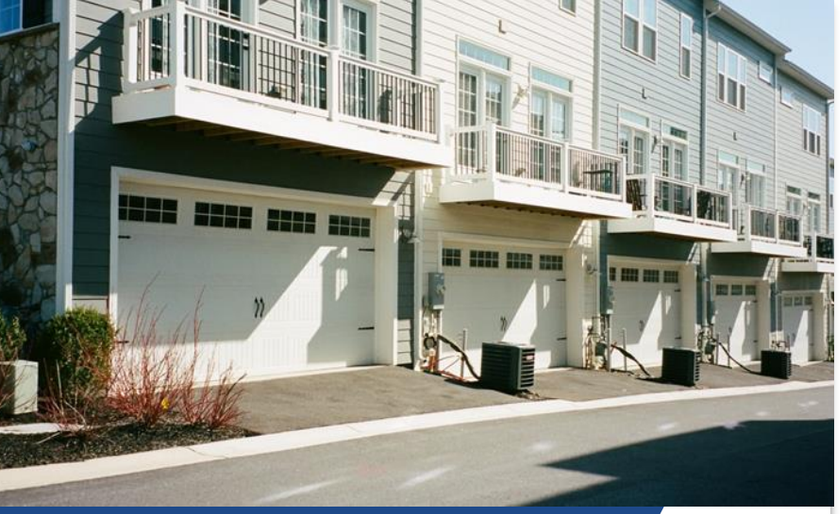


MA 10th Edition Building Code | 2025

Townhouse - Electric

HERS Index (ERI)

55 ▸ 45

Base Stretch

Electric Heat Pump

Home Details

- 2100 ft²
- Townhouse
- 3 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

PSD

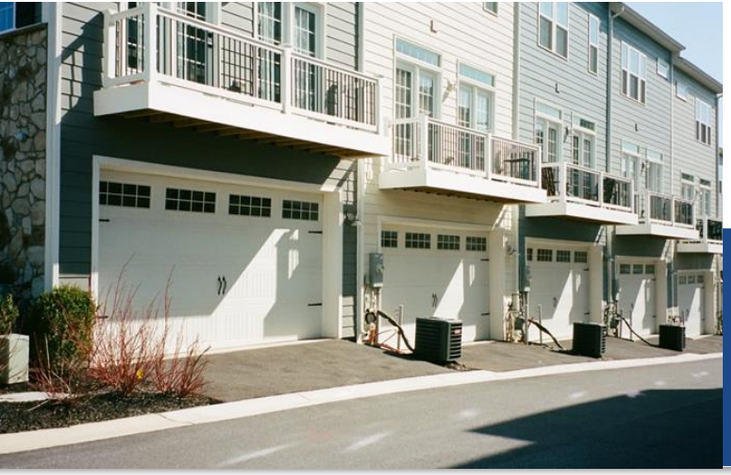
Costs and Benefits to Meet Stretch Code*

	COSTS	BENEFITS[4]	NET
Total Added Construction Costs	**$5,508** Extra Costs	**$7,500** Incentives[1]	$1,992 Cost Compared to Base Code

HOME BUYER	**$199** Reduction to Downpayment[3]	**$134** Reduction to Annual Mortgage Payment[3]	**$52** Estimated Energy Cost Savings per Year[2]	**$186** Buyer Annual Net Savings

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® new construction program Base Tier Incentives of $7,500 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Energy costs for all-electric homes are based on 22.95 cents/kWh. Massachusetts has a reduced cost per kWh for heat pumps of $0.172 between November and April, and an average cost per kWh of $0.287, so this is a blended rate between the two.
3. 30-year mortgage assumes 10% down payment at 6.35% APR.
4. Mass Save Incentives are not available in communities with municipal light plans, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population.



MA 10th Edition Building Code | 2025

Townhouse - Electric

HERS Index (ERI)

55 ▸ 45

Base Stretch

Electric Heat Pump

2100 ft² Townhouse
3 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Stretch Code

FEATURE	BASE CODE[3]	STRETCH CODE[4]	COST DIFFERENTIAL[1]
HERS INDEX[6]	52	42	
Windows (U-Value/SHGC)	**U-0.28, 0.29 SHGC**	**U-0.18, 0.29 SHGC**	**$1,530**
DHW	**Gas Tankless 0.94 EF**	**HPWH, 50 gal, 2.35 EF**	**-$316**
Heating	**Gas, 95% AFUE**	**HP SEER 20, 12 HSPF**	**-$4,276**
Cooling	**SEER 14.2**		
Duct Leakage to Outside	2 CFM25 per 100ft², R-6	In Conditioned Space	$0
Foundation Insulation	NA	Basement Walls R-21	$2,740
Floor Insulation	R-30 Fiberglass Batt	NA	
Walls Insulation	R-21, 2x6, 16 in o.c.	R-21, 2x6, 16 in o.c.	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	**Ceiling R-49, Vented**	**R-30 Open Cell Spray Foam, Unvented**	**$5,054**
Air Infiltration	**3 ACH50**	**2 ACH50**	**$776**
Mechanical Ventilation	HRV, 75%	HRV, 75%	$0
Pre-Wiring[5]	N/A	N/A	$0
Solar Array[5]	N/A	N/A	$0
TOTAL			**$5,508**

1. Additional Cost are the costs above Base Code to reach Stretch Code.
2. Cost included in basement and/or attic thermal boundary change.
3. Base Code home features are based on an analysis of typical practices for achieving a HERS 52 using HERS Provider data on previously built homes in Massachusetts.
4. Stretch Code home features are based on cost optimization modeling using BEopt software. Some individual features are less efficient than the Base Code home, but they are more than offset by other features that are more efficient. One benefit of using a HERS Index target as the basis of the Stretch Code is that it give builders the flexibility to make different design choice to allow for optimization of cost effectiveness, work around other design constraints, and accommodate client-specific requests. The stretch code model was developed used REM/rate Version 16.1.1.
5. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to the Base or Stretch Code.
6. Please note that an all-electric home qualifies for a three-point increase in the HERS Index, reducing the stringency from HERS 52 to 55 when following the Base Code, and HERS 42 to 45 when following the Stretch Code. For the purposes of this analysis, a HERS Index of 52 (for Base Code) and 42 (for Stretch and Specialized Code) have been used in the energy models for the all-electric scenario.

