Cost of Energy Efficiency Changes in New Housing: 2009 to 2015 or 2024 IECC

June 2026

Table of Contents

1. Background

The Residential Provisions of the International Energy Conservation Code (IECC) are used by state and local jurisdictions to set minimum efficiency requirements for new construction. The International Code Council (ICC) creates the IECC using a national code development process that takes place every three years. Local jurisdictions have the ultimate say on what codes they adopt, which means different locations may use different editions of the IECC.

For each new IECC edition, the U.S. Department of Energy (DOE) analyzes energy and economic impacts of the code changes (e.g., costs, savings, cost-effectiveness). DOE's analysis generally includes:

1. Identifying changes in the prescriptive and mandatory requirements that affect energy use,
2. Estimating the associated incremental construction costs of these changes,
3. Analyzing energy impacts of these changes, and
4. Evaluating the cost-effectiveness of the changes based on costs and energy cost savings of the entire package of changes (i.e., not Individual changes).

This report centers on the first two steps described above and expands on DOE's approach in two ways:

1. It evaluates the cumulative changes in efficiency requirements from the 2009 through the 2015 and 2009 to 2024 IECC. In contrast, DOE's approach is to consider incremental changes from one code edition to the next (e.g. 2021 to the 2024 IECC).
2. It compiles and considers multiple cost sources to develop estimated cost ranges for each code change. In contrast, DOE typically estimates a single cost for each code change.

With this approach, the purpose of this report is to provide stakeholders with a basis for examining how construction costs may change from the 2009 to the 2015 or 2009 to the 2024 IECC.

2. Methodology

The first step in this analysis was to identify the cumulative changes between the 2009 and 2015 or 2009 and 2024 IECC. This report, consistent with DOE analysis, only considers homes that utilize the IECC prescriptive path requirements. Compliance through the performance or ERI paths allows too many different energy efficiency measures options to effectively model. Evaluating the cumulative changes included making assumptions on compliance options for the 2024 IECC as described in Section 2.1; and determining which homes (e.g., climate zone, foundation) the code changes applied to as described in Section 2.3,

Next, incremental cost data were gathered for each code change identified. This included gathering data from multiple sources so that median, high, and low costs could be estimated as described in Section 2.2.

Finally, the costs associated with each code change were aggregated to calculate the total incremental cost for each scenario considered. These results are presented in Section 3.

2.1. 2024 IECC Additional Efficiency Requirements

The 2024 IECC contains requirements for homes to include additional efficiency measures from Section R408. For the homes considered in this analysis, at least two additional efficiency measures must be selected, and the selected measures must total at least 10 credits in accordance with Table R408.2. While there are multiple measure options, this analysis focuses on measures associated with heating, ventilation, and air conditioning (HVAC) and domestic hot water (DHW) measures. With this approach there were instances where the homes exceeded the minimum requirement of 10 credits.

The tables below summarize the efficiency measures used for meeting the 10 credit requirement of R408 in gas and electric homes.

Table 1 Natural Gas Home R408 Measures

Measure	CZ 1	CZ 2	CZ3	CZ4	CZ 4C	CZ5	CZ 6	CZ 7	CZ 8
R408.2.2(5) - High Performance Gas Furnace (Option 2) 95 AFUE				4	3	5	6	7	8
R408.2.3(2)(a) - Gas-Fired Instantaneous Water Heater (option 1) 0.92 UEF	10	9	9	6	7	5	5	4	3
R408.2.8 - Demand Responsive Thermostat	1	1	1						
Total	11	10	10	10	10	10	11	11	11

Table 2 Electric Home R408 Measures

Measure	CZ 1	CZ 2	CZ3	CZ4	CZ 4C	CZ5	CZ 6	CZ 7	CZ 8
R408.2.2(10) - High Performance Heat Pump with Electric Resistance Backup (Option 1): 7.8 HSPF2, 15.2 SEER2, and 11.7 EER2	13	12	11	12					
R408.2.2(14) - High Performance Heat Pump with Electric Resistance Backup (Option 2): 8.1 HSPF2, 15.2 SEER2, and 11.7 EER2,					8	12	13	14	16
R408.2.3(3) - Electric Water Heaters (Option 1): 3.30 UEF Heat Pump Water Heater					6				
R408.2.8 - Demand Responsive Thermostat	1	1	1	1		1	1	1	1
Total	14	13	12	13	14	13	14	15	17

2.2. Cost Sources and Ranges

Multiple sources were identified for incremental costs for each code change. Sources included, but were not limited to those listed below:

- RS Means[1]
- The National Residential Efficiency Measures Database (Mid values)[2]
- DOE Technical Support Documents for Appliance Standard Rulemakings[3]
- State and Reginal Technical Reference Manuals
- California Electronic Technical Reference Manual[4]
- Pacific Northwest National Laboratory (PNNL) Cost-Effectiveness Analysis of the IECC[5]
- Online Retailers
- Other industry reports and publications

[1] https://www.rsmeansonline.com/
[2] https://remdb.nlr.gov/
[3] https://www.energy.gov/cmei/buildings/standards-and-test-procedures
[4] https://www.caetrm.com/
[5] https://www.pnnl.gov/main/publications/external/technical_reports/pnnl-22068.pdf
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-24240.pdf
https://www.energycodes.gov/sites/default/files/2021-07/2018IECC_CE_Residential.pdf
https://www.energycodes.gov/sites/default/files/2021-07/2021IECC_CostEffectiveness_Final_Residential.pdf
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-35986.pdf

Costs from sources used for each code change were adjusted to 2025 dollars using the consumer price index from the Bureau of Labor Statistics.[6] Costs were also adjusted to match the home size assumption documented in Section 2.3, which could involve steps such as adjusting costs to per unit, or interpolating between values for two costs (e.g., interpolating between water heater UEF values).

This report uses the median cost of all the sources identified, as the median value is less likely to be influenced by outliers and is more representative of typical costs. Note that if there are an even number of sources, the median is defined as the average of the two middle values in the set.

This report also estimates a range of possible costs for a code change that could be caused by variability in factors like local material and labor costs. To estimate a range, this analysis looked at the RS Means City Cost Index (CCI) for all locations within the contiguous United States excluding California (California does not adopt IECC codes). The median, 80th percentile, and 20th percentile CCIs were identified and used to develop factors to scale median costs to 80th and 20th percentiles. These values were used to represent a typical range that reflects the costs for the majority of homes, not the absolute maximum or minimum costs that could be seen for a code change. The table below summarizes the CCI values and factors used to scale costs.

Table 3 Scaling Factors for Low and High Costs

Cost / Percentile	Location	RS Means Total Weighted Average CCI	Scaling Factor
Median / 50%	Cincinnati Ohio	91.0	NA
Low / 20%	Roanoke, Virginia	87.1	111%
High / 80%	Medford, Oregon	100.8	96%

Appendix A contains additional details on costs for specific code changes including the cost sources considered, and the specific source for the median costs.

2.3. Home Characteristics

Additional energy efficiency requirements in newer editions of the IECC increase construction costs. This report focuses on an example "starter" home because it is more likely to be purchased by a homebuyer that is most constrained by price, and therefore more sensitive to construction-cost increases associated with code changes.

To define the example home geometry, legacy and current data sources were considered. A 2008 NAHB Research Center analysis characterized a starter home as 1,535 square feet, with 76.8% of units being one-story.[7] To check this value against more recent data, the 2024 Census Survey of Construction data indicates that the average size of detached homes with two bedrooms or fewer is 1,562 square feet, and that 78% are one-story.[8] Given the close alignment between these two sources, the more recent Census data were used as the basis for the starter home assumptions in this analysis.

Additional geometric assumptions (e.g., aspect ratio, window area) were drawn from DOE's Methodology for Evaluating Residential Energy Code Updates.[9] Details of these assumptions can be seen in Table 4.

Costs were estimated for various foundation types so that the analysis represents more than 75% of new homes in each climate zone. This was done in accordance with the weighting factors from the DOE's

[6] https://www.bls.gov/data/inflation_calculator.htm
[7] https://www.homeinnovation.com/documents/Reports/BP_Solar_2008_with_FrontEnd_and_tables.pdf
[8] https://www.census.gov/construction/chars/index.html
[9] https://www.energycodes.gov/sites/default/files/2024-10/residential_methodology_2024.pdf

Methodology for Evaluating Residential Energy Code Updates. One exception is that costs are estimated for all foundation types in Climate Zone 4. Foundation types considered are shown in Table 5.

Costs were estimated for homes with either natural gas or electricity used for heating and hot water. This impacts the costs estimated for code changes associated with Section R408 in the 2024 IECC. But it does not impact the estimated costs for the 2015 IECC. None of the code changes for the 2015 IECC impact costs of HVAC or DHW equipment.

