



COMMONWEALTH OF MASSACHUSETTS

*Charles D. Baker, Governor
Karyn Polito, Lt. Governor
Matthew A. Beaton, Secretary
Judith Judson, Commissioner*

**The Green Communities Program –
Partnering with Massachusetts
Cities and Towns**

Jim Barry – Regional Coordinator

*Shrewsbury
March 28, 2017
Board of
Selectmen Meeting*

Green Communities Designation and Grant Program

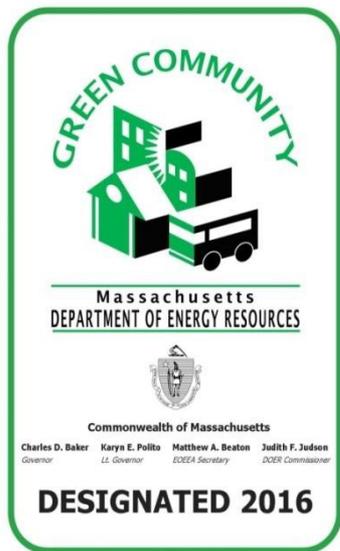
Provides up to \$20M annually in grants and loans to *qualifying communities*

- Grants will fund significant energy efficiency initiatives, renewable energy, innovative projects
- Funds allocated for Green Communities from RGGI auctions and ACP Funds.

Qualification Criteria – Designation

1. Adopt as-of-right siting for RE/AE generation, R&D, or manufacturing
2. Adopt expedited permitting process
3. Create an Energy Reduction Plan to reduce energy use by 20% in 5 years
4. Purchase only fuel-efficient vehicles
5. Minimize life cycle cost in new construction
→ adopt the Stretch Code

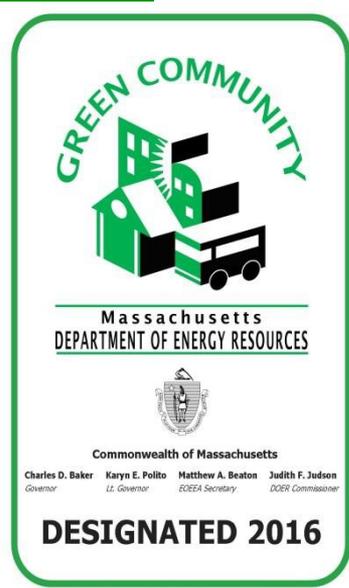
Creating a Clean, Affordable and Resilient Energy Future for the Commonwealth



Green Communities Designation Process Municipal Light Plant (MLP)

Qualification Criteria – Designation Continued

- The Green Communities Act requires a specific path forward in order for municipalities served by municipal light plants to participate in the Green Communities Designation and Grant program
 - Adopt the Renewable Energy Charge or document the municipality is served by Both a Municipal Light Plant and an Investor-Owned Utility
 - Ashburnham and Holyoke adopted the Renewable Energy Charge in 2009
 - Belmont, Chicopee, Concord, Lakeville, Littleton, Stow and Westfield have all provided documentation that the municipality is served by Both an MLP and IOU



