August 25, 2023

Recommendation of IECC Residential Project Team on Public Comments to RECD1-13-22

Proposal 1912 will be handled by errata

The following proposals are recommended to move to the committee(s) for consideration:

To Economics, Modeling, and Metrics Subcommittee
RE2D-59-23, Proposal 1913(RE2D-60-23), Proposal 1915(RE2D-66-23), Proposal 1919(RE2D-67-23), Proposal 1923(RE2D-68-23), and Proposal 1930(RE2D-61-23)

To HVACR & Water heating Subcommittee
Proposal 1917(RE2D-62-23), Proposal 1927(RE2D-63-23), Proposal 1928(RE2D-64-23), Proposal 1929(RE2D-65-23)

The following proposals are not recommended to move to the committee(s) and to be considered in the future cycle based on IECC Consensus procedures 9.7 and 3.5(a)(b)(c):
Proposal 1914, Proposal 1916, Proposal 1918, Proposal 1920, Proposal 1921, Proposal 1922, Proposal 1924, Proposal 1924, Proposal 1925, Proposal 1926, Proposal 1931

RE2D-59-23

IECC RE: TABLE R408.2

Proponents:

Rob Salcido, representing PNNL

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	

R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	~~1~~0	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA
R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4)[b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA

R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12)[b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16
R408.2.3(1)(a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1)(b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2)(a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2)(b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3)(a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3

R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	~~6~~5	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	~~9~~11	~~8~~9	~~7~~8	~~4~~7	
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	~~39~~38
R408.2.8b	Off-site renewable energy measure	~~1~~0	~~1~~0	~~1~~0	~~1~~0	~~1~~0	~~1~~0	~~1~~0	~~1~~0	10
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	~~0~~1	~~0~~1	~~0~~1	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a.	Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.
b.	Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.
c.	Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.
d.	Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

See PNNL methodology posted in 6.29.23 IECC R Agenda

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

See PNNL methodology posted in 6.29.23 IECC R Agenda

R408.2 sample 2 (1912)

IECC RE: TABLE R408.2 (New)

Proponents:

Craig Drumheller, representing WDMA

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

What was published in this Public Comment is correct (highlighted in yellow). However, what was published in the second residential energy public comment draft (RE-PCD2 -below) is incorrect. The point value for Climate Zone 4 should be "2" and not crossed out as incorrectly shown below.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

errata

R408.2 sample 3 (1913)

IECC RE: TABLE R408.2 (New)

Proponents:

Aaron Phillips, representing Asphalt Roofing Manufacturers Association (aphillips@asphaltroofing.org)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	~~1~~ 0	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

When PNNL presented their original version of Table R408.2 with proposed credit values, the entry for both roof reflectance rows in the table indicated “Roof reflectance 0.75.” However, compliance per Table R408.2.1.3 is via solar reflectance index rather than solar reflectance. In subsequent communications with PNNL, it became apparent that they modeled this credit using solar reflectance rather than solar reflectance index. PNNL subsequently redid their calculation for both roof reflectance credits. The result of those new calculations was a credit value less than 0.50% in climate zone 2 for the first roof reflectance credit. This comment proposes a change of the climate zone 2 credit from 1 to 0 based on the revised calculations completed by PNNL.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

This comment corrects a credit in Table R408.2 and will not impact cost of construction.

R408.2 sample 4 (1914)

IECC RE: TABLE R408.2 (New)

Proponents:

Gary Heikkinen, representing NW Natural (gary.heikkinen@nwnatural.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	~~NA~~ 1	~~NA~~ 2	~~NA~~ 5	~~NA~~ 3	6	7	7	~~NA~~ 9
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	~~NA~~ 5	~~NA~~ 6	~~NA~~ 7	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	~~NA~~ 2	~~NA~~ 4	~~NA~~ 4	~~NA~~ 5	~~NA~~ 6
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	~~NA~~ 3	~~NA~~ 5	~~NA~~ 5	~~NA~~ 6	~~NA~~ 6
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	~~NA~~ 4	~~NA~~ 6	~~NA~~ 7	~~NA~~ 8	~~NA~~ 9
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	~~13~~ TBD	~~12~~ TBD	~~9~~ TBD	~~7~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	~~13~~ TBD	~~12~~ TBD	~~11~~ TBD	~~12~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	~~NA~~ 5	~~NA~~ 5	~~NA~~ 4	~~NA~~ 5	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	~~NA~~ 6	~~NA~~ 6	~~NA~~ 5	~~NA~~ 5	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~8~~ TBD	~~0~~ TBD	~~-1~~ TBD	~~-3~~ TBD	~~-7~~ TBD
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~NA~~ TBD	~~8~~ TBD	~~12~~ TBD	~~13~~ TBD	~~14~~ TBD	~~16~~ TBD

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

1. There is no justification or explanation provided in PNNL's June 15, 2023 memo to support the use of NA in the table for these options. These options provide legitimate and important efficiency options for customers and they should be included in the table. Also, by not using the accurately estimated credits, the table may violate EPCA. It states, "To avoid preemption, a state building code provision must "establish 'credits' for various conservation measures, to provide, to the greatest degree possible, one-for-one equivalency between the energy efficiency of these differing measures and the credits provided for such energy efficiency." This requirement is "to assure that the credits for exceeding Federal standards are even-handed and are not unfairly weighted resulting in undue pressure on builders to install covered products exceeding Federal standards."

2. It was stated during one of the meetings that the switchover temperature for the gas back-up option was higher because of economic reasons. However, the table is based on site energy and therefore, the switchover temperatures should be the same. It does not make sense to penalize the gas back-up options, especially in the colder climate zones.

Cost Impact:

The code change proposal will decrease the cost of construction.

This change may decrease the cost of construction by allowing more cost-effective options for builders and customers.

