BUILDINGENERGY BOSTON

Getting to Zero: Bringing Residential Electrification to Scale

Thursday, April 2, 2020

Brought to you by:

NESEA

Sponsored by:

MASSACHUSETTS CLEAN ENERGY CENTER®

MASSACHUSETTS CLEAN ENERGY CENTER®

GETTING TO ZERO: BRINGING RESIDENTIAL ELECTRIFICATION TO SCALE

Presented By Peter McPhee, Jacqueline Guyol, Ellen Tohn

OUR MISSION

Grow the economy and help meet the state's ambitious clean energy and climate goals.

BUILDINGENERGY® BOSTON

Peter McPhee
Senior Director
Buildings
pmcphee@masscec.com

MASSACHUSETTS CLEAN ENERGY CENTER®

Jacqueline Guyol
Program Administrator
Clean Heating
jguyol@masscec.com

MASSACHUSETTS CLEAN ENERGY CENTER®

Ellen Tohn
www.massenergize.org
ellen@massenergize.org

Mass ENERGIZE

Beverly Craig
Sr. Program Manager
Low and Moderate Income
bcraig@masscec.com

MASSACHUSETTS CLEAN ENERGY CENTER®

AGENDA

- The Buildings Challenge
- Home Electrification as a Solution
- Tools and Programs for Home Electrification
- Engaging Residents in Home Electrification

MASSACHUSETTS CLEAN ENERGY CENTER®

GROW THE CLEAN ENERGY ECONOMY

Accelerate Market Adoption

Enable homeowners, businesses, government agencies, and non-profits to install clean energy systems

Build The Workforce

Connect job seekers and employers though internships, job and resume boards, and training programs

Supercharge Innovation

Support innovation at research institutions, startup companies, incubators and business accelerator programs

WHAT PORTION OF MASSACHUSETTS' GREENHOUSE GAS EMISSIONS COME FROM ONSITE FOSSIL FUEL COMBUSTION FOR BUILDINGS?

A) 5-15%

B) 16-25%

C) 26- 35%

D) 36- 45%

BUILDINGS: ENERGY, CARBON, AND MONEY

$2,500	**Annual household energy spending**
27%	**MA GHG emissions from fossil fuels used in buildings**
0% (net)	**Proposed 2050 MA emissions target**
2 million	**Number of buildings in MA**

ON AVERAGE, HOW MUCH OF ANNUAL INCOME DO LOW-INCOME MASSACHUSETTS HOUSEHOLDS SPEND ON ENERGY?

