MEEA Cost Effectiveness Analysis: OH (CZ 4 + 5)

2009 IECC, OHBA 1, OHBA 2, 2018 IECC

MEEA recommends the full adoption of ch. 11 (energy) of the 2018 IRC as the statewide residential energy code in Ohio. As is shown in the following cost-effectiveness analysis, updating to the unamended 2018 code is cost effective when compared to all current prescriptive pathways in the current Ohio residential code. This analysis demonstrates that any incremental costs incurred from the update will more than be recouped and will result in long-term energy and cost savings over the life of the building. This analysis is only projected out for 30 years, so these estimates are conservative as homes last 75-100 years. Adopting and implementing these cost-effective measures now will put more money back in the pockets of residents and create long-term savings, energy security and home resiliency for every Ohioan that lives in those homes over their lifetime.

In addition to the cost-effective savings demonstrated from this update, recent studies have shown that energy efficient homes and homes with a green certification sell at a 3-5% higher premium than traditional homes.[1][2] Studies also found that there is a strong correlation between a lower HERS score and a higher per square foot selling price in homes. Perhaps these findings aren't too surprising as energy efficiency has been among the top 10 things homeowners want in a home over the last several years. According to a 2013 NAHB survey, homeowners were willing to pay 2-3 percent more for an energy efficient home, and energy efficient appliances, windows and home rating were among the 10 most wanted items in a home. Four years later, the same NAHB survey, *What Homebuyers Really Want,* had similar findings, as homeowners indicated a willingness to trade off home size for amenities such as energy efficient features.[3] Additionally, a recent Zillow survey found that 50% of new home buyers want an energy efficient home, making it the 10th most desired home attribute.[4]

Lastly, an update to the 2018 IRC energy chapter will provide critical consumer protections to ensure homes are affordable, healthy and comfortable over the long-term. When considering homeowner affordability, long-term operational costs are a significant part of the equation. This is especially true when addressing affordability in low-income households who operate on fixed incomes. This population spends an average of 7.2 percent of their income on energy bills compared to the national average at 3.5 percent. [5] The adoption of the 2018 IRC energy chapter would help address long-term affordability and ease the burden on this population.

---

[1] 2017 North Carolina Energy Efficient, Green, and High-Performance Building Inventory Report- http://buildingnc.org/wp-content/uploads/NCBPA-2017-Inventory-Report_030918.pdf

[2] The Value of LEED Homes in the Texas Real Estate Market - https://www.usgbc.org/resources/value-leed-homes-austinround-rock-real-estate-market

[3] https://www.nahb.org/en/news-and-publications/press-releases/2017/01/buyers-willing-to-trade-square-footage-for-amenities-survey-results-show.aspx

[4] Zillow Homeowner Survey - Link

[5] See ACEEE and EE for All. Lifting the High Energy Burden in America's Largest Cities http://energyefficiencyforall.org/sites/default/files/Lifting%20the%20High%20Energy%20Burden_0.pdf.

Table of Contents

MEEA Introduction and Recommendation **1**
Table of Contents 2
Description of Analysis 3
Cost Effectiveness Analysis 1: Ohio PUCO Energy Costs. 4
Cost Effectiveness Analysis 2: EIA 10 Yr. Avg. Energy Costs 5
Analysis Assumptions 6
DOE Cost-Effectiveness Methodology 7
Energy Model Efficiency Inputs 8
Energy and Cost Savings: Analysis 1 ..... 9 - 11
Energy and Cost Savings: Analysis 2 12-14
Appendix **15**
REM/Design Building Summary – Slab on Grade Example 16-24
Construction Costs CZ 4 2009 IECC – 1 story 25
Construction Costs CZ 4 2018 IECC– 1 story 26
Construction Costs CZ 5 2009 IECC– 1 story 27
Construction Costs CZ 5 OHBA 1– 1 story 28
Construction Costs CZ 5 OHBA 2– 1 story 29
Construction Costs CZ 5 2018 IECC 30
REM/Design Building Summary – 2 Story Home Example 31-39
Construction Costs CZ 4 2009 IECC – 2 story 40
Construction Costs CZ 4 2018 IECC– 2 story 41
Construction Costs CZ 5 2009 IECC– 2 story 42
Construction Costs CZ 5 OHBA 1– 2 story 43
Construction Costs CZ 5 OHBA 2– 2 story 44
Construction Costs CZ 5 2018 IECC– 2 story 45

Description of Analysis:

MEEA was asked to conduct an analysis to determine the cost-effectiveness associated with Ohio updating to the unamended 2018 IRC energy chapter. This analysis uses two model homes which were provided by the OHBA and agreed upon by the RCAC. These homes consist of an 1800 sq. ft. slab on grade home and an 1800 sq. ft. two story home with a conditioned basement. Although not representative of the average home size in Ohio, these models were chosen to better reflect starter homes and homes within the low-income community.

Aside from agreed upon assumptions by the RCAC and OHBA, MEEA conducted this analysis per the methodology developed by the US Department of Energy (US DOE). This methodology is used in all DOE cost-effectiveness analyses of energy codes and is the framework when providing a final determination, which determines if the US DOE will support an update to a new model energy code. The DOE methodology is the established standard for conducting energy code cost-effectiveness analyses and is also used by the International Code Council, ASHRAE, NAHB, state agencies and others to ensure cost-effective updates to the energy code.

As you will see below, MEEA conducted two separate analyses based on two different energy cost rates for the state of Ohio. The first cost-effectiveness analysis uses current energy costs derived from the Ohio PUCO website. We collected energy cost data from local utilities and suppliers to derive the current average energy usage cost within the state. However, this approach is difficult to ensure all energy costs are accounted for, as utility riders, transmission costs and other fees are not shown on the Ohio PUCO website. To address this issue, MEEA also conducted the same analysis using a ten-year average energy cost rate for Ohio based on the Energy Information Administration cost numbers. DOE uses energy cost numbers from EIA in their cost-effectiveness methodology, so we thought it appropriate to include both sets of analyses to get a more complete picture of possible savings.

Below are findings which highlight the potential for energy and energy cost savings associated when comparing the 2009 IECC to the 2018 IECC prescriptive path for CZ 4 and 5, and the OHBA 1 and OHBA 2 compared to the 2018 IECC prescriptive path for CZ 5. All accompanying documents and related information can be found in the document.

PUCO Ohio Avg. Energy Costs

Table 1 shows the total incremental upfront costs when improving efficiency measures from the 2009 prescriptive paths to the 2018 prescriptive path. Costs for each measure can be found in the appendix and a description of how these costs were derived is in the assumptions section of the report.

Table 1. Incremental Costs by Measure

Avg. Ohio Home (25% slab, 75% basement)				
Incremental Costs by Measure	**CZ 4**	**CZ 5**		
	09 to 18	09 to 18	0HBA 1 to 18	OHBA 2 to 18
Basement Walls	$ -	$ 316.96	$ 652.21	$ 652.21
Wood Frame Walls	$ 1,363.50	$ -	$ 1,188.03	$ 1,363.50
Ceiling	$ 281.25	$ 281.25	$ -	$ -
Air Sealing/Test	$ 200.00	$ 200.00	$ -	$ -
Duct Sealing/Returns	$ 405.00	$ 405.00	$ 405.00	$ 405.00
HEL	$ 5.88	$ 5.88	$ 2.21	$ 2.21
Mechanical Vent.	$ 59.02	$ 59.02	$ 59.02	$ 59.02
Total Costs	$ 2,315	$ 1,268	$ 2,306	$ 2,482

Using the cost per measure above, Table 2 shows two cost-effectiveness analyses. These analyses use the current average Ohio energy costs based on the Ohio PUCO website. The first analysis is the simple payback which only looks at first costs and divides that by the annual savings. The second analysis, and the more relevant analysis for this comparison, is the Life Cycle Cost analysis. This analysis factors in all costs by measure and accounts for total cost and savings when amortized over a 30-year mortgage. As shown below, all analyses result in a positive LCC for the homeowner.

Table 2. Energy and Cost Saving Analysis

Avg. Ohio Home (25% slab, 75% basement)				
Simple Payback Analysis				
Annual Savings	$ 182.60	$ 195	$ 143.25	$ 131.00
Simple Payback (Years)	12.7	6.5	16	19
Life Cycle Cost Analysis				
Present Value Costs	$ -2,903	$ -1,611	$ -2,884	$ -3,100
Present Value Benefits	$ 4,704	$ 4,483	$ 3,776	$ 3,517
Life Cycle Cashflow	**$ 1,801**	**$ 2,872**	**$ 892**	**$ 417**

EIA Ohio Energy Costs

Table 3 shows the total incremental upfront costs when improving efficiency measures from the 2009 prescriptive paths to the 2018 prescriptive path. Costs for each measure can be found in the appendix and a description of how these costs were derived is in the assumptions section of the report.

Table 3. Incremental Costs by Measure

Avg. Ohio Home (25% slab, 75% basement)				
Incremental Costs by Measure	**CZ 4**	**CZ 5**		
	09 to 18	09 to 18	0HBA 1 to 18	OHBA 2 to 18
Basement Walls	$ -	$ 316.96	$ 652.21	$ 652.21
Wood Frame Walls	$ 1,363.50	$ -	$ 1,188.03	$ 1,363.50
Ceiling	$ 281.25	$ 281.25	$ -	$ -
Air Sealing/Test	$ 200.00	$ 200.00	$ -	$ -
Duct Sealing/Returns	$ 405.00	$ 405.00	$ 405.00	$ 405.00
HEL	$ 5.88	$ 5.88	$ 2.21	$ 2.21
Mechanical Vent.	$ 59.02	$ 59.02	$ 59.02	$ 59.02
Total Costs	$ 2,315	$ 1,268	$ 2,306	$ 2,482

Using the cost per measure above, Table 4 shows two cost-effectiveness analyses. These analyses use the10-year average Ohio energy costs based on the EIA database. The first analysis is the simple payback which only looks at first costs and divides that by the annual savings. The second analysis, and the more relevant analysis for this comparison is the Life Cycle Cost analysis. This analysis factors in all costs by measure and accounts for total cost and savings when amortized over a 30-year mortgage. As shown below, all analyses result in a positive LCC for the homeowner.

