COMMONWEALTH OF MASSACHUSETTS

Deval L. Patrick, Governor
Maeve Bartlett, Secretary
Meg Lusardi, Commissioner

The Green Communities Program – Partnering with Massachusetts Cities and Towns

Warwick
September, 2014

Jim Barry – Regional Coordinator
Green Communities Division
Department of Energy Resources
Executive Office Energy and Environmental Affairs

Green Communities Division

Serves as the hub for all Massachusetts cities and towns on energy matters

Helping Massachusetts Municipalities Create A Cleaner Energy Future

Green Communities Division -
Programs & Resources for Municipalities

- MassEnergyInsight energy tracking and analysis tool
- MMEG – Web forum for Municipal Energy Activities
- Energy Management Services Technical Assistance
- SAPHIRE grants for Schools and Public Housing
- OATA grant for any municipality
- CERP – Clean Energy Results Program with DEP
- Green Communities Designation and Grant Program
- Website filled with tools & resources
  www.mass.gov/energy/greencommunities
- Email updates via listserv – Sign up by sending an email to: join-ene-greencommunities@listserv.state.ma.us

Helping Massachusetts Municipalities Create A Cleaner Energy Future

Green Communities Grant Program

- Provides up to $10M annually in grants and loans to ***qualifying*** communities
  - Grants will fund significant energy efficiency initiatives, renewable energy, innovative projects

- **5 Qualification Criteria**
  1. Adopt as-of-right siting, in designated locations, for RE/AE generation, or RE/AE R&D, or RE/AE manufacturing
  2. Adopt expedited (12 month) application/permitting process
  3. Establish an energy use baseline inventory with a program to reduce baseline by 20% in 5 years
  4. Purchase only fuel-efficient vehicles
  5. Require all new residential construction > 3000 $ft^{2,}$ and new commercial and industrial real estate construction to minimize life-cycle energy costs

Criteria #1: As-Of Right Siting

Adopt as-of-right siting,
in designated locations,
for RE/AE Generation,
OR RE/AE Manufacturing,
OR RE/AE Research and Development

- Site Plan Approval and ConCom review still applicable but NO Special Permits
- Designated locations means NOT everywhere in town
- RE = Renewable Energy (Solar PV, Wind, Wave)
- AE = Alternative Energy (Biomass Combined Heat & Power)

Criteria #2: Expedited Permitting Process

- 12 Months from date of complete application
- Not all permits, just those that relate to Criteria #1

MGL 43 D ~ Priority Development Site is acceptable (this requires 6 month process)

Or a letter from legal counsel:

- Affirm no preclusions for expedited permitting
- Include language addressing approval procedures
- Associated timing from any applicable bylaws/ordinances or regulations.

Criteria #3: Energy Use Baseline

Establish Energy Use Baseline

And adopt a 5 Year Plan to reduce it by 20%

- Includes all Municipal Buildings, Vehicles, Street and Traffic Lights

- You can use new Mass Energy Insight
  Or Energy Star Portfolio Manager or other tools

- The Baseline Year can go back 2 years (to FY 2012)

- Comprehensive 5 year plan to reduce that baseline energy use by 20 %

Criteria #4: Purchase Only Fuel Efficient Vehicles

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Whenever such vehicles are commercially available and practicable

- Heavy duty vehicles such as Fire Trucks, Ambulances and some DPW trucks are exempt (GVW of 8500 lbs or more)

- Police cruisers are exempt; until they become commercially available

- If you do not have a fleet, must have a policy to promote reduced fossil fuel use. We can provide sample from Northfield or Gill or…

Criteria #5: Require all new residential construction > 3000 ft^2 and new commercial and industrial real estate construction to minimize life-cycle energy costs

Municipalities can meet this criteria by adopting the Stretch Code created by the BBRS (Board of Building Regulations and Standards).

Topics to be covered

- What is the Stretch Code,
  who is involved

- What it means for New Homes,
  Additions, Renovations & Repairs,
  Commercial buildings

- Costs vs. Benefits

- How to adopt it

Questions, Questions, Questions

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 7th Edition of the Mass Building Code 780 CMR**

- **Process is similar to Energy Star for Homes**

- **Training for Building Officials has been done**

- **Provides for Performance testing, rather than Prescriptive measures.**

Why Test Performance?

- Prescriptive codes don't guarantee good installation,

  air and water tightness,

  or that thermal insulation is effective.

- Small air gaps can

  reduce insulation R-values by 50% or more.

