notice of Proposed Rulemaking (Oct. 15, 2010) (75 FR 63404) and by Griffin, et al.). As a result, an alternative method was utilized to derive EUIs by climate zone. Zonal EUI ratios (EUI for climate zone/EUI national) were derived from building simulation modeling performed by the National Renewable Energy Laboratory (NREL; Deru, et al.) for 16 different climate zones (climate zones are shown in Figure 1).<sup>3,4</sup> These ratios were used to derive zonal EUIs by building type by multiplying them by the CBECS national median EUIs. This step produced the site-based building total EUIs by building type and climate zone shown in Table 1. A similar method was used to derive the zonal EUIs for residential building types using the RECS database (also listed in Table 1).

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<sup>2</sup> “Site” energy use refers to energy use measured at the building, usually by the electric, natural gas, and other energy meters.

<sup>3</sup> In the zonal EUI ratio calculation, consistent with the basis for the “EUI for climate zone” term, the “EUI national” term was also based on NREL simulation results. It is not identical to a CBECS or RECS national value.

<sup>4</sup> The 16 different climate zones referenced in this document consists of the 8 zones shown in Figure 1 (color coded) split into the moist (A), dry (B), and marine (C) regions as delineated in the figure. Note that the small climate zone (both in geographical area and number of buildings) identifiable as Climate Zone 7B in Figure 1 was not analyzed by NREL and is not represented in this analysis.

## Step 2: Generate Source-Energy-Based Building Energy Use Intensities

To quantify the total fossil fuel-based energy use from the electricity consumption accountable to a building, it is necessary to reach back to the electric generating power plant and quantify the specific fuel consumed to produce the electricity provided to the building. This is accomplished by converting the site energy-based EUIs from Step 1 to a source energy basis.<sup>5</sup> To do this, source-to-site energy use ratios were derived for each climate zone via analysis of localized buildings in the CBECS and RECS databases.<sup>6</sup> A simple multiplication of the resulting CBECS/RECS-based source-to-site energy use ratios times the site-energy-based EUIs in Table 1 yielded estimates of source-energy-based building EUIs by building type and climate zone.

The multipliers used to convert the site-based energy consumptions (electricity, natural gas, etc.) reported for each building in CBECS and RECS to their source-energy based equivalents are listed below. These multipliers were used in all steps where source energy use computations were performed.

<u>Energy Type</u>	<u>Source kBtu/Site kBtu<sup>7</sup></u>
Electricity:	3.16
Natural gas:	1.046
Fuel oil:	1.00
Propane:	1.00
District steam:	1.35
District steam (CHP <sup>8</sup> ):	1.00
District hot water:	1.28
Chilled water:	1.05
Coal:	1.00
Wood:	1.00

***From this point forward in this document, all references to energy use, EUIs, and energy use reduction targets will all relate to a source energy use basis.***

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<sup>5</sup> “Source” energy is the amount of raw fuel that is consumed in supporting the buildings energy requirements. A source energy basis incorporates production, transmission, and distribution losses.

<sup>6</sup> “Localized” means the buildings analyzed were 1) in close geographical proximity to the climate zone representative cities (refer to the legend for Figure 1) and 2) had similar climates to the climate zone representative cities.

<sup>7</sup> The electricity multiplier is based on the average utility delivery ratio for Year 2007 (the latest available) in Table 6.2.4 of the 2010 DOE Building Energy Data Book (<http://buildingsdatabook.eren.doe.gov>; also refer to the Fossil Fuel Reduction Notice of Proposed Rulemaking (Oct. 15, 2010) (75 FR 63404) ). The natural gas multiplier is derived from Table 1 of EIA’s Natural Gas Annual 2009 (using Year 2007 consumption data to correspond with the basis for the electricity multiplier). Multipliers for liquid and solid fuels used at the building can be expected to be near 1.00 so that value is used. The district and chilled water multipliers are derived based on a district energy services report prepared for EIA (Energy and Environmental Analysis, Inc., et al.).

<sup>8</sup> CHP – District steam from combined heat and power generation system. The multiplier for CHP was approximately 1.01 but a value of 1.00 was used for simplicity.

### Step 3: Determine Electricity Use Energy Use Intensities (Electric EUIs)

Next, it was necessary to separate electric EUIs and non-electric EUIs from the total source-based EUIs. This was needed because DOE directed ORNL to calculate fossil fuel-based energy use reductions, not total energy use reductions. The fossil fuel-based energy use of a building includes its direct fossil fuel energy use (such as natural gas use measured at the building, i.e., its “non-electric” energy use), plus the portion of its electricity use that is generated by fossil fuels (e.g., the coal or natural gas burned at the electric generating plant). To estimate these portions, it was necessary to estimate building electricity use and then determine the percentage of that electricity produced from fossil fuel-based generation. Ultimately, the fossil fuel-based electricity use derived from these calculations is added to the direct use of fossil-based fuel at the building in Step 5 to determine the baseline total fossil fuel-based energy use of buildings. This summation is most conveniently performed on a source energy use basis (kBtu/yr-sqft).

Breaking building total EUIs into their electric and non-electric EUI components was performed by deriving the electric energy use fraction of buildings energy use using CBECS and RECS in each of the 16 climate zones. Climate-zone specific analysis was required as electric energy use fractions in buildings vary significantly depending on location. In addition, electric energy use fractions vary significantly by building type as well. For example, the electric energy use fraction for a convenience store (large electricity use driven by refrigeration) is significantly higher than that for an office building. For this reason, the derivation of CBECS/RECS electricity fractions by zone was also performed based on three classes of electric use intensity (low, medium, and high). The resulting electric fractions multiplied by the total energy use EUIs derived in Step 2 yielded the electric and non-electric (natural gas, oil, etc.) EUIs by building type and climate zone.<sup>9</sup> The next step was to identify the fossil-fuel-generated portions of electric EUIs.

### Step 4: Estimate Fossil-Fuel-Generated Portion of Building Electric EUIs

The options for estimating the fossil fuel-generated portion of electric EUIs were 1) use a national average fossil fuel-based generation multiplier or 2) use grid, regional, or state-level-based multipliers. Due to the complexities involved with determining these multipliers beyond a national basis, DOE is currently using the national average fossil fuel-based electricity generation percentage, 71%.<sup>10</sup>

Multiplying this percentage by the total source electric EUIs developed in Step 3 produced the fossil fuel-based electric EUIs for each building type (by climate zone). The remaining step is to add these values to the direct fossil fuel used at the building to determine total fossil fuel-based EUIs.

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<sup>9</sup> Electric EUI = electric energy use fraction x building total EUI; Non-electric EUI = (1 - electric energy use fraction) x building total EUI.