Table 4. Energy and Cost Saving Analysis

Avg. Ohio Home (25% slab, 75% basement)				
Simple Payback Analysis				
Annual Savings	$ 302	$ 324	$ 270	$ 254
Simple Payback (Years)	7.7	3.9	8.5	9.8
Life Cycle Cost Analysis				
Present Value Costs	$ -2,903	$ -1,611	$ -2,884	$ -3,100
Present Value Benefits	$ 7,511	$ 7,418	$ 6,764	$ 6,417
Life Cycle Cashflow	**$ 4,608**	**$ 5,807**	**$ 3,880**	**$ 3,317**

Assumptions

Model Homes

- 1800 sq. ft. slab on grade 1 story ranch
- 1800 sq. ft. 2 story home with a conditioned basement

Avg. Ohio Model Home by Foundation

- The average foundation of a home in Ohio was derived from an Ohio specific dataset from the National Renewable Energy Laboratory, RESstock Program. Data collected from three main datasets shows that the breakdown of home foundations is 25% slab and 75% heated basement, after normalizing for other foundation types. In order to determine cost -effectiveness of the average home in Ohio by foundation, MEEA weighted costs and savings of the slab homes by 25% and the conditioned basement by 75%.[6]

Avg. Ohio Model Home by Heating Fuel

- MEEA also derived the average heating fuel for a home in Ohio from RESstock. According to the database, 20% of homes heat with electricity while 80% heat with natural gas, after normalizing for other heating fuels. MEEA ran separate energy models with each heating fuel and weighted savings by 20% and 80% for electric and gas, respectively.

Energy Costs[7][8]

- Local energy costs for the two separate analyses are derived from the Ohio PUCO and the 10-year average energy costs for Ohio estimated by the Energy Information Administration (energy costs used in the DOE Methodology).

Table 5. Energy Costs – Analysis 1 & 2

Energy Costs	Gas	Electric
	$/CCF	$/kWh
Analysis 1: PUCO OH Avg. Energy Costs	$ 0.53	$ 0.11
Analysis 2: EIA 10 Yr. OH Avg. Energy Costs	$ 1.1	$ 0.11

Construction Costs[9]

- Cost estimates for each source are listed next to each associated cost on the attached sheets in the appendix. MEEA used cost estimates from the OHBA, local Home Depot, local energy raters and the Home Innovation Research Lab.

Energy Modeling[10]

- MEEA used REMDesign v15.5 to conduct energy modeling of the two model homes. Separate energy models were run for each prescriptive path in the two codes being assessed, 2009 and 2018 IRC energy chapter. Associated energy savings were derived by subtracting energy use in the 2009 model homes from the 2018 model homes.

---

[6] NREL, RESstock national database - https://resstock.nrel.gov/dataviewer/national_example2

[7] Ohio avg. energy cost data. All cost data can also be found on OH PUCO - http://www.energychoice.ohio.gov/

[8] EIA Ohio 10 yr. Avg. Energy costs. https://www.eia.gov/dnav/ng/hist/n3010oh3a.htm

[9] Construction costs per model home based on 2009 IRC, OHBA path 1, OHBA path 2 and 2018 IRC are attached separately by climate zone. Found in appendix.

[10] Example 1 story and 2 story building summaries are in appendix.

DOE Cost-Effectiveness Methodology

MEEA conducted the cost-effectiveness analysis for simple payback and life cycle cost per the long-established standard for assessing cost-effectiveness in energy codes. The methodology developed by the Pacific Northwest National Laboratory (PNNL), *Methodology for Evaluating Cost-Effectiveness of Residential Energy Code Changes*, is a fully vetted methodology that was developed under guidance by the US DOE.

Although MEEA used the agreed upon home models and local energy and construction cost data for this Ohio-specific cost-effectiveness analysis, all other energy modeling, and economic parameters are per the DOE Methodology.[11] A quick description of that methodology is below:

> *The DOE methodology accounts for the benefits of energy-efficient home construction over the life of a typical mortgage, balancing initial costs against longer term energy savings. DOE evaluates residential energy codes based on three measures of cost-effectiveness:*
>
> *Life-Cycle Cost: Full accounting over a 30-year period of the cost savings, considering energy savings, the initial investment financed through increased mortgage costs, tax impacts, and residual values of energy efficiency measures.*
> *Cash Flow: Net annual cost outlay (difference between annual energy cost savings and increased annual costs for mortgage payments, etc.).*
> *Simple Payback: Number of years required for energy cost savings to exceed the incremental first costs of a new code.*
> *Life-cycle cost is the primary measure by which DOE assesses the cost-effectiveness of residential energy codes.*[12]

Table 6. Economic Parameters Used for Analysis

Parameter	Value
Mortgage Interest Rate	5.0%
Loan Term	30
Down Payment Rate	10.0%
Points and Loan Fees (Mortgage Fee)	0.7%
Discount Rate	5.0%
Period of Analysis	30
Property Tax Rate	0.9%
Income Tax Rate	25.0%
Home Price Escalation Rate	1.6%
Inflation Rate	1.6%
Fuel Price Escalation Rate	3.0%

[11] PNNL. Methodology for Evaluating Cost-Effectiveness of Residential Energy Code Changes. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23923.pdf
[12] https://www.energycodes.gov/development/residential/methodology

Table 7: Energy Model Efficiency Inputs – CZ 4 & 5

Requirements	CZ	2009 IECC	OHBA 1	OHBA 2	2018 IECC
Slab R-value/depth	CZ 4	10/2ft			10/2ft
	CZ 5	10/2ft	10/2ft	10/2ft	10/2ft
Basement Wall R-value/depth	CZ 4	10			10
	CZ 5	10 or 13	10 4ft down	10 4ft down	15
Wood Frame Wall R-value	CZ 4	13			20
	CZ 5	20	15	13	20
Fenestration U-factor	CZ 4	.35			.32
	CZ 5	.35	0.32	0.32	.30
Fenestration SHGC	CZ 4	.40			.40
	CZ 5	.40	.40	.40	.40
Ceiling R-value	CZ 4	38			49
	CZ 5	38	49	49	49
Thermal envelope testing		Tested to 7 ACH50	Tested to 6ACH50	Tested to 6ACH50	Tested to 3ACH50
Duct Leakage		Leakage to outdoors: 8 cfm/100 sq. ft.	Leakage to outdoors: 6 cfm/100 sq. ft.	Leakage to outdoors: 4 cfm/100 sq. ft.	Total leakage: 4 cfm/100 sq. ft.
Efficient Lighting		50%	75%	75%	90%
Whole house mechanical vent		No	No	no	Yes, Exhaust Vent. (24 hrs, 48cfm. 67 watts)
Furnace or ASHP (Federal Minimum)		80 AFUE or 8.2 HSPF	80 AFUE or 8.2 HSPF	80 AFUE or 8.2 HSPF	80 AFUE or 8.2 HSPF
AC or ASHP Eff. (Federal Minimum)		13 or 14 SEER	13 or 14 SEER	13 or 14 SEER	13 or 14 SEER
Water Heater		.57 EF	.57 EF	.57 EF	.57 EF

2009 IECC to 2018 IECC

Table 8: Natural Gas Heat – PUCO 09 to 18

Energy Use (ccf, kWh, MMBTU)								
Natural Gas Heat	2009 IECC			2018 IECC			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MMBTU		
Cleveland Slab	824	8199	108.1	685	7969	93.8	14.3	13%
Cleveland Basement	1196	8366	144.8	863	8121	111.5	33.3	23%
Columbus slab	732	8179	99	623	7935	87.6	11.4	12%
Columbus Basement	1058	8318	131.1	777	8091	103	28.1	21%
Cincinnati Slab	683	8247	95.2	564	7967	81.6	13.6	14%
Cincinnati Basement	990	8353	125.8	709	8089	97.2	28.6	23%
	Energy Cost							
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 438	$ 866	$ 1,303	$ 364	$ 842	$ 1,205	$ 98	8%
Cleveland Basement	$ 635	$ 883	$ 1,519	$ 458	$ 858	$ 1,316	$ 203	13%
Columbus slab	$ 389	$ 864	$ 1,252	$ 331	$ 838	$ 1,169	$ 84	7%
Columbus Basement	$ 562	$ 878	$ 1,440	$ 413	$ 854	$ 1,267	$ 173	12%
Cincinnati Slab	$ 363	$ 871	$ 1,234	$ 299	$ 841	$ 1,141	$ 93	8%
Cincinnati Basement	$ 526	$ 882	$ 1,408	$ 376	$ 854	$ 1,231	$ 177	13%

Table 9. Electric Heat– PUCO 09 to 18

Electric Heat			2009			2018		
	ccf	kWh	MMBTU	ccf	kWh	MBTU	Savings	%
Cleveland Slab	218	14825	71.8	213	13204	65.7	6.1	8%
Cleveland Basement	240	18934	88	233	15065	74	14	16%
Columbus slab	215	13760	67.8	210	12465	62.9	4.9	7%
Columbus Basement	237	17271	81.9	229	14061	70.2	11.7	14%
Cincinnati Slab	206	13237	65.5	202	11723	59.8	5.7	9%
Cincinnati Basement	227	16407	78.3	220	13263	66.9	11.4	15%
	Energy Cost							
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 116	$ 1,566	$ 1,681	$ 113	$ 1,394	$ 1,507	$ 174	10%
Cleveland Basement	$ 127	$ 1,999	$ 2,127	$ 124	$ 1,591	$ 1,715	$ 412	19%
Columbus slab	$ 114	$ 1,453	$ 1,567	$ 112	$ 1,316	$ 1,428	$ 139	9%
Columbus Basement	$ 126	$ 1,824	$ 1,950	$ 122	$ 1,485	$ 1,606	$ 343	18%
Cincinnati Slab	$ 109	$ 1,398	$ 1,507	$ 107	$ 1,238	$ 1,345	$ 162	11%
Cincinnati Basement	$ 121	$ 1,733	$ 1,853	$ 117	$ 1,401	$ 1,517	$ 336	18%

Table 10: 20% Electric, 80% Gas - – PUCO 09 to 18

Heating Fuel- 20% Electric, 80% Gas	2009			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	702.8	9524.2	100.84	590.6	9016	88.18	12.66	13%
Cleveland Basement	1004.8	10479.6	133.44	737	9509.8	104	29.44	22%
Columbus slab	628.6	9295.2	92.76	540.4	8841	82.66	10.1	11%
Columbus Basement	893.8	10108.6	121.26	667.4	9285	96.44	24.82	20%
Cincinnati Slab	587.6	9245	89.26	491.6	8718.2	77.24	12.02	13%
Cincinnati Basement	837.4	9963.8	116.3	611.2	9123.8	91.14	25.16	22%
	Energy Cost $							
	ccf	kWh	2009 Cost	ccf	kWh	2018 Cost	Savings	%
Cleveland Slab	$ 373	$ 1,006	$ 1,379	$ 314	$ 952	$ 1,266	$ 113	8%
Cleveland Basement	$ 534	$ 1,107	$ 1,640	$ 391	$ 1,004	$ 1,396	$ 245	15%
Columbus slab	$ 334	$ 982	$ 1,315	$ 287	$ 934	$ 1,221	$ 95	7%
Columbus Basement	$ 475	$ 1,068	$ 1,542	$ 354	$ 981	$ 1,335	$ 207	13%
Cincinnati Slab	$ 312	$ 976	$ 1,288	$ 261	$ 921	$ 1,182	$ 107	8%
Cincinnati Basement	$ 445	$ 1,052	$ 1,497	$ 325	$ 964	$ 1,288	$ 209	14%