R408.2 sample 5 (1915)

IECC RE: TABLE R408.2 (New)

Proponents:

Vladimir Kochkin, representing NAHB (vkochkin@nahb.org)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	~~NA~~ 0	~~NA~~ 0	~~NA~~ 0

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	~~NA~~ 0	~~NA~~ 1	~~NA~~ 2	~~NA~~ 5	~~NA~~ 3	6	7	7	~~NA~~ 9
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	~~NA~~ 5	~~NA~~ 5	~~NA~~ 7	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	~~NA~~ 7	~~NA~~ 4	~~NA~~ 4	~~NA~~ 5	~~NA~~ 6
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	~~NA~~ 3	~~NA~~ 5	~~NA~~ 5	~~NA~~ 6	~~NA~~ 6
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	~~NA~~ 4	~~NA~~ 6	~~NA~~ 7	~~NA~~ 8	~~NA~~ 9
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	~~NA~~ 10	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	~~NA~~ 5	~~NA~~ 5	~~NA~~ 4	~~NA~~ 5	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	~~NA~~ 6	~~NA~~ 6	~~NA~~ 5	~~NA~~ 6	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	~~NA~~ 7	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	~~NA~~ 12	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

At the last consensus committee there was substantial support for expanding equipment compliance options in R408. This proposal replaces N/A for several equipment options with credit values from the PNNL analysis. In addition, N/A in some cases appear to indicate that zero credit is allowed if a more efficient practice used than a similar practice with a credit (e.g., 5 credits for a 90 AFUE furnace and 0 credits for a 95 AFUE for climate zone 4). If the committee does not want to give additional credit as will be for a 97 AFUE compared to a 90 AFUE, then the credit should be listed as 5 for 97 AFUE (not zero). Some N/A are left as such intentionally (e.g., a cold climate heat pump in a warm climates).

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

This proposal adds compliance options.

R408.2 sample 6 (1916)

IECC RE: TABLE R408.2 (New)

Proponents:

Vladimir Kochkin, representing NAHB (vkochkin@nahb.org)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	~~8~~ TBD	~~0~~ TBD	~~1~~ TBD	~~3~~ TBD	~~7~~ TBD
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

Practice R408.2.2(13) shows negative credits in colder climates. This is because site energy is used for conversion between fuels. Site energy is OK to use when practices with the same fuel are compared to each other. A cost metric or source energy should be used in this case and the credits should be updated. We should not be discouraging the practice of installing heat pumps with a gas backup. This is a significant issue and the committee has not specifically considered it as we should have done. This is an oversight and it should be corrected.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

This proposed change would effectively add a viable compliance option for space heating in colder climates.

R408.2 sample 7 (1917)

IECC RE: TABLE R408.2 (New)

Proponents:

Vladimir Kochkin, representing NAHB (vkochkin@nahb.org)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	~~1~~ TBD	~~3~~ TBD	~~2~~ TBD	~~2~~ TBD	~~2~~ TBD
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	~~4~~ TBD	~~4~~ TBD	~~8~~ TBD	~~5~~ TBD	~~5~~ TBD	~~5~~ TBD

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	~~6~~ TBD	~~5~~ TBD	~~10~~ TBD	~~9~~ TBD	~~9~~ TBD	~~9~~ TBD
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	~~7~~ TBD	~~6~~ TBD	~~12~~ TBD	~~12~~ TBD	~~12~~ TBD	~~12~~ TBD
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

Results for measures with HRV/ERV should be reviewed and updated for the following reasons:

· Superposition for MF needs to be included in the analysis and results should be updated.

· The overall level of savings appears higher than other studies suggest. PNNL should evaluate energy savings using other commercially available software (e.g., Ekotrope, EnergyGage) to validate these results.

· The 75 percent recovery rate is unnecessarily high for HRVs and nearly unrealistic for ERVs making this practice unusable. A more

reasonable recovery rate should be selected for this measure and analysis should be updated.

· ERV and HRV should be separated into different practices. These devices perform differently and should be analyzed separately. This is particularly an issue for some climate zones.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

This public comment is primarily requesting refinement of the underlying analysis. It may have some impact in terms of reducing or increasing costs.

R408.2 sample 8 (1918)

IECC RE: TABLE R408.2 (New)

Proponents:

Gayathri Vijayakumar, representing Steven Winter Associates (gayathri@swinter.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	~~NA~~0	~~NA~~1	~~NA~~2	~~NA~~5	~~NA~~3	6	7	7	~~NA~~9
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	~~NA~~9	~~NA~~9	~~NA~~9	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	~~3~~NA	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	~~5~~NA	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	~~6~~NA	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	~~7~~NA	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	~~12~~NA	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	~~NA~~5	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	~~NA~~6	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	~~NA~~7	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	~~NA~~12	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
~~R408.2.8~~	~~Off-site renewable energy measures~~	~~71~~	~~65~~	~~62~~	~~55~~	~~46~~	~~41~~	~~43~~	~~41~~	~~39~~
~~R408.2.8b~~	~~Off-site renewable energy measure~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~
R408.2.~~9~~8[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.~~11~~10	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.~~12~~11	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

All are errata to align with prior action (these were not corrected in RE2D-59).

1. Remove the rows related to off-site since RED1-76 was Disapproved.

2. Based on action on RED1-351 and headers in R408.2.2, some of the HVAC points are missing/incorrect.

· Measures 1 through 5 were to be available to ALL CZs, so NA's should be replaced with their actual points.

· CZ 4 was split into two columns, so some points need to be added/replaced with NA

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

editorial

R408.2 sample 9 (1919)

IECC RE: TABLE R408.2 (New)

Proponents:

Gayathri Vijayakumar, representing Steven Winter Associates (gayathri@swinter.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	~~4~~14	~~8~~14	~~12~~14	~~19~~15	~~14~~10	~~25~~15	~~32~~17	~~35~~18	~~46~~21
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

The points proposed for the GSHP measure seemed higher than I expected. It was explained that the savings & points were calculated outside the software used to simulate the other HVAC measures. In consultation with PNNL and Dandelion Energy, I reviewed their savings calculations and worked with them to modify inputs in their tool to provide different values, while maintaining the inherent savings potential of GSHP beyond traditional ASHP.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Change will neither increase or decrease the cost of construction

R408.2 sample 10 (1920)

IECC RE: TABLE R408.2 (New), R408.2.3

Proponents:

Gayathri Vijayakumar, representing Steven Winter Associates (gayathri@swinter.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0

R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA
R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1)(a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1)(b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2)(a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2)(b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3)~~(a)~~[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
~~R408.2.3(3)(b)[d]~~	~~Electric water heaters (option 2)~~	~~12~~	~~11~~	~~11~~	~~8~~	~~8~~	~~5~~	~~4~~	~~4~~	~~3~~
R408.2.3(4)[d]	Electric water heaters (option 2~~3~~)	11	11	11	8	8	5	4	4	3
R408.2.3(5)(a)[d]	Electric water heaters (option 3~~4~~)	8	10	11	8	11	7	5	5	
R408.2.3(5)(b)[d]	Electric water heaters (option 4~~5~~)	9	11	12	8	11	7	6	5	4
R408.2.3(~~5~~6)[d]	Electric water heaters (option 5~~6~~)	12	11	11	8	8	5	4	4	3
R408.2.3(~~6~~7)(a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(~~6~~7)(b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

R408.2.3 Reduced energy use in service water-heating options.