Green Communities Designation and Grant Program

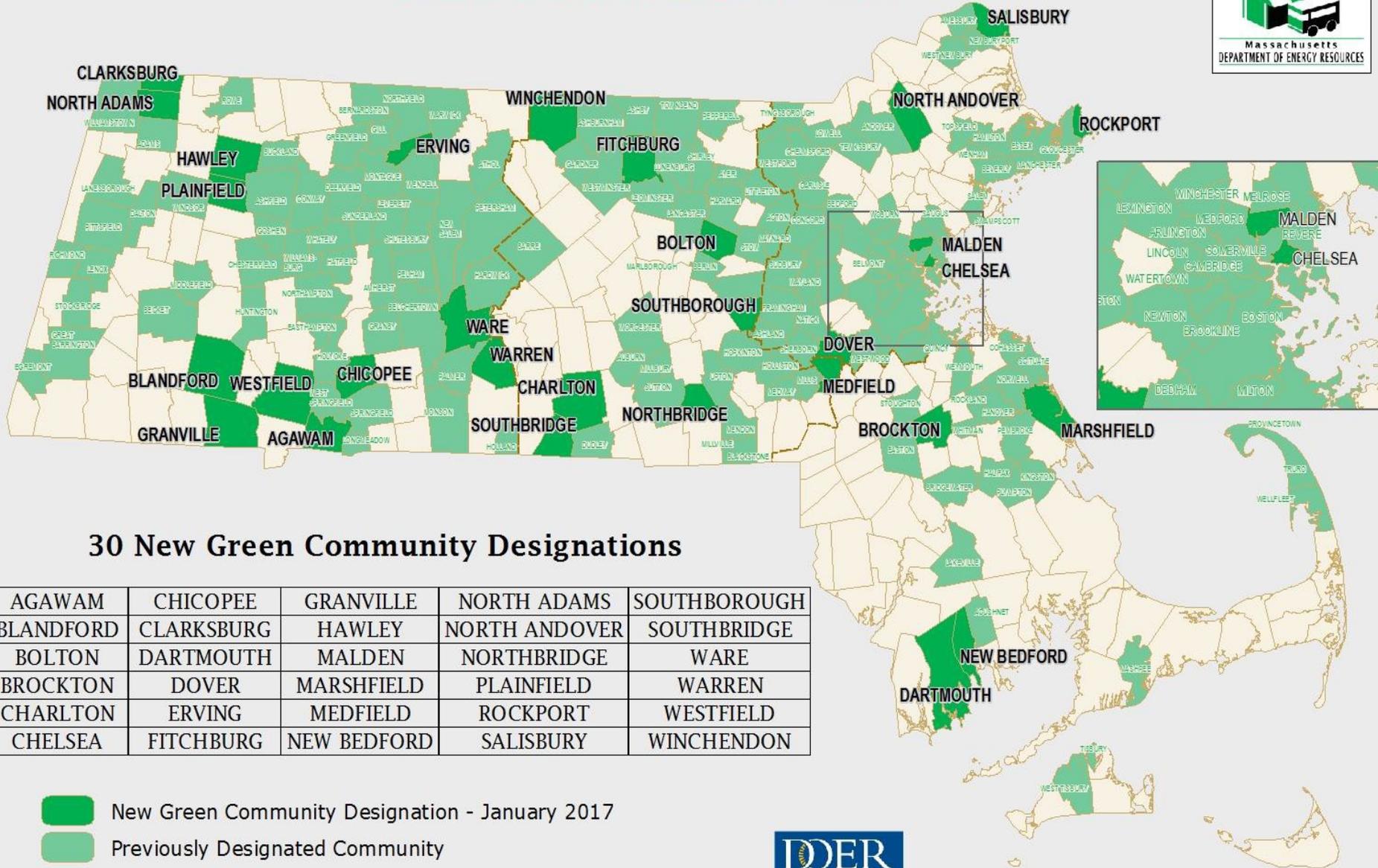
- Designation grant allocations based on a \$125K base plus a population/per capita income formula; maximum \$1M.
 - **Shrewsbury estimated grant amount \$180,000**
- Competitive grants available annually up to \$250,000 per applicant for Green Communities that have expended all prior grant funds.
- More than \$65M awarded in total for both designation and competitive grant programs
- Projects being funded include energy conservation measures, solar PV projects, incremental costs for hybrid vehicles.



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GREEN COMMUNITY DESIGNATIONS REACH ONE HUNDRED EIGHTY-FIVE



30 New Green Community Designations

AGAWAM	CHICOPEE	GRANVILLE	NORTH ADAMS	SOUTHBOROUGH
BLANDFORD	CLARKSBURG	HAWLEY	NORTH ANDOVER	SOUTHBRIDGE
BOLTON	DARTMOUTH	MALDEN	NORTHBRIDGE	WARE
BROCKTON	DOVER	MARSHFIELD	PLAINFIELD	WARREN
CHARLTON	ERVING	MEDFIELD	ROCKPORT	WESTFIELD
CHELSEA	FITCHBURG	NEW BEDFORD	SALISBURY	WINCHENDON

- New Green Community Designation - January 2017
- Previously Designated Community



Criteria #5 – Minimize Life Cycle Costs

Require all new residential construction and all new commercial and industrial real estate construction to minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies.

The DOER recommended way for cities and towns to meet this requirement is by adopting the BBRS Stretch Code (780 CMR 115.AA) an appendix to the MA State Building Code.

- In a town, the Stretch Code must be adopted as a general bylaw or article at Town Meeting.



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Criteria #5: Require new buildings to be more Energy Efficient

Municipalities can meet this criteria by adopting the new BBRS Stretch Code

- Stretch Code is an optional appendix to the 8th Edition of the Mass Building Code 780 CMR
 - Only for new residential and commercial construction
 - Repairs, additions, alterations follow Base Energy Code
- Follows the Base Energy Codes performance paths (IECC 2015 and ASHRAE 90.1 2013)
- Training for Building Officials has been done
- Provides for Performance testing, rather than Prescriptive measures.



Stretch Code old MIS-conceptions

- *‘Stretch Code is new and experimental.’*

No; It is based on Energy Star for Home, 20+ years
And many towns have over 6 years experience

- *‘Stretch Code requires tight unhealthy homes’*

No; Building science has evolved

Current code already requires stringent air sealing

- *‘We will give up our “local control” if we adopt it’*

No; There is no local control over the State wide
Building Code. You can opt-out of SC anytime.



Stretch Code old MIS-conceptions

“Town residents will be required to update their existing homes”

**No; the New Stretch Code only applies to
NEW residential construction and
NEW commercial construction > 100,000 sq ft**

**It explicitly exempts additions, renovations
& repairs from the Stretch Code**



The Stretch Code is no longer much of a Stretch

A few years ago, the Stretch Code WAS a bit of a stretch compared to the base energy code (IECC 2009).

But on July 1, 2014 a new base energy code (IECC 2012) took effect. Your town currently operates under this more energy efficient code.

That code “caught up” with the Stretch Code and some builders say that the Stretch Code is „easier“ to comply with than that IECC 2012 Code (insulation levels for example...)