DOER Massachusetts Department of Energy Resources

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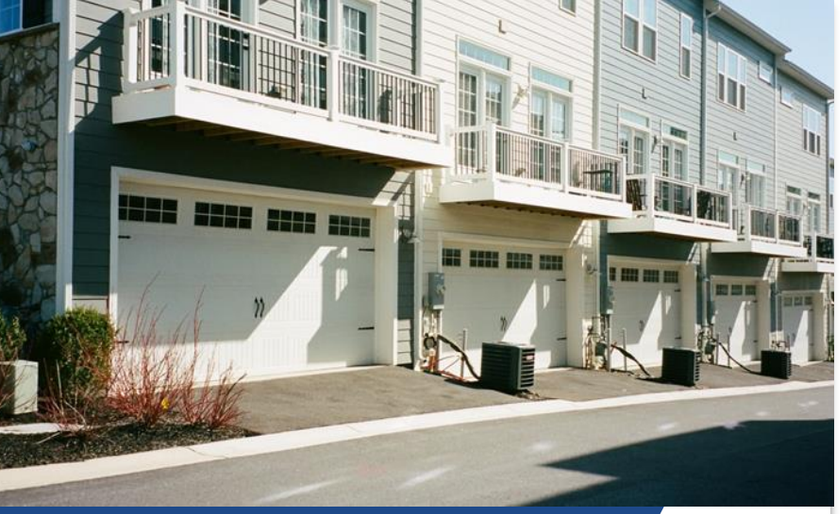


MA 10th Edition Building Code | 2025

Townhouse - Electric

HERS Index (ERI)

45 ▸ 45

Stretch **Specialized**

Electric Heat Pump

Home Details

- 2100 ft^2
- Townhouse
- 3 Bedrooms
- Worcester, MA

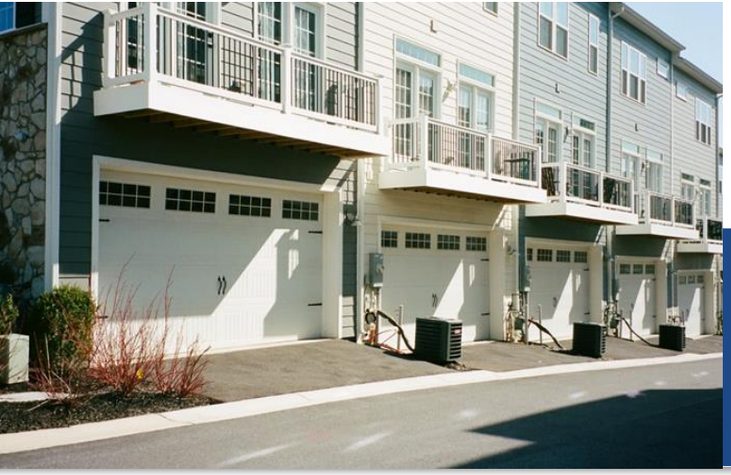
DOER Massachusetts Department of Energy Resources

PSD

Costs and Benefits to Meet Specialized Code

	COSTS[1,2]	BENEFITS	NET
Pre-Wiring Costs[3]	**$0** Total Pre-Wiring Cost	**$0** Incentives	**$0** Cost Compared to Stretch Code
Solar Costs	$0 Total Solar Cost	$0 Incentives	**$0** Cost Compared to Stretch Code

1. For All-Electric buildings, there is no cost difference between the Stretch Code and the Specialized Code because the requirements are the same.
2. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to all-electric buildings.
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.



MA 10th Edition Building Code | 2025

Townhouse - Electric

HERS Index (ERI)

45 ▸ 45

Stretch **Specialized**

Electric Heat Pump

2100 ft² Townhouse
3 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Specialized Code

FEATURE	STRETCH CODE	SPECIALIZED CODE	COST DIFFERENTIAL[1]
HERS INDEX[4]	42	42	
Windows (U-Value/SHGC)	U-0.18, 0.29 SHGC	U-0.18, 0.29 SHGC	$0
DHW	HPWH, 50 gal, 2.35 EF	HPWH, 50 gal, 2.35 EF	$0
Heating Cooling	HP SEER 20, 12 HSPF	HP SEER 20, 12 HSPF	$0
Duct Leakage to Outside	In Conditioned Space	In Conditioned Space	$0
Foundation Insulation	Basement Walls R-21	Basement Walls R-21	$0
Floor Insulation	NA	NA	$0
Walls Insulation	R-21, 2x6, 16 in o.c.	R-21, 2x6, 16 in o.c.	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	R-30 Open Cell Spray Foam, Unvented	R-30 Open Cell Spray Foam, Unvented	$0
Air Infiltration	2 ACH50	2 ACH50	$0
Mechanical Ventilation	HRV, 75%	HRV, 75%	$0
Pre-Wiring[2,3]	N/A	N/A	$0
Solar Array[2]	N/A	N/A	$0
TOTAL			$0

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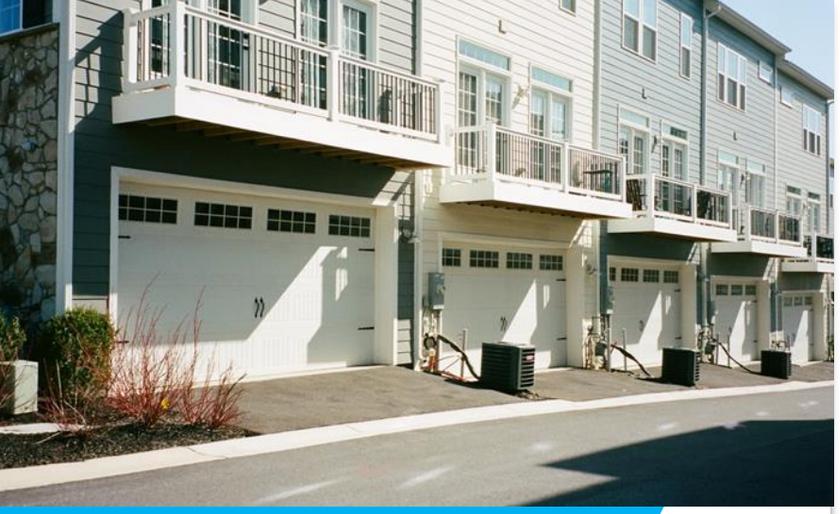
1. For All-Electric buildings, there is no cost difference between the Stretch Code and the Specialized Code because the requirements are the same.
2. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to all-electric buildings.
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.
4. Please note that an all-electric home qualifies for a three-point increase in the HERS Index, reducing the stringency from HERS 52 to 55 when following the Base Code, and HERS 42 to 45 when following the Stretch Code. For the purposes of this analysis, a HERS Index of 52 (for Base Code) and 42 (for Stretch and Specialized Code) have been used in the energy models for the all-electric scenario.