The tables below summarize the home-geometry assumptions and the foundation types analyzed by climate zones.

Table 4 Example Home Characteristics

Parameter	Assumption
Conditioned floor area*	1,562
Stories	1
Footprint – Length x Width	45.6 x 34.2
Perimeter	160
Window Area	234
Door Area	42
Above-Grade Wall Height	8.5
Above-Grade Wall Area	1,357
Basement Wall Height	8.0
Basement Wall Area	1,277
Duct Area Total	500
Supply Duct Area	422
Return Duct Area	78

Table 5 Example Home Foundation Types by Climate Zone

Climate Zone	Foundation Types Analyzed
CZ 1	Slab
CZ 2	Slab
CZ 3	Slab
CZ 4	Slab, Heated Basement, Unheated Basement, Crawlspace
CZ 4C	Crawlspace
CZ 5	Slab, Heated Basement, Unheated Basement
CZ 6	Slab, Heated Basement, Unheated Basement
CZ 7	Slab, Heated Basement, Crawlspace
CZ 8	Crawlspace

3. Results

The sections below summarize the resulting costs associated with code changes between the 2009 and 2015 or 2024 IECC. Additional details on costs are shown in Appendix A, B, and C. Appendix A summarizes cost of individual code changes. Appendix B and C summarize the median incremental costs for each code change applicable to a home for the 2015 and 2024 IECC (respectively) compared to the 2009 IECC.

3.1. Median Total Costs per Home

Table 6 below shows the median estimated total incremental costs for all code changes for each home for the 2015 and 2024 IECC compared to the 2009 IECC.

Table 6 Total Median Incremental Costs for the 2015 and 2024 IECC compared to the 2009 IECC

Climate Zone	Foundation	2015 IECC	2024 IECC	
		All	Gas	Electric
CZ 1	Slab	$1,972	$3,284	$2,681
CZ 2	Slab	$2,484	$3,796	$3,193
CZ 3	Slab	$3,590	$5,774	$5,171
CZ 4	Slab	$3,678	$7,776	$6,583
	Heated Bsmt.	$3,663	$7,383	$6,190
	Unheated Bsmt.	$3,658	$7,518	$6,326
	Crawlspace	$3,658	$7,518	$6,326
CZ 4C	Crawlspace	$2,303	$6,165	$6,406
CZ 5	Slab	$2,323	$6,423	$5,454
	Heated Bsmt.	$3,062	$6,784	$5,815
	Unheated Bsmt.	$2,303	$6,165	$5,197
CZ 6	Slab	$3,073	$6,683	$5,714
	Heated Bsmt.	$3,058	$6,668	$5,699
	Unheated Bsmt.	$3,053	$6,803	$5,835
CZ 7	Slab	$3,015	$6,746	$5,778
	Heated Bsmt.	$3,000	$6,731	$5,763
	Crawlspace	$2,995	$6,867	$5,898
CZ 8	Crawlspace	$2,995	$6,854	$5,886

3.2. Range of Total Costs per Home

Table 7 below shows the range (Low and High) of estimated total incremental costs for all code changes for each home for the 2015 and 2024 IECC compared to the 2009 IECC. These ranges are estimated based on the approach summarized in Section 2.2.

Table 7 Range of Incremental Costs for the 2015 and 2024 IECC compared to the 2009 IECC

Climate Zone	Foundation	2015 IECC	2024 IECC	
		All	Gas	Electric
CZ 1	Slab	$1,887 - $2,182	$3,143 - $3,634	$2,566 - $2,967
CZ 2	Slab	$2,377 - $2,749	$3,633 - $4,201	$3,056 - $3,534
CZ 3	Slab	$3,435 - $3,972	$5,526 - $6,390	$4,949 - $5,722
CZ 4	Slab	$3,520 - $4,070	$7,442 - $8,605	$6,301 - $7,285

	Heated Bsmt.	$3,505 - $4,053	$7,066 - $8,170	$5,924 - $6,850
	Unheated Bsmt.	$3,501 - $4,048	$7,195 - $8,320	$6,054 - $7,000
	Crawlspace	$3,501 - $4,048	$7,195 - $8,320	$6,054 - $7,000
CZ 4C	Crawlspace	$2,204 - $2,548	$5,901 - $6,823	$6,131 - $7,090
CZ 5	Slab	$2,223 - $2,571	$6,147 - $7,108	$5,220 - $6,036
	Heated Bsmt.	$2,931 - $3,389	$6,493 - $7,507	$5,566 - $6,436
	Unheated Bsmt.	$2,204 - $2,548	$5,901 - $6,823	$4,974 - $5,751
CZ 6	Slab	$2,941 - $3,401	$6,396 - $7,395	$5,469 - $6,324
	Heated Bsmt.	$2,927 - $3,384	$6,381 - $7,379	$5,454 - $6,307
	Unheated Bsmt.	$2,922 - $3,379	$6,511 - $7,529	$5,584 - $6,457
CZ 7	Slab	$2,886 - $3,337	$6,456 - $7,466	$5,530 - $6,394
	Heated Bsmt.	$2,871 - $3,320	$6,442 - $7,449	$5,515 - $6,377
	Crawlspace	$2,867 - $3,315	$6,572 - $7,599	$5,645 - $6,527
CZ 8	Crawlspace	$2,867 - $3,315	$6,560 - $7,585	$5,633 - $6,514

3.3. Other Cost Considerations

3.3.1. Market Penetration

Costs for certain code changes in this analysis may be overstated because they do not reflect regional market conditions or existing construction practice. HVAC and hot water heating equipment is a notable example of this where standard practice may exceed the assumed baseline in this analysis of federal minimums set by DOE.

As an example, the furnace upgrade from 80 AFUE to 95 AFUE is included as a code change to meet Section R408 of the 2024 IECC, with an incremental cost associated with it. The assumption of an 80 AFUE baseline (current DOE standard) is a conservative assumption as this does not reflect the market standard. Data available on *DOE's Residential Energy Code Field Study Dashboard*[10] shows that a 2020 study in Utah found that gas furnaces in new homes had an average AFUE of 94.0, and 89% of furnaces met or exceeded 95 AFUE; indicating that standard practice in this region exceeds the current DOE standard. In this case, the baseline assumption of an 80 AFUE system does not represent standard builder practices, and the modeled incremental cost reflects a theoretical upgrade rather than an actual cost that would be incurred from a code change. To reflect the impact of this, the median cost of the furnace upgrade could be decreased by $608, from $683 to a prorated value of $75 based on the percent of homes with furnaces less than 95 AFUE. For the slab homes in Climate Zone 5 this would lower the total median incremental cost from $6,423 to $5,815.

In a case where there is 100% market penetration of a measure (e.g., all new homes were built with at least 95 AFUE furnaces), the incremental cost for a code change could be justified to be $0. To illustrate the impact of this, Table 8 below shows the median estimated total incremental costs for all code changes for each home for the 2024 IECC compared to the 2009 IECC, when removing the costs of all heating, cooling, and hot water heating equipment code changes listed below.

- Gas Furnace: 80 AFUE to 95 AFUE
- Gas Water Heater: 0.58 UEF to 0.92 UEF
- Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2
- Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2
- Electric Water Heater: 0.92 UEF to 3.30 UEF

[10] https://www.energycodes.gov/residential-energy-code-field-studies

Table 8 Total Median Incremental Costs for the 2024 IECC compared to the 2009 IECC (HVAC and hot water heating measure removed)

Climate Zone	Foundation	2024 IECC	
		Gas	Electric
CZ 1	Slab	$2,045	$2,138
CZ 2	Slab	$2,557	$2,651
CZ 3	Slab	$4,253	$4,347
CZ 4	Slab	$5,476	$5,570
	Heated Bsmt.	$5,083	$5,177
	Unheated Bsmt.	$5,218	$5,312
	Crawlspace	$5,218	$5,312
CZ 4C	Crawlspace	$4,475	$4,475
CZ 5	Slab	$4,733	$4,827
	Heated Bsmt.	$5,094	$5,188
	Unheated Bsmt.	$4,475	$4,569
CZ 6	Slab	$5,002	$5,096
	Heated Bsmt.	$4,987	$5,081
	Unheated Bsmt.	$5,123	$5,216
CZ 7	Slab	$5,066	$5,159
	Heated Bsmt.	$5,050	$5,144
	Crawlspace	$5,186	$5,280
CZ 8	Crawlspace	$5,174	$5,268

3.3.2. Reduced HVAC Capacity

Many code changes result in reduced heating and cooling loads of a home from improvements to the thermal envelope, air sealing, ductwork, windows, etc. As loads decline, builders may be able to install smaller-capacity furnaces, air conditioners, or heat pumps, along with smaller ductwork. These changes can result in incremental cost savings that partially offset the cost of other code changes. Consistent with prior analysis by DOE and PNNL, this analysis assumes HVAC system sizing is unchanged across code levels and therefore does not include cost reductions associated with downsizing equipment or duct systems. While this approach maintains comparability with DOE cost-effectiveness analyses, illustrative cost reductions from smaller HVAC systems are presented here.