For measure numbers R408.2.3 (1) through R408.2.3(7), the installed hot water system shall meet one of the Uniform Energy Factors (UEF) or Solar Uniform Energy Factors (SUEF) in Table R408.2.3. For measure numbers R408.2.3 (3) through R408.2.3 (4), the integrated heat pump water heater shall be either installed or ducted in accordance with manufacturer's instructions, installed in a space with no less than 60 ft^2 of floor area, or installed in an enclosed space with grilles, louvers, or a louvered door with net free area of no less than 300 in^2. For measure number R408.2.3(8), a compact hot water distribution system shall comply with R408.2.3.1.

Reason:

I would have expected to see greater points for the HPWH measures with higher UEFs, but the points shown do not reflect that (likely diminishing returns). If these points remain as-is, option 2 should be deleted since there would be no reason/benefit to installing a UEF of 3.75 vs 3.30.

This public comment also provides language to limit the use of the first three iHPWH measure rows to those iHPWHs that are verified to be properly installed and therefore more likely to perform better than the electric resistance storage tanks they are being compared to. In the last round, some advocated that the baseline should be a HPWH if a HPWH is installed, which removes any credit for this design choice. The committee ultimately voted to allow the baseline to be electric resistance. However, some limitations are needed to prevent installations of iHPWHs that end up performing no better than resistance.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

this will not increase or decrease the cost of construction

R408.2 Harshad Inamdar 1 (1921)

IECC RE: TABLE R408.2 (New)

Proponents:

Harshad Inamdar, representing Rheem Manufacturing Company (harshad.inamdar@rheem.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	~~10~~ TBD	~~9~~ TBD	~~9~~ TBD	~~6~~ TBD	~~7~~ TBD	~~5~~ TBD	~~5~~ TBD	~~4~~ TBD	~~3~~ TBD
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	~~11~~TBD	~~10~~ TBD	~~9~~ TBD	~~6~~ TBD	~~7~~ TBD	~~6~~ TBD	~~5~~ TBD	~~4~~ TBD	~~3~~ TBD
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

Originally, the baseline used for measures R408.2.3(2)(a) and R408.2.3(2)(b) was a gas-fired storage water heater with a rated storage volume equal to 40 gallons and UEF = 0.64. This aligns with the minimum efficiency standard for a gas-fired storage water heater with a rated storage volume equal to 40 gallons at 10 CFR §430.32(d).

But, comparing different technologies—instantaneous tankless water heater in the high-performance measure with a storage water heater in the baseline may not result in an accurate representation of energy savings attributable to the measure. The space needed to install a tankless instantaneous water heater is not same as the space needed to install a storage tank water heater. The use pattern anticipated by the homeowner when selecting an instantaneous tankless water heater may also differ from the use pattern anticipated by

the homeowner when selecting a storage water heater.

We propose to use a baseline employing the same technology: a non condensing gas-fired instantaneous water heater with UEF = 0.81, which aligns with the minimum efficiency standard at 10 CFR §430.32(d) for low, medium, and high draw patterns. PNNL are performing annual energy use simulations to calculating energy savings resulting from the high-performance measure and therefore the energy credits to be assigned to the measures in each climate zone. Therefore, the values submitted in this public comment are yet to be defined.

Cost Impact:

The code change proposal will decrease the cost of construction.

Comment will decrease the cost of construction because the comment reduces the difference in construction costs between the high-performance measure and baseline.

R40.2 HARSHAD INAMDAR 2 (1922)

IECC RE: TABLE R408.2 (New)

Proponents:

Harshad Inamdar, representing Rheem Manufacturing Company (harshad.inamdar@rheem.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	~~13~~ 15	~~12~~ 13	~~9~~ 11	~~7~~ 11	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	~~0~~ 11	~~1~~ 11	~~3~~ 12	~~7~~ 12
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

Originally, the baseline used for measure R408.2.2(9) was a heat pump with auxiliary electric heat backup. The efficiency of this baseline was SEER2 = 14.3 and HSPF2 = 7.5, which is the minimum efficiency standard for consumer split system heat pumps at 10 CFR §430.32(c)(5).

The high-performance measure applies to a dual-fuel heat pump, which is a gas furnace and heat pump combination. For such an installation, the homeowner does not need the same electrical requirements to support the installation of an air handler with auxiliary electric heat. The original baseline on the other hand does require a supply service of at least 200 amps at the panel and larger conductors to the air handler to support the higher current draw of the auxiliary electric heater kit. Secondly, the high-performance

measure requires piped natural gas supply to the home whereas the baseline does not. Therefore, the high-performance measure and the original baseline cannot be compared on an equal basis. This change also avoids stranding of existing natural gas distribution infrastructure.

Instead, we propose to use a baseline of a gas furnace and air-conditioner combination. The efficiency of the baseline gas furnace should be AFUE 80%, which aligns with the baselines used for measures R408.2.2(7) and R408.2.2(8), which in turn aligns with the minimum efficiency standard for consumer non-weatherized gas furnaces at 10 CFR §430.32(e)(1)(ii). The efficiency of the baseline air conditioner should be SEER2 = 14.3, which aligns with the baseline used in measures R408.2.2(7) and R408.2.2(8), which in turn mostly aligns with the regional minimum efficiency standard for consumer split system air conditioners at 10 CFR §430.32(6)(i). Using the regional minimum efficiency standard is appropriate here because this high-performance measure applies to cooling-dominated climate zones 0, 1, 2, 3, 4a, and 4b, which largely cover the southeast and southwest regions as defined at 10 CFR §430.32(c)(6)(i). Although the regional minimum efficiency standard for consumer split system air conditioner is SEER2 = 14.3 for certified cooling capacity < 45,000 Btu/h and SEER2 = 13.8 for certified cooling capacity ≥ 45,000 Btu/h, we use the higher value to simplify calculation of energy credits and because <45,000 Btu/h represent a majority of installed equipment. For the purpose of calculating energy credits for the high-performance measure, the switchover temperature used to change from heat pump heating to gas furnace heating is proposed to be 25 °F.