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Insulation

- Performance suffers rapidly when details aren't followed
- Quality installation is key

Photos courtesy Conservation Services Group ©

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Stretch Code for New Residential Construction

New low-rise (three stories or less) residential buildings shall require a HERS (Home Energy Rating System) index rating as verified by a RESNET (Residential Energy Services Network) certified HERS rater.

- **For units greater than or equal to 3,000 sq ft in conditioned floor space, a HERS rating of 65 or less is required.**
- **For units less than 3,000 sq ft, a HERS rating of 70 or less is required.**

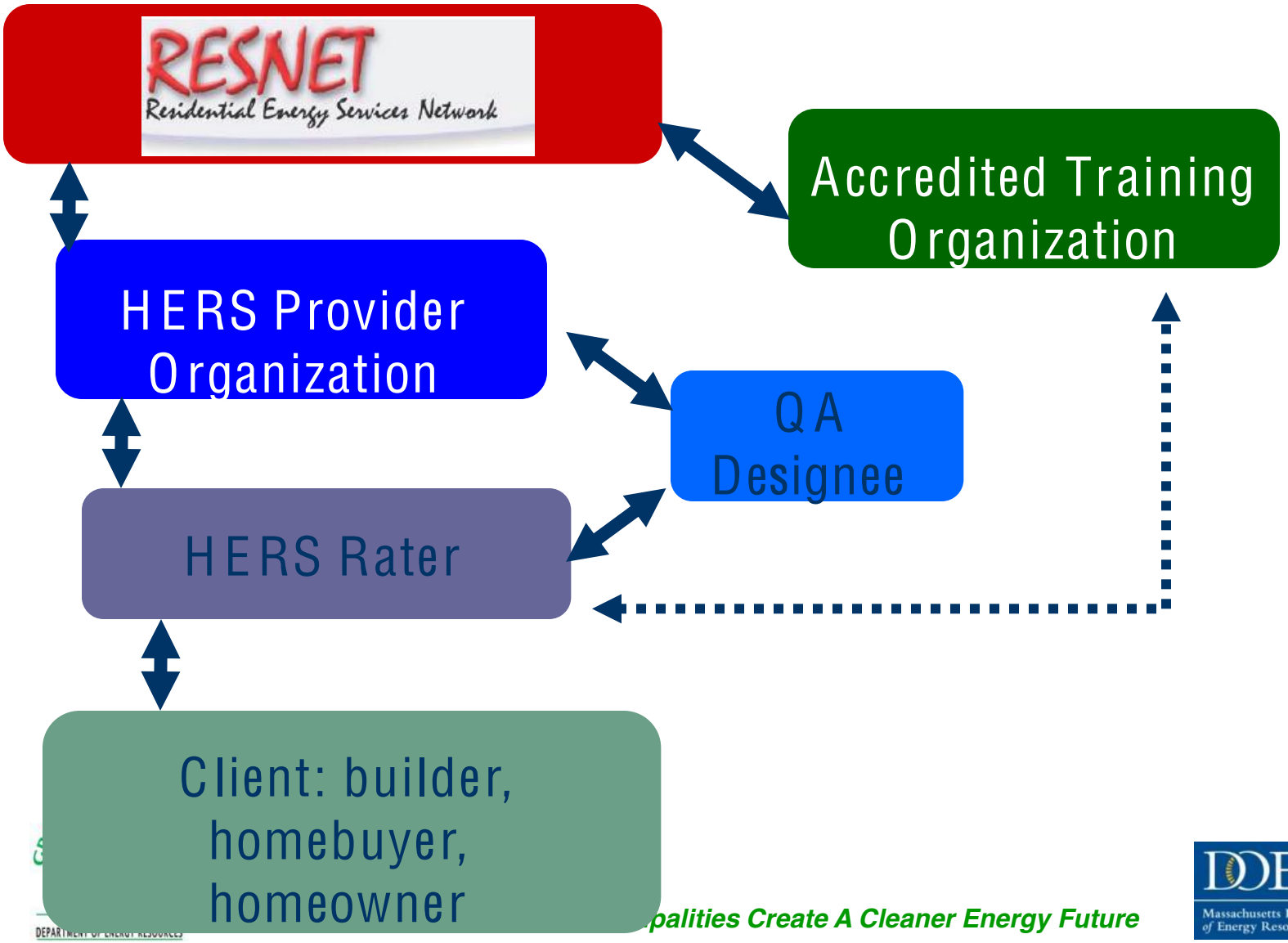
- **In addition, all new construction shall demonstrate compliance with the Energy Star Qualified Homes Thermal Bypass Inspection Checklist**