MA 10th Edition Building Code | 2025

Townhouse - Gas

HERS Index (ERI)

52 ▸ 42

Base Stretch

Gas

Home Details

- 2100 ft^2
- Townhouse
- 3 Bedrooms
- Worcester, MA

Massachusetts Department of Energy Resources

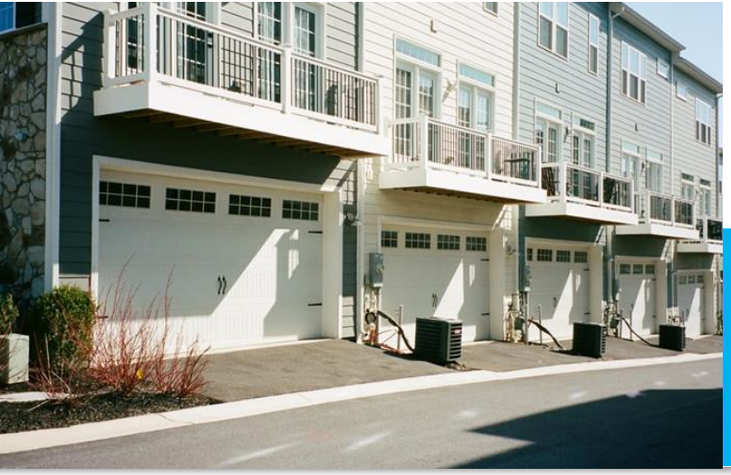
PSD

Costs and Benefits to Meet Stretch Code*

	COSTS	BENEFITS[4]	NET
Total Added Construction Costs	**$5,707** Extra Costs	**$0** Incentives[1]	**$5,707** Cost Compared to Base Code
HOME BUYER	**$571** Increase in Downpayment[3]	**$384** Increase in Annual Mortgage Payment[3]	**$26** Estimated Energy Cost Savings per Year[2]	**$358** Buyer Annual Net Costs

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® new construction program Base Tier Incentives of $7,500 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Energy costs are based on 28.7 cents/kWh, $2.08/therm, and $3.62/gal propane
3. 30-year mortgage assumes 10% down payment at 6.35% APR
4. Mass Save Incentives are not available in communities with municipal light plants, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population



MA 10th Edition Building Code | 2025

Townhouse - Gas

HERS Index (ERI)

52 ▸ 42

Base Stretch

Gas

2100 ft² Townhouse
3 Bedroom - Worcester, MA

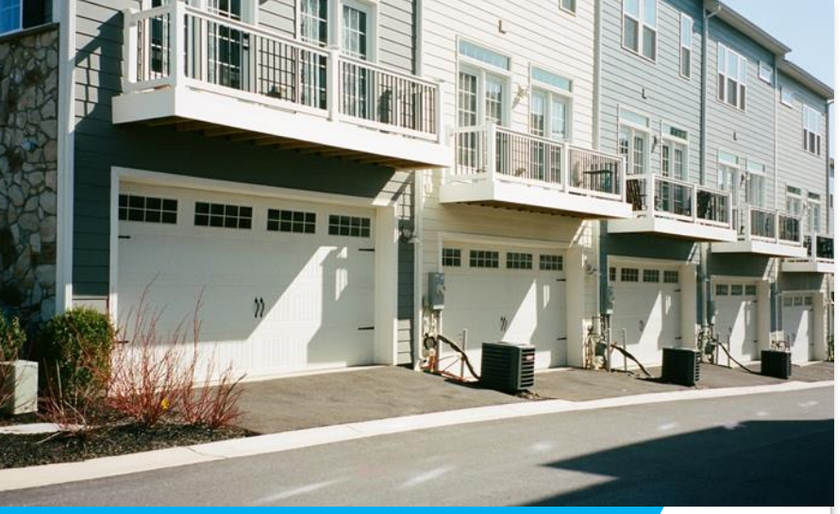
Breakdown of Construction Costs to Meet Stretch Code

FEATURE	BASE CODE[3]	STRETCH CODE[4]	COST DIFFERENTIAL[1]
HERS INDEX	52	42	
Windows (U-Value/SHGC)	**U-0.28, 0.29 SHGC**	**U-0.18, 0.29 SHGC**	**$1,530**
DHW	Gas Tankless 0.94 EF	Gas Tankless 0.94 EF	$0
Heating	**Gas, 95% AFUE**	**Gas, 98% AFUE**	**$688**
Cooling	**SEER 14.2**	**SEER 16**	**$646**
Duct Leakage to Outside	2 CFM25 per 100ft2, R-6	2 CFM25 per 100ft2, R-6	$0
Foundation Insulation	**NA**	**Basement Walls R-21**	**$1,955**
Floor Insulation	**R-30 Fiberglass Batt**	**NA**	**-$1,110**
Walls Insulation	**R-21, 2x6, 16 in o.c.**	**R-21, 2x6, 16 in o.c., R-5 XPS**	**$1,746**
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	**Ceiling R-49, Vented**	**Ceiling R-38, Vented**	**-$1,446**
Air Infiltration	**3 ACH50**	**1.5 ACH50**	**$1,698**
Mechanical Ventilation	HRV, 75%	HRV, 75%	$0
Pre-Wiring[5]	N/A	N/A	$0
Solar Array[5]	N/A	N/A	$0
TOTAL			**$5,707**

DOER Massachusetts Department of Energy Resources

PSD

1. Additional Costs are the costs above Base Code to reach Stretch Code.
2. Cost included in basement and/or attic thermal boundary change.
3. Base Code home features are based on an analysis of typical practices for achieving a HERS 52 using HERS Provider data on previously built homes in Massachusetts.
4. Stretch Code home features are based on cost optimization modeling using BEopt software. Some individual features are less efficient than the Base Code home, but they are more than offset by other features that are more efficient. One benefit of using a HERS Index target as the basis of the Stretch Code is that it give builders the flexibility to make different design choice to allow for optimization of cost effectiveness, work around other design constraints, and accommodate client-specific requests. The stretch code model was developed used REM/rate Version 16.1.1.
5. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to the Base or Stretch Code.



HERS Index (ERI)

42 ▸ 42

Stretch **Specialized**

Gas

MA 10th Edition Building Code | 2025

Townhouse - Gas

Costs and Benefits to Meet Specialized Code*

	COSTS	BENEFITS[1,2]	NET
Pre-Wiring Costs[4]	**$6,500** Additional Pre-Wiring Cost	$0 Incentives[1,2]	**$6,500** Cost Compared to Stretch Code
Solar Costs	**$14,920** Additional Solar Cost	**$1,000** Incentives[1,2]	**$13,920** Cost Compared to Stretch Code
Total Costs	**$20,420** Total Additional Costs	**$1,482** Annual Energy Bill Savings[3]	