We apply the same reasoning to propose a change in the baseline used in measure R408.2.2(13), from a heat pump with auxiliary electric heat backup to a gas furnace and air-conditioner combination. The efficiency of the baseline gas furnace should be AFUE 80%, which aligns with the baselines used for measures R408.2.2(7) and R408.2.2(8), which in turn aligns with the minimum efficiency standard for consumer non-weatherized gas furnaces at 10 CFR §430.32(e)(1)(ii). The efficiency of the baseline air conditioner should be SEER2 = 13.4, which aligns with the baseline used in measures R408.2.2(11) and R408.2.2(12), which in turn aligns with the federal minimum efficiency standard for consumer split system air conditioners at 10 CFR §430.32(c)(5). Using the federal minimum efficiency standard is appropriate here because this high-performance measure applies to heating-dominated climate zones 4c, 5, 6, 7, and 8. Since the high-performance heat pump in this measure R408.2.2(13) is a cold climate heat pump, for the purpose of calculating energy credits, the switchover temperature used to change from heat pump heating to gas furnace heating is proposed to be 5 °F.

Cost Impact:

The code change proposal will decrease the cost of construction.

Comment will decrease the cost of construction. The proposed change uses a baseline that from a construction point of view is similar to the high-performance measure, thus reducing the difference in construction costs between the high-performance measure and baseline.

R408.2 JOUANEH (1923)

IECC RE: TABLE R408.2 (New)

Proponents:

Michael Jouaneh, representing Lutron Electronics Co., Inc. (mjouaneh@lutron.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1
R408.2.12	Higher efficacy lighting	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1	~~0~~1

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

1) The points below are wrong per PNNL. Use the points from the correct PNNL file per PNNL's comment. Victor Salcido said the points in the table below were shifted accidently and in error. Per the correct file, there should be 1 point in Climate Zone 0-3 for Whole-Home Lighting Control not 0. The PNNL correct values are attached in the Excel file here as well.

2) The biggest waste in residential lighting energy is leaving lighting ON when no one is home. The whole-home lighting control provision addresses this directly by making it easy for the occupants to turn off the lights when they leave. This ALL-OFF function is used daily by occupants that have a whole-home lighting control system. So, it is hard to understand why demand responsive thermostats get 1 point in each climate zone while whole-home lighting control gets 0 in Climate Zones 4-8. DR thermostats may never be used as DR events do not happen often (maybe once or twice per year) and when they do happen it is for a short period of time (4-6 hours), while an ALL-OFF feature of whole-home lighting control systems are used daily by occupants that have this feature.

3) It is confusing if there are only zeroes in every climate zone. I know that there is still value if they are zero, but projects will not likely choose a measure with zero points. There should be at least one point available in at least one climate zone for each measure.

4) To rectify my concerns, I propose changes to R408.2-10 and R408.2.11. The larger the home, the more lighting and therefore the more lighting savings from the whole-home lighting control system and from higher efficacy lighting. According to the latest RECS data (Table CE5.1a Detailed household site electricity end-use consumption, released June 2023) US homes larger than 3,000 square feet use double the lighting electricity than homes which are 2,500 to 2,999 square feet (28.1 vs 61.4 trillion Btu). What's more, is that per RECS Table HC5.9 Lighting in U.S. homes by size, over 1.6 million homes larger than 3000 square feet have 20 or more indoor lights used at least 4 hours a day. So, for CZ 4-8 on whole-home lighting control, I propose a point if the home is larger than 5,000 sf or if the home has more than 50 permanently installed luminaires. I choose 5,000 to be well beyond the 3,000 square feet level in RECS plus it is consistent with ASHRAE 90.2 which has a similar mandatory provision for large homes (i.e., mansions larger than 5,000 square feet). Similarly, for the higher efficacy lighting provision, I propose a point in all climate zones but only for homes larger than 5,000 sf or if the home has more than 50 permanently installed luminaires. Instead of using an installed lighting wattage threshold, I propose a luminaire threshold as counting permanently installed lighting fixtures (i.e., hard-wired luminaires) is easier than totaling installed lighting wattage.

Bibliography:

https://www.eia.gov/consumption/residential/data/2020/hc/pdf/HC%205.9.pdf

https://www.eia.gov/consumption/residential/data/2020/c&e/pdf/ce5.1a.pdf

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

will neither increase nor decrease the cost of construction

R408.2 MARSTON (1924)

IECC RE: TABLE R408.2 (New)

Proponents:

Thomas Marston, representing Thomas H Marston (thmarstonmd@gmail.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	~~NA~~0	~~NA~~0	~~NA~~0

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	~~NA~~0	~~NA~~1	~~NA~~2	~~NA~~5	~~NA~~3	6	7	7	~~NA~~9
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	~~NA~~5	~~NA~~6	~~NA~~7	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	~~NA~~2	~~NA~~4	~~NA~~4	~~NA~~5	~~NA~~6
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	~~NA~~3	~~NA~~5	~~NA~~5	~~NA~~6	~~NA~~6
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	~~NA~~4	~~NA~~6	~~NA~~7	~~NA~~8	~~NA~~9
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	~~NA~~10	~~NA~~-1	~~NA~~-2	~~NA~~-5	~~NA~~-10
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	~~NA~~10	~~NA~~11	~~NA~~10	~~NA~~9	~~NA~~8
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	~~NA~~5	~~NA~~5	~~NA~~4	~~NA~~5	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	~~NA~~6	~~NA~~6	~~NA~~5	~~NA~~6	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	~~NA~~17	~~NA~~15	~~NA~~10	~~NA~~7	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	~~NA~~17	~~NA~~15	~~NA~~12	~~NA~~12	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

COMMENT

I am speaking to the current direction of this table is to black out the calculated points for specific equipment in specific climate zones. I predict that great harm will be created when the decision to black out specific cells occurs. The code officials in those climate zones will spend unnecessary time explaining to the applicant why this is the case. If there is a logical reason, I suspect the applicant will not agree. Case in point: Cell 25F speaks to a 95% AFUE furnace and 15 SEER2 cooling unit in climate zone #4. I live in this climate zone and my State, Maryland, offers incentives for this matched equipment. I also expect that the remodeling industry will specify this matching set of equipment when they build an addition that requires capturing 5 points as currently specified in PC#1.