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The Stretch Code is no longer much of a Stretch

January 1, 2017 – there is now a NEW base energy code (IECC 2015) and an associated NEW Stretch Code which is almost NO Stretch at all.

Basic difference in cost is for a HERS Energy Rater which is required by Stretch Code for new residential construction.

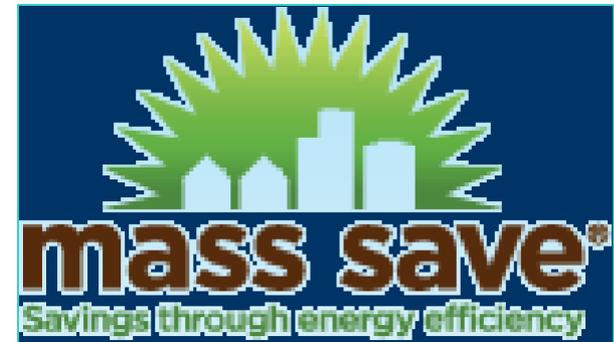
Costs between \$750 and \$1250 for typical single family home.

MassSave rebate covers most of this extra HERS cost.



Existing Residential Incentives

- Similar Requirements as the Stretch Code
 - Approx 30% of new homes in MA are eligible
- Builder incentives/rebates
 - \$750 - \$7000 for Single Family
 - \$350 - \$4,000 for Multi Family/unit
- HERS raters
 - \$700 - \$900 Single Family
 - \$250 - \$550 Multi Family/unit
- Additional Equipment Rebates
 - Appliances – up to \$50 (low income)
 - Heating – up to \$1,500
 - Water Heating – up to \$800



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What does Stretch Code Apply to?

Same application as the MA base energy code

- Insulation
- Doors, Windows, Skylights
- Mechanical Equipment
- Lighting
- Appliances
- Building tightness
- Duct tightness
- Renewables



What is HERS Process?

1. Review Building Plans via Computer Modeling
2. In-process inspections
 - First inspection
 - Thermal Bypass Checklist
 - Duct tightness test (if applicable)
 - Second Inspection (usually combined with 1st)
 - Insulation
 - Final Inspection
 - Blower door test
3. Finalize energy model based on verified performance and equipment



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What is a HERS Rating? (Home Energy Rating System)

Annualized energy analysis

Heating, Cooling, Water Heating,
Lighting and Appliances....

On site power generation-renewable energy

Reference Home

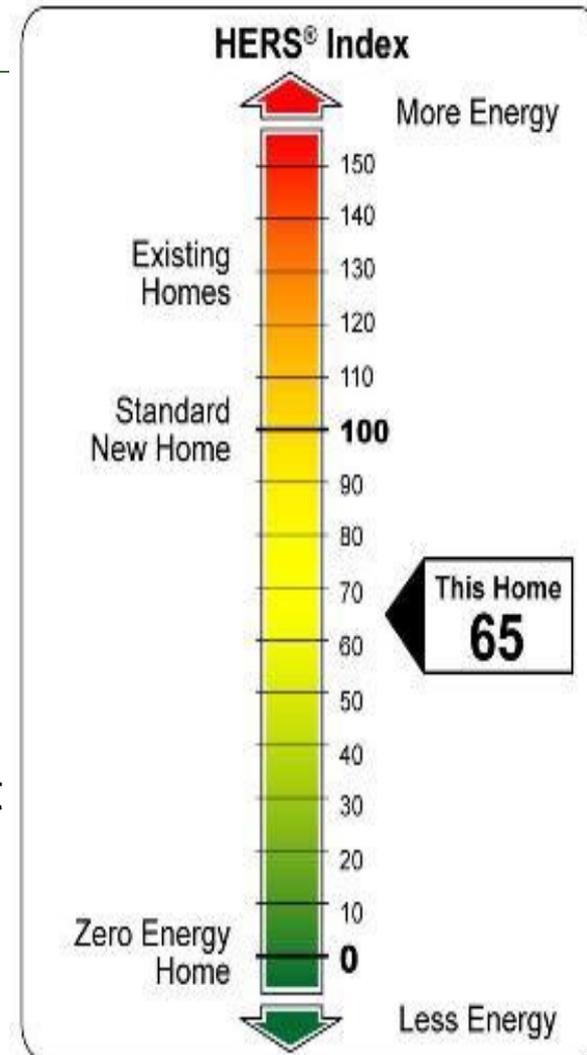
- Based on IECC **2006** Code
(International Energy Conservation Code)
Defined as 100 Points
- 1 percent change in consumption = 1 point