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

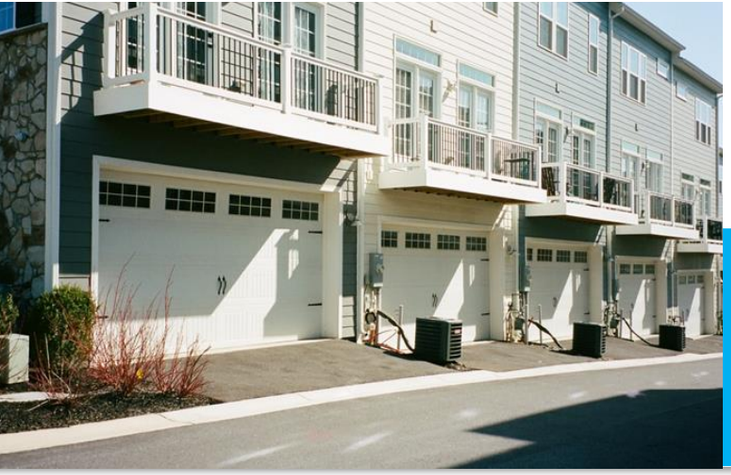
Home Details

- 2100 ft^2
- Townhouse
- 3 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

PSD

1. Projects with solar installed may be eligible for a 15% MA State tax credit of the solar cost, up to $1,000.
2. Mass Save Incentives are not available in communities with municipal light plants, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population
3. The PV Watts Calculator was used to determine the total kWh saving of the project, using defaults for module type, array type, system losses, tilt, azimuth, etc. The kWh savings was compared to the total kWh used in the energy model. The savings calculation estimates an energy cost of 28.7 cents/kWh.
4. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.



MA 10th Edition Building Code | 2025

Townhouse - Gas

HERS Index (ERI)

42 Stretch ▸ 42 **Specialized**

Gas

2100 ft² Townhouse
3 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Specialized Code

FEATURE	STRETCH CODE	SPECIALIZED CODE	COST DIFFERENTIAL[1]
HERS INDEX	**42**	**42**	$0
Windows (U-Value/SHGC)	U-0.18, 0.29 SHGC	U-0.18, 0.29 SHGC	$0
DHW	Gas Tankless 0.94 EF	Gas Tankless 0.94 EF	$0
Heating	Gas, 98% AFUE	Gas, 98% AFUE	$0
Cooling	SEER 16	SEER 16	$0
Duct Leakage to Outside	2 CFM25 per 100ft2, R-6	2 CFM25 per 100ft2, R-6	$0
Foundation Insulation	Basement Walls R-21	Basement Walls R-21	$0
Floor Insulation	NA	NA	$0
Walls Insulation	R-21, 2x6, 16 in o.c., R-5 XPS	R-21, 2x6, 16 in o.c., R-5 XPS	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	Ceiling R-38, Vented	Ceiling R-38, Vented	$0
Air Infiltration	1.5 ACH50	1.5 ACH50	$0
Mechanical Ventilation	HRV, 75%	HRV, 75%	$0
Pre-Wiring[3]	N/A	**Yes**	**$6,500**
Solar Array[2]	N/A	**4 kW**	**$13,920**
TOTAL			**$20,420**

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1. Additional Costs are the costs above Stretch Code to reach Specialized Code.
2. Solar costs are based on the Massachusetts Clean Energy Center Solar Costs Comparison Tool, using the median dollar per watt of $3.73 as of July 30, 2024. The model does not take credit for any solar energy kWh generation.
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.

HERS Index (ERI)

55 ▸ 45

Base Stretch

Electric Heat Pump

Home Details

- 1400 ft^2 per unit
- 6-Unit Multifamily
- 3 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

PSD

MA 10th Edition Building Code | 2025

6-unit Multifamily - Electric

Costs and Benefits to Meet Stretch Code*

	COSTS	BENEFITS[4]	NET
Total Added Construction Costs	**$11,086** Cost Savings	**$1,500** Incentives[1]	**$12,586** Cost Compared to Base Code

HOME BUYER	**$1,259** Reduction to Downpayment[3]	**$846** Reduction to Annual Mortgage Payment[3]	**$177** Estimated Energy Cost Savings per Year[2]	**$1,023** Buyer Annual Net Savings

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® Low-rise Base Tier multi-family new construction incentives of $1,500 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Energy costs for all-electric homes are based on 22.95 cents/kWh. Massachusetts has a reduced cost per kWh for heat pumps of $0.172 between November and April, and an average cost per kWh of $0.287, so this is a blended rate between the two.
3. 30-year mortgage assumes 10% down payment at 6.35% APR
4. Mass Save Incentives are not available in communities with municipal light plans, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population

MA 10th Edition Building Code | 2025

6-unit Multifamily - Electric

HERS Index (ERI)

55 ▸ 45

Base Stretch

Electric Heat Pump

1400 ft² per unit
6-Unit Multifamily
3 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Stretch Code

FEATURE	BASE CODE[3]	STRETCH CODE[4]	COST DIFFERENTIAL[1]
HERS INDEX[6]	**52**	**42**	
Windows (U-Value/SHGC)	**U-0.28, 0.29 SHGC**	**U-0.28, 0.29 SHGC**	**$0**
DHW	**Gas Tankless 0.94 EF**	**HPWH, 50 gal, 2.35 EF**	**-$316**
Heating	**Gas, 95% AFUE**	**SEER 20, 12 HSPF, Ductless**	**-$5,898**
Cooling	**SEER 14.2**		
Duct Leakage to Outside	**2 CFM25 per 100ft², R-6**	**Ductless**	**-$4,591**
Foundation Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Floor Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Wall Insulation	R-21, 2x6, 16 in o.c.	R-21, 2x6, 16 in o.c.	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	**Ceiling R-49, Vented**	**Ceiling R-38, Vented**	**-$803**
Air Infiltration	**3 ACH50**	**2 ACH50**	**$521**
Mechanical Ventilation	Exhaust Only	Exhaust Only	$0
Pre-Wiring[5]	N/A	N/A	$0
Solar Array[5]	N/A	N/A	$0
TOTAL			-$11,086

1. Additional Costs are the costs above Base Code to reach Stretch Code.
2. Cost included in basement and/or attic thermal boundary change
3. Base Code home features are based on an analysis of typical practices for achieving a HERS 52 using HERS Provider data on previously built homes in Massachusetts.
4. Stretch Code home features are based on cost optimization modeling using BEopt software. Some individual features are less efficient than the Base Code home, but they are more than offset by other features that are more efficient. One benefit of using a HERS Index target as the basis of the Stretch Code is that it give builders the flexibility to make different design choice to allow for optimization of cost effectiveness, work around other design constraints, and accommodate client-specific requests. The stretch code model was developed used REM/rate Version 16.1.1.
5. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to the Base or Stretch Code.
6. Please note that an all-electric home qualifies for a three-point increase in the HERS Index, reducing the stringency from HERS 52 to 55 when following the Base Code, and HERS 42 to 45 when following the Stretch Code. For the purposes of this analysis, a HERS Index of 52 (for Base Code) and 42 (for Stretch and Specialized Code) have been used in the energy models for the all-electric scenario.

