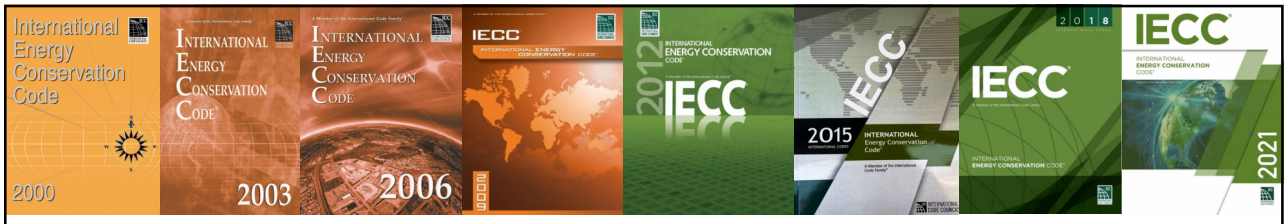


2024 IECC

Gaming the Future

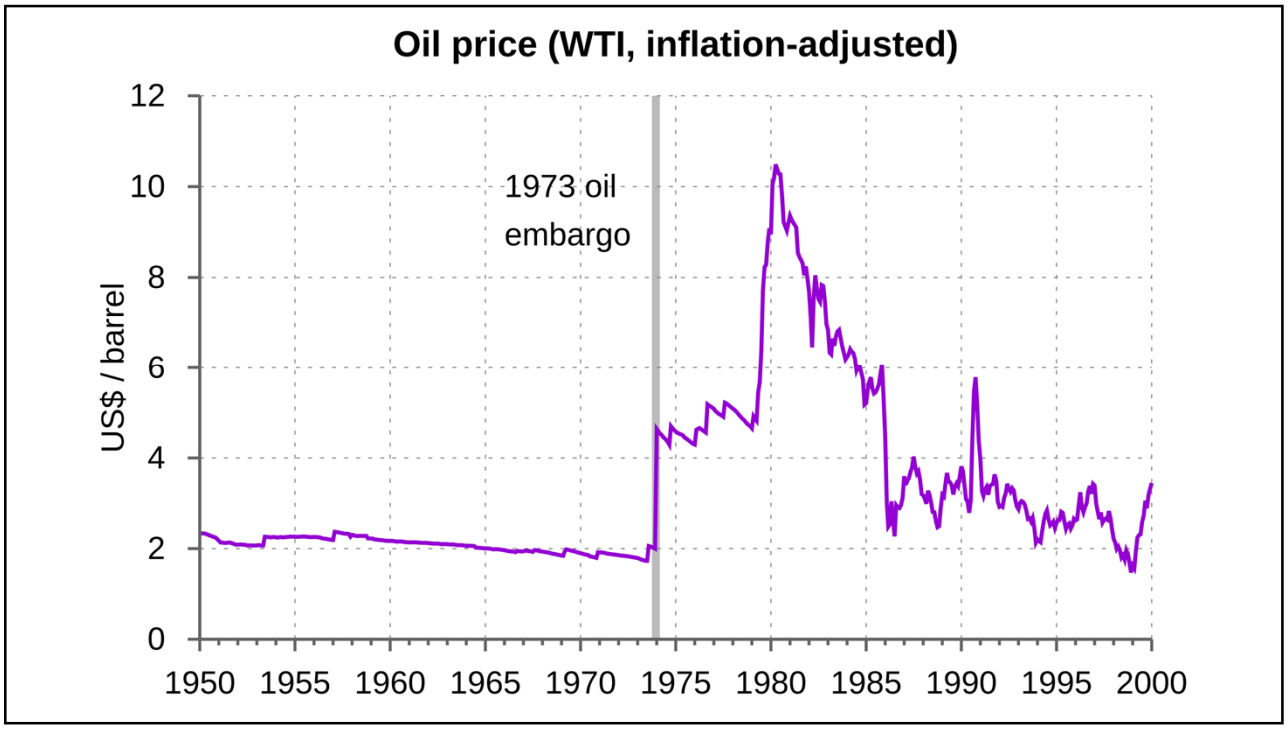
Louis van Belle – 1/15/2026
Northern Indiana ASHRAE