OHBA 1 to 2018 IECC

Table 11: Natural Gas Heat – PUCO OHBA1 to 18

Energy Use (ccf, kWh, MMBTU)								
Natural Gas Heat	2009 OHBA 1			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	804	7738	104.5	685	7969	93.8	10.7	10%
Cleveland Basement	1208	7840	144.1	863	8121	111.5	32.6	23%
Columbus slab	718	7706	96	623	7935	87.6	8.4	9%
Columbus Basement	1078	7784	131.2	777	8091	103	28.2	21%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 427	$ 817	$ 1,244	$ 364	$ 842	$ 1,205	$ 39	3%
Cleveland Basement	$ 641	$ 828	$ 1,469	$ 458	$ 858	$ 1,316	$ 154	10%
Columbus slab	$ 381	$ 814	$ 1,195	$ 331	$ 838	$ 1,169	$ 26	2%
Columbus Basement	$ 572	$ 822	$ 1,394	$ 413	$ 854	$ 1,267	$ 127	9%

Table 12: Electric Heat – PUCO OHBA1 to 18

Electric Heat	2009 OHBA 1			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	218	13909	68.7	213	13204	65.7	3	4%
Cleveland Basement	240	18540	86.6	233	15065	74	12.6	15%
Columbus slab	215	12906	64.9	210	12465	62.9	2	3%
Columbus Basement	237	16754	80.2	229	14061	70.2	10	12%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 116	$ 1,469	$ 1,585	$ 113	$1,394	$ 1,507	$ 77	5%
Cleveland Basement	$ 127	$ 1,958	$ 2,085	$ 124	$1,591	$ 1,715	$ 371	18%
Columbus slab	$ 114	$ 1,363	$ 1,477	$ 112	$1,316	$ 1,428	$ 49	3%
Columbus Basement	$ 126	$ 1,769	$ 1,895	$ 122	$1,485	$ 1,606	$ 289	15%

Table 13: 20% Electric, 80% Gas– PUCO OHBA1 to 18

Energy Use (ccf, kWh, MMBTU)								
Heating Fuel- 20% Electric, 80% Gas	2009 OHBA 1			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	686.8	8972.2	97.34	590.6	9016	88.18	9.16	9%
Cleveland Basement	1014.4	9980	132.6	737	9509.8	104	28.6	22%
Columbus slab	617.4	8746	89.78	540.4	8841	82.66	7.12	8%
Columbus Basement	909.8	9578	121	667.4	9285	96.44	24.56	20%
Energy Cost								
	ccf	kWh	2009 Cost	ccf	kWh	2018 Cost	Savings	%
Cleveland Slab	$ 365	$ 947	$ 1,312	$ 314	$ 952	$ 1,266	$ 46	4%
Cleveland Basement	$ 539	$ 1,054	$ 1,593	$ 391	$1,004	$ 1,396	$ 197	12%
Columbus slab	$ 328	$ 924	$ 1,251	$ 287	$ 934	$ 1,221	$ 31	2%
Columbus Basement	$ 483	$ 1,011	$ 1,495	$ 354	$ 981	$ 1,335	$ 160	11%

OHBA 2 to 2018 IECC

Table 14: Natural Gas Heat – PUCO OHBA2 to 18

Energy Use (ccf, kWh, MMBTU)								
Natural Gas Heat	2009 OHBA 2			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	799	7610	103.6	685	7969	93.8	9.8	9%
Cleveland Basement	1199	7730	142.9	863	8121	111.5	31.4	22%
Columbus slab	715	7577	95.3	623	7935	87.6	7.7	8%
Columbus Basement	1073	7676	130.3	777	8091	103	27.3	21%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 424	$ 804	$ 1,228	$ 364	$ 842	$1,205.29	$ 23	2%
Cleveland Basement	$ 637	$ 816	$ 1,453	$ 458	$ 858	$1,315.86	$ 137	9%
Columbus slab	$ 380	$ 800	$ 1,180	$ 331	$ 838	$1,168.78	$ 11	1%
Columbus Basement	$ 570	$ 811	$ 1,380	$ 413	$ 854	$1,267.02	$ 113	8%

Table 15: Electric Heat – PUCO OHBA2 to 18

Electric Heat	2009 OHBA 2			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	218	14025	69.1	213	13204	65.7	3.4	5%
Cleveland Basement	240	18373	86.1	233	15065	74	12.1	14%
Columbus slab	215	13034	65.3	210	12465	62.9	2.4	4%
Columbus Basement	237	16840	80.5	229	14061	70.2	10.3	13%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 116	$ 1,481	$ 1,597	$ 113	$ 1,394	$1,507.49	$ 89	6%
Cleveland Basement	$ 127	$ 1,940	$ 2,068	$ 124	$ 1,591	$1,714.64	$ 353	17%
Columbus slab	$ 114	$ 1,376	$ 1,491	$ 112	$ 1,316	$1,427.85	$ 63	4%
Columbus Basement	$ 126	$ 1,778	$ 1,904	$ 122	$ 1,485	$1,606.49	$ 298	16%

Table 16: 20% Electric, 80% Gas – PUCO OHBA2 to 18

Energy Use (ccf, kWh, MMBTU)								
Heating Fuel- 20% Electric, 80% Gas	2009 OHBA 2			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	682.8	8893	96.7	590.6	9016	88.18	8.52	9%
Cleveland Basement	1007.2	9858.6	131.54	737	9509.8	104	27.54	21%
Columbus slab	615	8668.4	89.3	540.4	8841	82.66	6.64	7%
Columbus Basement	905.8	9508.8	120.34	667.4	9285	96.44	23.9	20%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 363	$ 939	$ 1,302	$ 314	$ 952	$1,265.73	$ 36	3%
Cleveland Basement	$ 535	$ 1,041	$ 1,576	$ 391	$ 1,004	$1,395.61	$ 180	11%
Columbus slab	$ 327	$ 915	$ 1,242	$ 287	$ 934	$1,220.59	$ 21	2%
Columbus Basement	$ 481	$ 1,004	$ 1,485	$ 354	$ 981	$1,334.92	$ 150	10%

2009 IECC to 2018 IECC

Table 17: Natural Gas Heat – EIA 09 to 18

Energy Use (ccf, kWh, MMBTU)								
Natural Gas Heat	2009 IECC			2018 IECC			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MMBTU		
Cleveland Slab	824	8199	108.1	685	7969	93.8	14.3	13%
Cleveland Basement	1196	8366	144.8	863	8121	111.5	33.3	23%
Columbus slab	732	8179	99	623	7935	87.6	11.4	12%
Columbus Basement	1058	8318	131.1	777	8091	103	28.1	21%
Cincinnati Slab	683	8247	95.2	564	7967	81.6	13.6	14%
Cincinnati Basement	990	8353	125.8	709	8089	97.2	28.6	23%
	Energy Cost							
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 912	$ 939	$ 1,851	$ 758	$ 913	$ 1,671	$ 180	10%
Cleveland Basement	$ 1,323	$ 958	$ 2,282	$ 955	$ 930	$ 1,885	$ 397	17%
Columbus slab	$ 810	$ 937	$ 1,747	$ 689	$ 909	$ 1,599	$ 149	9%
Columbus Basement	$ 1,171	$ 953	$ 2,124	$ 860	$ 927	$ 1,787	$ 337	16%
Cincinnati Slab	$ 756	$ 945	$ 1,701	$ 624	$ 913	$ 1,537	$ 164	10%
Cincinnati Basement	$ 1,096	$ 957	$ 2,053	$ 785	$ 927	$ 1,711	$ 341	17%

Table 18: Electric Heat - EIA 09 to 18

Energy Use (ccf, kWh, MMBTU)								
Electric Heat			2009			2018		
	ccf	kWh	MMBTU	ccf	kWh	MBTU	Savings	%
Cleveland Slab	218	14825	71.8	213	13204	65.7	6.1	8%
Cleveland Basement	240	18934	88	233	15065	74	14	16%
Columbus slab	215	13760	67.8	210	12465	62.9	4.9	7%
Columbus Basement	237	17271	81.9	229	14061	70.2	11.7	14%
Cincinnati Slab	206	13237	65.5	202	11723	59.8	5.7	9%
Cincinnati Basement	227	16407	78.3	220	13263	66.9	11.4	15%
	Energy Cost							
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 241	$ 1,699	$ 1,940	$ 236	$ 1,513	$ 1,748	$ 191	10%
Cleveland Basement	$ 266	$ 2,169	$ 2,435	$ 258	$ 1,726	$ 1,984	$ 451	19%
Columbus slab	$ 238	$ 1,576	$ 1,814	$ 232	$ 1,428	$ 1,661	$ 154	8%
Columbus Basement	$ 262	$ 1,979	$ 2,241	$ 253	$ 1,611	$ 1,864	$ 377	17%
Cincinnati Slab	$ 228	$ 1,517	$ 1,745	$ 224	$ 1,343	$ 1,567	$ 178	10%
Cincinnati Basement	$ 251	$ 1,880	$ 2,131	$ 243	$ 1,520	$ 1,763	$ 368	17%

Table 19: 20% Electric, 80% Gas- EIA 09 to 18

Energy Use (ccf, kWh, MMBTU)								
Heating Fuel- 20% Electric, 80% Gas	2009			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	702.8	9524.2	100.84	590.6	9016	88.18	12.66	13%
Cleveland Basement	1004.8	10479.6	133.44	737	9509.8	104	29.44	22%
Columbus slab	628.6	9295.2	92.76	540.4	8841	82.66	10.1	11%
Columbus Basement	893.8	10108.6	121.26	667.4	9285	96.44	24.82	20%
Cincinnati Slab	587.6	9245	89.26	491.6	8718.2	77.24	12.02	13%
Cincinnati Basement	837.4	9963.8	116.3	611.2	9123.8	91.14	25.16	22%
	Energy Cost $							
	ccf	kWh	2009 Cost	ccf	kWh	2018 Cost	Savings	%
Cleveland Slab	$ 778	$ 1,091	$ 1,869	$ 654	$ 1,033	$ 1,687	$ 182	10%
Cleveland Basement	$ 1,112	$ 1,201	$ 2,313	$ 816	$ 1,090	$ 1,905	$ 407	18%
Columbus slab	$ 696	$ 1,065	$ 1,761	$ 598	$ 1,013	$ 1,611	$ 150	8%
Columbus Basement	$ 989	$ 1,158	$ 2,147	$ 739	$ 1,064	$ 1,802	$ 345	16%
Cincinnati Slab	$ 650	$ 1,059	$ 1,709	$ 544	$ 999	$ 1,543	$ 167	10%
Cincinnati Basement	$ 927	$ 1,142	$ 2,068	$ 676	$ 1,045	$ 1,722	$ 347	17%