The 2016 DOE Technical Support Document Residential Central Air Conditioners and Heat Pumps[11] presents total installed costs for products. The below costs per ton were estimated by comparing the DOE-reported costs for 2-ton and 3-ton equipment for Split-System Coil-Only Air Conditioners, and Split-System Heat Pumps. Values were then adjusted to 2025$ using the consumer price index.

- Air Conditioners: $1,125 / ton
- Air Source Heat Pumps: $1,111 / ton

To estimate the potential reduction in cost of HVAC equipment the above costs were applied to a sample of homes from DOE's Prototype Building Models[12], specifically single-family homes in Climate Zones 2, 4, and 6 with slab foundations. Table 9 and Table 10 below show the result of this comparison and an estimate of cost

[11] https://www.regulations.gov/document/EERE-2014-BT-STD-0048-0098
[12] https://www.energycodes.gov/prototype-building-models

impacts from reduced HVAC equipment capacity. Note that these estimates are based on the design capacity calculated in the building models, in practice there will be variability in an actual home's design capacity, and equipment will be selected to match nominal HVAC capacities available. Therefore, the capacity reductions in specific homes could be more or less than below, but these estimates, based on the design capacity, are useful as an average estimate across a population of homes. With the results below it is clear that cost reductions from reduced HVAC equipment capacity can be significant when compared to the incremental cost of code changes. The results here show illustrative examples for a few scenarios, and can justify further considering these costs when evaluating code changes.

Table 9 Cost Impact of Reduced Air Conditioner Capacity

Climate Zone	Estimated Capacity (Tons)			Capacity Reduction		Cost Reduction	
	2009 IECC	2015 IECC	2024 IECC	2015 IECC	2024 IECC	2015 IECC	2024 IECC
CZ 2	2.9	2.52	2.47	0.38	0.43	$427	$484
CZ 4	2.54	2.06	1.97	0.48	0.57	$540	$641
CZ 6	3.02	2.08	2.01	0.94	1.01	$1,057	$1,136

Table 10 Cost Impact of Reduced Air Source Heat Pump Capacity

Climate Zone	Estimated Capacity (Tons)		Capacity Reduction		Cost Reduction		
	2009 IECC	2015 IECC	2024 IECC	2015 IECC	2024 IECC	2015 IECC	2024 IECC
CZ 2	2.84	2.45	2.38	0.39	0.46	$433	$511
CZ 4	6.25	3.69	3.43	2.56	2.82	$2,844	$3,133
CZ 6	8.68	5.16	4.38	3.52	4.3	$3,911	$4,778

Appendix A: Cost of Individual Code Changes

The sections below summarize the relevant IECC sections for each code change, along with assumptions, incremental costs, and sources considered to develop the median costs.

Ceiling Insulation: R-30 to R-38

2009 IECC 402.1.1 requires R-30 ceiling insulation in Climate Zones 1-3.

2015 IECC R402.1.2 requires R-38 ceiling insulation in Climate zones 2-3.

2024 IECC R402.1.3 requires R-38 ceiling insulation in Climate zones 2-3.

Cost estimates assume ceiling insulation is provided with blown-in insulation, the specific insulation type varied by the cost source but was either fiberglass or cellulose. The cost for this change is based on additional insulation applied to the 1,562 square feet of ceiling area.

Incremental Cost Estimates per Home

Costs	
Low	$490.42
Median	$512.42
High	$567.07

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Home Depot, Michigan MEMD, Regional Technical Forum Analysis, NAHB Economic Database in Support of ASHRAE 90.2, NEEP Regional Evaluation Measurement & Verification Forum A Report on Costs in Six Northeast & Mid-Atlantic Markets. Median is determined from average of PNNL Cost-Effectiveness Analysis of the 2012 IECC and the NAHB Economic Database in Support of ASHRAE 90.2.

Ceiling Insulation: R-38 to R-49

2009 IECC 402.1.1 requires R-38 ceiling insulation in Climate Zones 4-5.

2015 IECC R402.1.2 requires R-49 ceiling insulation in Climate Zones 4-5.

2024 IECC R402.1.3 requires R-49 ceiling insulation in Climate Zones 4-5.

Cost estimates assume ceiling insulation is provided with blown-in insulation, the specific insulation type varied by the cost source but was either fiberglass or cellulose. The cost for this change is based on additional insulation applied to the 1,562 square feet of ceiling area.

Incremental Cost Estimates per Home

Costs	
Low	$861.55
Median	$900.21
High	$996.21

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012, 2021, and 2024 IECC, Home Depot, Michigan MEMD, Regional Technical Forum Analysis, NAHB Economic Database in Support of ASHRAE 90.2, NEEP Regional Evaluation Measurement & Verification Forum A Report on Costs in Six Northeast & Mid-Atlantic Markets, BCAP Incremental Construction Cost Analysis for New Homes. Median is determined from

NEEP Regional Evaluation Measurement & Verification Forum A Report on Costs in Six Northeast & Mid-Atlantic Markets.

Wall Insulation: R-13 to R-20

2009 IECC 402.1.1 requires R-13 wood frame wall insulation in Climate Zones 3-4.

2015 IECC R402.1.2 requires R-20 wood frame wall insulation in Climate Zones 3-4.

2024 IECC R402.1.3 requires R-20 wood frame wall insulation in Climate Zones 3.

Cost estimates assume wall cavity insulation is provided with batt insulation in wood-frame walls. The specific insulation type varied by the cost source and included materials such as fiberglass batt. A 2x4 framing assembly is assumed for R-13 walls, while a 2x6 framing assembly is assumed for R-20 walls.

Some cost sources assumed 16" on-center framing for both assemblies resulting in an increased cost of framing from upgrading to 2x6 studs. While other sources assumed no increases in framing costs because 2x6 walls used 24" on-center framing, resulting in less lumber and minimal (or no) cost changes for framing. Because there is inconsistency between sources on costs related to framing changes, this analysis increased cost values from sources when they did not include a cost for framing changes. The costs were increased by $610 reflecting 50% of the incremental cost from RS Means of switching from 2x4 16" on-center framing to 2x6 16" on-center framing.

The cost for this change is based on additional insulation applied to the 1,080 square feet of net above-grade wall area, excluding windows and doors.

Incremental Cost Estimates per Home

Costs	
Low	$1,057.17
Median	$1,104.60
High	$1,222.40

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Hancock Lumber, Lowes, Michigan Energy Financial Study of 2x6 Construction, NAHB Economic Database in Support of ASHRAE 90.2, NEEP Regional Evaluation Measurement & Verification Forum A Report on Costs in Six Northeast & Mid-Atlantic Markets. Median is determined from average Lowes and Hancock Lumber.

Wall Insulation: R-13 to R-20+5ci

2009 IECC 402.1.1 requires R-13 wood frame wall insulation in Climate Zones 3-4.

2024 IECC R402.1.3 requires R-20+5 wood frame wall insulation in Climate Zones 4.

Cost estimates assume cavity insulation is provided with batt insulation, and continuous insulation is provided with rigid board in wood-frame walls. The specific insulation type varied by the cost source and included materials such as fiberglass batt, XPS board. A 2x4 framing assembly is assumed for R-13 walls, while a 2x6 framing assembly is assumed for R-20+5ci walls.

Some cost sources assumed 16" on-center framing for both assemblies resulting in an increased cost of framing from upgrading to 2x6 studs. While other sources assumed no increases in framing costs because 2x6 walls used 24" on-center framing, resulting in less lumber and minimal (or no) cost changes for framing. Because there is inconsistency between sources on costs related to framing changes, this analysis increased cost values from sources when they did not include a cost for framing changes. The costs were increased by

$610 reflecting 50% of the incremental cost from RS Means of switching from 2x4 16" on-center framing to 2x6 16" on-center framing.

The cost for this change is based on additional insulation applied to the 1,080 square feet of net above-grade wall area, excluding windows and doors.

Incremental Cost Estimates per Home

Costs	
Low	$2,686.24
Median	$2,806.77
High	$3,106.09

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Lowe's, Builder's General Supply Company, Hancock Lumber. Median is determined from average of Lowe's, Builder's General Supply Company, Hancock Lumber

Wall Insulation: R-20 to R-20+5ci

2009 IECC 402.1.1 requires R-20 wood frame wall insulation in Climate Zone 6.

2015 IECC R402.1.2 requires R-20+5 wood frame wall insulation in Climate Zone 6.

2024 IECC R402.1.3 requires R-20+5 wood frame wall insulation in Climate Zone 6.

Cost estimates assume that continuous insulation is provided with rigid board insulation on the exterior of wood-frame walls. The specific insulation type varied by the cost source and included materials such as XPS board. The cost for this change is based on additional insulation applied to the 1,080 square feet of net above-grade wall area, excluding windows and doors.