DOER Massachusetts Department of Energy Resources

PSD

MA 10th Edition Building Code | 2025

6-unit Multifamily - Electric

HERS Index (ERI)

45 ▸ 45

Stretch **Specialized**

Electric Heat Pump

Home Details

- 1400 ft^2 per unit
- 6-Unit Multifamily
- 3 Bedrooms
- Worcester, MA

Massachusetts Department of Energy Resources

PSD

Costs and Benefits to Meet Specialized Code

	COSTS[1,2]	BENEFITS	NET
Solar Costs	**$0** Total Solar Cost	**$0** Incentives	**$0** Cost Compared to Stretch Code
Pre-Wiring Costs[3]	**$0** Total Pre-wiring Cost	**$0** Incentives	**$0** Costs Compared to Stretch Code

1. For All-Electric buildings, there is no cost difference between the Stretch Code and the Specialized Code because the requirements are the same.
2. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to all-electric buildings.
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.

MA 10th Edition Building Code | 2025

6-unit Multifamily - Electric

HERS Index (ERI)

45 ▸ 45

Stretch **Specialized**

Electric Heat Pump

1400 ft² per unit
6-Unit Multifamily
3 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Specialized Code

FEATURE	STRETCH CODE	SPECIALIZED CODE	COST DIFFERENTIAL[1]
HERS INDEX[4]	42	42	
Windows (U-Value/SHGC)	U-0.28, 0.29 SHGC	U-0.28, 0.29 SHGC	$0
DHW	HPWH, 50 gal, 2.35 EF	HPWH, 50 gal, 2.35 EF	$0
Heating	SEER 20, 12 HSPF, Ductless	SEER 20, 12 HSPF, Ductless	$0
Cooling			
Duct Leakage to Outside	Ductless	Ductless	$0
Foundation Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Floor Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Wall Insulation	R-21, 2x6, 16 in o.c.	R-21, 2x6, 16 in o.c.	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	Ceiling R-38, Vented	Ceiling R-38, Vented	$0
Air Infiltration	2 ACH50	2 ACH50	$0
Mechanical Ventilation	Exhaust Only	Exhaust Only	$0
Pre-Wiring[2,3]	N/A	N/A	$0
Solar Array[2]	N/A	N/A	$0
TOTAL			$0

DOER Massachusetts Department of Energy Resources

PSD

1. For All-Electric buildings, there is no cost difference between the Stretch Code and the Specialized Code because the requirements are the same.
2. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to all-electric buildings.
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.
4. Please note that an all-electric home qualifies for a three-point increase in the HERS Index, reducing the stringency from HERS 52 to 55 when following the Base Code, and HERS 42 to 45 when following the Stretch Code. For the purposes of this analysis, a HERS Index of 52 (for Base Code) and 42 (for Stretch and Specialized Code) have been used in the energy models for the all-electric scenario.

MA 10th Edition Building Code | 2025

6-unit Multifamily - Gas

HERS Index (ERI)

52 ▸ 42

Base Stretch

Gas

Home Details

- 1400 ft^2 per unit
- 6-Unit Multifamily
- 3 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

PSD

Costs and Benefits to Meet Stretch Code*

	COSTS	BENEFITS[4]	NET
Total Added Construction Costs	**$5,848** Extra Costs	**$0** Incentives[1]	**$5,848** Cost Compared to Base Code

HOME BUYER	**$585** Increase in Downpayment[3]	**$393** Increase in Annual Mortgage Payment[3]	**$158** Estimated Energy Cost Savings per Year[2]	**$235** Buyer Annual Net Costs

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® Low-rise Base Tier multi-family new construction incentives of $1,500 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Energy costs are based on 28.7 cents/kWh, $2.08/therm, and $3.62/gal propane
3. 30-year mortgage assumes 10% down payment at 6.35% APR
4. Mass Save Incentives are not available in communities with municipal light plants, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population

MA 10th Edition Building Code | 2025

6-unit Multifamily - Gas

HERS Index (ERI)

52 ▸ 42

Base Stretch

Gas

1400 ft² per unit
6-Unit Multifamily
3 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Stretch Code

FEATURE	BASE CODE[3]	STRETCH CODE[4]	COST DIFFERENTIAL[1]
HERS INDEX	**52**	**42**	
Windows (U-Value/SHGC)	U-0.28, 0.29 SHGC	U-0.18, 0.29 SHGC	$2,025
DHW	Gas Tankless 0.94 EF	Gas Tankless 0.94 EF	$0
Heating	Gas, 95% AFUE	Gas, 98% AFUE	**$686**
Cooling	**SEER 14.2**	**SEER 16**	**$408**
Duct Leakage to Outside	**2 CFM25 per 100ft2, R-6**	**In Conditioned Space**	$0
Foundation Insulation	**NA (upper-level unit)**	**NA (upper-level unit)**	**$0**
Floor Insulation	**NA (upper-level unit)**	**NA (upper-level unit)**	**$0**
Walls Insulation	**R-21, 2x6, 16 in o.c.**	**R-21, 2x6, 16 in o.c., R-5 XPS**	**$1,038**
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	**Ceiling R-49, Vented**	**Ceiling R-38, Vented**	**-$803**
Air Infiltration	**3 ACH50**	**1.5 ACH50**	**$1,140**
Mechanical Ventilation	Exhaust Only	HRV, 75%	$1,352
Pre-Wiring[5]	N/A	N/A	$0
Solar Array[5]	N/A	N/A	$0
TOTAL			**$5,848**

DOER Massachusetts Department of Energy Resources

PSD

1. Additional Cost are the costs above Base Code to reach Stretch Code.
2. Cost included in basement and/or attic thermal boundary change.
3. Base Code home features are based on an analysis of typical practices for achieving a HERS 52 using HERS Provider data on previously built homes in Massachusetts.
4. Stretch Code home features are based on cost optimization modeling using BEopt software. Some individual features are less efficient than the Base Code home, but they are more than offset by other features that are more efficient. One benefit of using a HERS Index target as the basis of the Stretch Code is that it give builders the flexibility to make different design choice to allow for optimization of cost effectiveness, work around other design constraints, and accommodate client-specific requests. The stretch code model was developed used REM/rate Version 16.1.1.
5. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to the Base or Stretch Code.

MA 10th Edition Building Code | 2025

6-unit Multifamily - Gas

HERS Index (ERI)

42 ▸ 42

Stretch **Specialized**

Gas

Home Details

- 1400 ft^2 per unit
- 6-Unit Multifamily
- 3 Bedrooms
- Worcester, MA

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Costs and Benefits to Meet Specialized Code*

	COSTS	BENEFITS[3]	NET
Pre-Wiring Costs[5]	**$4,250** Total Pre-Wiring Cost	$0 Incentives[1,2]	**$4,250** Cost Compared to Stretch Code
Solar Costs	**$3,917** Total Solar Cost	**$588** Incentives[1,2]	**$3,329** Cost Compared to Stretch Code
Total Costs	**$7,579** Total Additional Costs	**$389** Annual Energy Bill Savings[4]	

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® Low-rise Base Tier multi-family new construction incentives of $1,500 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Projects with solar installed may be eligible for a 15% MA State tax credit of the solar cost, up to $1,000.
3. Mass Save Incentives are not available in communities with municipal light plants, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population.
4. The PV Watts Calculator was used to determine the total kWh saving of the project, using defaults for module type, array type, system losses, tilt, azimuth, etc. The kWh savings was compared to the total kWh used in the energy model. The savings calculation estimates an energy cost of 28.7 cents/kWh.
5. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.