OHBA 1 to 2018 IECC

Table 20: Natural Gas Heat - EIA OHBA 1 to 18

Energy Use (ccf, kWh, MMBTU)								
Natural Gas Heat	2009 OHBA 1			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	804	7738	104.5	685	7969	93.8	10.7	10%
Cleveland Basement	1208	7840	144.1	863	8121	111.5	32.6	23%
Columbus slab	718	7706	96	623	7935	87.6	8.4	9%
Columbus Basement	1078	7784	131.2	777	8091	103	28.2	21%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 890	$ 887	$ 1,776	$ 758	$ 913	$ 1,671	$ 105	6%
Cleveland Basement	$ 1,337	$ 898	$ 2,235	$ 955	$ 930	$ 1,885	$ 350	16%
Columbus slab	$ 795	$ 883	$ 1,677	$ 689	$ 909	$ 1,599	$ 79	5%
Columbus Basement	$ 1,193	$ 892	$ 2,085	$ 860	$ 927	$ 1,787	$ 298	14%

Table 21: Electric Heat - EIA OHBA 1 to 18

Electric Heat	2009 OHBA 1			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	218	13909	68.7	213	13204	65.7	3	4%
Cleveland Basement	240	18540	86.6	233	15065	74	12.6	15%
Columbus slab	215	12906	64.9	210	12465	62.9	2	3%
Columbus Basement	237	16754	80.2	229	14061	70.2	10	12%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 241	$ 1,594	$ 1,835	$ 236	$1,513	$ 1,748	$ 86	5%
Cleveland Basement	$ 266	$ 2,124	$ 2,390	$ 258	$1,726	$ 1,984	$ 406	17%
Columbus slab	$ 238	$ 1,479	$ 1,717	$ 232	$1,428	$ 1,661	$ 56	3%
Columbus Basement	$ 262	$ 1,920	$ 2,182	$ 253	$1,611	$ 1,864	$ 317	15%

Table 22: 20% Electric, 80% Gas- EIA OHBA 1 to 18

Energy Use (ccf, kWh, MMBTU)								
Heating Fuel- 20% Electric, 80% Gas	2009 OHBA 1			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	686.8	8972.2	97.34	590.6	9016	88.18	9.16	9%
Cleveland Basement	1014.4	9980	132.6	737	9509.8	104	28.6	22%
Columbus slab	617.4	8746	89.78	540.4	8841	82.66	7.12	8%
Columbus Basement	909.8	9578	121	667.4	9285	96.44	24.56	20%
Energy Cost								
	ccf	kWh	2009 Cost	ccf	kWh	2018 Cost	Savings	%
Cleveland Slab	$ 760	$ 1,028	$ 1,788	$ 654	$1,033	$ 1,687	$ 101	6%
Cleveland Basement	$ 1,123	$ 1,143	$ 2,266	$ 816	$1,090	$ 1,905	$ 361	16%
Columbus slab	$ 683	$ 1,002	$ 1,685	$ 598	$1,013	$ 1,611	$ 74	4%
Columbus Basement	$ 1,007	$ 1,097	$ 2,104	$ 739	$1,064	$ 1,802	$ 302	14%

OHBA 2 to 2018 IECC

Table 23: Natural Gas Heat- EIA OHBA 2 to 18

Energy Use (ccf, kWh, MMBTU)								
Natural Gas Heat	2009 OHBA 2			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	799	7610	103.6	685	7969	93.8	9.8	9%
Cleveland Basement	1199	7730	142.9	863	8121	111.5	31.4	22%
Columbus slab	715	7577	95.3	623	7935	87.6	7.7	8%
Columbus Basement	1073	7676	130.3	777	8091	103	27.3	21%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 884	$ 872	$ 1,756	$ 758	$ 913	$1,671.03	$ 85	5%
Cleveland Basement	$ 1,327	$ 886	$ 2,212	$ 955	$ 930	$1,885.42	$ 327	15%
Columbus slab	$ 791	$ 868	$ 1,659	$ 689	$ 909	$1,598.52	$ 61	4%
Columbus Basement	$ 1,187	$ 879	$ 2,067	$ 860	$ 927	$1,786.81	$ 280	14%

Table 24: Electric Heat - EIA OHBA 2 to 18

Electric Heat	2009 OHBA 2			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	218	14025	69.1	213	13204	65.7	3.4	5%
Cleveland Basement	240	18373	86.1	233	15065	74	12.1	14%
Columbus slab	215	13034	65.3	210	12465	62.9	2.4	4%
Columbus Basement	237	16840	80.5	229	14061	70.2	10.3	13%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 241	$ 1,607	$ 1,848	$ 236	$ 1,513	$1,748.49	$ 100	5%
Cleveland Basement	$ 266	$ 2,105	$ 2,371	$ 258	$ 1,726	$1,983.83	$ 387	16%
Columbus slab	$ 238	$ 1,493	$ 1,731	$ 232	$ 1,428	$1,660.50	$ 71	4%
Columbus Basement	$ 262	$ 1,929	$ 2,192	$ 253	$ 1,611	$1,864.38	$ 327	15%

Table 25: 20% Electric, 80% Gas- EIA OHBA 2 to 18

Energy Use (ccf, kWh, MMBTU)								
Heating Fuel- 20% Electric, 80% Gas	2009 OHBA 2			2018			Savings	%
	ccf	kWh	MMBTU	ccf	kWh	MBTU		
Cleveland Slab	682.8	8893	96.7	590.6	9016	88.18	8.52	9%
Cleveland Basement	1007.2	9858.6	131.54	737	9509.8	104	27.54	21%
Columbus slab	615	8668.4	89.3	540.4	8841	82.66	6.64	7%
Columbus Basement	905.8	9508.8	120.34	667.4	9285	96.44	23.9	20%
Energy Cost								
	ccf	kWh	2009	ccf	kWh	2018	Savings	%
Cleveland Slab	$ 756	$ 1,019	$ 1,774	$ 654	$ 1,033	$1,686.52	$ 88	5%
Cleveland Basement	$ 1,115	$ 1,129	$ 2,244	$ 816	$ 1,090	$1,905.10	$ 339	15%
Columbus slab	$ 681	$ 993	$ 1,674	$ 598	$ 1,013	$1,610.92	$ 63	4%
Columbus Basement	$ 1,002	$ 1,089	$ 2,092	$ 739	$ 1,064	$1,802.33	$ 289	14%

Appendix

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Property/Builder Information

Building Name	OH 2018 IECC
Owner's Name	Builder 1
Property Address	
City, St, Zip	Cleveland, OH
Phone Number	
Builder's Name	
Phone Number	
Email Address	
Plan/Model Name	
Community/Development	
Permit Date/Number	

Organization Information

Organization Name	MEEA
Address	
City, St, Zip	,
Phone Number	
Website	
Verifier's Name	
Verifier's Email	

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

General Building Information

Area of Conditioned. Space(sq ft)	1800
Volume of Conditioned. Space	14400
Year Built	2017
Housing Type	Single-family detached
Level Type(Apartments Only)	None
Floors on or Above-Grade	1
Number of Bedrooms	3
Foundation Type	Slab
Enclosed Crawl Space Type	N/A
Number of Stories Including Conditioned Basement	1
Thermal Boundary Location	N/A

Slab Floor Information

Name	Library Entry	Area(sq ft)	Depth Below Grade(ft)	Full Perimeter(ft)	Exposed Perimeter(ft)	On-Grade Perimeter(ft)
Slab	R-10 Perimter****	1800	0.0	172	172	172

Slab Floor Library List

Slab Floor: R-10 Perimter****

Slab Covering	Carpet
Perimeter Insulation (R-Value)	10.0
Perimeter Insulation Depth (ft)	2.0
Under-Slab Insulation (R-Value)	0.0
Under-Slab Insulation Width (ft)	0.0
Slab Insulation Grade	1
Radiant Slab	No
Note	

Above-Grade Wall

Name	Library Entry	Location	Exterior Color	Area(sq ft)	Uo Value
North	R-20****	Cond -> ambient	Light	400.00	0.060
South	R-20****	Cond -> ambient	Light	400.00	0.060
East	R-20****	Cond -> ambient	Light	88.00	0.060
East G	R-20****	Cond -> garage	Medium	200.00	0.060

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Above-Grade Wall

Name	Library Entry	Location	Exterior Color	Area(sq ft)	Uo Value
West	R-20****	Cond -> ambient	Light	288.00	0.060

Above-Grade Wall Library List

Above-Grade Wall: R-20****

Information From Quick Fill Screen

Wall Construction Type	Standard Wood Frame
Continuous Insulation (R-Value)	0.0
Frame Cavity Insulation (R-Value)	20.0
Frame Cavity Insulation Thickness (in)	5.5
Frame Cavity Insulation Grade	1
Stud Size (w x d, in)	1.5 x 5.5
Stud Spacing (in o.c.)	16.0
Framing Factor - (default)	0.2300
Gypsum Thickness (in)	0.5
Note	

Window Information

						Overhang			Interior		Adjacent	
Name	Wall Assignment	Orient	U-Value	SHGC	Area (sqft)	Depth (ft)	To Top (ft)	To Btm (ft)	Winter Shading	Summer Shading	Winter Shading	Summer Shading
North	AGWall 1	North	0.300	0.450	75.00	2.0	2.0	5.5	0.85	0.70	Some	Some
South	AGWall 2	South	0.300	0.450	60.00	2.0	2.0	5.5	0.85	0.70	Some	Some
West	AGWall 5	West	0.300	0.450	45.00	2.0	2.0	5.5	0.85	0.70	None	None

Door Information

Name	Library Entry	Wall Assignment	Opaque Area(sq ft)	Uo Value	R-Value of Opaque Area	Storm Door
South Door	2-1/4 Wd solid r-3.3*****	AGWall 2	20.4	0.234	3.3	No
East Door	2-1/4 Wd solid r-3.3*****	AGWall 4	20.4	0.234	3.3	No

Roof Information

Name	Library Entry	Ceiling Area(sq ft)	Roof Area(sq ft)	Exterior Color	Radiant Barrier	Type	Uo Value	Cement or Clay Tiles	Roof Tile Ventilation