<sup>10</sup> The 71% is based on Year 2003 (the CBECS baseline year) electric generation by energy source numbers in Table 2.1 of EIA’s Electric Power Annual 2008, released on January 21, 2010. This percentage was the same in Year 2008 and is not expected to be that much different from this value in the current year.

## Step 5: Calculating Baseline Fossil Fuel-Based Building EUIs

Addition of the fossil fuel-based electric EUIs from Step 4 to the non-electric EUIs (representing the direct fossil fuel use at buildings) calculated in Step 3 results in the baseline total fossil fuel-based energy use intensity of buildings by building type and climate zone shown in Table 2. These numbers are intended to represent the CBECS 2003 and RECS 2005 baselines for “similar buildings” as referred to in EISA 2007.

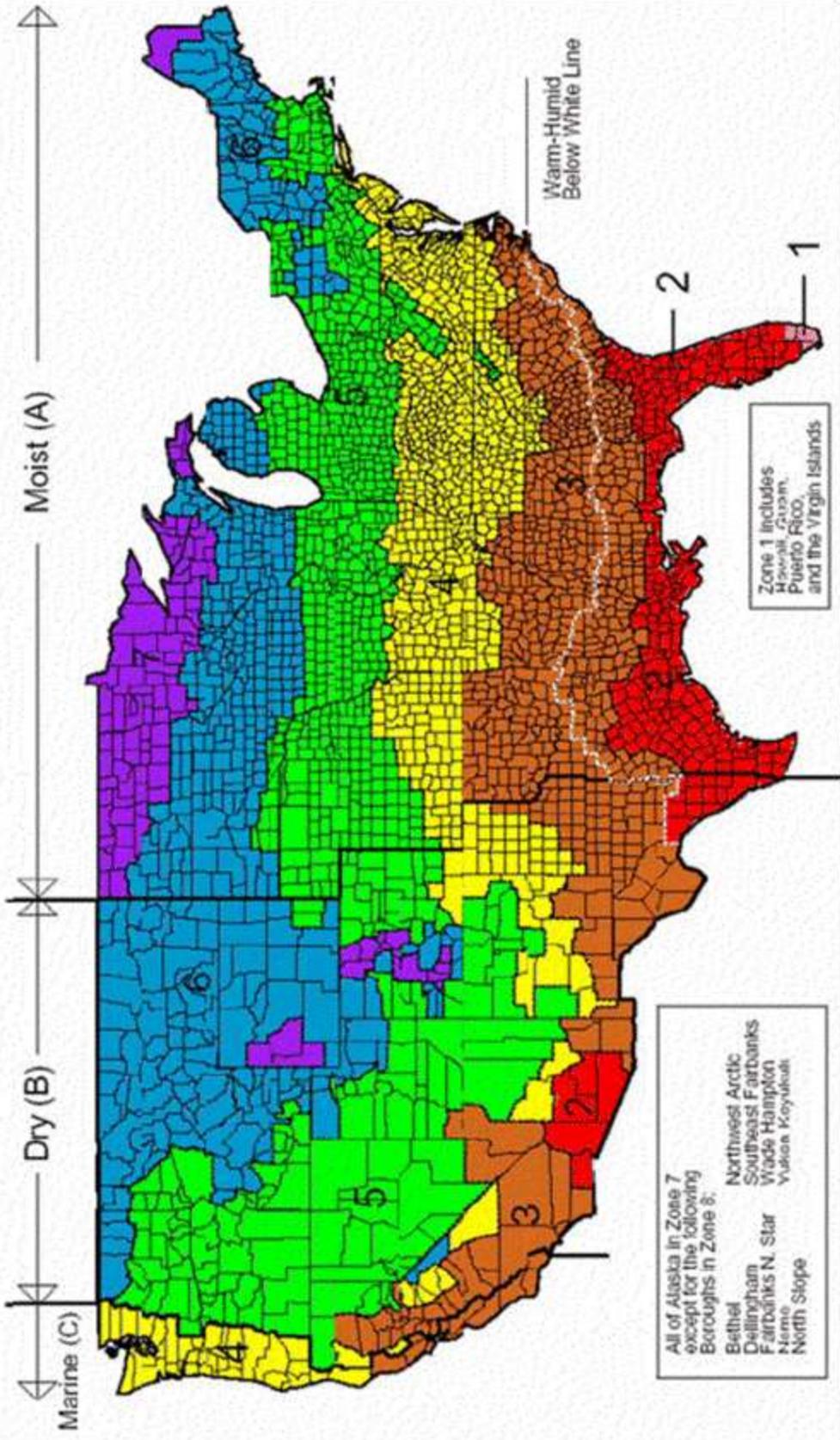
### **3. Determining the Federal Fossil Fuel-Based Energy Use Reduction Targets**

To calculate the fossil fuel-based energy use reduction targets for the Fossil Fuel Reduction rulemaking, the fossil fuel-based reduction percentages established in EISA 2007 (Table 3) were multiplied by the baseline EUI values calculated in Step 5 (Table 2). The fossil fuel-based energy reduction targets by fiscal year are summarized in Tables 4 thru 7. There is no table for FY 2030 and beyond because EISA 2007 sets a 100% fossil fuel-based energy reduction requirement at FY 2030.

#### 4. REFERENCES

1. Briggs, Robert S., et al., “*Climate Classification for Building Energy Codes and Standards*” by the Pacific Northwest National Laboratory March 2002.
2. Deru, Michael, et al., “*U.S. Department of Energy Commercial Reference Building Models of the National Building Stock*” by the National Renewable Energy Laboratory (NREL/TP-5500-46861, February 2011) available at <http://www.nrel.gov/docs/fy11osti/46861.pdf>.
3. Energy and Environmental Analysis, Inc. and International District Energy Association, *District Energy Services: Commercial Data Analysis for EIA’s National Energy Modeling System*. Prepared for Decision Analysis Corporation and Energy Information Administration. August 2007.
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5. Griffin, B., et al., “*Methodology for Modeling Building Energy Performance Across the Commercial Sector*” by the National Renewable Energy Laboratory (NREL/TP-550-41956, March 2008) available at <http://www.nrel.gov/docs/fy08osti/41956.pdf>.
6. U.S. Department of Energy, Energy Information Administration, *Commercial Building Energy Consumption Survey (2003) and Residential Energy Consumption Survey (2005)*, <http://www.eia.doe.gov/emeu/cbecs/> and <http://www.eia.doe.gov/emeu/recs/>.
7. U.S. Department of Energy, Energy Information Administration (EIA), *Electric Power Annual 2008*, released January 21, 2010.