1

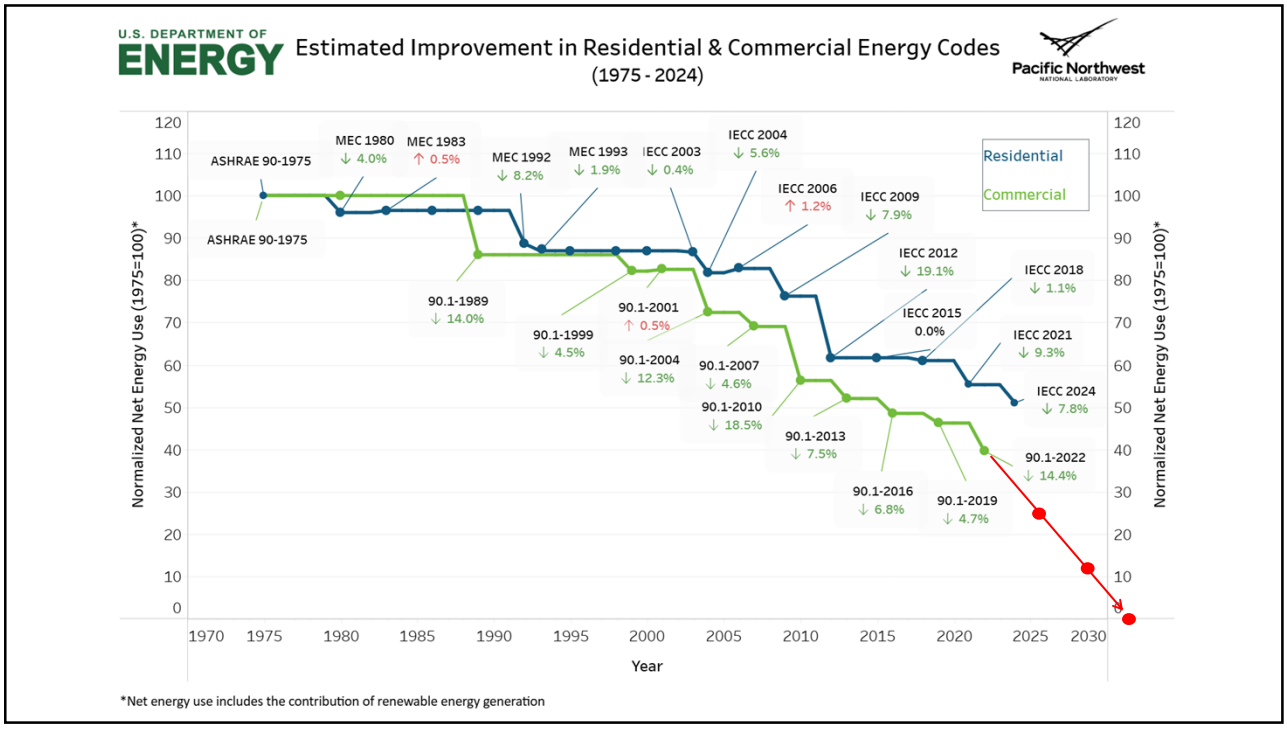
Learning Objectives

- History and Future of the Commercial Energy Code
- Renewable Energy Requirements
- Additional Requirements Section
- Load Management Requirements Section
- Compliance Paths

2

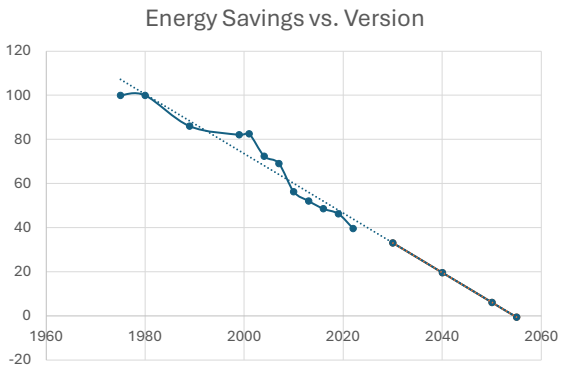

Oil price (WTI, inflation-adjusted)
US$ / barrel
1973 oil embargo
0
2
4
6
8
10
12
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000