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Roof Information

Name	Library Entry	Ceiling Area(sq ft)	Roof Area(sq ft)	Exterior Color	Radiant Barrier	Type	Uo Value	Cement or Clay Tiles	Roof Tile Ventilation
Ceiling	R-49 Blown, Attic****	1800.00	2250.00	Medium	No	Attic	0.020	No	No

Roof Library List

Ceiling: R-49 Blown, Attic****

Information From Quick Fill Screen	
Continous Insulation (R-Value)	36.0
Cavity Insulation (R-Value)	13.0
Cavity Insulation Thickness (in)	3.5
Cavity Insulation Grade	1
Gypsum Thickness (in)	0.500
Insulated Framing Size(w x h, in)	1.5 x 3.5
Insulated Framing Spacing (in o.c.)	24.0
Framing Factor - (default)	0.1100
Ceiling Type	Attic
Note	

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Mechanical Equipment

Number of Mechanical Systems	3
Heating SetPoint(F)	70.0
Heating Setback Thermostat	Present
Cooling SetPoint(F)	78.0
Cooling Setup Thermostat	Present
DHW SetPoint(F)	125.0

Heat: 80AFUE Gas Furn 64k

SystemType	Fuel-fired air distribution
Fuel Type	Natural gas
Rated Output Capacity (kBtuh)	64.0
Seasonal Equipment Efficiency	80.0 AFUE
Auxiliary Electric	776 Eae
Note	
Number Of Units	1
Location	Conditioned area
Performance Adjustment	100
Percent Load Served	100

DHW: 30 gal. 0.57EF Gas

Water Heater Type	Conventional
Fuel Type	Natural gas
Energy Factor	0.57
Recovery Efficiency	0.76
Water Tank Size (gallons)	30
Extra Tank Insulation (R-Value)	0.0
Note	
Number Of Units	1
Location	Conditioned area
Performance Adjustment	100
Percent Load Served	100

Cool: 13SEER A/C 3 ton

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Mechanical Equipment

System Type	Air conditioner
Fuel Type	Electric
Rated Output Capacity (kBtuh)	36.0
Seasonal Equipment Efficiency	13.0 SEER
Sensible Heat Fraction (SHF)	0.70
Note	
Number Of Units	1
Location	Ambient
Performance Adjustment	100
Percent Load Served	100

DHW Efficiencies

All bath faucets & showers <= 2gpm	false
All DHW pipes fully insulated >= R-3	true
Recirculation type	None (standard system)
Farthest fixture to DHW heater	69
TOTAL Pipelength for longest DHW run	79
DWHR unit present?	false
DHW Diagnostics	
dhwGpd	48.80
peRatio	0.83
dishwasherGpd	4.32
clothesWasherHotWaterGPD	3.89
EDeff	0.96
ewaste	25.19
tmains	56.60
dwhrWhInletTempAdj	0.00
pumpConsKwh	0.00
pumpConsMmbtu	0.00

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Duct Systems

Name	Ducts
Conditioned Floor Area(sq ft)	1800.0
# of Returns	6
Heating System	80AFUE Gas Furn 64k
Cooling System	13SEER A/C 3 ton
Supply Duct Surface Area(sq ft)	486.0
Return Duct Surface Area(sq ft)	450.0
Duct Leakage	
Qualitative Assessment	Not Applicable
Duct Leakage to Outside	
Supply+Return	72.00 CFM @ 25 Pascals
Supply Only	Not Applicable
Return Only	Not Applicable
Total Duct Leakage	72.00 CFM @ 25 Pascals
Duct Tightness Test	Postconstruction Test

Type	Location	Percent Location	R-Value
Supply	Conditioned space	50.0	0.0
	Attic, exposed	50.0	8.0
Return	Conditioned space	50.0	0.0
	Attic, exposed	50.0	6.0

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Infiltration and Mechanical Ventilation

Whole House Infiltration	
Measurement Type	Blower door test
Heating Season Infiltration Value	3.00 ACH @ 50 Pascals
Cooling Season Infiltration Value	3.00 ACH @ 50 Pascals
Shelter Class	4
Code Verification	Tested
Mechanical Ventilation for IAQ	
Type	Exhaust Only
Rate(cfm)	48
Sensible Recovery Efficiency(%)	0.00
Total Recovery Efficiency(%)	0.00
Hours per Day	24.0
Fan Power (watts)	67.20
ECM Fan Motor	false
Ventilation Strategy for Cooling	
Cooling Season Ventilation	No Ventilation

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC
CLeveland Slab 2018
Prescriptive.blg

Organization
MEEA

Builder

Lights and Appliances

Rating/RESNET audit	
Ceiling Fan CFM / Watt	70.40
Refrigerator kWh/yr	691
Refrigerator Location	Conditioned
Range/Oven Fuel Type	Natural gas
Induction Range	No
Convection Oven	No
Dishwasher	
Energy Factor	0.46
Dishwasher kWh/yr	0
Place Setting Capacity	12
Clothes Dryer	
Fuel Type	Electric
Location	Conditioned
Moisture Sensing	No
CEF	2.62
Clothes Washer	
Location	Conditioned
LER (kWh/yr)	704
IMEF	0.331
Capacity (CU.Ft)	2.874
Electricity Rate	0.08
Gas Rate	0.58
Annual Gas Cost	23.00
Qualifying Light Fixtures	
Interior CFLs %	90.0
Interior Fluorescent %	0.0
Exterior Lights %	0.0
Garage Lights %	0.0

CZ 4 - 1 Story Home

Basement Walls			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	172.00	172.00	8.00		$	-
Total Basement Wall Insulation						**$**	**-**

Above Grade Wall Framing			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x416x3	32.25	33.00	1.00	9.31	$	307.23
Studs	2x4x8	189.20	190.00	1.00	3.78	$	718.20
Openings	5 studs per	14	5		3.78	$	264.60
Ext Jams		14	1			$	-
Total Exterior Wall Framing						**$**	**1,290.03**

Exterior Wall Insulation			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		172.00	8.00	1.00		1376.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	12	15				-180.00
Total Sq Ft.						1154.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1154	$ 0.65		$	750.10
Total Exterior Wall Insulation					**$**	**750.10**

Ceiling Insulation			**Square Feet**		**1800.00**
Item	Description	Sq Ft	Unit Cost	Price W/ Tax	
Blown Insulation	R-38	####	$ 0.90	$	1,620.00
Total Ceiling Insulation				**$**	**1,620.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		50%	7.5	$ 1.63	$	12.23
LED Bulbs	LED	50%	7.5	$ 2.61	$	19.58
Total					**$**	**31.80**

Bath Fan	Description	Fans	Unit Cost		
	80 CFM Single Speed	1	$ 87.14	**$**	**87.14**

2009 IECC

Component	Description	Cost	Sources
Basement Insulation	R-10	$ -	OHBA
AGW Framing	2x4	$ 1,290.03	OHBA
Insulation	R-13	$ 750.10	OHBA
Ceiling Insulation	R-38	$ 1,620.00	OHBA
Blower Door Test	No		Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	No	$ 87.14	Home Depot
Efficient Lighting	50%	$ 31.80	Home Depot
Duct Sealing/Returns	No		Home Innovation Research Labs
Total Cost		**$ 3,979.07**	

Description	2009 IECC
Slabs	R-10/2ft
Above Grade Walls	R-13
Ceilings	R-38
ACH50	7
Blower Door Test	No
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	50%

CZ 4 - 1 Story Home **2018 IECC**

Basement Walls			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	172.00	172.00	8.00	0.92	$	1,271.42
Total Basement Wall Insulation						**$**	**1,271.42**

Above Grade Wall Framing			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x6x16x3	32.25	33.00	1.00	13.41	$	442.53
Studs (24" OC)	2x6x8	133.00	133.00	1.00	5.89	$	783.37
Openings	5 studs per	14	5		5.89	$	412.30
Ext Jams		14	1		25	$	350.00
Total Exterior Wall Framing						**$**	**1,988.20**

Exterior Wall Insulation			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		172.00	8.00	1.00		1376.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	12	15				-180.00
Total Sq Ft.						1154.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1154	$ 0.86		$	992.44
Total Exterior Wall Insulation					**$**	**992.44**

Ceiling Insulation			**Square Feet**		**1800.00**
Item	Description	Sq Ft	Unit Cost	Price W/ Tax	
Blown Insulation	R-49	1800.00	$ 1.15	$	2,070.00
Total Ceiling Insulation				**$**	**2,070.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		10%	1.5	$ 1.63	$	2.45
LED Bulbs	LED	90%	13.5	$ 2.61	$	35.24
Total					**$**	**37.68**

Bath Fan	Description	Fans	Unit Cost		
Broan Ultra Green	80 CFM Multi Speed	1	$146.16	**$**	**146.16**

Duct Sealing/Return	Description	Sq Ft	Unit Cost		
Building America	12 to 4 CFM	1800	0.225	**$**	**405.00**

Component	Description	Cost	Sources
Basement Insulation	R-10	$ 1,271.42	OHBA
AGW Framing (24" OC)	2x6	$ 1,988.20	OHBA
Insulation	R-21	$ 992.44	OHBA
Ceiling Insulation	R-49	$ 2,070.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	Yes	$ 146.16	Home Depot
Efficient Lighting	90%	$ 37.68	Home Depot
Duct Sealing/Returns	Yes	$ 405.00	Home Innovation Research Labs
Total Cost		**$ 7,310.90**	

Description	2018 IECC
Slabs	R-10/2ft
Basement Walls	R-10
Above Grade Walls	R-20
Ceilings	R-49
ACH50	3
Blower Door Test	Yes
Mechanical Ventilation	Yes
Duct Sealing/Returns	Yes
Efficient Lighting	90%

CZ 5 - 1 Story Home

Basement Walls			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	172.00	172.00	8.00	0.92	$	1,271.42
Total Basement Wall Insulation						**$**	**1,271.42**

Above Grade Wall Framing			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x6x16x3	32.25	33.00	1.00	13.41	$	442.53
Studs (24" OC)	2x6x8	133.00	133.00	1.00	5.89	$	783.37
Openings	5 studs per	14	5		5.89	$	412.30
Ext Jams		14	1		25	$	350.00
Total Exterior Wall Framing						**$**	**1,988.20**

Exterior Wall Insulation			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		172.00	8.00	1.00		1376.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	12	15				-180.00
Total Sq Ft.						1154.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1154	$ 0.86		$	992.44
Total Exterior Wall Insulation					**$**	**992.44**