Figure 1: ASHRAE U.S. Climate Zones



<b>Figure 1: ASHRAE U.S. Climate Zones (cont.)</b>		
<b>Zone</b>	<b>Thermal Criteria</b>	<b>Representative U.S. City</b>
1A	5000 < CDD10°C	Miami
2A	3500 < CDD10°C ≤ 5000	Houston
2B	3500 < CDD10°C ≤ 5000	Phoenix
3A	2500 < CDD10°C ≤ 3500	Atlanta
3B-Coast	2500 < CDD10°C ≤ 3500	Los Angeles
3B-Other	2500 < CDD10°C ≤ 3500	Las Vegas
3C	HDD18°C ≤ 2000	San Francisco
4A	CDD10°C ≤ 2500 AND HDD18°C ≤ 3000	Baltimore
4B	CDD10°C ≤ 2500 AND HDD18°C ≤ 3000	Albuquerque
4C	2000 < HDD18°C ≤ 3000	Seattle
5A	3000 < HDD18°C ≤ 4000	Chicago
5B	3000 < HDD18°C ≤ 4000	Denver
6A	4000 < HDD18°C ≤ 5000	Minneapolis
6B	4000 < HDD18°C ≤ 5000	Helena
7.0	5000 < HDD18°C ≤ 7000	Duluth
8.0	7000 < HDD18°C	Fairbanks
Notes:		
1. Climate zones are more fully described in the references (Briggs, et al.; Deru, et al.)		
2. Representative cities were used for simulation modeling.		

Table 1: CBECS/RECS Total Site-Based Energy Use Intensities <sup>1</sup>																	
Building Category	ASHRAE Climate Zone:	1A	2A	2B	3A	3B-Coast	3B-Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Total Site-Based Energy Use Intensity (site kBtu/yr-sqft)															
Education	College/university	88	88	86	89	64	83	72	103	86	92	112	93	129	111	142	210
Education	Elementary/middle school	54	53	51	53	43	50	46	58	51	52	60	53	66	58	70	103
Education	High school	64	64	63	65	47	61	53	75	63	67	81	68	94	81	103	153
Education	Other classroom education	36	36	35	36	26	34	29	42	35	38	46	38	53	45	58	86
Education	Preschool/daycare	70	68	66	69	56	64	59	75	66	66	78	68	85	75	90	133
Enclosed Mall	Enclosed mall	80	80	78	84	62	77	69	97	84	86	111	95	128	114	144	206
Food Sales	Convenience store	192	208	193	217	181	198	202	237	214	224	255	231	276	256	298	376
Food Sales	Convenience store with gas station	155	168	156	175	146	160	163	191	172	181	205	186	223	206	240	303
Food Sales	Grocery store/food market	160	174	161	181	151	165	168	197	178	187	212	192	230	213	248	313
Food Sales	Other food sales	48	53	49	55	46	50	51	60	54	57	64	58	70	64	75	95
Food Service	Fast food	374	383	375	396	339	379	361	436	400	405	474	430	519	476	561	710
Food Service	Other food service	110	113	110	117	98	111	107	129	118	122	140	127	153	141	166	209
Food Service	Restaurant/cafeteria	202	208	201	215	180	204	196	237	216	222	256	232	279	258	304	383
Inpatient Health Care	Hospital/inpatient health	202	204	200	201	191	197	186	205	184	193	198	180	203	186	205	237
Laboratory	Laboratory	249	251	245	256	213	242	221	278	249	252	294	263	323	292	346	460
Lodging	Dormitory/fraternity/sorority	57	61	60	68	45	62	57	83	69	77	94	79	107	95	122	170
Lodging	Hotel	71	72	69	74	67	70	69	78	74	75	82	78	87	84	92	107
Lodging	Motel or inn	79	75	75	73	68	72	66	74	71	68	75	72	80	75	82	98
Lodging	Other lodging	76	72	71	70	65	69	63	70	68	65	72	69	76	71	78	94
Nursing	Nursing home/assisted living	117	119	116	121	100	114	104	131	117	119	139	124	152	138	163	217
Office	Administrative/professional office	56	57	56	59	47	55	48	65	56	58	69	60	77	67	83	116
Office	Bank/other financial	79	81	80	84	66	79	68	92	80	82	98	85	109	96	117	164
Office	Government office	69	72	70	74	58	69	59	81	70	72	86	74	95	84	103	144
Office	Medical office (non-diagnostic)	47	49	48	51	40	47	41	55	48	49	59	51	65	57	70	99
Office	Mixed-use office	64	66	65	69	54	64	55	75	65	67	80	69	88	78	96	134
Office	Other office	54	55	54	57	45	53	46	63	55	56	66	58	74	65	80	112
Outpatient Health Care	Clinic/other outpatient health	72	69	70	69	64	69	57	68	65	60	65	64	67	65	66	75
Outpatient Health Care	Medical office (diagnostic)	48	46	46	46	43	46	38	45	43	40	43	42	44	43	44	50
Public Assembly	Entertainment/culture	32	33	32	33	28	32	29	36	32	33	38	34	42	38	45	60
Public Assembly	Library	85	86	84	88	73	83	76	95	86	87	101	90	111	101	119	158
Public Assembly	Other public assembly	39	40	39	41	34	38	35	44	39	40	47	42	51	46	55	73
Public Assembly	Recreation	37	37	36	38	32	36	33	41	37	37	44	39	48	43	51	68
Public Assembly	Social/meeting	38	39	38	40	33	37	34	43	38	39	45	41	50	45	54	71
Public Order & Safety	Fire station/police station	92	92	90	94	78	89	81	102	92	93	108	97	119	108	127	170
Public Order & Safety	Other public order and safety	83	84	82	86	71	81	74	93	84	85	99	88	108	98	116	154
Religious Worship	Religious worship	33	33	32	34	28	32	29	36	33	33	39	35	42	38	45	60
Retail (except malls)	Other retail	70	71	70	75	53	68	60	85	74	74	96	83	111	98	123	177
Retail (except malls)	Retail store	40	41	40	43	31	39	35	49	42	42	55	48	64	56	71	102
Retail (except malls)	Vehicle dealership/showroom	70	72	70	75	54	68	60	85	74	74	97	83	111	99	124	178
Service	Other service	84	85	83	87	72	82	75	94	84	85	100	89	109	99	117	156
Service	Post office/postal center	60	60	59	61	51	58	53	67	60	60	70	63	77	70	83	110
Service	Repair shop	40	40	39	41	34	39	35	44	40	40	47	42	52	47	55	73
Service	Vehicle service/repair shop	46	46	45	47	39	45	41	51	46	47	54	49	60	54	64	85
Service	Vehicle storage/maintenance	20	20	20	21	17	19	18	22	20	20	24	21	26	23	28	37
Strip Shopping Mall	Strip shopping mall	84	84	82	89	65	81	73	102	88	91	117	100	135	120	151	216
Warehouse	Distribution/shipping center	18	22	24	28	15	25	21	38	32	31	51	43	70	58	86	161
Warehouse	Non-refrigerated warehouse	8	11	11	14	7	12	10	19	16	15	25	21	34	28	41	78
Warehouse	Refrigerated warehouse	96	97	95	99	82	94	86	108	96	98	114	102	125	113	134	178
Residential	Mobile/manufactured home	54	57	57	64	42	58	54	78	65	73	88	74	101	89	115	160
Residential	Single-family detached	40	42	42	47	31	43	40	58	48	54	65	55	75	66	85	119
Residential	Single-family attached	46	49	49	54	36	50	46	66	55	62	75	63	86	76	98	137
Residential	Apartment (in 2-4 unit building)	68	72	71	80	53	73	68	97	81	91	110	93	126	112	144	201
Residential	Apartment (in 5+ unit building)	46	49	48	54	36	50	46	66	55	62	75	63	86	76	98	136