Incremental Cost Estimates per Home

Costs	
Low	$1,579.42
Median	$1,650.29
High	$1,826.28

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012, 2021 IECC, NAHB Economic Database in Support of ASHRAE 90.2, Michigan MEMD, Lowes, Builder's General Supply Company, Hancock Lumber. Median is determined from average of National Residential Efficiency Measures Database and Builder's General Supply Company.

Wall Insulation: R-21 to R-20+5ci

2009 IECC 402.1.1 requires R-21 wood frame wall insulation in Climate Zones 7-8.

2015 IECC R402.1.2 requires R-20+5 wood frame wall insulation in Climate Zones 7-8.

2024 IECC R402.1.3 requires R-20+5 wood frame wall insulation in Climate Zones 7-8.

Cost estimates assume that continuous insulation is provided with rigid board insulation on the exterior of wood-frame walls. The specific insulation type varied by the cost source and included materials such as

fiberglass batt and XPS board. The cost for this change is based on additional insulation applied to the 1,080 square feet of net above-grade wall area, excluding windows and doors.

Incremental Cost Estimates per Home

Costs	
Low	$1,524.24
Median	$1,592.64
High	$1,762.48

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012, 2021 IECC, NAHB Economic Database in Support of ASHRAE 90.2, Michigan MEMD, Builder's General Supply Company, Hancock Lumber. Median is determined from National Residential Efficiency Measures Database and Builder's General Supply Company.

Basement Wall Insulation: R-10ci to R-15ci

2009 IECC 402.1.1 requires R-10 continuous basement wall insulation in Climate Zones 4C and 5.

2015 IECC R402.1.2 requires R-15 continuous basement wall insulation in Climate Zones 4C and 5.

2024 IECC R402.1.3 requires R-15 continuous basement wall insulation in Climate Zones 4C and 5.

Cost estimates assume that continuous insulation is provided with rigid board in basement walls. The specific insulation type varied by the cost source and included materials such as XPS board. The cost for this change is based on additional insulation applied to the 1,277 square feet of basement wall area.

Incremental Cost Estimates per Home

Costs	
Low	$721.72
Median	$754.11
High	$834.53

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Home Depot, Roofing4US, Michigan MEMD, BCAP Incremental Construction Cost Analysis for New Homes. Median is determined from BCAP Incremental Construction Cost Analysis for New Homes.

Slab Insulation: None to R-10 2 ft

2009 IECC 402.1.1 requires no slab insulation in Climate Zone 3.

2024 IECC R402.1.3 requires R-10, 2ft slab insulation in Climate Zone 3.

The cost of this measure is based on the additional insulation applied to the perimeter of the slab. For the prototype home, the slab perimeter is 159 linear feet, and the corresponding insulated slab area is 319 square feet, calculated using a 2-foot slab insulation depth.

Incremental Cost Estimates per Home

Costs	
Low	$723.64
Median	$756.11
High	$836.74

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, PNNL Cost-Effectiveness Analysis of the 2021 IECC, NAHB Economic Database in Support of ASHRAE 90.2, Home Depot, Regional Technical Forum Analysis, BCAP Incremental Construction Cost Analysis for New Homes. Median is determined from average of National Residential Efficiency Measures Database and PNNL Cost-Effectiveness Analysis of the 2021 IECC.

Slab Insulation: R-10, 2 ft to R-10 3 ft

2009 IECC 402.1.1 requires R-10, 2ft slab insulation in Climate Zones 4-5.

2024 IECC R402.1.3 requires R-10, 3ft slab insulation in Climate Zones 4-5.

The cost of this measure is based on the additional insulation applied to the perimeter of the slab. For the prototype home, the slab perimeter is 159 linear feet, and the corresponding insulated slab area is 319 square feet, calculated using a 1-foot incremental slab insulation depth.

Incremental Cost Estimates per Home

Costs	
Low	$361.82
Median	$378.05
High	$418.37

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, PNNL Cost-Effectiveness Analysis of the 2021 IECC, NAHB Economic Database in Support of ASHRAE 90.2, Home Depot, Regional Technical Forum Analysis, BCAP Incremental Construction Cost Analysis for New Homes. Median is determined from average of National Residential Efficiency Measures Database and PNNL Cost-Effectiveness Analysis of the 2021 IECC.

Window U-factor: 1.20 to 0.5, 0.65 to 0.4, and 0.5 to 0.35

2009 IECC 402.1.1 requires window U-factor of 1.2 in Climate Zone 1, 0.65 in Climate Zone 2, and 0.5 in Climate Zone 3.

2015 IECC R402.1.2 requires window U-factor of 0.4 in Climate Zone 2, and 0.35 in Climate Zone 3.

2024 IECC R402.1.3 requires window U-factor of 0.5 in Climate Zone 1, and 0.4 in Climate Zone 2.

No incremental cost was assumed for these measures. The ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, indicates that typical worst-case windows available on the market have a 0.35 U-factor, and 0.30 SHGC. Therefore, compliance with these code changes are not expected to result in additional cost.

Window U-factor: 0.5 to 0.3

2009 IECC 402.1.1 requires window U-factor of 0.5 in Climate Zone 3.

2024 IECC R402.1.3 requires window U-factor of 0.3 in Climate Zone 3.

The cost of this measure is based on reducing the window U-factor from 0.35 to 0.30. A U-factor of 0.35 was treated as the market baseline, aligning with the ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, which indicates that typical worst-case windows available on the market have a 0.35 U-factor, and 0.30 SHGC. While this code requirement applies to doors, no incremental cost was assumed for doors as a review of market data from ENERGY STAR and major retailers shows U-factors of opaque doors,

that are assumed for these homes, exceed IECC required U-factors. The incremental cost was calculated based on 234.3 square feet of window area.

Incremental Cost Estimates per Home

Costs	
Low	$111.57
Median	$116.58
High	$129.01

Cost data for this code change were found in the following sources: ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Regional Technical Forum Standard Information Workbook. Median is determined from ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report.

Window U-factor: 0.35 to 0.32

2009 IECC 402.1.1 requires window U-factor of 0.35 in Climate Zones 5-8.

2015 IECC R402.1.2 requires window U-factor of 0.32 in Climate Zones 5-8.

The cost of this measure is based on reducing the window U-factor from 0.35 to 0.32. While this code requirement applies to doors, no incremental cost was assumed for doors as a review of market data from ENERGY STAR and major retailers shows U-factors of opaque doors, that are assumed for these homes, exceed IECC required U-factors. The incremental cost was calculated based on 234.3 square feet of window area.

Incremental Cost Estimates per Home

Costs	
Low	$55.63
Median	$58.12
High	$64.32

Cost data for this code change were found in the following sources: ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Regional Technical Forum Standard Information Workbook. Median is determined from PNNL Cost-Effectiveness Analysis of the 2012 IECC.

Window U-factor: 0.35 to 0.3

2009 IECC 402.1.1 requires window U-factor of 0.35 in Climate Zone 4.

2024 IECC R402.1.3 requires window U-factor of 0.3 in Climate Zone 4.

The cost of this measure is based on reducing the window U-factor from 0.35 to 0.32. While this code requirement applies to doors, no incremental cost was assumed for doors as a review of market data from ENERGY STAR and major retailers shows U-factors of opaque doors, that are assumed for these homes, exceed IECC required U-factors. The incremental cost was calculated based on 234.3 square feet of window area.

Incremental Cost Estimates per Home

Costs	
Low	$111.57

Median	$116.58
High	$129.01

Cost data for this code change were found in the following sources: ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Regional Technical Forum Standard Information Workbook. Median is determined from ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report.

Window U-factor: 0.35 to 0.28

2009 IECC 402.1.1 requires window U-factor of 0.35 in Climate Zones 5-6.

2024 IECC R402.1.3 requires window U-factor of 0.28 in Climate Zones 5-6.

The cost of this measure is based on reducing the window U-factor from 0.35 to 0.28. While this code requirement applies to doors, no incremental cost was assumed for doors as a review of market data from ENERGY STAR and major retailers shows U-factors of opaque doors, that are assumed for these homes, exceed IECC required U-factors. The incremental cost was calculated based on 234.3 square feet of window area.

Incremental Cost Estimates per Home

Costs	
Low	$218.74
Median	$228.55
High	$252.93

Cost data for this code change were found in the following sources: ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Regional Technical Forum Standard Information Workbook. Median is determined from PNNL Cost-Effectiveness Analysis of the 2012 IECC.