Residential Energy Services Network

- RESNET: National, nonprofit HERS (Home Energy Rating System) advocacy organization
  - Standards development and maintenance
  - Quality Assurance oversight
  - Forum for public comment on rating issues

- Recognized by
  Environmental Protection Agency - EPA
  Department of Energy – DOE
  Internal Revenue Service – IRS

HERS - Home Energy Rating System Industry and Stake Holders



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

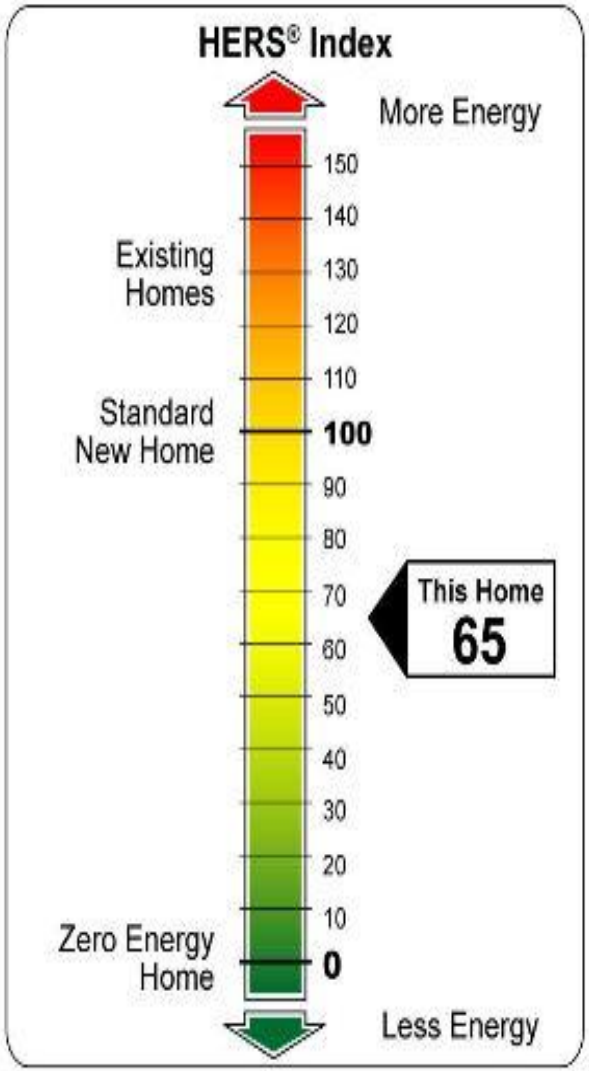
Reference Home

- 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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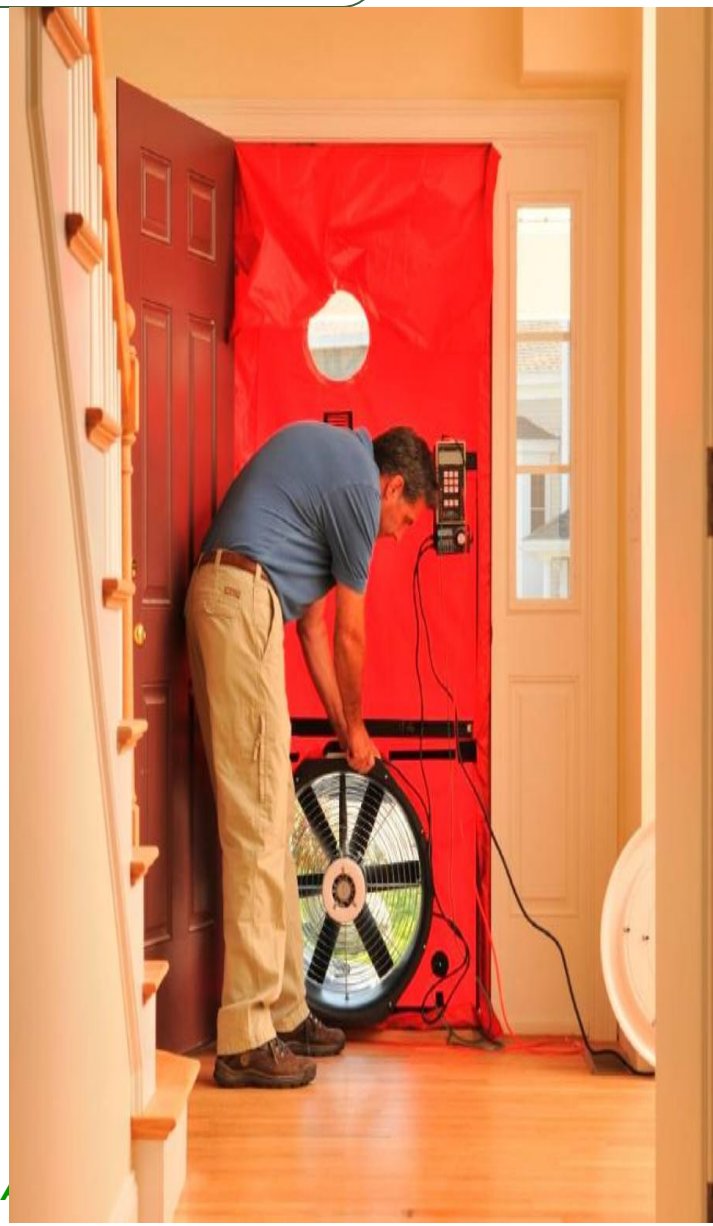
What is HERS Process?