HERS 65 means about

35% more efficient than reference home

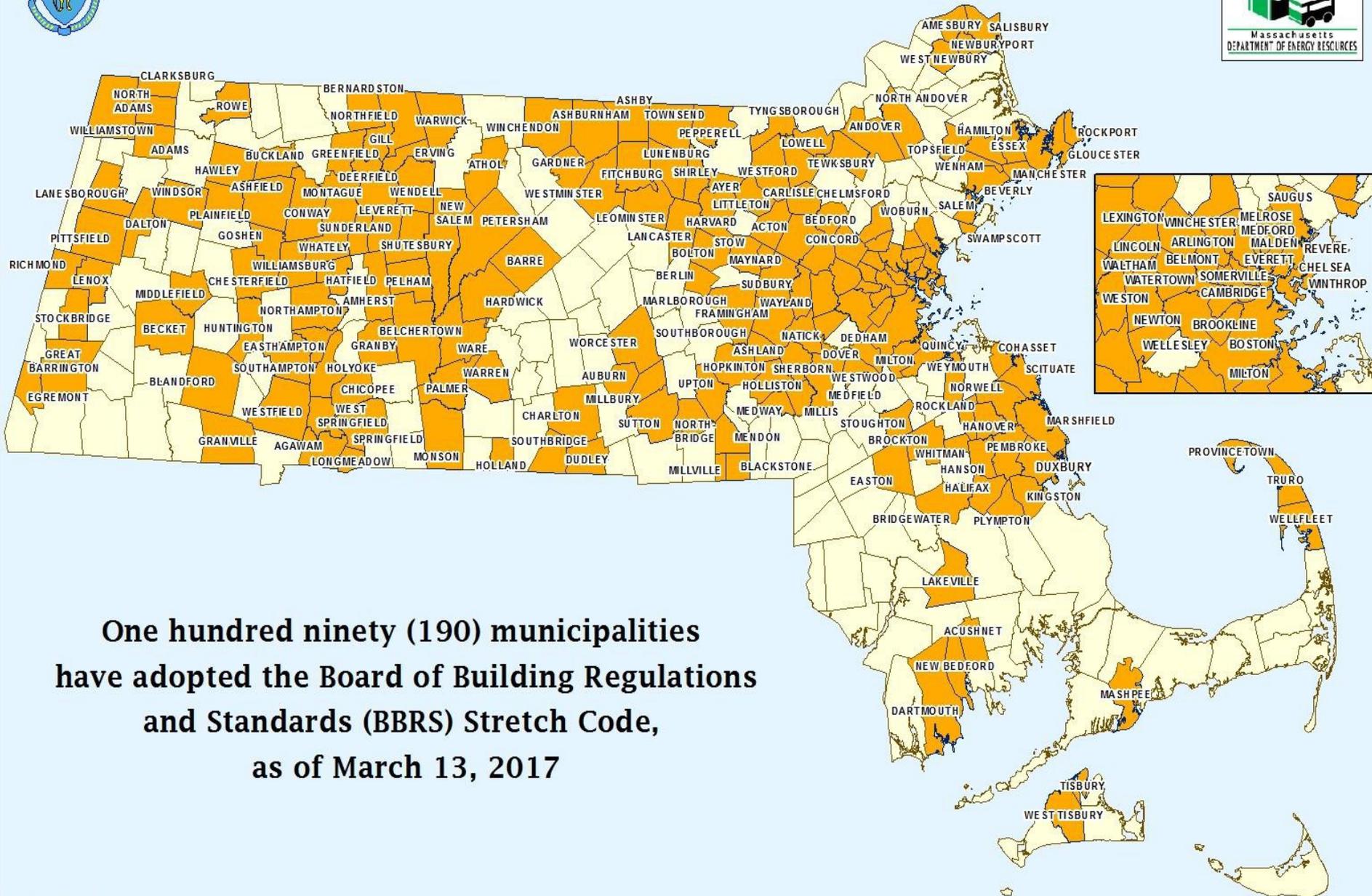


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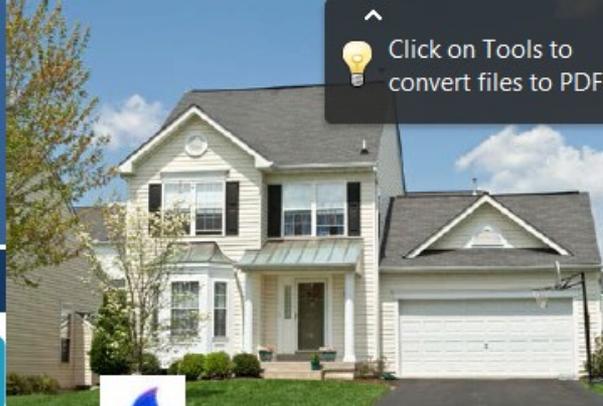
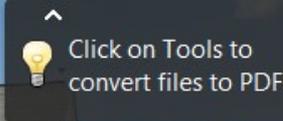


Stretch Code Adoption, by Community



9th Edition Stretch Code Modeling Analysis

2200 sq. ft. 3 BR Single Family Natural Gas Heat
Worcester, MA



2015 BASE CODE Three Compliance Options

HERS Index (ERI)	
Base	62

Energy Rating Index (HERS) PASS

Cost Alternative PASS

REScheck – UA Alternative PASS



Natural Gas Heat ERI compliance requires a HERS Index of 55 and a Certified HERS Rating

2015 STRETCH CODE HERS (ERI) Compliance Option

HERS Index (ERI)	
Stretch	55

Energy Rating Index (HERS) PASS

1 - Incentives revised annually around July 1

2 - Energy costs are based on 21 cents/kWh / \$1.01/therm, savings are compared with BASE CODE home