<sup>1</sup> Based on U.S. DOE/EIA Commercial and Residential Energy Consumptions Surveys (CBECS 2003 and RECS 2005).

Table 2. Federal Building Baseline Fossil Fuel-Based Energy Use Intensities <sup>1</sup>																	
Building Category	ASHRAE Climate Zone:	1A	2A	2B	3A	3B-Coast	3B-Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/university	198	197	193	181	132	186	158	161	145	156	171	145	204	182	216	324
Education	Elementary/middle school	121	119	115	108	89	112	100	91	87	87	93	82	104	96	107	159
Education	High school	144	143	141	132	96	136	115	118	106	114	125	106	149	133	158	236
Education	Other classroom education	81	80	79	74	54	76	64	66	59	64	70	59	83	74	88	132
Education	Preschool/daycare	156	154	148	139	115	144	129	118	112	113	119	105	134	124	138	205
Enclosed Mall	Enclosed mall	180	180	176	171	128	174	152	153	143	146	171	148	203	187	220	317
Food Sales	Convenience store	432	477	461	437	396	473	420	365	384	403	368	341	401	444	442	577
Food Sales	Convenience store with gas station	348	385	372	352	319	381	339	294	309	324	297	275	323	358	356	464
Food Sales	Grocery store/food market	360	398	384	364	330	394	350	304	320	335	307	284	334	370	368	480
Food Sales	Other food sales	109	120	116	110	100	119	106	92	97	102	93	86	101	112	111	145
Food Service	Fast food	839	877	894	796	741	905	751	673	718	728	684	635	754	828	833	1090
Food Service	Other food service	248	260	262	236	215	266	223	199	212	218	202	187	222	245	247	321
Food Service	Restaurant/cafeteria	453	475	479	432	393	486	407	365	388	399	370	343	405	449	452	587
Inpatient Health Care	Hospital/inpatient health	455	468	477	405	417	471	387	316	330	346	287	266	295	324	304	363
Laboratory	Laboratory	558	563	549	519	438	544	483	436	422	428	452	409	510	481	529	711
Lodging	Dormitory/fraternity/sorority	129	136	135	137	93	139	125	130	117	131	144	122	169	156	186	262
Lodging	Hotel	159	163	155	149	137	156	151	123	126	127	126	122	138	138	141	165
Lodging	Motel or inn	178	169	168	147	140	162	145	116	120	116	116	112	126	123	125	151
Lodging	Other lodging	170	161	160	141	134	154	139	111	115	111	111	107	120	117	119	145
Nursing	Nursing home/assisted living	263	266	259	245	207	257	228	206	199	202	213	193	241	227	249	335
Office	Administrative/professional office	125	129	126	120	96	124	104	102	96	98	106	93	121	111	126	179
Office	Bank/other financial	177	183	179	171	137	176	148	145	136	139	150	132	171	157	179	254
Office	Government office	156	161	157	150	120	155	130	128	119	122	132	116	151	138	158	223
Office	Medical office (non-diagnostic)	106	110	107	102	82	106	89	87	81	83	90	79	103	94	107	152
Office	Mixed-use office	144	149	146	139	111	144	121	118	111	113	122	107	140	128	146	207
Office	Other office	121	124	121	116	93	120	101	99	92	94	102	90	117	107	122	173
Outpatient Health Care	Clinic/other outpatient health	161	155	156	139	132	155	125	107	111	102	100	99	105	106	100	115
Outpatient Health Care	Medical office (diagnostic)	107	103	104	93	88	103	84	71	74	68	67	66	70	71	67	77
Public Assembly	Entertainment/culture	73	73	72	68	57	71	63	57	55	56	59	53	66	63	69	93
Public Assembly	Library	192	194	189	178	151	187	166	150	145	147	155	140	175	165	182	244
Public Assembly	Other public assembly	88	89	87	82	69	86	77	69	67	68	72	65	81	76	84	113
Public Assembly	Recreation	83	84	81	77	65	81	72	65	63	63	67	61	76	71	78	105
Public Assembly	Social/meeting	86	87	85	80	68	84	75	67	65	66	70	63	79	74	82	110
Public Order & Safety	Fire station/police station	205	207	202	191	161	200	178	161	155	158	166	150	188	177	195	262
Public Order & Safety	Other public order and safety	187	189	184	174	147	182	162	146	142	144	152	137	171	161	177	238
Religious Worship	Religious worship	73	74	72	68	58	71	63	57	55	56	59	54	67	63	69	93
Retail (except malls)	Other retail	157	160	156	152	110	152	131	133	125	125	148	129	175	162	189	273
Retail (except malls)	Retail store	90	92	90	87	63	87	76	77	72	72	85	74	101	93	108	157
Retail (except malls)	Vehicle dealership/showroom	157	161	157	152	110	153	132	134	125	126	148	129	176	162	189	274
Service	Other service	189	191	186	176	145	184	158	148	140	142	153	147	170	156	180	232
Service	Post office/postal center	134	135	132	124	105	130	116	104	101	102	108	98	122	115	127	170
Service	Repair shop	89	90	88	83	68	87	75	70	66	67	72	69	80	74	85	109
Service	Vehicle service/repair shop	103	104	102	96	79	101	87	81	77	78	84	80	93	85	99	127
Service	Vehicle storage/maintenance	45	45	44	42	34	44	38	35	33	34	36	35	40	37	43	55
Strip Shopping Mall	Strip shopping mall	189	189	185	179	135	182	159	160	150	154	179	156	213	197	231	333
Warehouse	Distribution/shipping center	39	50	53	58	31	57	44	61	54	52	78	70	109	91	132	240
Warehouse	Non-refrigerated warehouse	19	24	26	28	15	28	21	29	26	25	38	34	53	44	64	116
Warehouse	Refrigerated warehouse	216	223	226	200	180	224	178	166	173	176	165	150	182	197	199	274
Residential	Mobile/manufactured home	125	120	101	107	62	104	73	106	96	108	117	100	135	121	142	187
Residential	Single-family detached	92	89	75	79	46	77	54	79	72	80	87	74	100	90	105	139
Residential	Single-family attached	106	103	87	91	53	89	62	91	82	92	100	85	115	103	121	160
Residential	Apartment (in 2-4 unit building)	156	151	127	134	77	130	91	134	121	135	147	125	169	151	178	234
Residential	Apartment (in 5+ unit building)	106	102	86	91	53	89	62	91	82	92	100	85	115	103	121	159

<sup>1</sup> Based on U.S. DOE/EIA Commercial and Residential Energy Consumptions Surveys (CBECS 2003 and RECS 2005).