I do see that cell 22F is nearly the identical equipment rating and the code should not create redundant language. Therefore, better language should be developed during the next code cycle to assign formulas that allow the user to assign values such as AFUE, SEER2, HSPF and UEF along with a climate zone to determine the exact point value. This will allow many rows in this table to be condensed where redundant statements now occur.
In the meantime, I strongly recommend that all cells retain the number Zero or a whole number.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

the comment will neither increase nor decrease the cost of construction

R408.2 ATMOS ENERGY (1925)

IECC RE: TABLE R408.2 (New)

Proponents:

Eric Tate, representing Atmos Energy (eric.tate@atmosenergy.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	~~0~~2	~~1~~3	~~2~~3	4	3	~~NA~~2	~~NA~~2	~~NA~~2	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	~~0~~2	~~1~~3	~~1~~3	~~3~~5	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	~~5~~7	~~5~~7	~~4~~6	~~5~~7	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	~~4~~6	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	~~5~~7	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	8	~~0~~2	~~-1~~2	~~-3~~2	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

Comments on Table R408.2 presented here relate to table columns covering Climate Zones 2 through 7 since customers served by Atmos Energy are found in eight states covering those climate zones. Analysis by PNNL state that “High Performance” options are those that exceed federal minimum efficiencies for appliances and equipment, however the proposed null credits “Option 1” [Table row R408.2.2(4)] do not represent the PNNL modeled gas furnace efficiency of 90% AFUE. In these table cells, actual “High Performance” efficiency exceeds the current federal minimum efficiency standard of 80% AFUE. “Option 1” therefore increases installed gas furnace efficiency by 13% over the current federal minimum AFUE standard and represents a 56% efficiency increase over the practical theoretical maximum efficiency for gas furnaces of 98%. As a result, “Option 1” gas furnaces deserve credit in Table R408.2.

Atmos Energy proposes that Table R408.2 incorporate a 2-point credit increase for each cell of Climate Zones 2 through 7 for Table row R408.2.2(4), including granting 2 points where "N/A" is currently shown, to account for this efficiency gain over the current federal minimum efficiency. This point allocation is also justified to account for the additional cost of installing the PNNL-described "Option 1" efficiency gas furnaces, which require installation of Category IV gas furnaces instead of the federal minimum efficiency technology (Category I) and when in combination with other gas combustion equipment are likely to require unique venting systems and additional incremental costs. While nationally, installation of Category IV furnaces is becoming the virtual norm for new construction, that is not the case for all new residential construction, especially in cooling dominated climates and where installation of Category I furnaces represents in most cases the most cost-effective option for space heating.

Elsewhere in Table R408.2 [R408.2.2(5), R408.2.2(6), R408.2.2(7), R408.2.2(8) and R408.2.2(9)-Marine only, R408.2.2(11), R408.2.2(12), and R408.2.2(13)], the 2-point credit increase is applied incrementally to the current table credits shown. For mixed "gas furnace and cooling options," incremental credit for options other than "Option 1" is not proposed since the PNNL analysis does not explain the relative efficiency contributions of gas furnace/cooling technologies.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

The comment will neither increase or decrease the cost of construction.

R408.2 ONE GAS (1926)

IECC RE: TABLE R408.2 (New)

Proponents:

Tracee Rhodes, representing ONE Gas (tracee.rhodes@onegas.com)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	~~0~~2	~~1~~3	~~2~~3	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	~~0~~2	~~1~~3	~~1~~3	~~3~~5	~~NA~~2	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	~~5~~7	~~5~~7	~~4~~6	~~5~~7	~~NA~~2	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	~~NA~~2	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	~~NA~~2	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	~~4~~6	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	~~5~~7	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	~~NA~~2	~~NA~~2	~~NA~~2	~~NA~~2	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

ONE Gas comments on Table R408.2 relate to table columns covering Climate Zones 1 through 4 since almost all of its customers (residing in Texas, Oklahoma, and Kansas), are found in those climate zones. From PNNL's description of its analysis, "High Performance" options are those that exceed federal minimum efficiencies for appliances and equipment, but its proposal for "Option 1" [Table row R408.2.2(4)] receives no credits in Climate Zones 1 through 4. This outcome ignores the fact that the PNNL modeled gas furnace efficiency of 90% AFUE exceeds the current federal minimum efficiency standard of 80% AFUE. "Option 1," in fact, ***increases*** installed gas furnace efficiency by 13% over the current federal minimum AFUE standard and represents a 56% efficiency increase over the practical theoretical maximum efficiency for gas furnaces of 98%. As a result, "Option 1" gas furnaces deserve credit in Table

R408.2.

ONE Gas proposes that Table R408.2 incorporate a 2-point credit for each cell of Climate Zones 1 through 4 for Table row R408.2.2(4) where “N/A” is currently shown to account for this efficiency gain over the current federal minimum efficiency. This point allocation is also justified to account for the additional cost of installing the PNNL-described “Option 1” efficiency gas furnaces, which require installation of Category IV gas furnaces instead of the federal minimum efficiency technology (Category I) and when in combination with other gas combustion equipment, are likely to require unique venting systems and additional incremental costs. While nationally, installation of Category IV furnaces is becoming the virtual norm for new construction, that is not the case for cooling dominated climates such as Climate Zones 1 through 4 where ONE Gas customers reside and where installation of Category I furnaces represent, in most cases, the most cost-effective option for space heating.

Elsewhere in Table R408.2 [R408.2.2(5), R408.2.2(6), R408.2.2(7), R408.2.2(8) and R408.2.2(9)-Marine only, R408.2.2(11), R408.2.2(12), and R408.2.2(13)], the 2-point credit is applied incrementally to the current table credits shown. For mixed “gas furnace and cooling options,” incremental credit for options other than “Option 1” is not proposed since the PNNL analysis does not explain the relative efficiency contributions of gas furnace/cooling technologies.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Comment will neither increase or decrease the cost of construction

R408.2 MCMAHON 1 (1927)

IECC RE: TABLE R408.2 (New), R408.2.5

Proponents:

Alisa McMahon, representing self (mcmahon.gbac@cox.net)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed in *conditioned space*	0	0	0	0	1	3	2	2	2
R408.2.5(2)	ERV or HRV installed	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

R408.2.5(3~~2~~)[c]	≤2.0 ACH50 with ERV or HRV installed in *conditioned space*	0	0	0	4	4	8	5	5	5
R408.2.5(4)[c]	≤2.0 ACH50 with ERV or HRV installed	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
R408.2.5(5~~3~~)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(6 ~~4~~)[c]	≤1.5 ACH50 with ERV or HRV installed in *conditioned space*	0	0	0	6	5	10	9	9	9
R408.2.5(7)[c]	≤1.5 ACH50 with ERV or HRV installed	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
R408.2.5(8~~5~~)[c]	≤1.0 ACH50 with ERV or HRV installed in *conditioned space*	0	0	1	7	6	12	12	12	12
R408.2.5(9)[c]	≤1.0 ACH50 with ERV or HRV installed	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where

multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

R408.2.5 Improved air sealing and efficient ventilation system option.