Ceiling Insulation			**Square Feet**			**1800.00**
Item	Description	Sq Ft		Unit Cost	Price W/ Tax	
Blown Insulation	R-38	1800.00		$ 0.90	$	1,620.00
Total Ceiling Insulation					**$**	**1,620.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		50%	7.5	$ 1.63	$	12.23
LED Bulbs	LED	50%	7.5	$ 2.61	$	19.58
Total					**$**	**31.80**

Bath Fan	Description	Fans	Unit Cost		
Broan Ultra Green	80 CFM Multi Speed	1	$ 87.14	**$**	**87.14**

2009 IECC

Component	Description	Cost	Sources
Basement Insulation	R-10	$ 1,271.42	OHBA
AGW Framing (24" OC)	2x6	$ 1,988.20	OHBA
Insulation	R-21	$ 992.44	OHBA
Ceiling Insulation	R-38	$ 1,620.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	No	$ 87.14	Home Depot
Efficient Lighting	50%	$ 31.80	Home Depot
Duct Sealing/Returns	No		Home Innovation Research Labs
Total Cost		**$ 6,391.00**	

Description	2009 IECC
Slabs	R-10/2ft
Basement Walls	R-10
Above Grade Walls	R-20
Ceilings	R-38
ACH50	7
Blower Door Test	No
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	50%

CZ 5 - 1 Story Home

Basement Walls			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	172.00	172.00	8.00		$	-
Total Basement Wall Insulation						**$**	**-**

Above Grade Wall Framing			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x6x16x3	32.25	33.00	1.00	9.31	$	307.23
Studs (24" OC)	2x6x8	189.20	190.00	1.00	3.78	$	718.20
Openings	5 studs per	14	5		3.78	$	264.60
Ext Jams		14	1			$	-
Total Exterior Wall Framing						**$**	**1,290.03**

Exterior Wall Insulation			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		172.00	8.00	1.00		1376.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	12	15				-180.00
Total Sq Ft.						1154.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1154	$ 0.77		$	888.58
Total Exterior Wall Insulation					**$**	**888.58**

Ceiling Insulation			**Square Feet**		**1800.00**
Item	Description	Sq Ft	Unit Cost	Price W/ Tax	
Blown Insulation	R-49	1800.00	$ 1.15	$	2,070.00
Total Ceiling Insulation				**$**	**2,070.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		25%	3.75	$ 1.63	$	6.11
LED Bulbs	LED	75%	11.25	$ 2.61	$	29.36
Total					**$**	**35.48**

Bath Fan	Description	Fans	Unit Cost		
Broan Ultra Green	80 CFM Multi Speed	1	$ 87.14	**$**	**87.14**

Duct Sealing/Return	Description	Sq Ft	Unit Cost		
Building America	12 to 4 CFM	1800		**$**	**-**

OHBA 1

Component	Description	Cost	Sources
Basement Insulation	R-10	$ -	OHBA
AGW Framing	2x4	$ 1,290.03	OHBA
Insulation	R-15	$ 888.58	OHBA
Ceiling Insulation	R-49	$ 2,070.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	no	$ 87.14	Home Depot
Efficient Lighting	75%	$ 35.48	Home Depot
Duct Sealing/Returns	No	$ -	Home Innovation Research Labs
Total Cost		**$ 4,771.23**	

Description	**OHBA 1**
Slabs	R-10/2ft
Above Grade Walls	R-15
Ceilings	R-49
ACH50	6
Blower Door Test	Yes
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	75%

CZ 5 - 1 Story Home

Basement Walls			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	172.00	172.00	8.00		$	-
Total Basement Wall Insulation						**$**	**-**

Above Grade Wall Framing			**Lineal Feet**				**172.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x6x16x3	32.25	33.00	1.00	9.31	$	307.23
Studs (24" OC)	2x6x8	189.20	190.00	1.00	3.78	$	718.20
Openings	5 studs per	14	5		3.78	$	264.60
Ext Jams		14	1			$	-
Total Exterior Wall Framing						**$**	**1,290.03**

Exterior Wall Insulation			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		172.00	8.00	1.00		1376.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	12	15				-180.00
Total Sq Ft.						1154.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1154	$ 0.65		$	750.10
Total Exterior Wall Insulation					**$**	**750.10**

Ceiling Insulation			**Square Feet**		**1800.00**
Item	Description	Sq Ft	Unit Cost	Price W/ Tax	
Blown Insulation	R-49	1800.00	$ 1.15	$	2,070.00
Total Ceiling Insulation				**$**	**2,070.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		25%	3.75	$ 1.63	$	6.11
LED Bulbs	LED	75%	11.25	$ 2.61	$	29.36
Total					**$**	**35.48**

Bath Fan	Description	Fans	Unit Cost		
Broan Ultra Green	80 CFM Multi Speed	1	$ 87.14	**$**	**87.14**

Duct Sealing/Return	Description	Sq Ft	Unit Cost		
Building America	12 to 4 CFM	1800		**$**	**-**

OHBA 2

Component	Description	Cost	Sources
Basement Insulation	R-10	$ -	OHBA
AGW Framing	2x4	$ 1,290.03	OHBA
Insulation	R-13	$ 750.10	OHBA
Ceiling Insulation	R-49	$ 2,070.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	no	$ 87.14	Home Depot
Efficient Lighting	75%	$ 35.48	Home Depot
Duct Sealing/Returns	No	$ -	Home Innovation Research Labs
Total Cost		**$ 4,632.75**	

Description	OHBA 2
Slabs	R-10/2ft
Basement Walls	R-10/4ft
Above Grade Walls	R-13
Ceilings	R-49
ACH50	6
Blower Door Test	Yes
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	75%

CZ 5 - 1 Story Home **2018 IECC**

Basement Walls			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax
R-15 Ext.	Rigid Foam	172.00	172.00	8.00	1.35	$ 1,857.60
Total Basement Wall Insulation						**$ 1,857.60**

Above Grade Wall Framing			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax
Plates	2x6x16x3	32.25	33.00	1.00	13.41	$ 442.53
Studs (24" OC)	2x6x8	133.00	133.00	1.00	5.89	$ 783.37
Openings	5 studs per	14	5		5.89	$ 412.30
Ext Jams		14	1		25	$ 350.00
Total Exterior Wall Framing						**$ 1,988.20**

Exterior Wall Insulation			**Lineal Feet**			**172.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		172.00	8.00	1.00		1376.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	12	15				-180.00
Total Sq Ft.						1154.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1154	$ 0.86		$	992.44
Total Exterior Wall Insulation					**$**	**992.44**

Ceiling Insulation			**Square Feet**		**1800.00**
Item	Description	Sq Ft	Unit Cost	Price W/ Tax	
Blown Insulation	R-49	1800.00	$ 1.15	$ 2,070.00	
Total Ceiling Insulation				**$**	**2,070.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost	15
Incandescent		10%	1.5	$ 1.63	$ 2.45
LED Bulbs	LED	90%	13.5	$ 2.61	$ 35.24
Total					**$ 37.68**

Bath Fan	Description	Fans	Unit Cost	
Broan Ultra Green	80 CFM Multi Speed	1	$ 146.16	**$ 146.16**

Duct Sealing/Return	Description	Sq Ft	Unit Cost	
Building America	12 to 4 CFM	1800	0.225	**$ 405.00**

Component	Description	Cost	Sources
Basement Insulation	R-10	$ 1,857.60	OHBA
AGW Framing (24" OC)	2x6	$ 1,988.20	OHBA
Insulation	R-21	$ 992.44	OHBA
Ceiling Insulation	R-49	$ 2,070.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	Yes	$ 146.16	Home Depot
Efficient Lighting	50%	$ 37.68	Home Depot
Duct Sealing/Returns	Yes	$ 405.00	Home Innovation Labs
Total Cost		**$ 7,897.08**	

Description	2018 IECC
Slabs	R-10/2ft
Basement Walls	R-15
Above Grade Walls	R-20
Ceilings	R-49
ACH50	3
Blower Door Test	Yes
Mechanical Ventilation	Yes
Duct Sealing/Returns	Yes
Efficient Lighting	90%

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Property/Builder Information

Building Name	OH 2018 IECC basement
Owner's Name	Builder 1
Property Address	
City, St, Zip	Cleveland, OH
Phone Number	
Builder's Name	
Phone Number	
Email Address	
Plan/Model Name	
Community/Development	
Permit Date/Number	

Organization Information

Organization Name	MEEA
Address	
City, St, Zip	,
Phone Number	
Website	
Verifier's Name	
Verifier's Email	

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

General Building Information

Area of Conditioned. Space(sq ft)	1800
Volume of Conditioned. Space	23211
Year Built	2017
Housing Type	Single-family detached
Level Type(Apartments Only)	None
Floors on or Above-Grade	2
Number of Bedrooms	3
Foundation Type	Conditioned basement
Enclosed Crawl Space Type	N/A
Number of Stories Including Conditioned Basement	3
Thermal Boundary Location	N/A

Foundation Wall Information

Name	Library Entry	Location	Length(ft)	Total Height(ft)	Depth Below Grade(ft)	Height Above Grade(ft)	Uo Value Combo*	Uo Value (wall only)
North	R-15 Draped, Full****	Cond->ambient/grr	36.0	8.0	7.0	1.0	0.045	0.065
South	R-15 Draped, Full****	Cond->ambient/grr	36.0	8.0	7.0	1.0	0.045	0.065
West	R-15 Draped, Full****	Cond->ambient/grr	25.0	8.0	7.0	1.0	0.045	0.065
East	R-15 Draped, Full****	Cond->ambient/grr	25.0	8.0	7.0	1.0	0.045	0.065

* Uo Value Combo combines wall, airfilm, and soil path

Foundation Wall Library List

Foundation Wall: R-15 Draped, Full****

Type	Solid concrete or stone
Thickness(in)	6.0
Studs	None
Interior Insulation	
Continuous R-Value	15.0
Frame Cavity R-Value	0.0
Cavity Insulation Grade	1

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Foundation Wall Library List

Ins top	0.0 ft from top of wall
Ins Bottom	0.0 ft from bottom of wall
Exterior Insulation	
R-Value	0.0
Ins top	0.0 ft from top of wall
Ins bottom	0.0 ft below grade
Note	

Slab Floor Information

Name	Library Entry	Area(sq ft)	Depth Below Grade(ft)	Full Perimeter(ft)	Exposed Perimeter(ft)	On-Grade Perimeter(ft)
Slab	Uninsulated	900	7.0	122	122	0

Slab Floor Library List

Slab Floor: Uninsulated

Slab Covering	Carpet
Perimeter Insulation (R-Value)	0.0
Perimeter Insulation Depth (ft)	0.0
Under-Slab Insulation (R-Value)	0.0
Under-Slab Insulation Width (ft)	0.0
Slab Insulation Grade	1
Radiant Slab	No
Note	