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



The EPA Thermal Bypass Checklist

- EPA requirement for ENERGY STAR Qualified New Homes
- Multi-point checklist for 'common mistakes'
  - Focus: comfort, energy, warranty issues
- Builders may verify up to six items
  - Subject to the HERS Rater's approval
  - All remaining items must be verified by the certified rater
- Builder and certified rater both sign the Checklist to ensure accountability

ENERGY STAR Qualified Homes
Thermal Bypass Inspection Checklist

Home Address:_____ City:_____ State:_____

Thermal Bypass	Inspection Guidelines	Corrections Needed	Builder Verified	Rater Verified	N/A
1. Overall Air Barrier and Thermal Barrier Alignment	**Requirements:** Insulation shall be installed in full contact with sealed interior and exterior air barrier except for alternate to interior air barrier under item no. 2 *(Walls Adjoining Exterior Walls or Unconditioned Spaces)*				
	All Climate Zones:				
	1.1 Overall Alignment Throughout Home	☐	☐	☐	☐
	1.2 Garage Band Joist Air Barrier (at bays adjoining conditioned space)	☐	☐	☐	☐
	1.3 Attic Eave Baffles Where Vents/Leakage Exist	☐	☐	☐	☐
	Only at Climate Zones 4 and Higher:				
	1.4 Slab-edge Insulation (A maximum of 25% of the slab edge may be uninsulated in Climate Zones 4 and 5.)	☐	☐	☐	☐
	Best Practices Encouraged, Not Req'd.:				
	1.5 Air Barrier At All Band Joists (Climate Zones 4 and higher)	☐	☐	☐	☐
	1.6 Minimize Thermal Bridging (e.g., OVE framing, SIPs, ICFs)	☐	☐	☐	☐
2. Walls Adjoining Exterior Walls or Unconditioned Spaces	**Requirements:** • Fully insulated wall aligned with air barrier at both interior and exterior, **OR** • Alternate for **Climate Zones 1 thru 3**, sealed exterior air barrier aligned with RESNET Grade 1 insulation fully supported • Continuous top and bottom plates or sealed blocking				
	2.1 Wall Behind Shower/Tub	☐	☐	☐	☐
	2.2 Wall Behind Fireplace	☐	☐	☐	☐
	2.3 Insulated Attic Slopes/Walls	☐	☐	☐	☐
	2.4 Attic Knee Walls	☐	☐	☐	☐
	2.5 Skylight Shaft Walls	☐	☐	☐	☐
	2.6 Wall Adjoining Porch Roof	☐	☐	☐	☐
	2.7 Staircase Walls	☐	☐	☐	☐
	2.8 Double Walls	☐	☐	☐	☐
3. Floors between Conditioned and Exterior Spaces	**Requirements:** • Air barrier is installed at any exposed fibrous insulation edges • Insulation is installed to maintain permanent contact with sub-floor above including necessary supports (e.g., staves for blankets, netting for blown-in) • Blanket insulation is verified to have no gaps, voids or compression. • Blown-in insulation is verified to have proper density with firm packing				
	3.1 Insulated Floor Above Garage	☐	☐	☐	☐
	3.2 Cantilevered Floor	☐	☐	☐	☐