3 - 30 Year Mortgage assumes 10% downpayment at 4% APR

Changes to meet STRETCH CODE		Cost or (Savings)
Builder Costs	Estimated cost of adjustments + HERS Rater fee	\$2,017
	Utility rebates ¹	(\$2,050)
	Cost compared to BASE CODE	(\$33)
Homebuyer Costs	Estimated energy cost change per year ²	(\$165)
	Change to downpayment ³	(\$33)
	Change to annual mortgage payment ³	\$0
	Year 1 cash flow	(\$198)
	Year 2+ cash flow	(\$165)

March 2016

9th Edition Stretch Code Modeling Analysis

2200 sq. ft. 3 BR Single Family Natural Gas Heat
Worcester, MA

BASELINE FEATURES

FOUNDATION	<i>Unconditioned, uninsulated basement</i>
FLOOR	<i>R30 fiberglass Grade 1</i>
WALLS	<i>R21 fiberglass Grade 1</i>
WINDOWS (U-VALUE/SHGC)	<i>0.30/0.30</i>
CEILING – FLAT	<i>R-19 + R-30 fiberglass cross</i>
CEILING – SLOPED	<i>R-30 fiberglass Grade 1</i>
HEATING	<i>92% Furnace x1</i>
COOLING	<i>13 SEER x1</i>
DHW	<i>0.62 EF 40 gallon tank</i>
DUCT LEAKAGE TO OUTSIDE	<i>4%</i>
AIR INFILTRATION	<i>3.0 ACH50</i>
HIGH EFFICACY LIGHTING	<i>75%</i>

2015 STRETCH CODE HERS (ERI)

HERS Index (ERI)		Adjusted Features	Construction Cost/(savings)
Base	62		
Stretch	55	HERS Rating	\$1,350
		Floor R30 Grade 2	(\$64)
		95% Furnace x1	\$639
		0.95 Tankless DHW	\$92
		100% LED lighting	\$0
		Total Cost	\$2,017

Incentive Breakdown	Incentive
MassSave RNC Program Tier I	\$750
MassSave RNC Program LED light bulbs ⁴	\$200
Furnace ≥95% AFUE rating equipped with ECM	\$300
On-Demand, Tankless Water Heater with an Energy Factor ≥0.94 and electronic ignition	\$800
Total Incentive	\$2,050
Total Cost compared to BASE CODE	(\$33)

9th Edition Stretch Code Modeling Analysis

3800 sq. ft. 3 BR Single Family Natural Gas Heat
Worcester, MA



2015 BASE CODE Three Compliance Options

HERS Index (ERI)

Base	58
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Energy Rating Index (HERS)

PASS

Cost Alternative

PASS

REScheck – UA Alternative

PASS



Natural Gas Heat ERI compliance requires a HERS Index of 55 and a Certified HERS Rating

2015 STRETCH CODE HERS (ERI) Compliance Option

HERS Index (ERI)

Stretch	52
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Energy Rating Index (HERS)

PASS

Changes to meet STRETCH CODE

Changes to meet STRETCH CODE		Cost or (Savings)
Builder Costs	Estimated cost of adjustments + HERS Rater fee	\$1,442
	Utility rebates ¹	(\$1,750)
	Cost compared to BASE CODE	(\$308)
Homebuyer Costs	Estimated energy cost change per year ²	(\$200)
	Change to downpayment ³	(\$31)
	Change to annual mortgage payment ³	(\$16)
	Year 1 cash flow	(\$247)
	Year 2+ cash flow	(\$216)

1 - Incentives revised annually around July 1

2 - Energy costs are based on 21 cents/kWh / \$1.01/therm, savings are compared with BASE CODE home

3 - 30 Year Mortgage assumes 10% downpayment at 4% APR

March 2016

9th Edition Stretch Code Modeling Analysis

3800 sq. ft. 3 BR Single Family Natural Gas Heat
Worcester, MA

BASELINE FEATURES

FOUNDATION	<i>Unconditioned, uninsulated basement</i>
FLOOR	<i>R30 fiberglass Grade 1</i>
WALLS	<i>R21 fiberglass Grade 1</i>
WINDOWS (U-VALUE/SHGC)	<i>0.30/0.30</i>
CEILING – FLAT	<i>R-19 + R-30 fiberglass cross</i>
CEILING – SLOPED	<i>R-30 fiberglass Grade 2</i>
HEATING	<i>92% Furnace x2</i>
COOLING	<i>13 SEER x2</i>
DHW	<i>0.62 EF 50 gallon tank</i>
DUCT LEAKAGE TO OUTSIDE	<i>4%</i>
AIR INFILTRATION	<i>3.0 ACH50</i>
HIGH EFFICACY LIGHTING	<i>75%</i>

2015 STRETCH CODE HERS (ERI)

HERS Index (ERI)		Adjusted Features	Construction Cost/(savings)
Base	58	HERS Rating	\$1,350
Stretch	52	0.95 Tankless DHW	\$92
		100% LED lighting	\$0
		Total Cost	\$1,442