Rim and Band Joist Information

Name	Location	Area(sq ft)	Continuous Ins	Framed Cavity Ins	Cavity Ins Thk(in)	Joist Spacing	Insulation Grade	Uo Value
North	Cond -> ambient	129.00	0.0	20.0	5.5	16.0	1	0.049
South	Cond -> ambient	129.00	0.0	20.0	5.5	16.0	1	0.049
East	Cond -> ambient	89.50	0.0	20.0	5.5	16.0	1	0.049
West	Cond -> ambient	89.50	0.0	20.0	5.5	16.0	1	0.049

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Above-Grade Wall

Name	Library Entry	Location	Exterior Color	Area(sq ft)	Uo Value
North	R-20****	Cond -> ambient	Light	576.00	0.060
South	R-20****	Cond -> ambient	Light	576.00	0.060
East	R-20****	Cond -> ambient	Light	200.00	0.060
East G	R-20****	Cond -> garage	Medium	200.00	0.060
West	R-20****	Cond -> ambient	Light	400.00	0.060

Above-Grade Wall Library List

Above-Grade Wall: R-20****

Information From Quick Fill Screen

Wall Construction Type	Standard Wood Frame
Continuous Insulation (R-Value)	0.0
Frame Cavity Insulation (R-Value)	20.0
Frame Cavity Insulation Thickness (in)	5.5
Frame Cavity Insulation Grade	1
Stud Size (w x d, in)	1.5 x 5.5
Stud Spacing (in o.c.)	16.0
Framing Factor - (default)	0.2300
Gypsum Thickness (in)	0.5
Note	

Window Information

						Overhang			Interior		Adjacent	
Name	Wall Assignment	Orient	U-Value	SHGC	Area (sqft)	Depth (ft)	To Top (ft)	To Btm (ft)	Winter Shading	Summer Shading	Winter Shading	Summer Shading
North	AGWall 1	North	0.300	0.450	120.00	2.0	2.0	5.5	0.85	0.70	Some	Some
South	AGWall 2	South	0.300	0.450	135.00	2.0	2.0	5.5	0.85	0.70	Some	Some
West	AGWall 5	West	0.300	0.450	60.00	2.0	2.0	5.5	0.85	0.70	None	None

Door Information

Name	Library Entry	Wall Assignment	Opaque Area(sq ft)	Uo Value	R-Value of Opaque Area	Storm Door
South Door	Steel-urth w/brk****	AGWall 2	20.4	0.234	3.3	No
East Door	Steel-urth w/brk****	AGWall 4	20.4	0.234	3.3	No

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Roof Information

Name	Library Entry	Ceiling Area(sq ft)	Roof Area(sq ft)	Exterior Color	Radiant Barrier	Type	Uo Value	Cement or Clay Tiles	Roof Tile Ventilation
Ceiling	R-49 Blown, Attic****	900.00	1125.00	Medium	No	Attic	0.020	No	No

Roof Library List

Ceiling: R-49 Blown, Attic****

Information From Quick Fill Screen	
Continous Insulation (R-Value)	36.0
Cavity Insulation (R-Value)	13.0
Cavity Insulation Thickness (in)	3.5
Cavity Insulation Grade	1
Gypsum Thickness (in)	0.500
Insulated Framing Size(w x h, in)	1.5 x 3.5
Insulated Framing Spacing (in o.c.)	24.0
Framing Factor - (default)	0.1100
Ceiling Type	Attic
Note	

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Mechanical Equipment

Number of Mechanical Systems	3
Heating SetPoint(F)	70.0
Heating Setback Thermostat	Present
Cooling SetPoint(F)	78.0
Cooling Setup Thermostat	Present
DHW SetPoint(F)	125.0

Heat: 80AFUE Gas Furn 64k

SystemType	Fuel-fired air distribution
Fuel Type	Natural gas
Rated Output Capacity (kBtuh)	64.0
Seasonal Equipment Efficiency	80.0 AFUE
Auxiliary Electric	776 Eae
Note	
Number Of Units	1
Location	Conditioned area
Performance Adjustment	100
Percent Load Served	100

DHW: 30 gal. 0.57EF Gas

Water Heater Type	Conventional
Fuel Type	Natural gas
Energy Factor	0.57
Recovery Efficiency	0.76
Water Tank Size (gallons)	30
Extra Tank Insulation (R-Value)	0.0
Note	
Number Of Units	1
Location	Conditioned area
Performance Adjustment	100
Percent Load Served	100

Cool: 13SEER A/C 3 ton

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Mechanical Equipment

System Type	Air conditioner
Fuel Type	Electric
Rated Output Capacity (kBtuh)	36.0
Seasonal Equipment Efficiency	13.0 SEER
Sensible Heat Fraction (SHF)	0.70
Note	
Number Of Units	1
Location	Ambient
Performance Adjustment	100
Percent Load Served	100

DHW Efficiencies

All bath faucets & showers <= 2gpm	false
All DHW pipes fully insulated >= R-3	true
Recirculation type	None (standard system)
Farthest fixture to DHW heater	69
TOTAL Pipelength for longest DHW run	99
DWHR unit present?	false
DHW Diagnostics	
dhwGpd	51.95
peRatio	1.25
dishwasherGpd	4.32
clothesWasherHotWaterGPD	3.89
EDeff	1.01
ewaste	34.27
tmains	56.60
dwhrWhInletTempAdj	0.00
pumpConsKwh	0.00
pumpConsMmbtu	0.00

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Duct Systems

Name	Ducts
Conditioned Floor Area(sq ft)	1800.0
# of Returns	6
Heating System	80AFUE Gas Furn 64k
Cooling System	13SEER A/C 3 ton
Supply Duct Surface Area(sq ft)	364.5
Return Duct Surface Area(sq ft)	337.5
Duct Leakage	
Qualitative Assessment	Not Applicable
Duct Leakage to Outside	
Supply+Return	72.00 CFM @ 25 Pascals
Supply Only	Not Applicable
Return Only	Not Applicable
Total Duct Leakage	72.00 CFM @ 25 Pascals
Duct Tightness Test	Postconstruction Test

Type	Location	Percent Location	R-Value
Supply	Conditioned space	50.0	0.0
	Attic, exposed	50.0	8.0
Return	Conditioned space	50.0	0.0
	Attic, exposed	50.0	6.0

Building Summary

Property
Builder 1
Cleveland, OH

Weather:Cleveland, OH
OH 2018 IECC basement
Cleveland Basement 2018
Prescriptive.blg

Organization
MEEA

Builder

Infiltration and Mechanical Ventilation

Whole House Infiltration	
Measurement Type	Blower door test
Heating Season Infiltration Value	3.00 ACH @ 50 Pascals
Cooling Season Infiltration Value	3.00 ACH @ 50 Pascals
Shelter Class	4
Code Verification	Tested
Mechanical Ventilation for IAQ	
Type	Exhaust Only
Rate(cfm)	48
Sensible Recovery Efficiency(%)	0.00
Total Recovery Efficiency(%)	0.00
Hours per Day	24.0
Fan Power (watts)	67.20
ECM Fan Motor	false
Ventilation Strategy for Cooling	
Cooling Season Ventilation	No Ventilation

CZ 4 - 2 Story Home

Basement Walls			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	122.00	122.00	8.00	0.92	$	901.82
Total Basement Wall Insulation						**$**	**901.82**

Above Grade Wall Framing			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x416x3	22.88	23.00	2.00	9.31	$	428.26
Studs	2x4x8	134.20	135.00	2.00	3.78	$	1,020.60
Openings	5 studs per	25	5		3.78	$	472.50
Ext Jams		25	1			$	-
Total Exterior Wall Framing						**$**	**1,921.36**

Exterior Wall Insulation			**Lineal Feet**			**122.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		122.00	8.00	2.00		1952.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	23	15				-345.00
Total Sq Ft.						1565.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1565	$ 0.65		$	1,017.25
Total Exterior Wall Insulation					**$**	**1,017.25**

Ceiling Insulation			**Square Feet**			**900.00**
Item	Description	Sq Ft		Unit Cost	Price W/ Tax	
Blown Insulation	R-38	900.00		$ 0.90	$	810.00
Total Ceiling Insulation					**$**	**810.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		50%	7.5	$ 1.63	$	12.23
LED Bulbs	LED	50%	7.5	$ 2.61	$	19.58
Total					**$**	**31.80**

Bath Fan	Description	Fans	Unit Cost		
	80 CFM Single Speed	1	$ 87.14	**$**	**87.14**

2009 IECC

Component	Description	Cost	Sources
Basement Insulation	R-10	$ 901.82	OHBA
AGW Framing	2x4	$ 1,921.36	OHBA
Insulation	R-13	$ 1,017.25	OHBA
Ceiling Insulation	R-38	$ 810.00	OHBA
Blower Door Test	No		Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	No	$ 87.14	Home Depot
Efficient Lighting	50%	$ 31.80	Home Depot
Duct Sealing/Returns	No		Home Innovation Research Labs
Total Cost		**$ 4,969.37**	

Description	2009 IECC
Slabs	R-10/2ft
Basement Walls	R-10
Above Grade Walls	R-13
Ceilings	R-38
ACH50	7
Blower Door Test	No
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	50%

CZ 4- 2 Story Home **2018 IECC**

Basement Walls			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	122.00	122.00	8.00	0.92	$	901.82
Total Basement Wall Insulation						**$**	**901.82**

Above Grade Wall Framing			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x6x16x3	22.88	23.00	2.00	13.41	$	616.86
Studs (24" OC)	2x6x8	94.50	95.00	2.00	5.89	$	1,119.10
Openings	5 studs per	25	5		5.89	$	736.25
Ext Jams		25	1		25	$	625.00
Total Exterior Wall Framing						**$**	**3,097.21**

Exterior Wall Insulation			**Lineal Feet**			**122.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		122.00	8.00	2.00		1952.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	23	15				-345.00
Total Sq Ft.						1565.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1565	$ 0.86		$	1,345.90
Total Exterior Wall Insulation					**$**	**1,345.90**

Ceiling Insulation			**Square Feet**			**900.00**
Item	Description	Sq Ft		Unit Cost	Price W/ Tax	
Blown Insulation	R-49	900.00		$ 1.15	$	1,035.00
Total Ceiling Insulation					**$**	**1,035.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		10%	1.5	$ 1.63	$	2.45
LED Bulbs	LED	90%	13.5	$ 2.61	$	35.24
Total					**$**	**37.68**

Bath Fan	Description	Fans	Unit Cost		
Broan Ultra Green	80 CFM Multi Speed	1	$146.16	**$**	**146.16**