Window U-factor: 0.35 to 0.27

2009 IECC 402.1.1 requires window U-factor of 0.35 in Climate Zones 7-8.

2024 IECC R402.1.3 requires window U-factor of 0.27 in Climate Zones 7-8.

The cost of this measure is based on reducing the window U-factor from 0.35 to 0.27. While this code requirement applies to doors, no incremental cost was assumed for doors as a review of market data from ENERGY STAR and major retailers shows U-factors of opaque doors, that are assumed for these homes, exceed IECC required U-factors. The incremental cost was calculated based on 234.3 square feet of window area.

Incremental Cost Estimates per Home

Costs	
Low	$334.72
Median	$349.74
High	$387.04

Cost data for this code change were found in the following sources: ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Regional

Technical Forum Standard Information Workbook. Median is determined from ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report.

Window SHGC: 0.3 to 0.25

2009 IECC 402.1.1 requires window SHGC of 0.3 in Climate Zones 1-3.

2015 IECC R402.1.2 requires window SHGC of 0.25 in Climate Zones 1-3.

2024 IECC R402.1.3 requires window SHGC of 0.25 in Climate Zones 1-3.

The cost of this measure is based on reducing the SHGC from 0.3 to 0.25. Available cost data for this measure is limited because improvements in window SHGC are difficult to isolate and price independently. The incremental cost was calculated based on 234.3 square feet of window area.

Incremental Cost Estimates per Home

Costs	
Low	$289.69
Median	$299.56
High	$331.50

Cost data for this code change were found in the following sources: ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, PNNL Cost-Effectiveness Analysis of the 2012 IECC. Median is determined from average of ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report and PNNL Cost-Effectiveness Analysis of the 2012 IECC.

Window SHCG: NR to 0.4

2009 IECC 402.1.1 does require window SHGC in Climate Zone 4.

2015 IECC R402.1.2 requires window SHGC of 0.4 in Climate Zone 4.

2024 IECC R402.1.3 requires window SHGC of 0.4 in Climate Zone 4.

No incremental cost was assumed for this measure. The ENERGY STAR® Windows, Doors, and Skylights Version 7.0 Criteria Analysis Report, indicates that typical worst-case windows available on the market have a 0.35 U-factor, and 0.30 SHGC. Therefore, compliance with this code change is not expected to result in additional cost.

Infiltration: 7 ACH50 to 5 ACH50

2009 IECC 402.4.2.1 requires maximum air leakage rate of 7 ACH50 in Climate Zones 1-2.

2015 IECC R402.4.1.2 requires maximum air leakage rate of 5 ACH50 in Climate Zones 1-2.

The air leakage reduction approach varies by cost sources, but it's either a direct reduction from 7 ACH50 to 5 ACH50 or as an equivalent reduction of 29%. The cost of this change is based on reducing infiltration for a prototype home with 1,562 square feet of conditioned floor area.

Incremental Cost Estimates per Home

Costs	
Low	$716.99
Median	$749.16
High	$829.05

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012, 2024 IECC, Massachusetts EEAC Residential New Construction Incremental Cost, NAHB Economic Database in Support of ASHRAE 90.2, Michigan MEMD, NEEP Regional Evaluation. Median is determined from Massachusetts EEAC Residential New Construction Incremental Cost.

Infiltration: 7 ACH50 to 4 ACH50

2009 IECC 402.4.2.1 requires maximum air leakage rate of 7 ACH50 in Climate Zones 1-2.

2024 IECC R402.5.1.2 requires maximum air leakage rate of 4 ACH50 in Climate Zones 1-2.

The air leakage reduction approach varies by cost sources, but it's either a direct reduction from 7 ACH50 to 4 ACH50 or as an equivalent reduction of 43%. The cost of this change is based on reducing infiltration for a prototype home with 1,562 square feet of conditioned floor area.

Incremental Cost Estimates per Home

Costs	
Low	$717.37
Median	$749.56
High	$829.49

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012, 2024 IECC, Massachusetts EEAC Residential New Construction Incremental Cost, NAHB Economic Database in Support of ASHRAE 90.2, Michigan MEMD, NEEP Regional Evaluation. Median is determined from Massachusetts EEAC Residential New Construction Incremental Cost.

Infiltration: 7 ACH50 to 3 ACH50

2009 IECC 402.4.2.1 requires maximum air leakage rate of 7 ACH50 in Climate Zones 3-8.

2015 IECC R402.4.1.2 requires maximum air leakage rate of 3 ACH50 in Climate Zones 3-8.

2024 IECC R402.5.1.2 requires maximum air leakage rate of 3 ACH50 in Climate Zones 3-5.

The air leakage reduction approach varies by cost sources, but it's either a direct reduction from 7 ACH50 to 3 ACH50 or as an equivalent reduction of 57%. The cost of this change is based on reducing infiltration for a prototype home with 1,562 square feet of conditioned floor area.

Incremental Cost Estimates per Home

Costs	
Low	$717.75
Median	$749.95
High	$829.93

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012, 2024 IECC, Massachusetts EEAC Residential New Construction Incremental Cost, NAHB Economic Database in Support of ASHRAE 90.2, Michigan MEMD, NEEP Regional Evaluation. Median is determined from Massachusetts EEAC Residential New Construction Incremental Cost.

Infiltration: 7 ACH50 to 2.5 ACH50

2009 IECC 402.4.2.1 requires maximum air leakage rate of 7 ACH50 in Climate Zones 6-8.

2024 IECC R402.5.1.2 requires maximum air leakage rate of 2.5 ACH50 in Climate Zones 6-8.

The air leakage reduction approach varies by cost sources, but it's either a direct reduction from 7 ACH50 to 2.5 ACH50 or as an equivalent reduction of 65%. The cost of this change is based on reducing infiltration for a prototype home with 1,562 square feet of conditioned floor area.

Incremental Cost Estimates per Home

Costs	
Low	$794.51
Median	$830.16
High	$918.69

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012, 2024 IECC, Massachusetts EEAC Residential New Construction Incremental Cost, NAHB Economic Database in Support of ASHRAE 90.2, Michigan MEMD, NEEP Regional Evaluation. Median is determined from National Residential Efficiency Measures Database.[13]

Mechanical Ventilation: None to Supply Fan

2009 IECC does not require whole-house mechanical ventilation system.

2015 IECC R403.6.1 requires whole-house mechanical ventilation with minimum fan efficacy.

2024 IECC R403.6.2 requires whole-house mechanical ventilation with minimum fan efficacy.

Because 2009 IECC does not include a mechanical ventilation system, no ventilation fan was assumed. For the 2015 and 2024 IECC an in-line supply fan, or a central-fan integrated supply system was assumed as the most typical compliance path in Climate Zones 1-4. This assumption was intended to reflect climate-specific ventilation designs. The incremental cost of this measure is based on the cost and installation of an inline supply fan sized to provide approximately 38 CFM of continuous ventilation airflow in accordance with Section M1505.4.3 of the 2024 IRC. The fan is required to have an efficacy of 3.8 CFM/W for the 2024 IECC and 2.8 CFM/W for the 2015 IECC, though no incremental cost difference was assumed between the two efficacy levels.

Incremental Cost Estimates per Home

Costs	
Low	$405.51
Median	$423.71
High	$468.89

Cost data for this code change were found in the following sources: LBNL Review of Residential Ventilation Technologies, NAHB Optimum Solutions for Residential Mechanical Ventilation, California ETRM, DOE building

[13] Note that the costs in this database are for retrofits, and costs for air sealing new construction is less. Costs were estimated for new construction by only using the regression for less than 40% leakage reduction and comparing the cost of retrofits of going from 8 to 7 and 8 to 2.5 ACH50.

American Case Study: Ventilation System Effectiveness and Tested Indoor Air Quality Impacts. Median is determined from average of LBNL Review of Residential Ventilation Technologies and California ETRM.

Mechanical Ventilation: None to Exhaust Fan

2009 IECC does not require whole-house mechanical ventilation system.

2015 IECC R403.6.1 requires whole-house mechanical ventilation with minimum fan efficacy.

2024 IECC R403.6.2 requires whole-house mechanical ventilation with minimum fan efficacy.

Because 2009 IECC does not include a mechanical ventilation system, no ventilation fan was assumed. For the 2015 and 2024 IECC an exhaust-only system was assumed as the most typical compliance path in Climate Zones 5-8 and 5 respectively. This assumption was intended to reflect climate-specific ventilation designs. The incremental cost of this measure is based on the cost and installation of an exhaust fan sized to provide approximately 38 CFM of continuous ventilation airflow in accordance with Section M1505.4.3 of the 2024 IRC. The fan is assumed to have an efficacy of 2.8 CFM/W for the 2024 IECC and 1.4 CFM/W for the 2015 IECC, though no incremental cost difference was assumed between the two efficacy levels.