<b>Table 3: EISA Fossil Fuel-Based Energy Use Reduction Percentages</b>	
<b>FY</b>	<b>Percent Reduction</b>
<b>2010</b>	<b>55</b>
<b>2015</b>	<b>65</b>
<b>2020</b>	<b>80</b>
<b>2025</b>	<b>90</b>
<b>2030</b>	<b>100</b>

Building Category	ASHRAE Climate Zone:	1A	2A	2B	3A	3B-Coast	3B-Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/university	89	88	87	81	59	84	71	73	65	70	77	65	92	82	97	146
Education	Elementary/middle school	54	54	52	49	40	50	45	41	39	39	42	37	47	43	48	71
Education	High school	65	65	63	59	43	61	52	53	48	51	56	48	67	60	71	106
Education	Other classroom education	36	36	35	33	24	34	29	30	27	29	31	27	37	33	40	59
Education	Preschool/daycare	70	69	67	63	52	65	58	53	50	51	54	47	60	56	62	92
Enclosed Mall	Enclosed mall	81	81	79	77	58	78	68	69	64	66	77	67	91	84	99	143
Food Sales	Convenience store	194	215	208	197	178	213	189	164	173	181	166	153	181	200	199	259
Food Sales	Convenience store with gas station	156	173	167	158	144	171	152	132	139	146	133	124	145	161	160	209
Food Sales	Grocery store/food market	162	179	173	164	149	177	158	137	144	151	138	128	150	167	166	216
Food Sales	Other food sales	49	54	52	50	45	54	48	41	44	46	42	39	46	50	50	65
Food Service	Fast food	378	395	402	358	333	407	338	303	323	327	308	286	339	373	375	490
Food Service	Other food service	112	117	118	106	97	120	100	90	96	98	91	84	100	110	111	144
Food Service	Restaurant/cafeteria	204	214	216	195	177	219	183	164	175	180	166	154	182	202	203	264
Inpatient Health Care	Hospital/inpatient health	205	210	215	182	188	212	174	142	149	156	129	120	133	146	137	163
Laboratory	Laboratory	251	254	247	233	197	245	217	196	190	192	203	184	229	216	238	320
Lodging	Dormitory/fraternity/sorority	58	61	61	62	42	63	56	58	53	59	65	55	76	70	84	118
Lodging	Hotel	71	73	70	67	62	70	68	55	57	57	57	55	62	62	64	74
Lodging	Motel or inn	80	76	76	66	63	73	65	52	54	52	52	50	57	55	66	68
Lodging	Other lodging	76	73	72	63	60	69	62	50	52	50	50	48	54	53	54	65
Nursing	Nursing home/assisted living	118	120	117	110	93	115	103	93	90	91	96	87	108	102	112	151
Office	Administrative/professional office	56	58	57	54	43	56	47	46	43	44	48	42	54	50	57	80
Office	Bank/other financial	80	82	80	77	62	79	67	65	61	62	67	59	77	71	81	114
Office	Government office	70	72	71	67	54	70	59	57	54	55	59	52	68	62	71	100
Office	Medical office (non-diagnostic)	48	49	48	46	37	48	40	39	37	37	40	36	46	42	48	68
Office	Mixed-use office	65	67	65	63	50	65	54	53	50	51	55	48	63	58	66	93
Office	Other office	54	56	55	52	42	54	45	44	42	42	46	40	52	48	55	78
Outpatient Health Care	Clinic/other outpatient health	72	70	70	63	60	70	56	48	50	46	45	44	47	48	45	52
Outpatient Health Care	Medical office (diagnostic)	48	46	47	42	40	46	38	32	33	31	30	30	32	32	30	35
Public Assembly	Entertainment/culture	33	33	32	30	26	32	28	26	25	25	26	24	30	28	31	42
Public Assembly	Library	86	87	85	80	68	84	75	68	65	66	70	63	79	74	82	110
Public Assembly	Other public assembly	40	40	39	37	31	39	34	31	30	30	32	29	36	34	38	51
Public Assembly	Recreation	37	38	37	35	29	36	32	29	28	29	30	27	34	32	35	47
Public Assembly	Social/meeting	39	39	38	36	31	38	34	30	29	30	31	28	35	33	37	49
Public Order & Safety	Fire station/police station	92	93	91	86	73	90	80	72	70	71	75	68	84	80	88	118
Public Order & Safety	Other public order and safety	84	85	83	78	66	82	73	66	64	65	68	62	77	73	80	107
Religious Worship	Religious worship	33	33	32	31	26	32	29	26	25	25	27	24	30	28	31	42
Retail (except malls)	Other retail	70	72	70	68	50	69	59	60	56	56	66	58	79	73	85	123
Retail (except malls)	Retail store	40	41	40	39	28	39	34	34	32	32	38	33	45	42	49	71
Retail (except malls)	Vehicle dealership/showroom	71	72	70	68	50	69	59	60	56	57	67	58	79	73	85	123
Service	Other service	85	86	84	79	65	83	71	67	63	64	69	66	76	70	81	104
Service	Post office/postal center	60	61	59	56	47	59	52	47	45	46	49	44	55	52	57	77
Service	Repair shop	40	40	39	37	31	39	34	32	30	30	33	31	36	33	38	49
Service	Vehicle service/repair shop	46	47	46	43	36	45	39	37	34	35	38	36	42	38	44	57
Service	Vehicle storage/maintenance	20	20	20	19	15	20	17	16	15	15	16	16	18	17	19	25
Strip Shopping Mall	Strip shopping mall	85	85	83	81	61	82	72	72	67	69	81	70	96	89	104	150
Warehouse	Distribution/shipping center	18	23	24	26	14	26	20	27	24	23	35	32	49	41	59	108
Warehouse	Non-refrigerated warehouse	9	11	11	13	7	12	9	13	12	11	17	15	24	20	29	52
Warehouse	Refrigerated warehouse	97	100	102	90	81	101	80	75	78	79	74	68	82	89	90	123
Residential	Mobile/manufactured home	56	54	46	48	28	47	33	48	43	49	53	45	61	54	64	84
Residential	Single-family detached	42	40	34	36	21	35	24	36	32	36	39	33	45	40	47	62
Residential	Single-family attached	48	46	39	41	24	40	28	41	37	41	45	38	52	46	55	72
Residential	Apartment (in 2-4 unit building)	70	68	57	60	35	59	41	60	54	61	66	56	76	68	80	105
Residential	Apartment (in 5+ unit building)	48	46	39	41	24	40	28	41	37	41	45	38	52	46	55	72

<sup>1</sup> 5% below baselines from U.S. DOE/EIA Commercial and Residential Energy Consumption Surveys (CBECS 2003 and RECS 2005).