4. Shafts	**Requirements:** Openings to unconditioned space are fully sealed with solid blocking or flashing and any remaining gaps are sealed with caulk or foam (provide fire-rated collars and caulking where required)				
	4.1 Duct Shaft	☐	☐	☐	☐
	4.2 Piping Shaft/Penetrations	☐	☐	☐	☐
	4.3 Flue Shaft	☐	☐	☐	☐
5. Attic/ Ceiling Interface	**Requirements:** • All attic penetrations and dropped ceilings include a full interior air barrier aligned with insulation with any gaps fully sealed with caulk, foam or tape • Movable insulation fits snugly in opening and air barrier is fully gasketed				
	5.1 Attic Access Panel (fully gasketed and insulated)	☐	☐	☐	☐
	5.2 Attic Drop-down Stair (fully gasketed and insulated)	☐	☐	☐	☐
	5.3 Dropped Ceiling/Soffit (full air barrier aligned with insulation)	☐	☐	☐	☐
	5.4 Recessed Lighting Fixtures (ICAT labeled and sealed to drywall)	☐	☐	☐	☐
	5.5 Whole-house Fan (insulated cover gasketed to the opening)	☐	☐	☐	☐
6. Common Walls Between Dwelling Units	**Requirements:** Gap between drywall shaft wall (i.e., common wall) and the structural framing between units is fully sealed at all exterior boundary conditions				
	6.1 Common Wall Between Dwelling Units	☐	☐	☐	☐

Home Energy Rating Provider: _____ Rater Inspection Date: _____ Builder Inspection Date: _____

Home Energy Rater Company Name: _____ Builder Company Name: _____

Home Energy Rater Signature: _____ Builder Employee Signature: _____

Posted 06/02/08

Some Efficiency steps to reach HERS 70

- New Home – approx. 1500 sf, 2 Stories, Full Basement

  Home meeting Prescriptive Requirements of the **CURRENT** Building Code Requirements (IECC 2009) earned a HERS rating of **82**

Option 1: Add R5 rigid insulation to the exterior of the home, change the basement wall exterior insulation to R15, change the windows U value to 0.30 and put the ductwork under the attic insulation = HERS 70

OR

Option 2: Change to a 92% efficient furnace, 14 SEER condensing unit and an 80% efficient on demand gas fired water heater = HERS 67

Baseline Home (2,672 sf)

	IECC 2009 Code	Stretch Code	Stretch Code - with ENERGY STAR[4,5] -
HERS Index Modeled in REM/Rate	**86**	**70**	**70**
Improvement Measures (changes relative to Basecase)	- Unconditioned basement - Floor, R30 - Walls, R21 - Ceiling, R38 G2 - Heating, 80 AFUE - Cooling, 13 SEER - Water Heating, .59 EF - Duct leakage, 8% - Infiltration, 7 ACH50 - Efficient lighting, 50%	- Ceiling, R38 G1 - Heating, 94 AFUE - Water heating, .62 EF - Infiltration, 4 ACH50 - Efficient lighting, 75% - Exhaust Only Ventilation	- Ceiling, R38 G1 - Heating, 94 AFUE - Water heating, .62 EF - Duct leakage, 6% - Infiltration, 5 ACH50 - Efficient lighting, 80% - Exhaust Only Ventilation
Improvement Costs		$ 2,049	$ 2,155
HERS Rater Fee[1]		$ 900	$ 900
HERS Rater reimbursement[2]		-	$ (650)
ENERGY STAR Incentive[3]		-	$ (650)
Total Improvement Costs		$ 2,949	$ 1,755
Mortgage Interest Rate		6%	6%
Loan Term (Years)		30	30
Annual Incremental Mortgage Payment		$ 214	$ 127
Annual Energy Costs[6]	$ 3,970	$ 3,463	$ 3,454
Annual Energy Savings from Baseline		$ 507	$ 516
Annual Cash Flow	**$ -**	**$ 293**	**$ 389**

Energy Efficient Mortgages

- Energy Efficient Mortgages make it easier for borrowers to qualify for loans to purchase homes that are already energy efficient or to cover the expenses for making cost-effective energy improvements when purchasing or refinancing older existing homes.
  - Conventional Energy Efficient Mortgages
  - FHA Energy Efficient Mortgages
  - VA Energy Efficient Mortgages

Residential Additions

1. Prescriptive:

   2009 IECC envelope insulation levels, Energy Star Homes Builders Option Package (BOP) except HVAC, Energy Star labeled windows