Incremental Cost Estimates per Home

Costs	
Low	$110.44
Median	$115.39
High	$127.70

Cost data for this code change were found in the following sources: LBNL Review of Residential Ventilation Technologies, Climate-Specific Passive Building Standards, NAHB Optimum Solutions for Residential Mechanical Ventilation, California ETRM, Home Depot. Median is determined from LBNL Review of Residential Ventilation Technologies.

Mechanical Ventilation: None to HRV

2009 IECC does not require whole-house mechanical ventilation system.

2024 IECC R403.6.1 requires a heat recovery ventilation fan in Climate Zones 6–8.

Because 2009 IECC does not include a mechanical ventilation system, no ventilation fan was assumed. The incremental cost of this measure is based on the cost and installation of a 65% sensible recovery efficiency HRV sized to provide approximately 38 CFM of continuous ventilation airflow in accordance with Section M1505.4.3 of the 2024 IRC.

Incremental Cost Estimates per Home

Costs	
Low	$1,505.69
Median	$1,573.25
High	$1,741.03

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, PNNL Cost-Effectiveness Analysis of the 2021, 2024 IECC, California ETRM, LBNL Review of Residential Ventilation Technologies, Climate-Specific Passive Building Standards, NAHB Optimum Solutions for Residential Mechanical Ventilation, Illinois TRM V14.0. Median is determined from average of National Residential Efficiency Measures Database, and PNNL Cost-Effectiveness Analysis of the 2024 IECC.

Duct Insulation: R-6 to R-8 (Slab Homes)

2009 IECC 403.2.1 requires supply ducts in attics to be insulated to R-8, while all other ducts are insulated to R-6.

2015 IECC R403.3.1 requires both supply and return ducts in attics to be insulated to R-8, with ducts in all other locations remaining at R-6.

2024 IECC R403.3.3 requires both supply and return ducts outside conditioned space to be insulated to R-8.

Duct location assumptions follow Table R405.4.2(1) of 2024 IECC, which assumes 100% ducts located in the attic for the prototype slab homes. Supply and return duct surface areas were estimated using Ekotrope. The incremental cost of this change is based on additional duct insulation required for return ducts area in the attic, representing 78 square feet of duct area. Under these assumptions, the affected duct area is the same under both the 2015 and 2024 IECC, and therefore the incremental cost is assumed to be identical for both code scenarios.

Incremental Cost Estimates per Home

Costs	
Low	$19.21
Median	$20.07
High	$22.22

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2015 IECC, Supply House, Home Depot, SF Webb. Median is determined from Home Depot.

Duct Insulation: R-6 to R-8 (Heated Basement Homes)

2009 IECC 403.2.1 requires supply ducts in attics to be insulated to R-8, while all other ducts are insulated to R-6.

2015 IECC R403.3.1 requires both supply and return ducts in attics to be insulated to R-8, with ducts in all other locations remaining at R-6.

2024 IECC R403.3.3 requires both supply and return ducts outside conditioned space to be insulated to R-8.

Duct location assumptions follow Table R405.4.2(1) of 2024 IECC, which assumes 25% ducts located in the attic and 75% in conditioned space for the prototype heated basement homes. Supply and return duct surface areas were estimated using Ekotrope. The incremental cost of this change is based on additional duct insulation required for return ducts area in the attic, representing 20 square feet of duct area. Under these assumptions, the affected duct area is the same under both the 2015 and 2024 IECC, and therefore the incremental cost is assumed to be identical for both code scenarios.

Incremental Cost Estimates per Home

Costs	
Low	$4.80
Median	$5.02
High	$5.55

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2015 IECC, Supply House, Home Depot, SF Webb. Median is determined from Home Depot.

Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)

2009 IECC 403.2.1 requires supply ducts in attics to be insulated to R-8, while all other ducts are insulated to R-6.

2024 IECC R403.3.3 requires both supply and return ducts outside conditioned space to be insulated to R-8.

Duct location assumptions follow Table R405.4.2(1) of 2024 IECC, which assumes 100% ducts located in unconditioned basement/crawlspace for the prototype crawlspace and unconditioned basement homes. Supply and return duct surface areas were estimated using Ekotrope. For the 2024 IECC, the incremental cost of this change is based on additional duct insulation required for the supply and return duct area that is in unconditioned basement/crawlspace , representing approximately 500 square feet of duct area.

Incremental Cost Estimates per Home

Costs	
Low	$122.70
Median	$128.21
High	$141.88

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2015 IECC, Supply House, Home Depot, SF Webb. Median is determined from Home Depot.

Return Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)

2009 IECC 403.2.1 requires supply ducts in attics to be insulated to R-8, while all other ducts are insulated to R-6.

2015 IECC R403.3.1 requires both supply and return ducts in attics to be insulated to R-8, with ducts in all other locations remaining at R-6.

Duct location assumptions follow Table R405.4.2(1) of 2024 IECC, which assumes 100% ducts located in unconditioned basement/crawlspace for the prototype crawlspace and unconditioned basement homes. For the 2015 IECC the impacted duct would be the return ducts in the attic which are not present in the crawlspace and unconditioned basement homes. Therefore, compliance with this code change is not expected to result in additional cost.

Total Duct Leakage: 12 to 4 CFM per 100 ft^2

2009 IECC 403.2.2 requires total duct leakage of 12 CFM per 100 ft^2 of conditioned floor area in all Climate Zones.

2015 IECC R403.3.4 requires total duct leakage of 4 CFM per 100 ft^2 of conditioned floor area in all Climate Zones.

2024 IECC R403.3.7 requires total duct leakage of 4 CFM per 100 ft^2 of conditioned floor area in all Climate Zones.

The cost for this change is based on total duct leakage measured at final testing and 1,562 square feet of conditioned floor area.

Incremental Cost Estimates per Home

Costs	
Low	$458.63
Median	$479.21
High	$530.31

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, RS Means, PNNL Cost-Effectiveness Analysis of the 2012 IECC, Regional Technical Forum Standard Information Workbook, Massachusetts EEAC Residential New Construction Incremental Cost, Itron California Public Utilities Commission Report. Median is determined from average of Regional Technical Forum Standard Information Workbook and Itron California Public Utilities Commission Report.

Lighting: 50% to 100% High Efficiency Lighting

2009 IECC 404.1 requires 50% of lamps to be high-efficacy.

2024 IECC R404.1 requires 100% of lamps to be high-efficacy.

No incremental cost was assumed for high-efficacy lighting upgrade, which generally requires LED or CFL lighting. These technologies are already widely adopted and generally are required by federal DOE appliance standards. Therefore no incremental cost was assigned to high-efficiency lighting in this analysis.

Lighting: 50% to 75% High Efficiency Lighting

2009 IECC 404.1 requires 50% of lamps to be high-efficacy.

2015 IECC R404.1 requires 75% of lamps to be high-efficacy.

No incremental cost was assumed for high-efficacy lighting upgrade, which generally requires LED or CFL lighting. These technologies are already widely adopted and generally are required by federal DOE appliance standards. Therefore, no incremental cost was assigned to high-efficiency lighting in this analysis.

Lighting Controls (Slab and Conditioned Basement Homes)

2009 IECC does not require lighting control.

2024 IECC R404.2 requires lighting controls of all in habitable spaces and garages, unfinished basements, laundry rooms, and utility rooms.

Because the 2009 IECC does not require lighting controls, the incremental cost of automatic shutoff controls was compared to standard on/off switches. In accordance with Section R404.2.1, one primary lighting control was assumed for each habitable space (as defined in the 2024 IRC), resulting in four spaces requiring controls (living room, kitchen, and two bedrooms). In accordance with Section R404.2.2, automatic shutoff controls were assumed for two of the following spaces: garage, unfinished basement, laundry room, and utility room, resulting in a total of six spaces needing controls.

Incremental Cost Estimates per Home

Costs	
Low	$128.06
Median	$133.81
High	$148.08

Cost data for this code change were found in the following sources: Home Depot, Lowes, Minnesota TRM v5.0, Michigan MEMD, Mid Atlantic TRM v9, Home Innovation 2024 IECC Cost Analysis for Single-Family Homes. Median is determined from average of Home Innovation 2024 IECC Cost Analysis for Single-Family Homes and Michigan MEMD.

Lighting Controls (Unconditioned Basement and Crawlspace Homes)

2009 IECC does not require lighting control.

2024 IECC R404.2 requires dimmer control of all lighting in habitable spaces and an automatic shutoff control in garages, unfinished basements, laundry rooms and utility rooms.

Because the 2009 IECC does not require lighting controls, the incremental cost of automatic shutoff controls was compared to standard on/off switches. In accordance with Section R404.2.1, one primary lighting control was assumed for each habitable space (as defined in the 2024 IRC), resulting in four spaces requiring controls (living room, kitchen, and two bedrooms). In accordance with Section R404.2.2, automatic shutoff controls were assumed for three of the following spaces: garage, unfinished basement, laundry room, and utility room, resulting in a total of seven spaces needing controls.