Duct Sealing/Return	Description	Sq Ft	Unit Cost		
Building America	12 to 4 CFM	1800	0.225	**$**	**405.00**

Component	Description	Cost	Sources
Basement Insulation	R-10	$ 901.82	OHBA
AGW Framing (24" OC)	2x6	$ 3,097.21	OHBA
Insulation	R-21	$ 1,345.90	OHBA
Ceiling Insulation	R-49	$ 1,035.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	Yes	$ 146.16	Home Depot
Efficient Lighting	50%	$ 37.68	Home Depot
Duct Sealing/Returns	Yes	$ 405.00	Home Innovation Research Labs
Total Cost		**$ 7,368.77**	

Description	2018 IECC
Slabs	R-10/2ft
Basement Walls	R-10
Above Grade Walls	R-20
Ceilings	R-49
ACH50	3
Blower Door Test	Yes
Mechanical Ventilation	Yes
Duct Sealing/Returns	Yes
Efficient Lighting	90%

CZ 5- 2 Story Home

Basement Walls			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	122.00	122.00	8.00	0.92	$	897.92
Total Basement Wall Insulation						**$**	**897.92**

Above Grade Wall Framing			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x6x16x3	22.88	23.00	2.00	13.41	$	616.86
Studs (24" OC)	2x6x8	94.50	95.00	2.00	5.89	$	1,119.10
Openings	5 studs per	25	5		5.89	$	736.25
Ext Jams		25	1		25	$	625.00
Total Exterior Wall Framing						**$**	**3,097.21**

Exterior Wall Insulation			**Lineal Feet**			**122.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		122.00	8.00	2.00		1952.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	23	15				-345.00
Total Sq Ft.						1565.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1565	$ 0.86		$	1,345.90
Total Exterior Wall Insulation					**$**	**1,345.90**

Ceiling Insulation			**Square Feet**			**900.00**
Item	Description	Sq Ft		Unit Cost	Price W/ Tax	
Blown Insulation	R-38	900.00		$ 0.90	$	810.00
Total Ceiling Insulation					**$**	**810.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		50%	7.5	$ 1.63	$	12.23
LED Bulbs	LED	50%	7.5	$ 2.61	$	19.58
Total					**$**	**31.80**

Bath Fan	Description	Fans	Unit Cost		
Broan Ultra Green	80 CFM Multi Speed	1	$ 87.14	**$**	**87.14**

Duct Sealing/Return	Description	Sq Ft	Unit Cost		
Building America	12 to 4 CFM	1800		**$**	**-**

2009 IECC

Component	Description	Cost	Sources
Basement Insulation	R-15	$ 897.92	OHBA
AGW Framing (24" OC)	2x6	$ 3,097.21	OHBA
Insulation	R-21	$ 1,345.90	OHBA
Ceiling Insulation	R-38	$ 810.00	OHBA
Blower Door Test	No		Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	No	$ 87.14	Home Depot
Lighting	50%	$ 31.80	Home Depot
Duct Sealing/Returns	No	$ -	Home Innovation Research Labs
Total Cost		**$ 6,469.97**	

Description	2009 IECC
Slabs	R-10/2ft
Basement Walls	R-10
Above Grade Walls	R-20
Ceilings	R-38
ACH50	7
Blower Door Test	No
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	50%

CZ 5- 2 Story Home

Basement Walls			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	122.00	122.00	4.00	0.92	$	450.91
Total Basement Wall Insulation						**$**	**450.91**

Above Grade Wall Framing			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x4x16x3	22.88	23.00	2.00	9.31	$	428.26
Studs	2x4x8	134.20	135.00	2.00	3.78	$	1,020.60
Openings	5 studs per	25	5		3.78	$	472.50
Ext Jams		25	1			$	-
Total Exterior Wall Framing						**$**	**1,921.36**

Exterior Wall Insulation			**Lineal Feet**			**122.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		122.00	8.00	2.00		1952.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	23	15				-345.00
Total Sq Ft.						1565.00
Insulation	R-15	Sq ft	Cost/ Sq Ft		Total	
		1565	$ 0.77		$	1,205.05
Total Exterior Wall Insulation					**$**	**1,205.05**

Ceiling Insulation			**Square Feet**			**900.00**
Item	Description	Sq Ft		Unit Cost	Price W/ Tax	
Blown Insulation	R-49	900.00		$ 1.15	$	1,035.00
Total Ceiling Insulation					**$**	**1,035.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		25%	3.75	$ 1.63	$	6.11
LED Bulbs	LED	75%	11.25	$ 2.61	$	29.36
Total					**$**	**35.48**

Bath Fan	Description	Fans	Unit Cost		
	80 CFM Single Speed	1	$ 87.14	**$**	**87.14**

OHBA 1

Component	Description	Cost	Sources
Basement Insulation	R-10	$ 450.91	OHBA
AGW Framing	2x4	$ 1,921.36	OHBA
Insulation	R-15	$ 1,205.05	OHBA
Ceiling Insulation	R-49	$ 1,035.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	No	$ 87.14	Home Depot
Efficient Lighting	75%	$ 35.48	Home Depot
Duct Sealing/Returns	No		Home Innovation Research Labs
Total Cost		**$ 5,134.94**	

Description	OHBA 1
Slabs	R-10/2ft
Basement Walls	R-10/4ft
Above Grade Walls	R-15
Ceilings	R-49
ACH50	6
Blower Door Test	Yes
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	75%

CZ 5- 2 Story Home

Basement Walls			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-10 Ext.	Rigid Foam	122.00	122.00	4.00	0.92	$	450.91
Total Basement Wall Insulation						**$**	**450.91**

Above Grade Wall Framing			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x4x16x3	22.88	23.00	2.00	9.31	$	428.26
Studs	2x4x8	134.20	135.00	2.00	3.78	$	1,020.60
Openings	5 studs per	25	5		3.78	$	472.50
Ext Jams		25	1			$	-
Total Exterior Wall Framing						**$**	**1,921.36**

Exterior Wall Insulation			**Lineal Feet**			**122.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		122.00	8.00	2.00		1952.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	23	15				-345.00
Total Sq Ft.						1565.00
Insulation	R-13	Sq ft	Cost/ Sq Ft		Total	
		1565	$ 0.65		$	1,017.25
Total Exterior Wall Insulation					**$**	**1,017.25**

Ceiling Insulation			**Square Feet**		**900.00**
Item	Description	Sq Ft	Unit Cost	Price W/ Tax	
Blown Insulation	R-49	900.00	$ 1.15	$	1,035.00
Total Ceiling Insulation				**$**	**1,035.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		25%	3.75	$ 1.63	$	6.11
LED Bulbs	LED	75%	11.25	$ 2.61	$	29.36
Total					**$**	**35.48**

Bath Fan	Description	Fans	Unit Cost		
	80 CFM Single Speed	1	$ 87.14	**$**	**87.14**

OHBA 2

Component	Description	Cost	Sources
Basement Insulation	R-10	$ 450.91	OHBA
AGW Framing	2x4	$ 1,921.36	OHBA
Insulation	R-13	$ 1,017.25	OHBA
Ceiling Insulation	R-49	$ 1,035.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	No	$ 87.14	Home Depot
Efficient Lighting	75%	$ 35.48	Home Depot
Duct Sealing/Returns	No		Home Innovation Research Labs
Total Cost		**$ 4,947.14**	

Description	OHBA 2
Slabs	R-10/2ft
Basement Walls	R-10/4ft
Above Grade Walls	R-13
Ceilings	R-49
ACH50	6
Blower Door Test	Yes
Mechanical Ventilation	No
Duct Sealing/Returns	No
Efficient Lighting	75%

CZ 5- 2 Story Home **2018 IECC**

Basement Walls			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Height	Unit Cost	Price W/ Tax	
R-15 Ext.	Rigid Foam	122.00	122.00	8.00	1.35	$	1,320.53
Total Basement Wall Insulation						**$**	**1,320.53**

Above Grade Wall Framing			**Lineal Feet**				**122.00**
Item	Description	Ln Ft	Use	Floors	Unit Cost	Price W/ Tax	
Plates	2x6x16x3	22.88	23.00	2.00	13.41	$	616.86
Studs (24" OC)	2x6x8	94.50	95.00	2.00	5.89	$	1,119.10
Openings	5 studs per	25	5		5.89	$	736.25
Ext Jams		25	1		25	$	625.00
Total Exterior Wall Framing						**$**	**3,097.21**

Exterior Wall Insulation			**Lineal Feet**			**122.00**
Item	Description	Ln Ft	Height	Floors		Square Feet
Wall Sq Ft		122.00	8.00	2.00		1952.00
Openings	No	Sq Ft				
Doors	2	21				-42.00
Windows	23	15				-345.00
Total Sq Ft.						1565.00
Insulation	R-21	Sq ft	Cost/ Sq Ft		Total	
		1565	$ 0.86		$	1,345.90
Total Exterior Wall Insulation					**$**	**1,345.90**

Ceiling Insulation			**Square Feet**			**900.00**
Item	Description	Sq Ft		Unit Cost	Price W/ Tax	
Blown Insulation	R-49	900.00		$ 1.15	$	1,035.00
Total Ceiling Insulation					**$**	**1,035.00**

Efficient Lighting	Description	Req	Total Bulbs	Unit Cost		15
Incandescent		10%	1.5	$ 1.63	$	2.45
LED Bulbs	LED	90%	13.5	$ 2.61	$	35.24
Total					**$**	**37.68**

Bath Fan	Description	Fans	Unit Cost		
Broan Ultra Green	80 CFM Multi Speed	1	$146.16	**$**	**146.16**

Duct Sealing/Return	Description	Sq Ft	Unit Cost		
Building America	12 to 4 CFM	1800	0.225	**$**	**405.00**

Component	Description	Cost	Sources
Basement Insulation	R-15	$ 1,320.53	OHBA
AGW Framing (24" OC)	2x6	$ 3,097.21	OHBA
Insulation	R-21	$ 1,345.90	OHBA
Ceiling Insulation	R-49	$ 1,035.00	OHBA
Blower Door Test	Yes	$ 200.00	Local Energy Rater
Duct Blaster Test	Yes	$ 200.00	Local Energy Rater
Mechanical Ventilation	Yes	$ 146.16	Home Depot
Lighting	90%	$ 37.68	Home Depot
Duct Sealing/Returns	Yes	$ 405.00	Home Innovation Research Labs
Total Cost		**$ 7,787.48**	

Description	2018 IECC
Slabs	R-10/2ft
Basement Walls	R-15
Above Grade Walls	R-20
Ceilings	R-49
ACH50	3
Blower Door Test	Yes
Mechanical Ventilation	Yes
Duct Sealing/Returns	Yes
Efficient Lighting	90%