OR

2. Performance-based: HERS 65 or 70

Commercial by Size and Type

- Over 100,000 ft^2 - Only Performance option
  Energy model showing 20% below ASHRAE 90.1-2007 Appendix G.
- 5,000-100,000 ft^2 – Performance or Prescriptive
  20% below ASHRAE or
  Stretch code amendments to IECC Chapter 5
- ‹ 5,000 ft^2 are exempt
- Special Cases are exempt:
  buildings with unusual energy demands
  (Supermarkets, Labs, Warehouses….)
- Renovations of commercial buildings are exempt

Adoption by Cities & Towns

- Adoption Process
  - Building Official Training (already done)
  - Municipal Public Hearing / Forum
  - Vote of Town Meeting
- Timing of Adoption
  - Muni vote any time
  - Code change only starts on **July 1** or **January 1**
  - Base code & Stretch code are both in place
    for the first 6 months (concurrency period)
    Builder can choose EITHER code

Implementation Timeline example

Example of code **adoption** by a town

– Fall 2014….. Municipal public meeting/forum

– Fall 2014… Vote of Town Meeting to adopt Stretch Code with an **effective start date of July 1, 2015**
Town is eligible to become a Green Community Oct 2014

Timing of code **implementation**

– July 1, 2015 Stretch code implemented alongside new base code

– July -> Dec 2015 Building permits can comply with either current base code (IECC 2012) **or** Stretch code until Dec 31, 2015

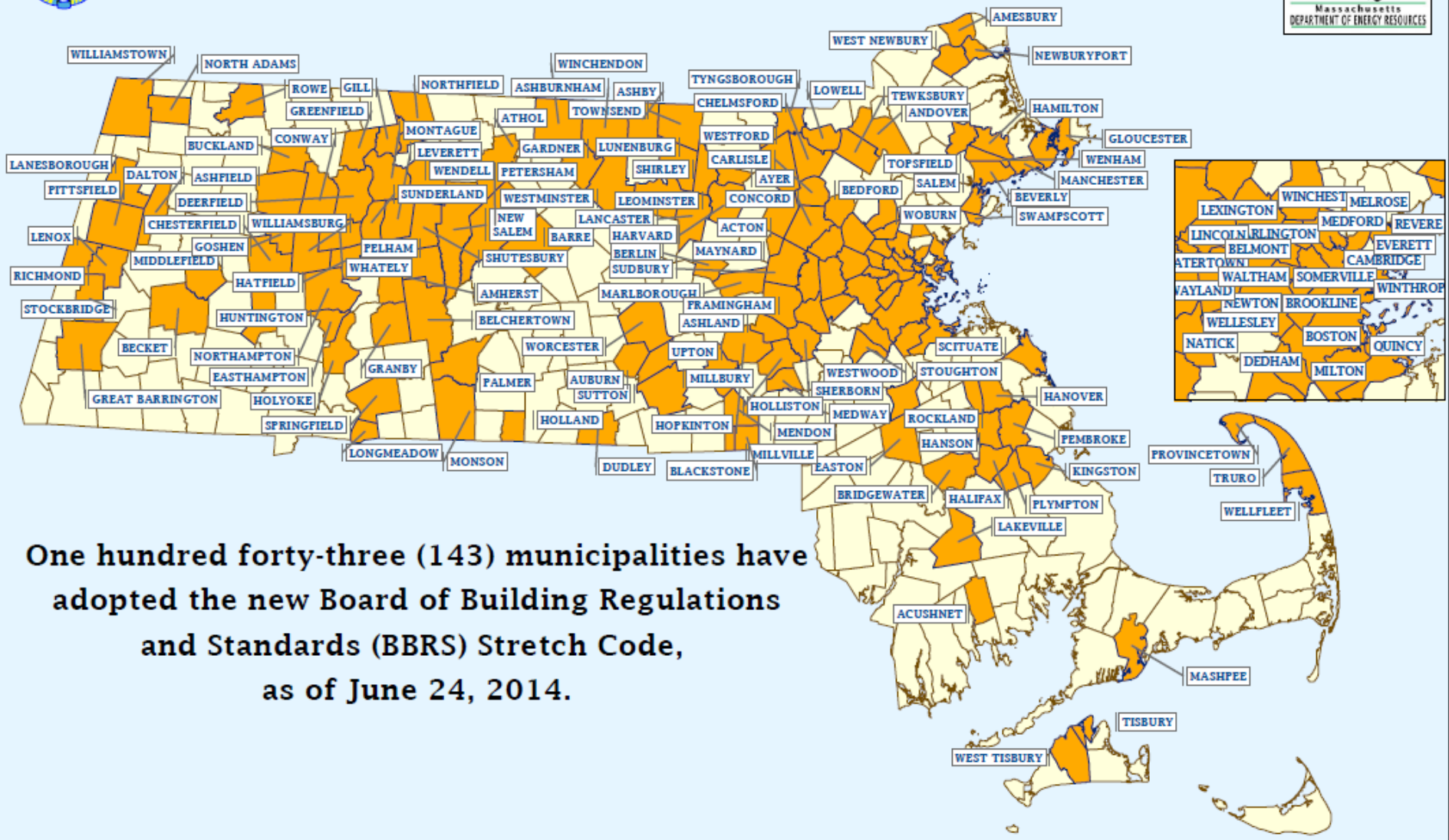
– **Jan 1, 2016** Stretch code becomes sole energy code in town for all new building permits