Incremental Cost Estimates per Home

Costs	
Low	$139.99
Median	$146.27
High	$161.87

Cost data for this code change were found in the following sources: Home Depot, Lowes, Minnesota TRM v5.0, Michigan MEMD, Mid Atlantic TRM v9, Home Innovation 2024 IECC Cost Analysis for Single-Family Homes. Median is determined from Home Innovation 2024 IECC Cost Analysis for Single-Family Homes and Michigan MEMD.

Gas Furnace: 80 AFUE to 95 AFUE

2009 IECC does not require gas furnace energy efficiency.

2024 IECC 408.2.2(5) requires 95 AFUE gas furnace and is selected as one of the gas home prototype energy credits in all Climate Zones.

Because 2009 IECC does not require heat pump efficiency, the incremental cost of the 95 AFUE furnace was compared to a furnace meeting the national minimum energy efficiency standards. The baseline system was assumed to be 80 kBtuh unit. No capacity difference assumed for the efficiency upgrade. Note that higher efficiency equipment is often eligible for incentives or tax credits available through utilities, and state or federal government programs, but these are not accounted for in this analysis.

Incremental Cost Estimates per Home

Costs	
Low	$653.89
Median	$683.23
High	$756.09

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, DOE Appliance Technical Support Documents, PNNL Cost-Effectiveness Analysis of the 2024 IECC, NEEP Regional Evaluation, Lowes, Massachusetts Water Heating, Boiler, and Furnace Cost Study, California ETRM, Illinois TRM v14.0, Michigan MEMD, Minnesota TRM v4.2, Home Innovation 2024 IECC Cost Analysis for Single-Family Homes. Median is determined from average of National Residential Efficiency Measures Database and Minnesota TRM v4.2.

Gas Water Heater: 0.58 UEF to 0.92 UEF

2009 IECC does not require water heater energy efficiency.

2024 IECC R408.2.3(2)(a) requires 0.92 UEF of gas instantaneous water heater and is selected as one of the gas home prototype energy efficiency credits in in all Climate Zones.

Because 2009 IECC does not require hot water efficiency, the incremental cost of the 0.92 UEF gas instantaneous water heater was compared to a federal minimum efficiency gas storage water heater. Per 10 CFR 430.32(d), the baseline was assumed to be a 40-gallon medium-draw gas storage water heater with a calculated UEF of 0.58. Note that higher efficiency equipment is often eligible for incentives or tax credits available through utilities, and state or federal government programs, but these are not accounted for in this analysis.

Incremental Cost Estimates per Home

Costs	
Low	$1,037.52
Median	$1,084.07
High	$1,199.68

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, DOE Appliance Technical Support Documents, PNNL Cost-Effectiveness Analysis of the 2021 IECC, NEEP Regional Evaluation, Home Depot, Lowes, Massachusetts Water Heating, Boiler, and Furnace Cost Study, California ETRM, Illinois TRM v14.0, Michigan MEMD, Home Innovation 2024 IECC Cost Analysis for Single-Family Homes. Median is determined from National Residential Efficiency Measures Database.

Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2

2009 IECC does not require heat pump efficiency.

2024 IECC R408.2.2(10) requires 7.8 HSPF2 / 15.2 SEER2 of heat pump and is selected as one of the electric home prototype energy efficiency credits in Climate Zones 1-4.

Because 2009 IECC does not require heat pump efficiency, the incremental cost of the 7.8 HSPF2 / 15.2 SEER2 heat pump was compared to a heat pump meeting the national minimum energy efficiency standards. The baseline system was assumed to be an air-source split system with 2-ton capacity. No capacity difference assumed for the efficiency upgrade. The cost sources include heat pump rated in both SEER and SEER2, when needed values were converted to SEER2 using RESNET conversion factors. Note that higher efficiency equipment is often eligible for incentives or tax credits available through utilities, and state or federal government programs, but these are not accounted for in this analysis.

Incremental Cost Estimates per Home

Costs	
Low	$460.42
Median	$481.08

High	$532.39

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, DOE Appliance Technical Support Documents, AC Outlet, EIA Buildings Sector Appliance and Equipment Costs and Efficiencies, California ETRM, Illinois TRM v14.0, Michigan MEMD, Minnesota TRM v5.0, Pennsylvania Incremental Costs Database, Home Innovation 2024 IECC Cost Analysis for Single-Family Homes. Median is determined from average of DOE Appliance Technical Support Documents and California ETRM.

Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2

2009 IECC does not require heat pump efficiency.

2024 IECC R408.2.2(14) requires 8.1 HSPF2 / 15.2 SEER2 of heat pump and is selected as one of the electric home prototype energy efficiency credits in Climate Zones 4C-8.

Because 2009 IECC does not require heat pump efficiency, the incremental cost of the 8.1 HSPF2 / 15.2 SEER2 heat pump was compared to a heat pump meeting the national minimum energy efficiency standards. The baseline system was assumed to be an air-source split system with 2-ton capacity. No capacity difference assumed for the efficiency upgrade. The cost sources include heat pump rated in both SEER and SEER2, when needed were converted to SEER2 using RESNET conversion factors. Note that higher efficiency equipment is often eligible for incentives or tax credits available through utilities, and state or federal government programs, but these are not accounted for in this analysis.

Incremental Cost Estimates per Home

Costs	
Low	$674.71
Median	$704.98
High	$780.17

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, DOE Appliance Technical Support Documents, AC Outlet, EIA Buildings Sector Appliance and Equipment Costs and Efficiencies, California ETRM, Illinois TRM v14.0, Michigan MEMD, Minnesota TRM v5.0, Pennsylvania Incremental Costs Database. Median is determined from average of DOE Appliance Technical Support Documents and AC Outlet.

Electric Water Heater: 0.92 UEF to 3.30 UEF

2009 IECC does not require water heater efficiency.

2024 IECC R408.2.3(3) requires 3.30 UEF of heat pump water heater and is selected as one of the electric home prototype energy efficiency credits in Climate Zone 4C.

Because 2009 IECC does not require hot water efficiency, the incremental cost of the 3.30 UEF HPWH was compared to a federal minimum efficiency electric storage water heater. Per 10 CFR 430.32(d), the baseline was assumed to be a 52-gallon medium-draw electric storage water heater with a calculated UEF of 0.92. The HPWH was assumed to have a 60-gallon storage capacity. Note that higher efficiency equipment is often eligible for incentives or tax credits available through utilities, and state or federal government programs, but these are not accounted for in this analysis.

Incremental Cost Estimates per Home

Costs

Low	$1,247.31
Median	$1,303.27
High	$1,442.6

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, DOE Appliance Technical Support Documents, Home Depot, Lowes, EIA Buildings Sector Appliance and Equipment Costs and Efficiencies, Massachusetts EEAC Heat Pump Water Heater Study (2021), Massachusetts Water Heating, Boiler, and Furnace Cost Study, California ETRM, Illinois TRM v14.0, Michigan MEMD, Minnesota TRM v5.0, Home Innovation 2024 IECC Cost Analysis for Single-Family Homes. Median is determined from average of Massachusetts EEAC Heat Pump Water Heater Study (2021) and Home Innovation 2024 IECC Cost Analysis for Single-Family Homes.

Thermostat: Programmable to Demand Responsive

2009 IECC 403.1.1 requires a programmable thermostat that is capable of controlling the heating and cooling systems on a schedule.

2024 IECC R408.2.8 requires a thermostat that is demand responsive and has two-way communication that meets specific protocols.

Research found that most thermostats certified to ENERGY STAR Connected Thermostats Version 1.0 criteria met the requirements of R408.2.8. The cost for this change assumes one thermostat per home. Note that demand responsive equipment is often eligible for incentives or tax credits available through utilities, and state or federal government programs, but these are not accounted for in this analysis.

Incremental Cost Estimates per Home

Costs	
Low	$89.83
Median	$93.86
High	$103.87

Cost data for this code change were found in the following sources: National Residential Efficiency Measures Database, California ETRM, EmPOWER Maryland 2024 TRM v11.0, Illinois TRM v13.0, Lowes, Home Depot, and Home Innovation 2024 IECC Cost Analysis for Single-Family Home. Median is determined from Illinois TRM v13.0.

Appendix B: 2015 IECC Costs for Each Code Change per Home

The table below summarizes the median incremental costs for each code change applicable to a home for the 2015 IECC compared to the 2009 IECC.