The measured air leakage rate and *ventilation* system shall meet one of the following:

1.	Either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed in *conditioned space*.
2.	Either an ERV or HRV installed.
~~2.~~3.	Less than or equal to 2.0 ACH50, with either an ERV or HRV installed in *conditioned space*.
4.	Less than or equal to 2.0 ACH50, with either an ERV or HRV installed.
~~3.~~5.	Less than or equal to 2.0 ACH50, with a *balanced ventilation system* .
~~4.~~6.	Less than or equal to 1.5 ACH50, with either an ERV or HRV installed in *conditioned space*.
7.	Less than or equal to 1.5 ACH50, with either an ERV or HRV installed.
~~5.~~8.	Less than equal to 1.0 ACH50, with either an ERV or HRV installed in *conditioned space*.
9.	Less than or equal to 1.0 ACH50, with either an ERV or HRV installed.

In addition, for measures requiring either an ERV or HRV, HRV and ERV Sensible Recovery Efficiency (SRE) shall be no less than 75 percent at 32°F (0°C), at the lowest *listed* net airflow. ERV Latent Recovery/Moisture Transfer (LRMT) shall be no less than 50 percent, at the lowest *listed* net airflow. In *Climate Zone* 8, recirculation shall not be used as a defrost strategy.

Reason:

PNNL modeled R408.2.5(1), R408.2.5(2), R408.2.5(4) and R408.2.5(5) with ERV/HRVs located in conditioned space. However, Section R408.2.5 does not state that ERV/HRVs are to be located in conditioned space. In other words, there is a disparity between the measure description in Section R408.2.5 and the credit values in Table R408.2. As currently written, ERV/HRVs installed outside conditioned space would receive undeserved credit.

To resolve this disparity, the measure description in Section R408.2.5 can be aligned to the credit values or the credit values can be aligned to the measure description. This proposal does both. 1) Existing credit values are maintained with the addition of language that specifies location within conditioned space and 2) PNNL would provide new analysis for ERV/HRVs located outside conditioned space. PNNL has confirmed this would not be an onerous task.

TBD

= credit values to be determined by PNNL

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Comment will neither increase or decrease the cost of construction. This is an optional measure that presumably will not be chosen unless it is cost effective.

R408.2 MCMAHON 2 (1928)

IECC RE: TABLE R408.2 (New), R408.2.5

Proponents:

Alisa McMahon, representing self (mcmahon.gbac@cox.net)

2024 International Energy Code [RE] [RE Project] R3

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16
R408.2.3(1)(a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2

R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Revise as follows:

R408.2.5 Improved air sealing and efficient ventilation system option.

The measured air leakage rate and *ventilation* system shall meet one of the following:

1.	Either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed.

2.	Less than or equal to 2.0 ACH50, with either an ERV or HRV installed.
3.	Less than or equal to 2.0 ACH50, with a *balanced ventilation system*.
4.	Less than or equal to 1.5 ACH50, with either an ERV or HRV installed.
5.	Less than equal to 1.0 ACH50, with either an ERV or HRV installed.

In addition, for measures requiring either an ERV or HRV, the ERV or HRV shall be located in *conditioned space.* HRV and ERV Sensible Recovery Efficiency (SRE) shall be no less than 75 percent at 32°F (0°C), at the lowest *listed* net airflow. ERV Latent Recovery/Moisture Transfer (LRMT) shall be no less than 50 percent, at the lowest *listed* net airflow. In *Climate Zone* 8, recirculation shall not be used as a defrost strategy.

Reason:

PNNL modeled R408.2.5(1), R408.2.5(2), R408.2.5(4) and R408.2.5(5) with ERV/HRVs located in conditioned space. However, Section R408.2.5 does not state that ERV/HRVs are to be located in conditioned space. In other words, there is a disparity between the measure description in Section R408.2.5 and the credit values in Table R408.2. As currently written, ERV/HRVs installed outside conditioned space would receive undeserved credit.

To resolve this disparity, the measure description in Section R408.2.5 can be aligned to the credit values or the credit values can be aligned to the measure description. This proposal does the former: the ERV/HRV location is explicitly stated within the compliance requirements.

Specifying the installation location for this measure does not prohibit the installation of ERV/HRVs outside conditioned space; nor does it affect ERV/HRV provisions elsewhere in IECC-R. It merely defines how this optional measure is to be built in order to qualify for points.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Comment will neither increase or decrease the cost of construction. This is an optional measure that presumably will not be chosen unless it is cost effective.

R408.2 MCMAHON 3 (1929)

IECC RE: TABLE R408.2 (New)

Proponents:

Alisa McMahon, representing self (mcmahon.gbac@cox.net)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0
R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA

R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7
R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16

R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2
R408.2.5(1)	ERV or HRV installed	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~1~~TBD	~~3~~TBD	~~2~~TBD	~~2~~TBD	~~2~~TBD
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~4~~TBD	~~4~~TBD	~~8~~TBD	~~5~~TBD	~~5~~TBD	~~5~~TBD

R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~4~~TBD	~~4~~TBD	~~4~~TBD
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	~~0~~TBD	~~0~~TBD	~~0~~TBD	~~6~~TBD	~~5~~TBD	~~10~~TBD	~~9~~TBD	~~9~~TBD	~~9~~TBD
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	~~0~~TBD	~~0~~TBD	~~1~~TBD	~~7~~TBD	~~6~~TBD	~~12~~TBD	~~12~~TBD	~~12~~TBD	~~12~~TBD
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

PNNL modeled R408.2.5(1), R408.2.5(2), R408.2.5(4) and R408.2.5(5) with ERV/HRVs located in conditioned space. However, Section R408.2.5 does not state that ERV/HRVs are to be located in conditioned space. In other words, there is a disparity between the measure description in Section R408.2.5 and the credit values in Table R408.2. As currently written, ERV/HRVs installed outside conditioned space would receive undeserved credit.