Building Category	ASHRAE Climate Zone:	1A	2A	2B	3A	3B-Coast	3B-Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
	Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/university	69	69	67	63	46	65	55	56	51	55	60	51	71	64	76	113
Education	Elementary/middle school	42	42	40	38	31	39	35	32	30	31	32	29	36	34	37	56
Education	High school	51	50	49	46	34	48	40	41	37	40	44	37	52	47	55	83
Education	Other classroom education	28	28	28	26	19	27	23	23	21	22	24	21	29	26	31	46
Education	Preschool/daycare	55	54	52	49	40	50	45	41	39	39	42	37	47	43	48	72
Enclosed Mall	Enclosed mall	63	63	62	60	45	61	53	53	50	51	60	52	71	66	77	111
Food Sales	Convenience store	151	167	161	153	139	165	147	128	134	141	129	119	140	156	155	202
Food Sales	Convenience store with gas station	122	135	130	123	112	133	119	103	108	113	104	96	113	125	125	163
Food Sales	Grocery store/food market	126	139	135	127	116	138	123	106	112	117	107	99	117	130	129	168
Food Sales	Other food sales	38	42	41	39	35	42	37	32	34	36	32	30	35	39	39	51
Food Service	Fast food	294	307	313	279	259	317	263	235	251	255	239	222	264	290	292	381
Food Service	Other food service	87	91	92	83	75	93	78	70	74	76	71	66	78	86	86	112
Food Service	Restaurant/cafeteria	159	166	168	151	138	170	143	128	136	140	129	120	142	157	158	206
Inpatient Health Care	Hospital/inpatient health	159	164	167	142	146	165	136	111	116	121	100	93	103	113	107	127
Laboratory	Laboratory	195	197	192	182	153	190	169	153	148	150	158	143	178	168	185	249
Lodging	Dormitory/fraternity/sorority	45	48	47	48	32	49	44	45	41	46	50	43	59	54	65	92
Lodging	Hotel	56	57	54	52	48	55	53	43	44	44	44	43	48	48	49	58
Lodging	Motel or inn	62	59	59	52	49	57	51	41	42	41	41	39	44	43	44	53
Lodging	Other lodging	59	56	56	49	47	54	49	39	40	39	39	37	42	41	42	51
Nursing	Nursing home/assisted living	92	93	91	86	72	90	80	72	70	71	75	67	84	79	87	117
Office	Administrative/professional office	44	45	44	42	34	43	36	36	33	34	37	32	42	39	44	63
Office	Bank/other financial	62	64	62	60	48	62	52	51	48	49	52	46	60	55	63	89
Office	Government office	55	56	55	52	42	54	46	45	42	43	46	40	53	48	55	78
Office	Medical office (non-diagnostic)	37	38	37	36	29	37	31	30	29	29	31	28	36	33	38	53
Office	Mixed-use office	51	52	51	49	39	50	42	41	39	40	43	38	49	45	51	72
Office	Other office	42	44	43	41	33	42	35	35	32	33	36	31	41	37	43	60
Outpatient Health Care	Clinic/other outpatient health	56	54	55	49	46	54	44	37	39	36	35	35	37	37	35	40
Outpatient Health Care	Medical office (diagnostic)	37	36	36	32	31	36	29	25	26	24	23	23	25	25	23	27
Public Assembly	Entertainment/culture	25	26	25	24	20	25	22	20	19	20	21	19	23	22	24	32
Public Assembly	Library	67	68	66	62	53	65	58	53	51	51	54	49	61	58	64	86
Public Assembly	Other public assembly	31	31	30	29	24	30	27	24	23	24	25	23	28	27	29	39
Public Assembly	Recreation	29	29	29	27	23	28	25	23	22	22	23	21	26	25	27	37
Public Assembly	Social/meeting	30	31	30	28	24	29	26	24	23	23	24	22	28	26	29	38
Public Order & Safety	Fire station/police station	72	73	71	67	56	70	62	56	54	55	58	53	66	62	68	92
Public Order & Safety	Other public order and safety	65	66	65	61	51	64	57	51	50	50	53	48	60	56	62	83
Religious Worship	Religious worship	26	26	25	24	20	25	22	20	19	20	21	19	23	22	24	33
Retail (except malls)	Other retail	55	56	55	53	39	53	46	47	44	44	52	45	61	57	66	96
Retail (except malls)	Retail store	31	32	31	30	22	31	26	27	25	25	30	26	35	32	38	55
Retail (except malls)	Vehicle dealership/showroom	55	56	55	53	39	54	46	47	44	44	52	45	62	57	66	96
Service	Other service	66	67	65	61	51	64	55	52	49	50	54	51	59	55	63	81
Service	Post office/postal center	47	47	46	43	37	46	40	37	35	36	38	34	43	40	44	60
Service	Repair shop	31	31	31	29	24	30	26	25	23	23	25	24	28	26	30	38
Service	Vehicle service/repair shop	36	36	36	34	28	35	30	28	27	27	29	28	33	30	34	44
Service	Vehicle storage/maintenance	16	16	15	15	12	15	13	12	12	12	13	12	14	13	15	19
Strip Shopping Mall	Strip shopping mall	66	66	65	63	47	64	56	56	52	54	63	54	74	69	81	117
Warehouse	Distribution/shipping center	14	18	18	20	11	20	15	21	19	18	27	25	38	32	46	84
Warehouse	Non-refrigerated warehouse	7	8	9	10	5	10	7	10	9	9	13	12	18	15	22	41
Warehouse	Refrigerated warehouse	76	78	79	70	63	78	62	58	61	61	58	53	64	69	70	96
Residential	Mobile/manufactured home	44	42	35	37	22	36	25	37	34	38	41	35	47	42	50	65
Residential	Single-family detached	32	31	26	28	16	27	19	28	25	28	30	26	35	31	37	49
Residential	Single-family attached	37	36	30	32	18	31	22	32	29	32	35	30	40	36	42	56
Residential	Apartment (in 2-4 unit building)	55	53	44	47	27	46	32	47	42	47	51	44	59	53	62	82
Residential	Apartment (in 5+ unit building)	37	36	30	32	18	31	22	32	29	32	35	30	40	36	42	56

<sup>1</sup> 65% below baselines from U.S. DOE/EIA Commercial and Residential Energy Consumption Surveys (CBECS 2003 and RECS 2005).