New Base Code July 1, 2014

Comparison of Stretch to New Base

Code requirement	Stretch code 2009	IECC2012	Summary of differences
Improved Air sealing – blower door test	Mandatory blower door test by HERS rater	**Mandatory** test, max 3 air changes per hour	A blower door test is required. A HERS rater is not required for the IECC2012, but is required for the stretch code
HERS Rating	Required: Max 65 over 3,000 sqft Max 70 under 3,000 sqft.	Optional: Max of 65 for any home size if you **choose** the HERS rating option.	IECC 2012 in MA has options: a) Prescriptive path, b) HERS rating, c) Rescheck (shell trade-off), d) IECC performance path
Ceiling insulation default	HERS rating provides flexibility	R-49 but builder can reduce with better windows/wall	If you follow the IECC2012 prescriptive path, then R-49 insulation is needed in the ceiling. Most IECC2012 homes will use Rescheck to avoid this.
Window heat loss	HERS rating provides flexibility, but energy star windows are typical	U 0.32	Improved to match current market standard, not a significant cost.
Hot water pipe insulation	recommended best practice	R-3 or shorter thinner pipes required	Shortens time taken for hot water to arrive at faucet, saving water & energy
Efficient lighting	Min. 50% of fixtures, but typically 75-100% efficient lighting	Minimum of 75% of all hard wired fixtures required	
Commercial	Various standards based on building size/usage	Various standards based on building size/usage	New Base Code identical to Stretch Code

Stretch Code Adoption, by Community



One hundred forty-three (143) municipalities have adopted the new Board of Building Regulations and Standards (BBRS) Stretch Code, as of June 24, 2014.

DOER, 6-25-14, jpfister

Green Communities Designation and Grant Program – the 123

- Grant allocations based on a $125K base plus a population/per capita income formula; maximum $1M.
  - Range from $130,725 in Hatfield to $1M for Boston
- Close to $30M awarded in total for both designation and competitive grants programs
- Projects being funded include energy conservation measures, solar PV projects, incremental costs for hybrid vehicles.
- 56 projects complete to date (47 designation, 9 competitive)
  - Total Project Costs - $16.88M
  - Total GC grant funds used - $10.80M
  - Total Utility incentives - $2.15 M
  - Projected annual savings ($)- $2.27M
  - Projected annual savings (MMBTU) – 77,848, or about 603 homes
  - Projected annual GHG rdxtns (metric tonnes) – 6,631 about 1,382 cars