MA 10th Edition Building Code | 2025

6-unit Multifamily - Gas

HERS Index (ERI)

42 ▸ 42

Stretch **Specialized**

Gas

1400 ft² per unit
6-Unit Multifamily
3 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Specialized Code

FEATURE	STRETCH CODE	SPECIALIZED CODE	COST DIFFERENTIAL[1]
HERS INDEX	**42**	**42**	
Windows (U-Value/SHGC)	U-0.18, 0.29 SHGC	U-0.18, 0.29 SHGC	$0
DHW	Gas Tankless 0.94 EF	Gas Tankless 0.94 EF	$0
Heating	Gas, 98% AFUE	Gas, 98% AFUE	$0
Cooling	SEER 16	SEER 16	$0
Duct Leakage to Outside	In Conditioned Space	In Conditioned Space	$0
Foundation Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Floor Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Walls Insulation	R-21, 2x6, 16 in o.c., R-5 XPS	R-21, 2x6, 16 in o.c., R-5 XPS	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	Ceiling R-38, Vented	Ceiling R-38, Vented	$0
Air Infiltration	1.5 ACH50	1.5 ACH50	$0
Mechanical Ventilation	HRV, 75%	HRV, 75%	$0
Pre-Wiring[3]	N/A	**Yes**	**$4,250**
Solar Array[2]	N/A	**1.05 kW**	**$3,329**
TOTAL			**$7,579**

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1. Additional Cost are the costs above Stretch Code to reach Specialized Code.
2. Solar costs are based on the Massachusetts Clean Energy Center Solar Costs Comparison Tool, using the median dollar per watt of $3.73 as of July 30, 2024. The model does not take credit for any solar energy kWh generation. The solar array size was determined using the calculation of 0.75w/ft² multiplied by the gross conditioned floor area of 1,400ft² as per Section RC104.4.2
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.

MA 10th Edition Building Code | 2025

4-story Multifamily - Electric

HERS Index (ERI)

55 ▸ 45

Base Stretch

Electric Heat Pump

Home Details

- 1200 sq.ft. per unit
- 4-Story Multifamily
- 2 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

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Costs and Benefits to Meet Stretch Code*

	COSTS	BENEFITS[4]	NET
Total Added Construction Costs	**$12,705** Cost Savings	**$1,000** Incentives[1]	**$13,705** Cost Compared to Base Code

HOME BUYER	**$1,371** Reduction to Downpayment[3]	**$921** Reduction to Annual Mortgage Payment[3]	**$141** Estimated Energy Cost Savings per Year[2]	**$1,062** Buyer Annual Net Savings

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® High-rise Base Tier multi-family new construction incentives of $1,000 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Energy costs for all-electric homes are based on 22.95 cents/kWh. Massachusetts has a reduced cost per kWh for heat pumps of $0.172 between November and April, and an average cost per kWh of $0.287, so this is a blended rate between the two.
3. 30-year mortgage assumes 10% down payment at 6.35% APR
4. Mass Save Incentives are not available in communities with municipal light plans, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population

MA 10th Edition Building Code | 2025

4-story Multifamily - Electric

HERS Index (ERI)

55 ▸ 45

Base Stretch

Electric Heat Pump

1200 ft² per unit
4-story Multifamily
2 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Stretch Code

FEATURE	BASE CODE[3]	STRETCH CODE[4]	COST DIFFERENTIAL[1]
HERS INDEX[6]	**52**	**42**	
Windows (U-Value/SHGC)	**U-0.18, 0.29 SHGC**	**U-0.28, 0.29 SHGC**	**-$2,305**
DHW	**Gas Tankless 0.94 EF**	**HPWH, 50 gal, 2.35 EF**	**-$316**
Heating	**Gas, 95% AFUE**	**SEER 20, 12 HSPF, Ductless**	**-$6,331**
Cooling	**SEER 14.2**		
Duct Leakage to Outside	**In Conditioned Space**	**Ductless**	**-$3,765**
Foundation Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Floor Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Wall Insulation	R-21, 2x6, 16 in o.c., R-5 XPS	R-21, 2x6, 16 in o.c.	-$497
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	**R-30, 2x10**	**R-30, 2x10**	**-$803**
Air Infiltration	**2 ACH50**	**1.5 ACH50**	**$508**
Mechanical Ventilation	Exhaust Only	Exhaust Only	$0
Pre-Wiring[5]	N/A	N/A	$0
Solar Array[5]	N/A	N/A	$0
TOTAL			-$12,705

1. Additional Costs are the costs above Base Code to reach Stretch Code.
2. Cost included in basement and/or attic thermal boundary change
3. Base Code home features are based on an analysis of typical practices for achieving a HERS 52 using HERS Provider data on previously built homes in Massachusetts.
4. Stretch Code home features are based on cost optimization modeling using BEopt software. Some individual features are less efficient than the Base Code home, but they are more than offset by other features that are more efficient. One benefit of using a HERS Index target as the basis of the Stretch Code is that it give builders the flexibility to make different design choice to allow for optimization of cost effectiveness, work around other design constraints, and accommodate client-specific requests. The stretch code model was developed used REM/rate Version 16.1.1.
5. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to the Base or Stretch Code.
6. Please note that an all-electric home qualifies for a three-point increase in the HERS Index, reducing the stringency from HERS 52 to 55 when following the Base Code, and HERS 42 to 45 when following the Stretch Code. For the purposes of this analysis, a HERS Index of 52 (for Base Code) and 42 (for Stretch and Specialized Code) have been used in the energy models for the all-electric scenario.

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MA 10th Edition Building Code | 2025

4-story Multifamily - Electric

HERS Index (ERI)

45 ▸ 45

Stretch **Specialized**

Electric Heat Pump

Home Details

- 1200 sq.ft. per unit
- 4-Story Multifamily
- 2 Bedrooms
- Worcester, MA

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Costs and Benefits to Meet Specialized Code

	COSTS[1,2]	BENEFITS	NET
Solar Costs	**$0** Total Solar Cost	**$0** Incentives	**$0** Cost Compared to Stretch Code
Pre-Wiring Costs[3]	**$0** Total Pre-wiring Cost	**$0** Incentives	**$0** Costs Compared to Stretch Code
Total Cost	$0 Total Cost	**$500[1]** Incentives	**$500** Cost Savings Compared to Stretch Code

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. R-use buildings over 12,000 ft^2 using the specialized code are required to be passive house certified, which qualify for the Passive House Adder of $500/unit for the Mass Save Multi-Family New Construction Program Incentives up to $20,000 per project. These incentives are not applicable to mixed fuel projects. The values used in this model do not directly reflect these additional costs.
2. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to all-electric buildings.
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.