Building Category	Climate Zone:	1A	2A	2B	3A	3B-Coast	3B-Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
		Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)															
Education	College/university	40	39	39	36	26	37	32	32	29	31	34	29	41	36	43	65
Education	Elementary/middle school	24	24	23	22	18	22	20	18	17	17	19	16	21	19	21	32
Education	High school	29	29	28	26	19	27	23	24	21	23	25	21	30	27	32	47
Education	Other classroom education	16	16	16	15	11	15	13	13	12	13	14	12	17	15	18	26
Education	Preschool/daycare	31	31	30	28	23	29	26	24	22	23	24	21	27	25	28	41
Enclosed Mall	Enclosed mall	36	36	35	34	26	35	30	31	29	29	34	30	41	37	44	63
Food Sales	Convenience store	86	95	92	87	79	95	84	73	77	81	74	68	80	89	88	115
Food Sales	Convenience store with gas station	70	77	74	70	64	76	68	59	62	65	59	55	65	72	71	93
Food Sales	Grocery store/food market	72	80	77	73	66	79	70	61	64	67	61	57	67	74	74	96
Food Sales	Other food sales	22	24	23	22	20	24	21	18	19	20	19	17	20	22	22	29
Food Service	Fast food	168	175	179	159	148	181	150	135	144	146	137	127	151	166	167	218
Food Service	Other food service	50	52	52	47	43	53	45	40	42	44	40	37	44	49	49	64
Food Service	Restaurant/cafeteria	91	95	96	86	79	97	81	73	78	80	74	69	81	90	90	117
Inpatient Health Care	Hospital/inpatient health	91	94	95	81	83	94	77	63	66	69	57	53	59	65	61	73
Laboratory	Laboratory	112	113	110	104	88	109	97	87	84	86	90	82	102	96	106	142
Lodging	Dormitory/fraternity/sorority	26	27	27	27	19	28	25	26	23	26	29	24	34	31	37	52
Lodging	Hotel	32	33	31	30	27	31	30	25	25	25	25	24	28	28	28	33
Lodging	Motel or inn	36	34	34	29	28	32	29	23	24	23	23	22	25	25	25	30
Lodging	Other lodging	34	32	32	28	27	31	28	22	23	22	22	21	24	23	24	29
Nursing	Nursing home/assisted living	53	53	52	49	41	51	46	41	40	40	43	39	48	45	50	67
Office	Administrative/professional office	25	26	25	24	19	25	21	20	19	20	21	19	24	24	25	36
Office	Bank/other financial	35	37	36	34	27	35	30	29	27	28	30	26	34	31	36	51
Office	Government office	31	32	31	30	24	31	26	26	24	24	26	23	30	28	32	45
Office	Medical office (non-diagnostic)	21	22	21	20	16	21	18	17	16	17	18	16	21	19	21	30
Office	Mixed-use office	29	30	29	28	22	29	24	24	22	23	24	21	28	26	29	41
Office	Other office	24	25	24	23	19	24	20	20	18	19	20	18	23	21	24	35
Outpatient Health Care	Clinic/other outpatient health	32	31	31	28	26	31	25	21	22	20	20	20	21	21	20	23
Outpatient Health Care	Medical office (diagnostic)	21	21	21	19	18	21	17	14	15	14	13	13	14	14	13	15
Public Assembly	Entertainment/culture	15	15	14	14	11	14	13	11	11	11	12	11	13	13	14	19
Public Assembly	Library	38	39	38	36	30	37	33	30	29	29	31	28	35	33	36	49
Public Assembly	Other public assembly	18	18	17	16	14	17	15	14	13	14	14	13	16	15	17	23
Public Assembly	Recreation	17	17	16	15	13	16	14	13	13	13	13	12	15	14	16	21
Public Assembly	Social/meeting	17	17	17	16	14	17	15	13	13	13	14	13	16	15	16	22
Public Order & Safety	Fire station/police station	41	41	40	38	32	40	36	32	31	32	33	30	38	35	39	52
Public Order & Safety	Other public order and safety	37	38	37	35	29	36	32	29	28	29	30	27	34	32	35	48
Religious Worship	Religious worship	15	15	14	14	12	14	13	11	11	11	12	11	13	13	14	19
Retail (except malls)	Other retail	31	32	31	30	22	30	26	27	25	25	30	26	35	32	38	55
Retail (except malls)	Retail store	18	18	18	17	13	17	15	15	14	14	17	15	20	19	22	31
Retail (except malls)	Vehicle dealership/showroom	31	32	31	30	22	31	26	27	25	25	30	26	35	32	38	55
Service	Other service	38	38	37	35	29	37	32	30	28	28	31	29	34	31	36	46
Service	Post office/postal center	27	27	26	25	21	26	23	21	20	20	22	20	24	23	25	34
Service	Repair shop	18	18	18	17	14	17	15	14	13	13	14	14	16	15	17	22
Service	Vehicle service/repair shop	21	21	20	19	16	20	17	16	15	16	17	16	19	17	20	25
Service	Vehicle storage/maintenance	9	9	9	8	7	9	8	7	7	7	7	7	8	7	9	11
Strip Shopping Mall	Strip shopping mall	38	38	37	36	27	36	32	32	30	31	36	31	43	39	46	67
Warehouse	Distribution/shipping center	8	10	11	12	6	11	9	12	11	10	16	14	22	18	26	48
Warehouse	Non-refrigerated warehouse	4	5	5	6	3	6	4	6	5	5	8	7	11	9	13	23
Warehouse	Refrigerated warehouse	43	45	45	40	36	45	36	33	35	35	33	30	36	39	40	55
Residential	Mobile/manufactured home	25	24	20	21	12	21	15	21	19	22	23	20	27	24	28	37
Residential	Single-family detached	18	18	15	16	9	15	11	16	14	16	17	15	20	18	21	28
Residential	Single-family attached	21	21	17	18	11	18	12	18	16	18	20	17	23	21	24	32
Residential	Apartment (in 2-4 unit building)	31	30	25	27	15	26	18	27	24	27	29	25	34	30	36	47
Residential	Apartment (in 5+ unit building)	21	20	17	18	11	18	12	18	16	18	20	17	23	21	24	32

<sup>1</sup> 80% below baselines from U.S. DOE/EIA Commercial and Residential Energy Consumption Surveys (CBECS 2003 and RECS 2005).