Incentive Breakdown	Incentive
MassSave RNC Program Tier I	\$750
MassSave RNC Program LED light bulbs ⁴	\$200
On-Demand, Tankless Water Heater with an Energy Factor ≥ 0.94 and electronic ignition	\$800
Total Incentive	\$1,750
Total Cost compared to BASE CODE	<u>(\$308)</u>

Stretch code documentation

- Residential HERS rater requirements
 - Permit – plan review submittal with projected HERS rating ‘based on plans’
 - Certificate of Occupancy – Certified HERS index score based on final blower-door, duct testing
- Large Commercial – Energy Model requirements
 - Plan review – ASHRAE 90.1 Appendix G energy model submitted with plans
 - Certificate of Occupancy – Final energy model showing as-built building meets 10% savings



Commercial Stretch energy code – 2016

- Large Commercial = Annual Energy use 10% below ASHRAE 90.1-2013 - Appendix G modeling
 - Appendix G also used for LEED certification
- Applies to:
 - New construction over 100,000 sqft
 - Labs, Supermarkets, conditioned warehouses over 40,000 sqft





Commercial Incentives

- Incentives available for commercial:
 - New Construction/Major Renovation and Replacing Failed Equipment
 - The New Construction Program is for business customers who are building new facilities, undergoing major renovations of an existing facility, or replacing failed equipment.
 - Large Retrofit Program
 - The Retrofit Program is designed for business customers who want to replace or refit aging, inefficient equipment and systems with energy efficient technologies.
 - Small Business Program
 - The Small Business Program offers technical and financial assistance to help small businesses find ways to become more energy efficient and save money.
 - Multi-Family Buildings Program
 - Mass Save® offers energy efficiency improvement or replacement opportunities for facilities with five (5) or more dwelling units.

<http://www.masssave.com/en/business/incentive-programs>



Creating a Clean, Affordable and Resilient Energy Future for the Commonwealth



Green Communities Contacts

Jim Barry – Western Regional Coordinator

Jim.Barry@State.MA.US (413) 755-2322

Kelly Brown – Central Regional Coordinator

Kelly.Brown@State.MA.US (508) 767-2703

Website: <http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/>



Creating a Clean, Affordable and Resilient Energy Future for the Commonwealth



9th Edition Stretch Code Modeling Analysis

2200 sq. ft. 3 BR Single Family Electric Heat
Worcester, MA

BASELINE FEATURES

FOUNDATION	<i>Unconditioned, uninsulated basement</i>
FLOOR	<i>R30 fiberglass Grade 1</i>
WALLS	<i>R21 fiberglass Grade 1</i>
WINDOWS (U-VALUE/SHGC)	<i>0.30/0.30</i>
CEILING – FLAT	<i>R-19 + R-30 fiberglass cross</i>
CEILING – SLOPED	<i>R-30 fiberglass Grade 1</i>
HEATING	<i>10 HSPF Heat Pump</i>
COOLING	<i>19 SEER Heat Pump</i>
DHW	<i>0.95 EF Tank Electric Resistance WH</i>
DUCT LEAKAGE TO OUTSIDE	<i>N/A Ductless</i>
AIR INFILTRATION	<i>3.0 ACH50</i>
LED/CFL LIGHTING	<i>75%</i>

2015 STRETCH CODE HERS (ERI)

HERS Index (ERI)

Base	57
Stretch	49

Adjusted Features Construction Cost/(savings)

HERS Rating	\$1,350
Floor R30 Grade 2	(\$64)
Walls R21 Grade 2	(\$120)
Ceiling – Sloped R30 Grade 2	(\$20)
11.3HSPF/19.1SEER Heat Pump	\$500
3.25 EF Heat Pump DHW	\$419
LED Lighting 100%	\$0
Total Cost	\$2,066

MassSave Incentive Breakdown Incentive

RNC Program Tier II	\$1,250
Heat Pump – MassSave and MassCEC	\$2,593
Heat Pump Water Heater Incentive	\$750
RNC Program LED light bulbs ⁴	\$200
Total Incentive	\$4,793
Total Cost compared to BASE CODE	<u>(\$2,727)</u>

9th Edition Stretch Code Modeling Analysis

2200 sq. ft. 3 BR Single Family Electric Heat
Worcester, MA



2015 BASE CODE Three Compliance Options

HERS Index (ERI)

Base	57
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Energy Rating Index (HERS) PASS

Cost Alternative PASS

REScheck – UA Alternative PASS



Electric Heat Pump

ERI compliance requires a HERS Index of max. 55 and a Certified HERS Rating

2015 STRETCH CODE HERS (ERI) Compliance Option

HERS Index (ERI)

Stretch	49
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Energy Rating Index (HERS) PASS

Changes to meet STRETCH CODE

Changes to meet STRETCH CODE		Cost or (Savings)
Builder Costs	Estimated cost of adjustments + HERS Rater fee	\$2,066
	Utility rebates ¹	(\$4,793)
	Cost compared to BASE CODE	(\$2,727)
Homebuyer Costs	Estimated reduced energy cost per year ²	(\$567)
	Change to downpayment ³	(\$273)
	Change to annual mortgage payment ³	(\$141)
	Year 1 cash flow	(\$980)
	Year 2+ cash flow	(\$708)