2015 IECC CZ1 Slab Home	
Code Change	**Median Cost**
Window U-factor: 1.20 to 0.5	$0
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 5 ACH50	$749
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$1,972**
2015 IECC CZ2 Slab Home	
Code Change	**Median Cost**
Ceiling Insulation: R-30 to R-38	$512
Window U-factor: 0.65 to 0.4	$0
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 5 ACH50	$749
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$2,484**
2015 IECC CZ3 Slab Home	
Code Change	**Median Cost**
Ceiling Insulation: R-30 to R-38	$512
Wall Insulation: R-13 to R-20	$1,105
Window U-factor: 0.5 to 0.35	$0
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,590**
2015 IECC CZ4 Slab Home	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20	$1,105
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	$3,678
2015 IECC CZ4 Heated Bsmt. Home	
Code Change	**Median Cost**

Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20	$1,105
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Return Ducts)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,663**
2015 IECC CZ4 Uneated Bsmt. Home	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20	$1,105
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Return Ducts)	$0
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,658**
2015 IECC CZ4 Crawlspace Home	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20	$1,105
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Return Ducts)	$0
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,658**
2015 IECC CZ4C Crawlspace Home	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Return Ducts)	$0
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$2,303**
2015 IECC CZ5 Slab Home	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$2,323**

2015 IECC CZ5 Heated Bsmt. Home	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Basement Wall Insulation: R-10ci to R-15+5ci	$754
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,062**
2015 IECC CZ5 Uneated Bsmt. Home	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Return Ducts)	$0
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$2,303**
2015 IECC CZ6 Slab Home	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,073**
2015 IECC CZ6 Heated Bsmt. Home	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	$3,058
2015 IECC CZ6 Unheated Bsmt. Home	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Return Ducts)	$0
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,053**

2015 IECC CZ7 Slab Home	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,015**
2015 IECC CZ7 Heated Bsmt. Home	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$3,000**
2015 IECC CZ7 Crawlspace Home	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Return Ducts)	$0
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$2,995**
2015 IECC CZ8 Crawlspace Home	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.32	$58
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Return Ducts)	$0
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 75% High Efficiency Lighting	$0
Total	**$2,995**

Appendix C: 2024 IECC Costs for Each Code Change per Home

The table below summarizes the median incremental costs for each code change applicable to a home for the 2024 IECC compared to the 2009 IECC.

2024 IECC CZ1 Slab Home (Gas)	
Code Change	**Median Cost**
Window U-factor: 1.20 to 0.5	$0
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 4 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Thermostat: Programmable to Demand Responsive	$94
Total	**$3,284**
2024 IECC CZ1 Slab Home (Electric)	
Code Change	**Median Cost**
Window U-factor: 1.20 to 0.5	$0
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 4 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2	$481
Thermostat: Programmable to Demand Responsive	$94
Total	**$2,681**
2024 IECC CZ2 Slab Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-30 to R-38	$512
Window U-factor: 0.65 to 0.4	$0
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 4 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Thermostat: Programmable to Demand Responsive	$94
Total	**$3,796**
2024 IECC CZ2 Slab Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-30 to R-38	$512
Window U-factor: 0.65 to 0.4	$0
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 4 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424

Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2	$481
Thermostat: Programmable to Demand Responsive	$94
Total	**$3,193**
2024 IECC CZ3 Slab Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-30 to R-38	$512
Wall Insulation: R-13 to R-20	$1,105
Slab Insulation: None to R-10 2 ft	$756
Window U-factor: 0.5 to 0.3	$117
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,774**
2024 IECC CZ3 Slab Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-30 to R-38	$512
Wall Insulation: R-13 to R-20	$1,105
Slab Insulation: None to R-10 2 ft	$756
Window U-factor: 0.5 to 0.3	$117
Window SHGC: 0.3 to 0.25	$300
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2	$481
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,171**
2024 IECC CZ4 Slab Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Slab Insulation: R-10, 2 ft to R-10 3 ft	$378
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0

Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$7,776**
2024 IECC CZ4 Slab Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Slab Insulation: R-10, 2 ft to R-10 3 ft	$378
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2	$481
Thermostat: Programmable to Demand Responsive	$94
Total	**$6,583**
2024 IECC CZ4 Heated Bsmt. Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$7,383**
2024 IECC CZ4 Heated Bsmt. Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2	$481
Thermostat: Programmable to Demand Responsive	$94
Total	**$6,190**
2024 IECC CZ4 Uneated Bsmt. Home (Gas)	

Code Change	Median Cost
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$7,518**
2024 IECC CZ4 Uneated Bsmt. Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2	$481
Thermostat: Programmable to Demand Responsive	$94
Total	**$6,326**
2024 IECC CZ4 Crawlspace Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$7,518**
2024 IECC CZ4 Crawlspace Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-13 to R-20+5ci	$2,807
Window U-factor: 0.35 to 0.3	$117
Window SHCG: NR to 0.4	$0
Infiltration: 7ACH50 to 3 ACH50	$750

Mechanical Ventilation: None to Supply Fan	$424
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 7.8 HSPF2 / 15.2 SEER2	$481
Thermostat: Programmable to Demand Responsive	$94
Total	**$6,326**
2024 IECC CZ4C Crawlspace Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,165**
2024 IECC CZ4C Crawlspace Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Electric Water Heater: 0.92 UEF to 3.30 UEF	$1,303
Total	**$6,406**
2024 IECC CZ5 Slab Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Slab Insulation: R-10, 2 ft to R-10 3 ft	$378
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,423**

2024 IECC CZ5 Slab Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Slab Insulation: R-10, 2 ft to R-10 3 ft	$378
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,454**
2024 IECC CZ5 Heated Bsmt. Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Basement Wall Insulation: R-10ci to R-15+5ci	$754
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,784**
2024 IECC CZ5 Heated Bsmt. Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Basement Wall Insulation: R-10ci to R-15+5ci	$754
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,815**
2024 IECC CZ5 Uneated Bsmt. Home (Gas)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750

Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,165**
2024 IECC CZ5 Uneated Bsmt. Home (Electric)	
Code Change	**Median Cost**
Ceiling Insulation: R-38 to R-49	$900
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 3 ACH50	$750
Mechanical Ventilation: None to Exhaust Fan	$115
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,197**
2024 IECC CZ6 Slab Home (Gas)	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,683**
2024 IECC CZ6 Slab Home (Electric)	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,714**
2024 IECC CZ6 Heated Bsmt. Home (Gas)	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650

Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,668**
2024 IECC CZ6 Heated Bsmt. Home (Electric)	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,699**
2024 IECC CZ6 Unheated Bsmt. Home (Gas)	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,803**
2024 IECC CZ6 Unheated Bsmt. Home (Electric)	
Code Change	**Median Cost**
Wall Insulation: R-20 to R-20+5ci	$1,650
Window U-factor: 0.35 to 0.28	$229
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,835**
2024 IECC CZ7 Slab Home (Gas)	
Code Change	**Median Cost**

Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,746**
2024 IECC CZ7 Slab Home (Electric)	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Slab Homes)	$20
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,778**
2024 IECC CZ7 Heated Bsmt. Home (Gas)	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,731**
2024 IECC CZ7 Heated Bsmt. Home (Electric)	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Heated Basement Homes)	$5
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,763**
2024 IECC CZ7 Crawlspace Home (Gas)	

Code Change	Median Cost
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,867**
2024 IECC CZ7 Crawlspace Home (Electric)	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Unconditioned Basement and Crawlspace Homes)	$146
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,898**
2024 IECC CZ8 Crawlspace Home (Gas)	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Gas Furnace: 80 AFUE to 95 AFUE	$683
Gas Water Heater: 0.58 UEF to 0.92 UEF	$1,084
Total	**$6,854**
2024 IECC CZ8 Crawlspace Home (Electric)	
Code Change	**Median Cost**
Wall Insulation: R-21 to R-20+5ci	$1,593
Window U-factor: 0.35 to 0.27	$350
Infiltration: 7ACH50 to 2.5 ACH50	$830
Mechanical Ventilation: None to ERV	$1,573
Duct Insulation: R-6 to R-8 (Crawlspace and Unheated Basement Homes)	$128
Total Duct Leakage: 12 to 4 CFM50 per 100 ft²	$479
Lighting: 50% to 100% High Efficiency Lighting	$0
Lighting Controls (Slab and Conditioned Basement Homes)	$134
Air Source Heat Pump: 7.5 HSPF2 / 14.3 SEER2 to 8.1 HSPF2 / 15.2 SEER2	$705
Thermostat: Programmable to Demand Responsive	$94
Total	**$5,886**


twitter.com/ICF


linkedin.com/company/icf-international


facebook.com/ThisIsICF

icf.com


#thisisicf

About ICF

ICF (NASDAQ:ICFI) is a global consulting and digital services company with over 7,000 full- and part-time employees, but we are not your typical consultants. At ICF, business analysts and policy specialists work together with digital strategists, data scientists and creatives. We combine unmatched industry expertise with cutting-edge engagement capabilities to help organizations solve their most complex challenges. Since 1969, public and private sector clients have worked with ICF to navigate change and shape the future. Learn more at icf.com.