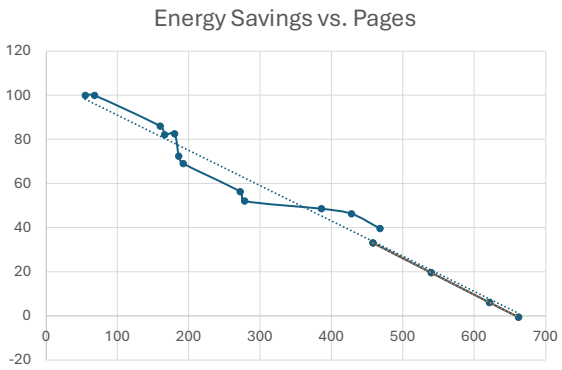
3


U.S. DEPARTMENT OF ENERGY
Estimated Improvement in Residential & Commercial Energy Codes
(1975 - 2024)
Pacific Northwest NATIONAL LABORATORY
Residential
Commercial
ASHRAE 90-1975
MEC 1980 ↓ 4.0%
MEC 1983 ↑ 0.5%
MEC 1992 ↓ 8.2%
MEC 1993 ↓ 1.9%
IECC 2003 ↓ 0.4%
IECC 2004 ↓ 5.6%
IECC 2006 ↑ 1.2%
IECC 2009 ↓ 7.9%
IECC 2012 ↓ 19.1%
IECC 2015 0.0%
IECC 2018 ↓ 1.1%
IECC 2021 ↓ 9.3%
IECC 2024 ↓ 7.8%
90.1-1989 ↓ 14.0%
90.1-1999 ↓ 4.5%
90.1-2001 ↑ 0.5%
90.1-2004 ↓ 12.3%
90.1-2007 ↓ 4.6%
90.1-2010 ↓ 18.5%
90.1-2013 ↓ 7.5%
90.1-2016 ↓ 6.8%
90.1-2019 ↓ 4.7%
90.1-2022 ↓ 14.4%
Normalized Net Energy Use (1975=100)*
Year
*Net energy use includes the contribution of renewable energy generation

4

Energy Savings vs Version and Pages



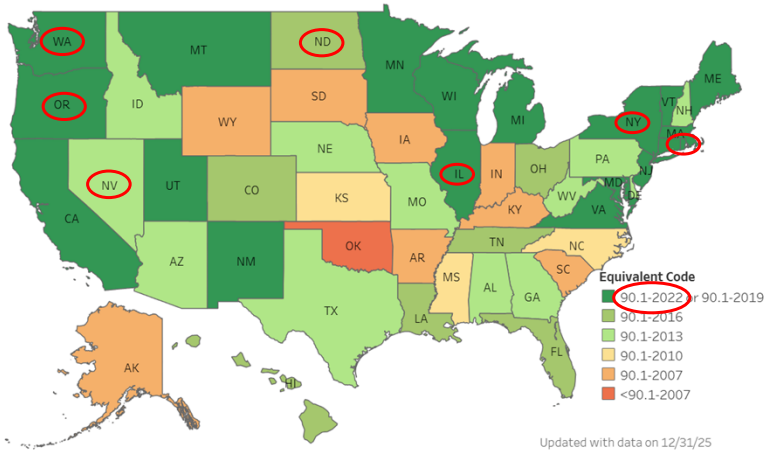


5

State Adoptions

2024 IECC and 90.1-2022
- New York
- Rhode Island
- Illinois - automatic
- Washington
- North Dakota
- Nevada - automatic

90.1-2022
- Oregon



6

C405.15 Renewable Energy Systems

- Buidings in climate zones 0 through 7.
- Nameplate rating of 0.75 W/SF (minimum).
  - Square footage of largest three floors.
- Some exceptions, but then off-site renewable energy must be procured.

7

C405.15 Renewable Energy Exceptions

- Unshaded flat plate collector receives less than 1.1 kBtu/SF.
- 80% of the roof area is obstructed (mechanical equipment, green roof, access paths, occupied roof terrace).
- 50% of the roof area is shaded (mountains, other buildings, etc.) for more than 2,500 hours per year.
- Buildings less than 5,000 SF.
- Buildings must then comply with 405.15.2 (off-site renewable energy).

8

C405.15 Offsite Renewable Energy

Equation 4-11 $TRE_{off} = (REN_{off} \times 0.75\,W/ft^2 \times FLRA - IRE_{on}) \times 15$

where:

TRE_{off} = Total off-site renewable electrical energy in kilowatt-hours (kWh) to be procured in accordance with Table C405.15.2.

REN_{off} = Annual off-site renewable electrical energy from Table C405.15.2, in units of kilowatt-hours per watt of array capacity.

$FLRA$ = The sum of the gross conditioned floor area of all floors not to exceed the combined floor area of the three largest floors.

IRE_{on} = Annual on-site renewable electrical energy generation of a new on-site renewable energy system, to be installed as part of the building project, whose rated capacity is less than the rated capacity required in Section C405.15.1.

› INSIGHTS (1)

TABLE C405.15.2 ANNUAL OFF-SITE RENEWABLE ENERGY REQUIREMENTS

CLIMATE ZONE	ANNUAL OFF-SITE RENEWABLE ELECTRICAL ENERGY (kWh/W)
1A, 2B, 3B, 3C, 4B and 5B	1.75
0A, 0B, 1B, 2A, 3A and 6B	1.55
4A, 4C, 5A, 5C, 6A and 7	1.35

9

C405.15 Offsite Renewable Energy

Equation 4-11 $TRE_{off} = (REN_{off} \times 0.75\,W/ft^2 \times FLRA - IRE_{on}) \times 15$

- 100,000 SF Building

(1.35 kWh/W x 0.75 W/SF x 100,000 SF – 0) x 15 = 1,520,000 kWh

- 5,000 SF Building

(1.35 kWh/W x 0.75 W/SF x 5,000 SF – 0) x 15 = 75,000 kWh

10

C405.15 Renewable Energy Credits

- 405.15.2.1: Off-site procurement
  - Physical purchase agreement
  - Financial purchase agreement
  - Community facility
  - Off-site facility owned by the property owner
  - Renewable energy investment fund
  - Green retail tariff
- 405.15.2.2: Off-site contract
  - Must be for a minimum of 10 years
- 405.15.3: Renewable energy credits