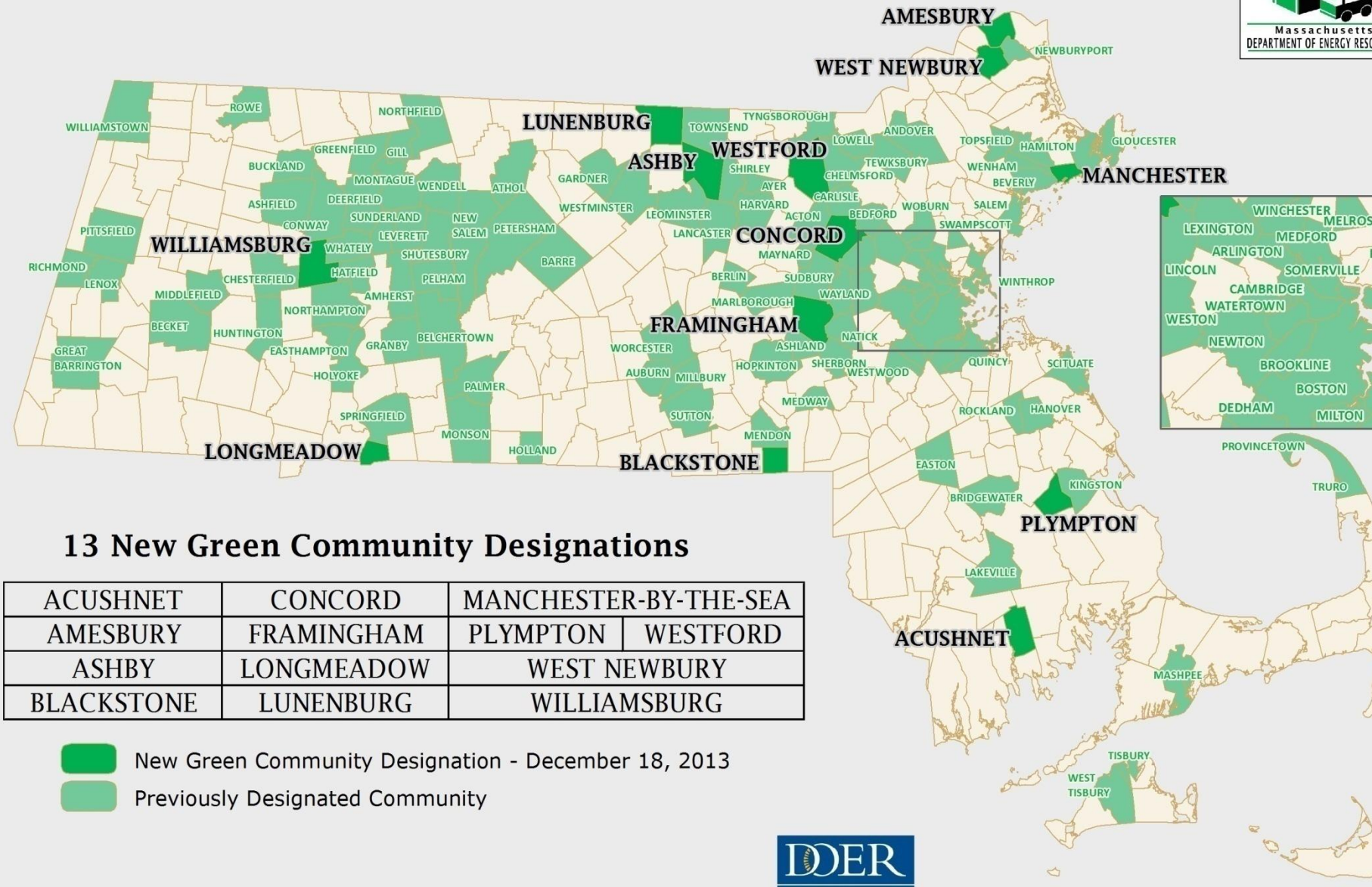
Green Communities Designation and Grant Program – the 123

- Grant allocations based on a $125K base plus a population/per capita income formula; maximum $1M.

	Grant	Population
Rowe	$ 135,725	350
Middlefield	$ 135,025	520
Warwick	???	750
New Salem	$ 140,650	920
Wendell	$ 155,000	980

- Projects being funded include energy conservation measures, energy savings performance contracts, solar PV projects, incremental costs for hybrid vehicles, residential efficiency grant programs, energy efficiency coordinators (10%)

GREEN COMMUNITY DESIGNATIONS REACH ONE HUNDRED TWENTY-THREE



13 New Green Community Designations

ACUSHNET	CONCORD	MANCHESTER-BY-THE-SEA	
AMESBURY	FRAMINGHAM	PLYMPTON	WESTFORD
ASHBY	LONGMEADOW	WEST NEWBURY	
BLACKSTONE	LUNENBURG	WILLIAMSBURG	

New Green Community Designation - December 18, 2013

Previously Designated Community

25 Miles

DOER
Massachusetts Department of Energy Resources

J.Pfister, 12-18-13

Why Become a Green Community?

- **Economic Benefits** – reduce energy consumption, reduce energy costs
- **Environmental benefits** – reduce greenhouse gas emissions
- **Recognition** – Sustainability leader in the Commonwealth
  - Recognized on DOER website, printed materials
  - Recognition sign placed in each community
- **Grants** - $$ to become even greener

www.mass.gov/energy/greencommunities

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