Building Category	Climate Zone:	1A	2A	2B	3A	3B-Coast	3B-Other	3C	4A	4B	4C	5A	5B	6A	6B	7	8
		Building Type	Fossil Fuel-Generated Energy Use Intensity (source kBtu/yr-sqft)														
Education	College/university	20	20	19	18	13	19	16	16	15	16	17	14	20	18	22	32
Education	Elementary/middle school	12	12	12	11	9	11	10	9	9	9	9	8	10	10	11	16
Education	High school	14	14	14	13	10	14	12	12	11	11	13	11	15	13	16	24
Education	Other classroom education	8	8	8	7	5	8	6	7	6	6	7	6	8	7	9	13
Education	Preschool/daycare	16	15	15	14	12	14	13	12	11	11	12	11	13	12	14	20
Enclosed Mall	Enclosed mall	18	18	18	17	13	17	15	15	14	15	17	15	20	19	22	32
Food Sales	Convenience store	43	48	46	44	40	47	42	36	38	40	37	34	40	44	44	58
Food Sales	Convenience store with gas station	35	38	37	35	32	38	34	29	31	32	30	27	32	36	36	46
Food Sales	Grocery store/food market	36	40	38	36	33	39	35	30	32	34	31	28	33	37	37	48
Food Sales	Other food sales	11	12	12	11	10	12	11	9	10	10	9	9	10	11	11	15
Food Service	Fast food	84	88	89	80	74	90	75	67	72	73	68	63	75	83	83	109
Food Service	Other food service	25	26	26	24	21	27	22	20	21	22	20	19	22	25	25	32
Food Service	Restaurant/cafeteria	45	48	48	43	39	49	41	36	39	40	37	34	41	45	45	59
Inpatient Health Care	Hospital/inpatient health	45	47	48	41	42	47	39	32	33	35	29	27	29	32	30	36
Laboratory	Laboratory	56	56	55	52	44	54	48	44	42	43	45	41	51	48	53	71
Lodging	Dormitory/fraternity/sorority	13	14	14	14	9	14	13	13	12	13	14	12	17	16	19	26
Lodging	Hotel	16	16	15	15	14	16	15	12	13	13	13	12	14	14	14	17
Lodging	Motel or inn	18	17	17	15	14	16	15	12	12	12	12	11	13	12	12	15
Lodging	Other lodging	17	16	16	14	13	15	14	11	12	11	11	11	12	12	12	14
Nursing	Nursing home/assisted living	26	27	26	24	21	26	23	21	20	20	21	19	24	23	25	34
Office	Administrative/professional office	12	13	13	12	10	12	10	10	10	10	11	9	12	11	13	18
Office	Bank/other financial	18	18	18	17	14	18	15	15	14	14	15	13	17	16	18	25
Office	Government office	16	16	16	15	12	16	13	13	12	12	13	12	15	14	16	22
Office	Medical office (non-diagnostic)	11	11	11	10	8	11	9	9	8	8	9	8	10	9	11	15
Office	Mixed-use office	14	15	15	14	11	14	12	12	11	11	12	11	14	13	15	21
Office	Other office	12	12	12	12	9	12	10	10	9	9	10	9	12	11	12	17
Outpatient Health Care	Clinic/other outpatient health	16	15	16	14	13	15	13	11	11	10	10	10	11	11	10	12
Outpatient Health Care	Medical office (diagnostic)	11	10	10	9	9	10	8	7	7	7	7	7	7	7	7	8
Public Assembly	Entertainment/culture	7	7	7	7	6	7	6	6	5	6	6	5	7	6	7	9
Public Assembly	Library	19	19	19	18	15	19	17	15	15	15	16	14	18	17	18	24
Public Assembly	Other public assembly	9	9	9	8	7	9	8	7	7	7	7	6	8	8	8	11
Public Assembly	Recreation	8	8	8	8	6	8	7	6	6	6	7	6	8	7	8	11
Public Assembly	Social/meeting	9	9	8	8	7	8	7	7	7	7	7	6	8	7	8	11
Public Order & Safety	Fire station/police station	21	21	20	19	16	20	18	16	16	16	17	15	19	18	19	26
Public Order & Safety	Other public order and safety	19	19	18	17	15	18	16	15	14	14	15	14	17	16	18	24
Religious Worship	Religious worship	7	7	7	7	6	7	6	6	6	6	6	5	7	6	7	9
Retail (except malls)	Other retail	16	16	16	15	11	15	13	13	12	13	15	13	18	16	19	27
Retail (except malls)	Retail store	9	9	9	9	6	9	8	8	7	7	8	7	10	9	11	16
Retail (except malls)	Vehicle dealership/showroom	16	16	16	15	11	15	13	13	13	13	15	13	18	16	19	27
Service	Other service	19	19	19	18	14	18	16	15	14	14	15	15	17	16	18	23
Service	Post office/postal center	13	13	13	12	10	13	12	10	10	10	10	10	12	12	13	17
Service	Repair shop	9	9	9	8	7	9	7	7	7	7	7	7	8	7	8	11
Service	Vehicle service/repair shop	10	10	10	10	8	10	9	8	8	8	8	8	9	9	10	13
Service	Vehicle storage/maintenance	4	5	4	4	3	4	4	3	3	3	4	3	4	4	4	6
Strip Shopping Mall	Strip shopping mall	19	19	18	18	13	18	16	16	15	15	18	16	21	20	23	33
Warehouse	Distribution/shipping center	4	5	5	6	3	6	4	6	5	5	8	7	11	9	13	24
Warehouse	Non-refrigerated warehouse	2	2	3	3	1	3	2	3	3	3	4	3	5	4	6	12
Warehouse	Refrigerated warehouse	22	22	23	20	18	22	18	17	17	18	16	15	18	20	27	27
Residential	Mobile/manufactured home	12	12	10	11	6	10	7	11	10	11	12	10	13	12	14	19
Residential	Single-family detached	9	9	8	8	5	8	5	8	7	8	9	7	10	9	11	14
Residential	Single-family attached	11	10	9	9	5	9	6	9	8	9	10	9	12	10	12	16
Residential	Apartment (in 2-4 unit building)	16	15	13	13	8	13	9	13	12	14	15	13	17	15	18	23
Residential	Apartment (in 5+ unit building)	11	10	9	9	5	9	6	9	8	9	10	9	11	10	12	16

<sup>1</sup> 90% below baselines from U.S. DOE/EIA Commercial and Residential Energy Consumptions Surveys (CBECS 2003 and RECS 2005).