11

C406 Additional Requirements

Expanded Energy Credits in Energy Codes - Technical Brief

Pacific Northwest NATIONAL LABORATORY

PNNL-31572

Expanded Energy Credits in Energy Codes

Technical Brief

July 2021

Reviews development of the additional energy credit measures

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31572.pdf

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C406 Additional Requirements

- 2021 IECC included 15 options for goal of 2.5% energy cost savings
- 90.1-2022 includes 24 options for goal of 5.0% energy cost savings
- Credits represent 1/10 of 1% energy cost savings

13

C406: Additional Requirements

C406.1: Compliance

- Buildings greater than 2,000 SF shall comply with C406.1.1
  - Additional energy efficiency credit requirements
- Buildings greater than 5,000 SF shall comply with C406.1.1 and C406.1.2
  - Renewable and load management credit requirements

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C406: Additional Requirements

TABLE C406.1.1(1) ENERGY CREDIT REQUIREMENTS BY BUILDING OCCUPANCY GROUP

BUILDING OCCUPANCY GROUP	CLIMATE ZONE																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R-2, R-4 and I-1	65	66	67	77	80	86	80	81	90	86	90	90	86	90	90	70	89	80	78
I-2	43	42	38	37	36	38	32	32	30	36	36	36	43	43	44	46	47	50	53
R-1	63	62	66	65	70	71	77	80	84	81	83	83	85	86	90	83	87	87	85
B	62	62	64	66	66	65	64	64	68	70	72	74	71	73	77	71	74	74	71
A-2	70	70	72	72	75	75	70	73	82	69	74	78	67	72	78	60	67	57	51
M	80	79	83	79	81	84	67	74	87	80	66	69	79	62	50	75	67	75	58
E	56	57	55	58	58	57	59	62	59	61	66	62	64	67	67	65	67	63	58
S-1 and S-2	61	60	61	60	58	57	44	54	62	85	68	71	90	72	90	89	90	90	
All other	31	31	31	32	32	33	30	32	36	35	35	35	37	36	36	36	37	36	34

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C406 Energy Credits

- 32 Options
- Not every option is available to every building type
- Not every option is available in every climate zone
- Points listed are Maximum Possible
- Points vary based on climate zone

TABLE C406.2(7) BASE ENERGY CREDITS FOR GROUP E OCCUPANCIES[a]

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																
E02	UA reduction (15%)	C406.2.1.2	8	18	7	19	12	13	20	17	11	24	20	17	33	32	29	40	38	46	44
E03	Reduced air leakage	C406.2.1.3	4	3	3	3	2	5	2	1	1	1	1	1	1	1	1	2	1	1	1
E04	Add roof insulation	C406.2.1.4	8	8	4	9	5	7	16	7	1	14	7	10	18	13	13	23	25	22	28
E05	Add wall insulation	C406.2.1.5	5	7	4	8	3	6	8	6	2	6	3	6	5	5	6	7	6	7	8
E06	Improve fenestration	C406.2.1.6	8	10	6	9	11	11	15	9	1	16	8	15	22	18	19	33	29	19	18
H01	HVAC performance	C406.2.2.1	30	28	25	26	23	21	20	18	15	19	18	17	19	20	15	23	20	25	29
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	4	3	3	5	5	10	9	11	6	15	11	18	26
H03	Cooling efficiency	C406.2.2.3	9	8	6	7	5	4	2	2	1	1	1	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	45	42	37	41	36	34	41	39	30	43	46	58	57	65	40	79	63	88	117
W01	SHW preheat recovery	C406.2.3.1 a	7	7	9	8	10	11	13	13	15	14	15	15	15	14	17	13	15	14	12
W02	Heat pump water heater	C406.2.3.1 b	4	4	6	5	7	7	9	9	10	10	10	11	11	10	12	10	11	10	9
W03	Efficient gas water heater	C406.2.3.1 c	4	4	6	5	6	7	8	8	9	9	9	10	9	9	11	8	10	9	7
W04	SHW pipe insulation	C406.2.3.2	3	3	4	4	4	4	4	5	6	5	5	6	5	5	7	4	5	4	4
W05	Point of use water heaters	C406.2.3.3 a	3	4	4	4	4	5	5	5	6	5	5	5	5	5	6	4	5	4	3
W06	Thermostatic bal. valves	C406.2.3.3 b	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	2	1	1
W07	SHW heat trace system	C406.2.3.3 c	4	4	4	4	5	5	5	6	7	6	6	7	6	6	8	5	7	5	5
W08	SHW submeters	C406.2.3.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W09	SHW flow reduction	C406.2.3.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
W10	Shower heat recovery	C406.2.3.6	2	2	2	2	3	3	3	3	4	3	3	4	3	3	4	3	3	3	3
P01	Energy monitoring	C406.2.4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
L01	Lighting performance	C406.2.5.1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L02	Lighting dimming & tuning	C406.2.5.2	5	5	5	6	6	6	5	6	7	6	6	6	5	5	6	4	4	3	2
L03	Increase occp. sensor	C406.2.5.3	4	4	5	5	5	6	6	6	7	6	6	5	4	4	5	3	4	3	2
L04	Increase daylight area	C406.2.5.4	6	6	7	7	7	7	7	7	8	6	6	6	6	5	6	5	5	5	4
L05	Residential light control	C406.2.5.5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
L06	Light power reduction	C406.2.5.6	6	7	7	7	8	8	8	8	10	7	8	7	6	7	8	6	6	4	2