1 - Incentives revised annually around July 1

2 - Energy costs are based on 21 cents/kWh / \$1.01/therm, savings are compared with BASE CODE home

3 - 30 Year Mortgage assumes 10% downpayment at 4% APR

March 2016

9th Edition Stretch Code Modeling Analysis

2200 sq. ft. 3 BR Single Family Propane Heat
Worcester, MA



2015 BASE CODE Three Compliance Options

HERS Index (ERI)

Base	62
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Energy Rating Index (HERS)

PASS

Cost Alternative

PASS

REScheck – UA Alternative

PASS



Propane Heat
ERI compliance requires a
HERS Index of 55 and a
Certified HERS Rating

2015 STRETCH CODE HERS (ERI) Compliance Option

HERS Index (ERI)

Stretch	55
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Energy Rating Index (HERS)

PASS

Changes to meet STRETCH CODE

Changes to meet STRETCH CODE		Cost or (Savings)
Builder Costs	Estimated cost of adjustments + HERS Rater fee	\$2,017
	Utility rebates ¹	(\$2,250)
	Cost compared to BASE CODE	(\$233)
Homebuyer Costs	Estimated energy cost change per year ²	(\$117)
	Change to downpayment ³	(\$233)
	Change to annual mortgage payment ³	\$0
	Year 1 cash flow	(\$350)
	Year 2+ cash flow	(\$117)

1 - Incentives revised annually around July 1

2 - Energy costs are based on 21 cents/kWh / \$1.01/therm, savings are compared with BASE CODE home

3 - 30 Year Mortgage assumes 10% downpayment at 4% APR

August 2016

9th Edition Stretch Code Modeling Analysis

2200 sq. ft. 3 BR Single Family Propane Heat

Worcester, MA

BASELINE FEATURES

FOUNDATION	<i>Unconditioned, uninsulated basement</i>
FLOOR	<i>R30 fiberglass Grade 1</i>
WALLS	<i>R21 fiberglass Grade 1</i>
WINDOWS (U-VALUE/SHGC)	<i>0.30/0.30</i>
CEILING – FLAT	<i>R-19 + R-30 fiberglass cross</i>
CEILING – SLOPED	<i>R-30 fiberglass Grade 1</i>
HEATING	<i>92% Furnace x1</i>
COOLING	<i>13 SEER x1</i>
DHW	<i>0.62 EF 40 gallon tank</i>
DUCT LEAKAGE TO OUTSIDE	<i>4%</i>
AIR INFILTRATION	<i>3.0 ACH50</i>
HIGH EFFICACY LIGHTING	<i>75%</i>

2015 STRETCH CODE HERS (ERI)

HERS Index (ERI)		Adjusted Features	Construction Cost/(savings)
Base	62		
Stretch	55	HERS Rating	\$1,350
		Floor R30 Grade 2	(\$64)
		95% Furnace x1	\$639
		0.95 Tankless DHW	\$92
		100% LED lighting	\$0
		Total Cost	\$2,017

Incentive Breakdown	Incentive
MassSave RNC Program Tier I	\$750
MassSave RNC Program LED light bulbs ⁴	\$200
Furnace ≥95% AFUE rating equipped with ECM	\$500
On-Demand, Tankless Water Heater with an Energy Factor ≥0.94 and electronic ignition	\$800
Total Incentive	\$2,250
Total Cost compared to BASE CODE	(\$233)

9th Edition Stretch Code Modeling Analysis

3800 sq. ft. 3 BR Single Family Electric Heat
Worcester, MA



2015 BASE CODE Three Compliance Options

HERS Index (ERI)

Base	60
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Energy Rating Index (HERS)

PASS

Cost Alternative

PASS

REScheck – UA Alternative

PASS



Electric Heat Pump

ERI compliance requires a HERS Index of max. 55 and a Certified HERS Rating

2015 STRETCH CODE HERS (ERI) Compliance Option

HERS Index (ERI)

Stretch	53
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Energy Rating Index (HERS)

PASS

Changes to meet STRETCH CODE

Changes to meet STRETCH CODE		Cost or (Savings)
Builder Costs	Estimated cost of adjustments + HERS Rater fee	\$1,503
	Utility rebates ¹	(\$1,700)
	Cost compared to BASE CODE	(\$197)
Homebuyer Costs	Estimated reduced energy cost per year ²	(\$827)
	Change to downpayment ³	(\$20)
	Change to annual mortgage payment ³	(\$10)
	Year 1 cash flow	(\$837)
	Year 2+ cash flow	(\$817)

1 - Incentives revised annually around July 1

2 - Energy costs are based on 21 cents/kWh / \$1.01/therm, savings are compared with BASE CODE home