To resolve this disparity, the measure description in Section R408.2.5 can be aligned to the credit values or the credit values can be aligned to the measure description. This proposal does the latter: the measure would be reanalyzed by PNNL with ERV/HRVs located

outside conditioned space. PNNL has confirmed this would not be an onerous task.

TBD

= credit values to be determined by PNNL

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Comment will neither increase or decrease the cost of construction. This is an optional measure that presumably will not be chosen unless it is cost effective.

R408.2 MCMAHON 4 (1930)

IECC RE: TABLE R408.2 (New)

Proponents:

Alisa McMahon, representing self (mcmahon.gbac@cox.net)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY
Portions of table not shown remain unchanged.

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3(1)	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	~~1~~0	~~1~~0	0	0	0	0	0	0	0

R408.2.1.3(2)	Roof reflectance (roof is above an unconditioned space that contains a duct system)	~~1~~0	~~1~~0	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA
R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7

R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16
R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2

R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5
R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	1	1	1	1	1	1	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

A. Errata

Measure identified above as R408.2.1.3(1) - Climate Zone 2 - credit value should be "0"

B. Proposed change

Section R408.2.1.3 has numerous shortcomings that preclude it from justifiably receiving points.

1. Section R408.2.1.3 does not explicitly state what percentage of roof area must comply with the SRI requirements to earn credit.

- A percentage is buried in Exception 4.
- That percentage was not intended to be the minimum roof area percentage for compliance. Rather it was imported from the commercial code in a list of exceptions to a *requirement*.
- The exception requires some work to decipher:

In C402.4, where ≥75% of the roof area falls into one or more of the exceptions, the entire roof is exempt from the requirement. In other words, the requirement must be met if >25% of the roof area does not fall into one or more of the exceptions.

But R408.2.1.3 is not a requirement; it's an optional measure. So the exception language translates here to: The roof can qualify for credit if >25% of the roof area does not fall into one or more of the exceptions.

In other words, the roof qualifies for credit if 26% of the roof area meets the SRI and 74% does not.

2. The required percentage of roof area must correlate with the credits in Table R408.2.

- In PNNL's analysis, it was assumed **100%** of roof area met the required SRI.
- Modeled at 100% compliance, measure number R408.2.1.3(2) achieved one point by the slimmest of margins – 0.04% in Climate Zone 1 and 0.02% in Climate Zone 2. If PNNL had modeled, for example, 30% of roof area (and even higher), the measure would not have met the 0.50 threshold to round up to one point.

3. The required SRIs must correlate with the credits in Table R408.2. The steep slope SRI does not.

- PNNL analysis for these measures was performed using only the low slope SRI 75. SRI 75 was modeled against a baseline of 25. The steep slope SRI was not modeled. The credit values in Table R408.2 are based solely on SRI 75.
- At 16, the required steep slope SRI is lower than the modeled baseline. If SRI 16 had been modeled against the baseline of 25, the results could have been negative. In any case, the results would not have met the 0.5 threshold to round up to one point.
- Even modeled at SRI 75, the measures barely achieved one point. Measure number R408.2.1.3(1) reached one point in one Climate Zone (rounded up from 0.67%) and measure number R408.2.1.3(2) qualified for one point in two Climate Zones (rounded up from 0.54% and 0.52%). If modeled at SRI 16, it is unlikely either measure would qualify for a point in any Climate Zone.

Under this proposal, the credit values would be zero and no credits could be earned. However, measure numbers R408.2.1.3(1) and R408.2.1.3(2) would still qualify as measures under Section R408.2.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Comment will neither increase or decrease the cost of construction. This is an optional measure that presumably will not be chosen unless it is cost effective.

R408.2 MCMAHON 5 (1931)

IECC RE: TABLE R408.2 (New)

Proponents:

Alisa McMahon, representing self (mcmahon.gbac@cox.net)

2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

TABLE R408.2 CREDITS FOR ADDITIONAL ENERGY EFFICIENCY
Portions of table not shown remain unchanged.

Measure Number	Measure Description	Credit Value								
		Climate Zone 0 & 1	Climate Zone 2	Climate Zone 3	Climate Zone 4 except Marine	Climate Zone 4 Marine	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
R408.2.1.1(1)	≥2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥5% reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	>7.5% reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	>10% reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	>15% reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	>20% reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	>30% reduction in total TC	3	6	6	8	8	11	12	13	16
R408.2.1.2(2)	U-factor and SHGC for vertical fenestration per Table R408.2.1	1	1	1	2	1	1	1	1	
R408.2.1.3	Roof reflectance (roof is part of the *building thermal envelope* and directly above cooled, conditioned space)	1	1	0	0	0	0	0	0	0

R408.2.1.3	Roof reflectance (roof is above an unconditioned space that contains a duct system)	1	1	0	0	0	0	0	0	0
R408.2.1.4	Reduced air leakage	1	1	1	2	1	3	NA	NA	NA
R408.2.2(1)[b]	Ground source heat pump	4	8	12	19	14	25	32	35	46
R408.2.2(2) [b]	High Performance Cooling (Option 1)	5	4	3	2	1	1	1	1	1
R408.2.2(3)[b]	High Performance Cooling (Option 2)	6	4	3	2	1	1	1	1	1
R408.2.2(4) [b]	High Performance Gas furnace (Option 1)	NA	NA	NA	NA	NA	6	7	7	NA
R408.2.2(5)[b]	High Performance Gas furnace (Option 2)	0	1	2	4	3	NA	NA	NA	8
R408.2.2(6)[b]	High Performance Gas furnace (Option 3)	0	1	1	3	NA	NA	NA	NA	NA
R408.2.2(7)[b]	High Performance Gas furnace and cooling (Option 1)	5	5	4	5	NA	NA	NA	NA	NA
R408.2.2(8)[b]	High Performance Gas furnace and cooling (Option 2)	6	5	5	6	NA	NA	NA	NA	NA
R408.2.2(9)[b]	High Performance Gas furnace and heat pump (Option 1)	13	12	9	7	NA	NA	NA	NA	NA
R408.2.2(10)[b]	HIgh Performance Heat pump with electric resistance backup (Option 1)	13	12	11	12	NA	NA	NA	NA	NA
R408.2.2(11)[b]	High Performance Gas furnace and cooling (Option 3)	NA	NA	NA	NA	4	6	7	7	9
R408.2.2(12) [b]	High Performance Gas furnace and cooling (Option 4)	NA	NA	NA	NA	5	7	8	8	10
R408.2.2(13)[b]	High Performance Gas furnace and heat pump (Option 2)	NA	NA	NA	NA	8	0	-1	-3	-7