MA 10th Edition Building Code | 2025

4-story Multifamily - Electric

HERS Index (ERI)

45 ▸ 45

Stretch **Specialized**

Electric Heat Pump

1200 ft² per unit
4-story Multifamily
2 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Specialized Code

FEATURE	STRETCH CODE	SPECIALIZED CODE	COST DIFFERENTIAL[1]
HERS INDEX[4]	42	42	
Windows (U-Value/SHGC)	U-0.28, 0.29 SHGC	U-0.28, 0.29 SHGC	$0
DHW	HPWH, 50 gal, 2.35 EF	HPWH, 50 gal, 2.35 EF	$0
Heating Cooling	SEER 20, 12 HSPF, Ductless	SEER 20, 12 HSPF, Ductless	$0
Duct Leakage to Outside	Ductless	Ductless	$0
Foundation Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Floor Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Wall Insulation	R-21, 2x6, 16 in o.c.	R-21, 2x6, 16 in o.c.	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	Ceiling R-38, Vented	Ceiling R-38, Vented	$0
Air Infiltration	2 ACH50	2 ACH50	$0
Mechanical Ventilation	Exhaust Only	Exhaust Only	$0
Pre-Wiring[2,3]	N/A	N/A	$0
Solar Array[2]	N/A	N/A	$0
TOTAL			$0

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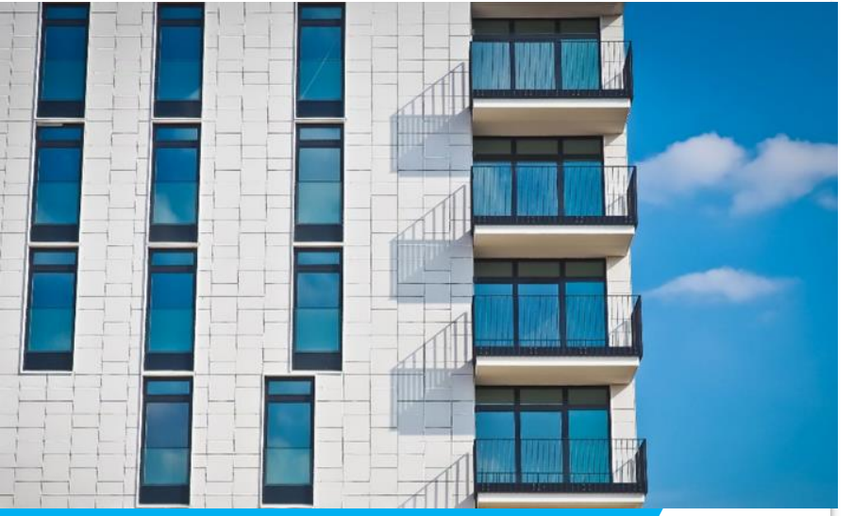
1. For All-Electric buildings, there is no cost difference between the Stretch Code and the Specialized Code because the requirements are the same.
2. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to all-electric buildings.
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.
4. Please note that an all-electric home qualifies for a three-point increase in the HERS Index, reducing the stringency from HERS 52 to 55 when following the Base Code, and HERS 42 to 45 when following the Stretch Code. For the purposes of this analysis, a HERS Index of 52 (for Base Code) and 42 (for Stretch and Specialized Code) have been used in the energy models for the all-electric scenario.
5. R-use buildings over 12,000 ft² using the specialized code are required to be passive house certified. The values used in this model do not directly reflect these additional costs.



HERS Index (ERI)

52 ▸ 42

Base Stretch

Gas

Home Details

- 1200 sq.ft. per unit
- 4-Story Multifamily
- 2 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

PSD

MA 10th Edition Building Code | 2025

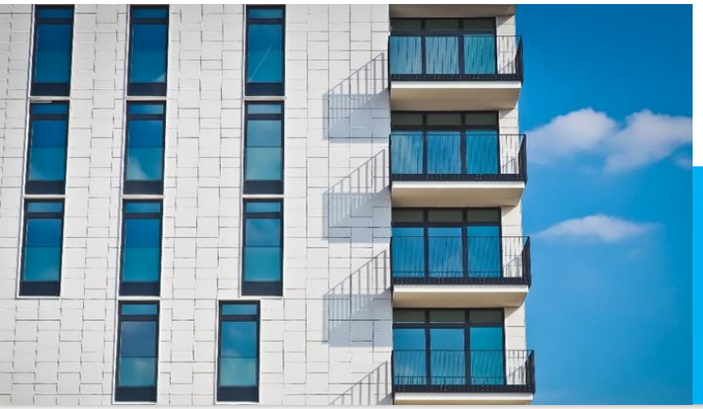
4-story Multifamily - Gas

Costs and Benefits to Meet Stretch Code*

	COSTS	BENEFITS[4]	NET
Total Added Construction Costs	**$2,652** Extra Costs	**$0** Incentives[1]	**$2,652** Cost Compared to Base Code
HOME BUYER	**$265** Increase in Downpayment[3]	**$178** Increase in Annual Mortgage Payment[3]	**$77** Estimated Energy Cost Savings per Year[2]	**$101** Buyer Annual Net Cost

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® High-rise Base Tier multi-family new construction incentives of $1,000 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Energy costs are based on 28.7 cents/kWh, $2.08/therm, and $3.62/gal propane
3. 30-year mortgage assumes 10% down payment at 6.35% APR
4. Mass Save Incentives are not available in communities with municipal light plants, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population



MA 10th Edition Building Code | 2025

4-story Multifamily - Gas

HERS Index (ERI)

52 ▸ 42

Base Stretch

Gas

1200 ft² per unit
4-story Multifamily
2 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Stretch Code

FEATURE	BASE CODE[3]	STRETCH CODE[4]	COST DIFFERENTIAL[1]
HERS INDEX	**52**	**42**	
Windows (U-Value/SHGC)	U-0.18, 0.29 SHGC	U-0.18, 0.29 SHGC	$0
DHW	Gas Tankless 0.94 EF	Gas Tankless 0.94 EF	$0
Heating	98% AFUE	98% AFUE	**-$34**
Cooling	**SEER 14.2**	**SEER 16**	**$479**
Duct Leakage to Outside	**In Conditioned Space**	**In Conditioned Space**	$0
Foundation Insulation	**NA (upper-level unit)**	**NA (upper-level unit)**	**$0**
Floor Insulation	**NA (upper-level unit)**	**NA (upper-level unit)**	**$0**
Walls Insulation	**R-21, 2x6, 16 in o.c., R-5 XPS**	**R-21, 2x6, 16 in o.c., R-5 XPS**	**$0**
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	**R-30, 2x10**	**R-30, 2x10**	**$0**
Air Infiltration	**2 ACH50**	**1 ACH50**	**$855**
Mechanical Ventilation	Exhaust Only	HRV, 75%	$1,352
Pre-Wiring[5]	N/A	N/A	$0
Solar Array[5]	N/A	N/A	$0
TOTAL			$2,652