DOAS = Dedicated Outside Air System; HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water; UA = *U*-Factor × Area.

a. "x" indicates measure is not available in that climate zone for that measure.

H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	4	3	3	5	5	10	9	11	6	15	11	18	26
H03	Cooling efficiency	C406.2.2.3	9	8	6	7	5	4	2	2	1	1	1	1	1	1	1	x	x	x	x

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C406 Envelope Credits

TABLE C406.2(7) BASE ENERGY CREDITS FOR GROUP E OCCUPANCIES[a]

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	8	18	7	19	12	13	20	17	11	24	20	17	33	32	29	40	38	46	44
E03	Reduced air leakage	C406.2.1.3	4	3	3	3	2	5	2	1	1	1	1	1	1	1	1	2	1	1	1
E04	Add roof insulation	C406.2.1.4	8	8	4	9	5	7	16	7	1	14	7	10	18	13	13	23	25	22	28
E05	Add wall insulation	C406.2.1.5	5	7	4	8	3	6	8	6	2	6	3	5	5	5	6	7	6	7	8
E06	Improve fenestration	C406.2.1.6	8	10	6	9	11	11	15	9	1	16	8	15	22	18	19	33	29	19	18

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E01 Improved Envelope Performance

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																		
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
E01	Envelope performance	C406.2.1.1	Determined in accordance with Section C406.2.1.1																		
E02	UA reduction (15%)	C406.2.1.2	8	18	7	19	12	13	20	17	11	24	20	17	33	32	29	40	38	46	44

C406.2.1.1: E01 Improved envelope performance ASHRAE 90.1 Appendix C.

Building thermal envelope measures shall be installed to improve the energy performance of the project. The achieved energy credits shall be determined using Equation 4-13.

Equation 4-13 $EC_{ENV} = 1{,}000 \times (EPF_B - EPF_P) / EPF_B$

where:

EC_{ENV} = E01 measure energy credits.
EPF_B = base envelope performance factor calculated in accordance with ASHRAE 90.1 Appendix C.
EPF_P = proposed envelope performance factor calculated in accordance with ASHRAE 90.1 Appendix C.

- Energy Simulation Methodology.
- 3.3% Improvement = 33 Points

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E02 UA Reduction (15%)

ID	ENERGY CREDIT MEASURE	SECTION	0A	0B	1A	1B	2A	2B	3A
E01	Envelope performance	C406.2.1.1						Determined	
E02	UA reduction (15%)	C406.2.1.2	8	18	7	19	12	13	20

C406.2.1.2: E02 Component performance envelope reduction.

Energy credits shall be achieved where the component performance of the *building therma* below the component performance of the *building thermal envelope* in accordance with Sec

C402.1.4: Component performance method.

Building thermal envelope values and *fenestration* areas determined in accordance with the *U*-, *F*-, psi-, chi-, and *C*-factors in Tables C402.1.2, C402.1.2.1.7, C402.1 areas in Section C402.5.1. *Fenestration* shall meet the applicable SHGC requiremer

Equation 4-1 $A_P + B_P + C_P + T_P \leq A_T + B_T + C_T + T_T \cdot V_F \cdot V_S$

Equation 4-1 $A_P + B_P + C_P + T_P \leq A_T + B_T + C_T + T_T \cdot V_F \cdot V_S$

where:

A_P = Sum of the (area × *U*-factor) for each proposed building thermal envelope assembly, other than slab-on-grade or below-grade wall assemblies.

B_P = Sum of the (length × *F*-factor) for each proposed slab-on-grade edge condition.

C_P = Sum of the (area × *C*-factor) for each proposed below-grade wall assembly.