R408.2.2(14)[b]	High Performance Heat pump with electric resistance backup (Option 2)	NA	NA	NA	NA	8	12	13	14	16
R408.2.3(1) (a)[d]	Gas-fired storage water heaters(option 1)	8	7	7	5	6	4	4	3	2
R408.2.3(1) (b)[d]	Gas Fired Storage Water Heater(option 2)	9	8	8	6	7	5	4	4	3
R408.2.3(2) (a)[d]	Gas-fired instantaneous water heaters (option 1)	10	9	9	6	7	5	5	4	3
R408.2.3(2) (b)[d]	Gas-fired instantaneous water heaters (option 2)	11	10	9	6	7	6	5	4	3
R408.2.3(3) (a)[d]	Electric water heaters (option 1)	12	11	11	8	8	5	4	4	3
R408.2.3(3) (b)[d]	Electric water heaters (option 2)	12	11	11	8	8	5	4	4	3
R408.2.3(4)[d]	Electric water heaters (option 3)	11	11	11	8	8	5	4	4	3
R408.2.3(5) (a)[d]	Electric water heaters (option 4)	8	10	11	8	11	7	5	5	
R408.2.3(5) (b)[d]	Electric water heaters (option 5)	9	11	12	8	11	7	6	5	4
R408.2.3(5)[d]	Electric water heaters (option 6)	12	11	11	8	8	5	4	4	3
R408.2.3(6) (a)[d]	Solar hot water heating system (option 1)	13	13	13	9	8	5	4	4	3
R408.2.3(6) (b)[d]	Solar hot water heating system (option 2)	10	9	9	6	7	6	5	4	3
R408.2.3.1 [c]	Compact hot water distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)[c]	More efficient distribution system	3	4	5	7	8	10	10	10	14
R408.2.4(2)[c]	100% of *duct systems* in conditioned space	2	3	4	6	7	9	9	~~9~~9	13
R408.2.4(3)[c]	≥80% of ductwork inside *conditioned space*	2	3	3	5	6	7	7	7	9
R408.2.4(4)[c]	Reduced total duct leakage	1	1	1	1	1	1	2	2	2

R408.2.5(1)	ERV or HRV installed	0	0	0	0	1	3	2	2	2
R408.2.5(2)[c]	≤2.0 ACH50 with ERV or HRV installed	0	0	0	4	4	8	5	5	5
R408.2.5(3)[c]	≤2.0 ACH50 with a *balanced ventilation system*	0	0	0	0	0	0	4	4	4
R408.2.5(4)[c]	≤1.5 ACH50 with ERV or HRV installed	0	0	0	6	5	10	9	9	9
R408.2.5(5)[c]	≤1.0 ACH50 with ERV or HRV installed	0	0	1	7	6	12	12	12	12
R408.2.6[a]	Energy efficient appliances	~~1~~0	~~1~~0	~~1~~0	~~1~~0	~~1~~0	~~1~~0	0	0	0
R408.2.7	On-site renewable energy measures	17	16	17	11	11	9	8	7	4
R408.2.8	Off-site renewable energy measures	71	65	62	55	46	41	43	41	39
R408.2.8b	Off-site renewable energy measure	1	1	1	1	1	1	1	1	1
R408.2.9[c]	Demand responsive thermostat	1	1	1	1	1	1	1	1	1
R408.2.11	Whole home lighting control	0	0	0	0	0	0	0	0	0
R408.2.12	Higher efficacy lighting	0	0	0	0	0	0	0	0	0

a. Where the measure is selected, each dwelling unit, sleeping unit, and common areas where the measure is applicable must have the measure installed.

b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.

d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.

SEER2: Seasonal Energy Efficiency Ratio, HSPF2: Heating Season Performance Factor, EER2: Energy Efficiency Ratio, COP: Coefficient of Performance

Reason:

The refrigerator requirement in measure number R408.2.6 is unacceptable. The measure should be precluded from receiving points until the refrigerator requirement can be more fully and accurately developed. This is especially true because refrigerators account for 65% of the total maximum annual energy use in the measure.

Section R408.2.6 specifies a refrigerator with an annual energy consumption no greater than 620 kWh/yr.

Every refrigerator configuration has a maximum allowed annual energy consumption known as the U.S. Federal Standard. 620 is higher than the Federal Standard for many refrigerator configurations. Of course, the annual energy use of Energy Star models is lower than Federal Standards and Energy Star Most Efficient models consume the least amount of energy.

Annual Energy Use Ranges (in kWh/yr)

Configuration Main Categories

U.S. Federal Standard

Energy Star

Energy Star

Most Efficient

Top Freezer standard size

331 to 536

263 to 489

263 to 489

Bottom Freezer standard size

439 to 844

286 to 807

286 to 595

Side-by-side standard size

646 to 885

560 to 805

N/A

Compact

228 to 580

106 to 470

106 to 255

Source: https://www.energystar.gov/productfinder/product/certified-residential-refrigerators/results

620 is higher than the Federal maximum allowed for all top freezer configurations, many bottom freezer configurations, and all compacts. That's the problem with having just one number for all refrigerators. We would give R408 credit for refrigerators that merely meet their applicable Federal Standard. These refrigerators are not even Energy Star Certified!

At minimum, for appliances to receive R408 credit, the measure should require a different maximum Annual Energy Consumption for each of the three main standard-size refrigerator configurations (top, bottom and side-by-side). Compacts should have a separate maximum Annual Energy Consumption or be excluded.

Ideally, for R408 credit, the criteria should be commensurate with Energy Star Most Efficient.

Where did the refrigerator requirement of 620 come from? A survey of Home Depot's website. 620 represents an average of the annual energy use of the 12 side-by-side and French door models on Home Depot's website in November 2022.

Under this proposal, the credit values for measure number R408.2.6 would be zero and no credits could be earned. However, the measure number would still qualify as a measure under Section R408.2.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

Comment will neither increase or decrease the cost of construction. This is an optional measure that presumably will not be chosen unless it is cost effective.