3 - 30 Year Mortgage assumes 10% downpayment at 4% APR

March 2016

9th Edition Stretch Code Modeling Analysis

3800 sq. ft. 3 BR Single Family Electric Heat
Worcester, MA

BASELINE FEATURES

FOUNDATION	<i>Unconditioned, uninsulated basement</i>
FLOOR	<i>R30 fiberglass Grade 1</i>
WALLS	<i>R21 fiberglass Grade 1</i>
WINDOWS (U-VALUE/SHGC)	<i>0.30/0.30</i>
CEILING – FLAT	<i>R-19 + R-30 fiberglass cross</i>
CEILING – SLOPED	<i>R-30 fiberglass Grade 2</i>
HEATING	<i>8.2 HSPF Heat Pump</i>
COOLING	<i>14 SEER Heat Pump</i>
DHW	<i>0.95 EF Tank Electric Resistance WH</i>
DUCT LEAKAGE TO OUTSIDE	<i>N/A Ductless</i>
AIR INFILTRATION	<i>3.0 ACH50</i>
LED/CFL LIGHTING	<i>75%</i>

2015 STRETCH CODE HERS (ERI)

HERS Index (ERI)		Adjusted Features	Construction Cost/(savings)
Base	60	HERS Rating	\$1,350
Stretch	53	Floor R30 Grade 2	(\$111)
		Wall R21 Grade 2	(\$154)
		3.25 EF Heat Pump DHW	\$419
		LED Lighting 100%	\$0
		Total Cost	\$1,503

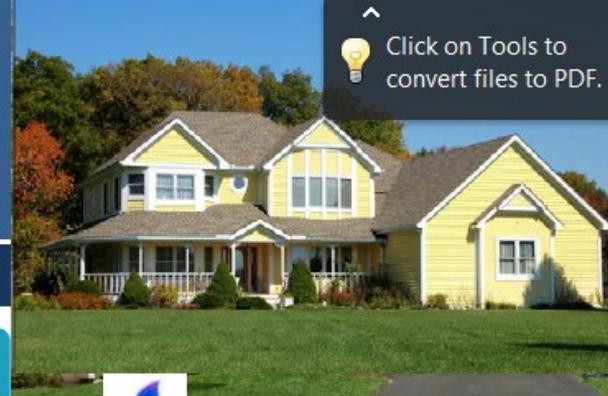
MassSave Incentive Breakdown	Incentive
RNC Program Tier I	\$750
Heat Pump Water Heater Incentive	\$750
RNC Program LED light bulbs ⁴	\$200
Total Incentive	\$1,700
Total Cost compared to BASE CODE	<u>(\$197)</u>

4 – LED value assumed at \$10/bulb for 20 bulbs

9th Edition Stretch Code Modeling Analysis

3800 sq. ft. 3 BR Single Family Propane Heat
Worcester, MA

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convert files to PDF.



2015 BASE CODE Three Compliance Options

HERS Index (ERI)

Base	58
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Energy Rating Index (HERS)

PASS

Cost Alternative

PASS

REScheck – UA Alternative

PASS



Propane Heat
ERI compliance requires a
HERS Index of 55 and a
Certified HERS Rating

2015 STRETCH CODE HERS (ERI) Compliance Option

HERS Index (ERI)

Stretch	52
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Energy Rating Index (HERS)

PASS

Changes to meet STRETCH CODE

Changes to meet STRETCH CODE		Cost or (Savings)
Builder Costs	Estimated cost of adjustments + HERS Rater fee	\$1,442
	Utility rebates ¹	(\$1,750)
	Cost compared to BASE CODE	(\$308)
Homebuyer Costs	Estimated energy cost change per year ²	(\$120)
	Change to downpayment ³	(\$31)
	Change to annual mortgage payment ³	(\$16)
	Year 1 cash flow	(\$167)
	Year 2+ cash flow	(\$136)

1 - Incentives revised annually
around July 1

2 - Energy costs are based on 21
cents/kWh / \$1.01/therm, savings
are compared with BASE CODE
home

3 - 30 Year Mortgage assumes 10%
downpayment at 4% APR

August 2016

9th Edition Stretch Code Modeling Analysis

3800 sq. ft. 3 BR Single Family Propane Heat
Worcester, MA

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WALLS	<i>R21 fiberglass Grade 1</i>
WINDOWS (U-VALUE/SHGC)	<i>0.30/0.30</i>
CEILING – FLAT	<i>R-19 + R-30 fiberglass cross</i>
CEILING – SLOPED	<i>R-30 fiberglass Grade 2</i>
HEATING	<i>92% Furnace x2</i>
COOLING	<i>13 SEER x2</i>
DHW	<i>0.62 EF 50 gallon tank</i>
DUCT LEAKAGE TO OUTSIDE	<i>4%</i>
AIR INFILTRATION	<i>3.0 ACH50</i>
HIGH EFFICACY LIGHTING	<i>75%</i>

2015 STRETCH CODE HERS (ERI)

HERS Index (ERI)		Adjusted Features	Construction Cost/(savings)
Base	58	HERS Rating	\$1,350
Stretch	52	0.95 Tankless DHW	\$92
		100% LED lighting	\$0
		Total Cost	\$1,442

Incentive Breakdown	Incentive
MassSave RNC Program Tier I	\$750
MassSave RNC Program LED light bulbs ⁴	\$200
On-Demand, Tankless Water Heater with an Energy Factor ≥ 0.94 and electronic ignition	\$800
Total Incentive	\$1,750
Total Cost compared to BASE CODE	(\$308)