T_P = Sum of the (ψLP) and (χNP) values for each type of thermal bridge condition of the building thermal envelope as identified in Section C402.7 in the proposed building. For the purposes of this section, the (ψLP) and (χNP) values for thermal bridges caused by materials with a thermal conductivity less than or equal to 3.0 Btu × in/h × ft² × °F shall be assigned as zero. For buildings or structures located in Climate Zones 0 through 3, the value of T_P shall be assigned as zero.

ψLP = Psi-factor × length of the thermal bridge elements in the proposed building thermal envelope.

χNP = Chi-factor × number of the thermal bridge point elements other than fasteners, ties or brackets in the proposed building thermal envelope.

A_T = Sum of the (area × *U*-factor permitted by Tables C402.1.2 and C402.5) for each proposed building thermal envelope assembly, other than slab-on-grade or below-grade wall assemblies.

B_T = Sum of the (length × *F*-factor permitted by Table C402.1.2) for each proposed slab-on-grade edge condition.

C_T = Sum of the (area × *C*-factor permitted by Table C402.1.2) for each proposed below-grade wall assembly.

T_T = Sum of the (ψLP) and (χNT) values for each type of thermal bridge condition in the proposed building thermal envelope as identified in Section C402.7 with values specified as "compliant" in Table C402.1.4. For the purposes of this section, the (ψLT) and (χNT) values for thermal bridges caused by materials with a thermal conductivity less than or equal to 3.0 Btu × in/h × ft² × °F shall be assigned as zero. For buildings or structures located in Climate Zones 0 through 3, the value of T_T shall be assigned as zero.

ψLT = Psi-factor specified as "compliant" in Table C402.1.4) × length of the thermal bridge elements in the proposed building thermal envelope.

χNT = (Chi-factor specified as "compliant" in Table C402.1.4) × number of the thermal bridge point elements other than fasteners, ties or brackets in the proposed building thermal envelope.

P_T = Maximum vertical fenestration area allowable by Section C402.5.1, C402.5.1.1 or C402.5.1.2.

R_F = $Q_P - P_P$, but not less than zero (excess vertical fenestration area).

S_F = Area-weighted average *U*-factor permitted by Table C402.5 of all vertical fenestration assemblies.

T_F = Area-weighted average *U*-factor permitted by Table C402.1.2 of all exterior opaque wall assemblies.

U_F = $S_F - T_F$ (excess *U*-factor for excess vertical fenestration area).

V_F = $R_F \times U_F$ (excess $U \times A$ due to excess vertical fenestration area).

P_S = Maximum skylight area allowable by Section C402.1.2.

Q_S = Actual skylight area.

R_S = $Q_S - P_S$, but not less than zero (excess skylight area).

S_S = Area-weighted average *U*-factor permitted by Table C402.5 of all skylights.

T_S = Area-weighted average *U*-factor permitted by Table C402.1.2 of all opaque roof assemblies.

U_S = $S_S - T_S$ (excess *U*-factor for excess skylight area).

V_S = $R_S \times U_S$ (excess $U \times A$ due to excess skylight area).

A proposed psi- or *chi-factor* for each thermal bridge shall comply with one of the following, as applicable:

1. Where the proposed mitigation of a thermal bridge is compliant with the requirements of Section C402.7, the "compliant" values in Table C402.1.4 shall be used for the proposed psi- or chi-factors.
2. Where a thermal bridge is not mitigated in a manner at least equivalent to Section C402.7, the "noncompliant" values in Table C402.1.4 shall be used for the proposed psi- or chi-factors.
3. Where the proposed mitigation of a thermal bridge provides a psi- or chi-factor less than the "compliant" values in Table C402.1.4, the proposed psi- or chi-factor shall be determined by thermal analysis, testing or other approved sources.

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C406.2.2 Mechanical Credits

TABLE C406.2(7) BASE ENERGY CREDITS FOR GROUP E OCCUPANCIES[a]

ID	ENERGY CREDIT MEASURE	SECTION	CLIMATE ZONE																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
H01	HVAC performance	C406.2.2.1	30	28	25	26	23	21	20	18	15	19	18	17	19	20	15	23	20	25	29
H02	Heating efficiency	C406.2.2.2	x	x	x	x	x	x	4	3	3	5	5	10	9	11	6	15	11	18	26
H03	Cooling efficiency	C406.2.2.3	9	8	6	7	5	4	2	2	1	1	1	1	1	1	1	x	x	x	x
H04	Residential HVAC control	C406.2.2.4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H05	DOAS/fan control	C406.2.2.5	45	42	37	41	36	34	41	39	30	43	46	58	57	65	40	79	63	88	117