DOER Massachusetts Department of Energy Resources

PSD

1. Additional Cost are the costs above Base Code to reach Stretch Code.
2. Cost included in basement and/or attic thermal boundary change.
3. Base Code home features are based on an analysis of typical practices for achieving a HERS 52 using HERS Provider data on previously built homes in Massachusetts.
4. Stretch Code home features are based on cost optimization modeling using BEopt software. Some individual features are less efficient than the Base Code home, but they are more than offset by other features that are more efficient. One benefit of using a HERS Index target as the basis of the Stretch Code is that it give builders the flexibility to make different design choice to allow for optimization of cost effectiveness, work around other design constraints, and accommodate client-specific requests. The stretch code model was developed used REM/rate Version 16.1.1.
5. Pre-wiring and solar costs are only applicable to mixed fuel projects following the Specialized code and do not apply to the Base or Stretch Code.

MA 10th Edition Building Code | 2025

4-story Multifamily - Gas

HERS Index (ERI)

42 ▸ 42

Stretch **Specialized**

Gas

Home Details

- 1200 sq.ft. per unit
- 4-Story Multifamily
- 2 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

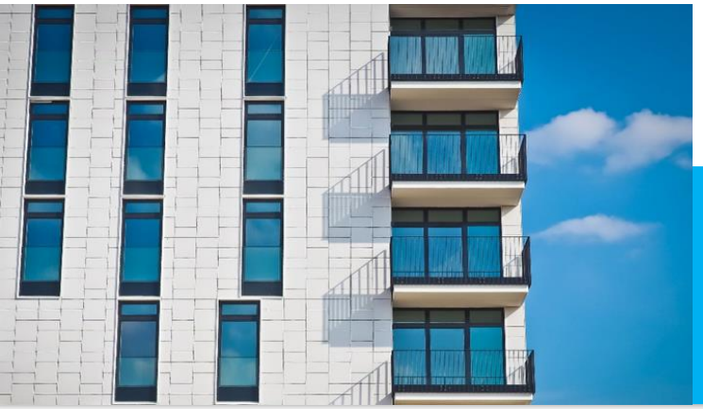
PSD

Costs and Benefits to Meet Specialized Code*

	COSTS	BENEFITS[3]	NET
Pre-Wiring Costs[5]	**$4,000** Total Pre-Wiring Cost	$0 Incentives[1,2]	**$4,000** Cost Compared to Stretch Code
Solar Costs	**$3,357** Total Solar Cost	**$504** Incentives[1,2]	**$2,853** Cost Compared to Stretch Code
Total Costs	**$6,853** Total Additional Costs	**$335** Annual Energy Bill Savings[4]	

*Green shaded boxes indicate cost savings, while red shaded boxes indicate added costs.

1. Incentives are calculated on a per unit basis, using Mass Save ® High-rise Base Tier multi-family new construction incentives of $1,000 without any Market Transformation Adders. These incentives are not applicable to mixed fuel projects.
2. Projects with solar installed may be eligible for a 15% MA State tax credit of the solar cost, up to $1,000.
3. Mass Save Incentives are not available in communities with municipal light plants, which are locally owned utilities which represent 52 towns that make up about 13% of the MA population.
4. The PV Watts Calculator was used to determine the total kWh saving of the project, using defaults for module type, array type , system losses, tilt, azimuth, etc. The kWh savings was compared to the total kWh used in the energy model. The savings calculation estimates an energy cost of 28.7 cents/kWh.
5. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.
6. R-use buildings over 12,000 ft^2 using the specialized code are required to be passive house certified, which qualify for the Passive House Adder of $500/unit for the Mass Save Multi-Family New Construction Program Incentives up to $20,000 per project. These incentives are not applicable to mixed fuel projects. The values used in this model do not directly reflect these additional costs.



MA 10th Edition Building Code | 2025

4-story Multifamily - Gas

HERS Index (ERI)

42 ▸ 42

Stretch **Specialized**

Gas

1200 ft² per unit
4-story Multifamily
2 Bedroom - Worcester, MA

Breakdown of Construction Costs to Meet Specialized Code

FEATURE	STRETCH CODE	SPECIALIZED CODE	COST DIFFERENTIAL[1]
HERS INDEX	**42**	**42**	
Windows (U-Value/SHGC)	U-0.18, 0.29 SHGC	U-0.18, 0.29 SHGC	$0
DHW	Gas Tankless 0.94 EF	Gas Tankless 0.94 EF	$0
Heating	Gas, 98% AFUE	Gas, 98% AFUE	$0
Cooling	SEER 16	SEER 16	$0
Duct Leakage to Outside	In Conditioned Space	In Conditioned Space	$0
Foundation Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Floor Insulation	NA (upper-level unit)	NA (upper-level unit)	$0
Walls Insulation	R-21, 2x6, 16 in o.c., R-5 XPS	R-21, 2x6, 16 in o.c., R-5 XPS	$0
High Efficacy Lighting	100% LED	100% LED	$0
Ceiling Insulation	R-30, 2x10	R-30, 2x10	$0
Air Infiltration	1 ACH50	1 ACH50	$0
Mechanical Ventilation	HRV, 75%	HRV, 75%	$0
Pre-Wiring[3]	N/A	**Yes**	**$4,000**
Solar Array[2]	N/A	**0.9 kW**	**$2,853**
TOTAL			**$6,853**

DOER Massachusetts Department of Energy Resources

PSD

1. Additional Cost are the costs above Stretch Code to reach Specialized Code.
2. Solar costs are based on the Massachusetts Clean Energy Center Solar Costs Comparison Tool, using the median dollar per watt of $3.73 as of July 30, 2024. The model does not take credit for any solar energy kWh generation. The solar array size was determined using the calculation of 0.75w/ft² multiplied by the gross conditioned floor area of 1,200ft² as per Section RC104.4.2
3. Pre-wiring includes the costs to add a dedicated branch circuit and outlet nearby any equipment currently using fossil fuels for space heating, water heating, cooking, and clothes drying. This does not include the costs associated with upgrading an electrical panel.
4. R-use buildings over 12,000 ft² using the specialized code are required to be passive house certified. The values used in this model do not directly reflect these additional costs.