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C406.2.2 Mechanical Credits

C406.2.2: More efficient HVAC equipment performance. INSIGHTS

All heating and cooling systems shall meet the minimum requirements of Section C403 and efficiency improvements shall be referenced to minimum efficiencies listed in tables referenced by Section C403.3.2. Where multiple efficiency requirements are listed, equipment shall meet the seasonal or part-load efficiencies including SEER, integrated energy efficiency ratio (IEER), *integrated part load value* (IPLV) or AFUE. Equipment that is larger than the maximum capacity range indicated in tables referenced by Section C403.3.2 shall utilize the values listed for the largest capacity equipment for the associated equipment type shown in the table. Where multiple individual heating or cooling systems serve the project, the improvement shall be the weighted-average improvement based on individual system capacity. Systems are permitted to achieve HVAC energy credits by meeting the requirements of one of the following:

1. C406.2.2.1 H01.
2. C406.2.2.2 H02.
3. C406.2.2.3 H03.
4. C406.2.2.4 H04.
5. C406.2.2.5 H05.
6. Any combination of H02, H03, H04 and H05.
7. The combination of H01 and H04.

21

HO5 Dedicated Outdoor Air System

- Only allowed where single zone units are not required to be multispeed.
- Zone fan units turn fan on and off or limit fan power to 0.12 watts/cfm (0.16 hp / 1,000 CFM).
- Ventilation is supplied by independent system.
- Energy recovery enthalpy ratio of 65% or better.
- DOAS resets supply temperature based on zone demand or outdoor air temperature.
- Hot gas reheat.

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HO5 Dedicated Outdoor Air System

Where only a portion of the *building* is permitted to be served by constant air volume units or the *enthalpy recovery ratio* or *sensible energy recovery ratio* is less than 65 percent, the base energy credits shown in Section C406.2 shall be prorated as follows:

Equation 4-18 $EC_{DOAS} = EC_{BASE} \times FLOOR_{CAV} \times ERE_{ADJ}$

where:

EC_{DOAS} = Energy credits achieved for H05.

EC_{BASE} = H05 base energy credits in Section C406.2.

$FLOOR_{CAV}$ = Fraction of whole-project gross conditioned floor area not required to have variable-speed or multi-speed fan airflow control in accordance with Section C403.8.6.

ERE_{adj} = The energy recovery adjustment from Table C406.2.2.5 based on the lower of actual cooling or heating enthalpy recovery ratio or sensible energy recovery ratio where required for the climate zone. Where recovery ratios vary, use a weighted average by supply airflow.

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HO5 Dedicated Outdoor Air System

TABLE C406.2.2.5 DOAS ENERGY RECOVERY ADJUSTMENTS

ERE_{adj} BASED ON LOWER OF ACTUAL HEATING OR COOLING ENERGY RECOVERY EFFECTIVENESS WHERE REQUIRED		
Cooling *Err* Is at Least	Heating Enthalpy Recovery Ratio or Sensible Energy Recovery Ratio Is at Least	Energy Recovery Effectiveness Adjustment (ERE_{adj})
65%	65%	1.00
60%	60%	0.67
55%	55%[a]	0.33
50%	50%[a]	0.25

a. In climate zones where heating recovery is required in Section C403, a heating recovery effectiveness below 60 percent is not allowed for dwelling units.

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C406.3 Renewable and Load Management

TABLE C406.1.2 RENEWABLE AND LOAD MANAGEMENT CREDIT REQUIREMENTS BY BUILDING OCCUPANCY GROUP

BUILDING OCCUPANCY GROUP	CLIMATE ZONE																		
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R-2, R-4 and I-1	34	37	31	46	48	56	49	56	38	31	42	32	26	33	34	23	27	25	25
I-2	23	24	25	25	25	28	26	30	22	25	32	24	25	28	29	26	28	22	20
R-1	30	28	35	30	34	36	34	37	41	32	37	27	28	33	32	25	29	22	18
B	38	39	45	42	45	49	47	56	57	44	55	42	38	47	46	38	45	38	31
A-2	8	8	9	9	8	9	9	11	13	8	11	9	8	10	9	8	9	8	3
M	32	32	42	37	39	47	44	58	57	42	54	46	38	48	50	42	45	38	34
E	27	34	38	37	39	47	44	58	57	42	54	46	38	48	50	42	45	38	34
S-1 and S-2	89	90	90	90	90	90	90	90	90	90	90	90	78	90	90	84	86	71	54
All other	35	39	46	42	46	52	49	56	56	40	52	42	37	44	44	36	39	32	28

Excess points can be used for meeting additional energy efficiency requirements.

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C406.3 Renewable and Load Management

TABLE C406.3(7) RENEWABLE AND LOAD MANAGEMENT CREDITS FOR GROUP E OCCUPANCIES

ID	ENERGY CREDIT ABBREVIATED TITLE	SECTION	CLIMATE ZONE																	
			0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
R01	Renewable energy	C406.3.1	10	11	13	12	13	16	15	21	22	15	19	15	14	17	16	13	16	12	10
G01	Lighting load management	C406.3.2	7	12	12	13	13	15	14	16	13	12	16	16	10	14	18	16	13	14	14
G02	HVAC load management	C406.3.3	18	22	32	23	25	31	26	26	20	23	31	24	20	31	12	18	27	16	9
G03	Automated shading	C406.3.4	7	13	16	12	18	17	17	18	13	12	17	17	10	15	13	14	10	16	17
G04	Electric energy storage	C406.3.5	16	16	18	17	19	21	21	23	26	22	24	24	23	24	24	20	22	19	19
G05	Cooling energy storage	C406.3.6	36	9	46	21	36	32	39	62	39	24	37	22	20	28	13	16	31	3	4
G06	SHW energy storage	C406.3.7	5	5	6	5	6	6	7	7	8	7	7	8	7	7	8	7	7	7	6
G07	Building thermal mass	C406.3.8	7	2	11	5	17	28	23	27	63	21	44	48	37	60	38	31	50	47	21

HVAC = Heating, Ventilation and Air Conditioning; SHW = Service Hot Water.

x = Credits excluded from this building use type and climate zone.

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C406.3 Renewable and Load Management

- Measures shall be automatic.
- R01 – renewable energy in excess of that required in C405.15.1
- G01 – Lighting (if not required elsewhere) - reduce to 80% of full power for 50% of floor area.
- G02 – HVAC
  - Increase cooling setpoint by 3 F, reduce capacity by 60%
  - Decrease heating setpoint by 3 F, reduce capacity by 60%.
  - Overventilate then reduce ventilation during peak periods.
- G03 – Automated shading
- G04 – Electric storage.

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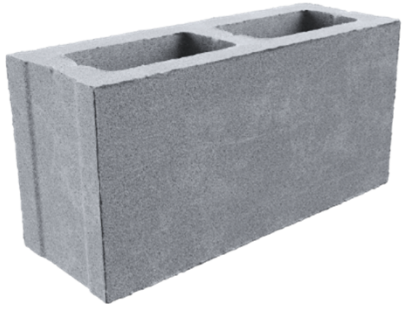
C406.3 Renewable and Load Management

- G05 – Cooling energy storage
  - Pro-rated based on amount of storage compared with peak load
- G06 – Service hot water storage (electric heating)
  - Increase storage
  - Preheat in non-peak times
- G07 – Building thermal mass
  - Walls have minimum mass of 10 lbs/foot
  - HVAC flush at night with fans operating at low speed.



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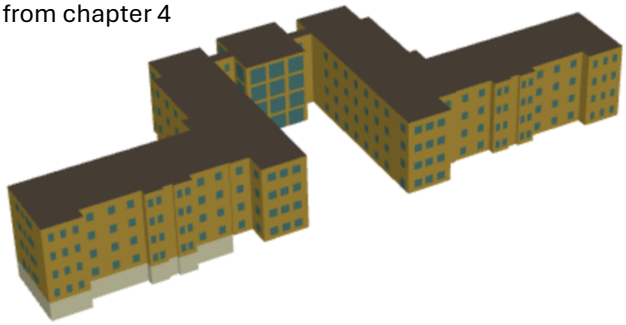
Compliance Paths

- New building – Chapter 4
  - 90.1-2022
  - Prescriptive
  - C407 – Whole Building Simulation
    - Still many mandatory requirements from chapter 4
    - On-site renewable is not required. Baseline shall include PV.



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Compliance Paths

- Existing Building – Chapter 5
  - Alteration
  - Repair
  - Addition
  - Change of Occupancy

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C502 Additions

- Addition alone mechanical and plumbing shall comply with chapter 4.
- Addition alone or addition and existing building exterior and interior lighting systems comply with chapter 4.
- Comply with additional energy efficiency and load management measures . Only need 50% of points indicated on table C406.1.1(1).

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C503 Alterations

- Envelope – what you touch needs to be brought up to date. Some exceptions.
- New heating and cooling systems shall meet chapter 4.
  - New cooling systems shall include economizer where required.
  - Minimum curb heights to accommodate future insulation.
- *Substantial improvements* shall achieve additional efficiency and load management credits.
  - Substantial > 50% of the original building value.

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C504 Repairs

- Repair of damage and routine maintenance – compliance not required.

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C505 Change of Occupancy

- Increasing energy intensity
  - Only applies to portions of building that are changing
  - Envelope may need to be updated if glazing area exceeds permitted area for new occupancy.
  - Mechanical, Service HW, Lighting shall be updated
  - Example classroom area changed to laboratory
  - Exception < 5,000 SF

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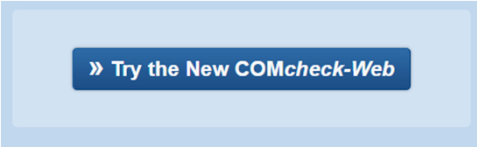
COMcheck

- Must use the New COMcheck-Web



- Includes project sharing features

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