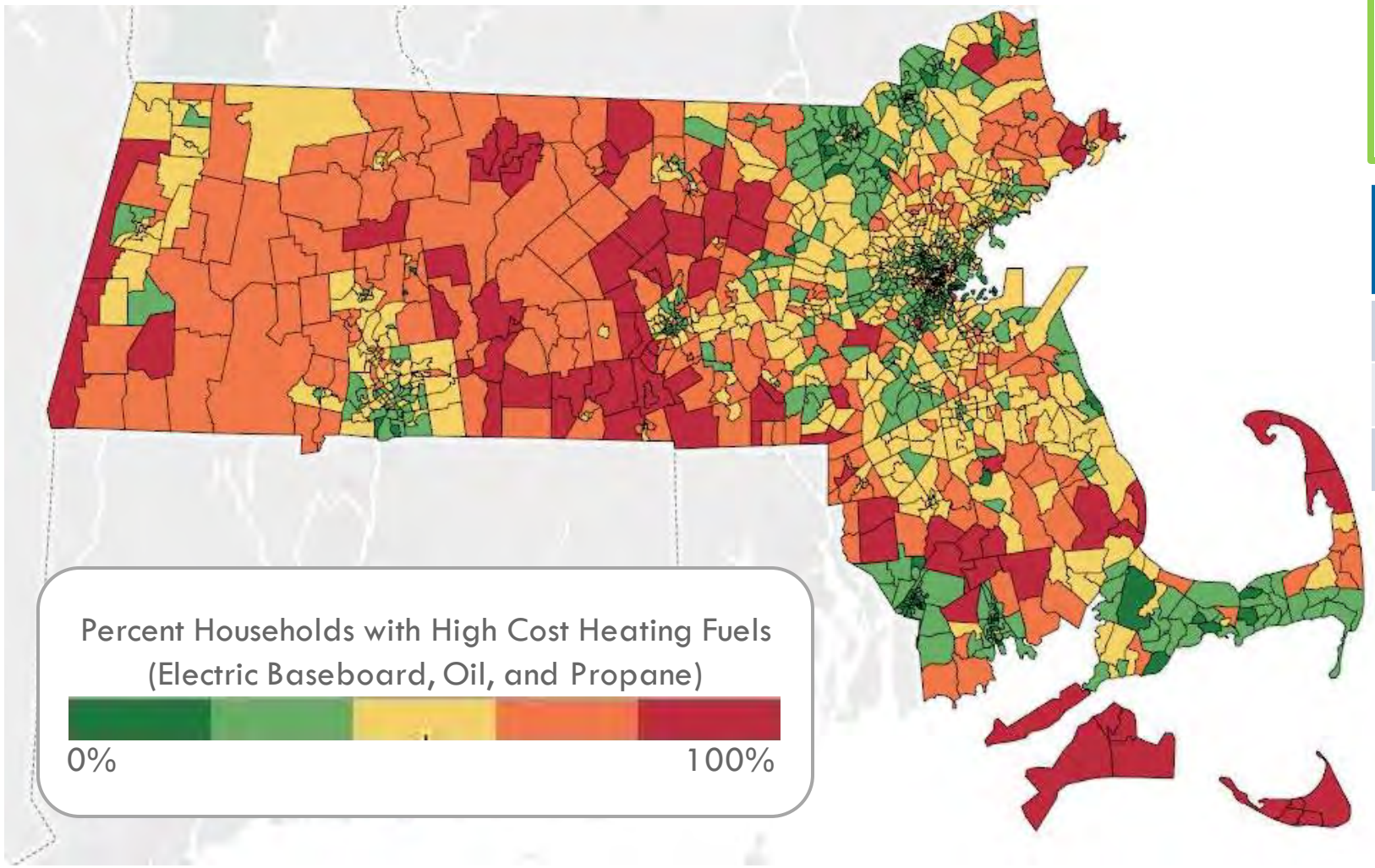
A) One day

B) One week

C) Two weeks

D) One month

HEATING COSTS DISPROPORTIONATELY HIGH FOR LOW-INCOME FAMILIES

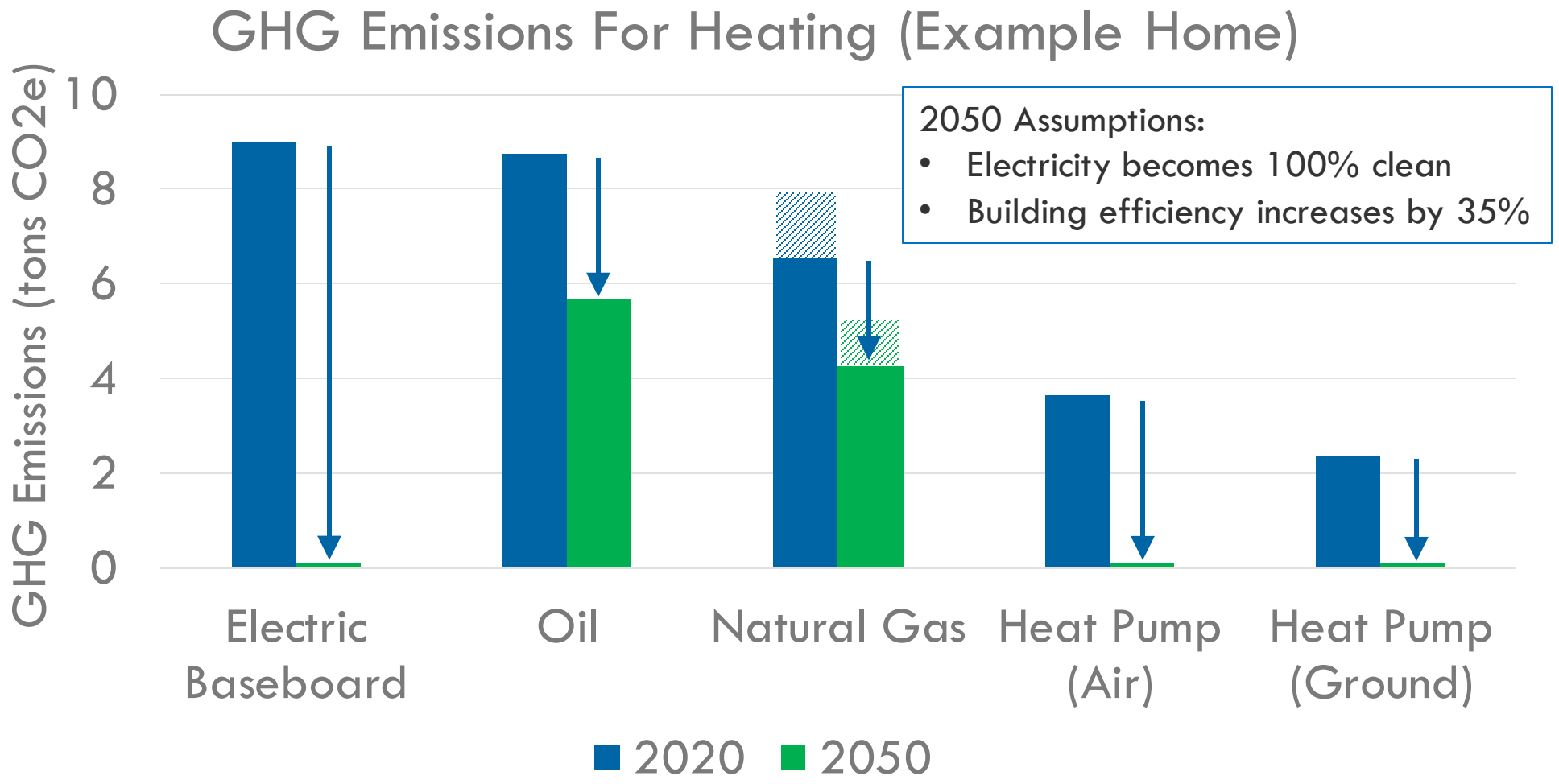


$$Energy\ Burden = \frac{Cost\ of\ Energy}{Household\ Income}$$

Income Demographic	Energy Burden (National)
Higher-income	2.3%
Median-income	3.5%
Low-income	7.2%

ACEEE Report: Lifting the High Energy Burden in America's Largest Cities

HOME ELECTRIFICATION LEADS TO LOWER GHG



SOME KEY INDUSTRY CONCEPTS FOR THE 2020S

Equity: how can decarbonization work for everyone?

Consumers: how do we make heat pumps and weatherization the default?

Systems, not technologies: how do we best integrate shell efficiency with electrification to deliver the most cost-effective low-carbon solution?

Zero over time: how do we take advantage of renovations and equipment replacement cycles?

Innovation: how can innovation lower the cost and accelerate the rate of building decarbonization?

Address barriers: what programs could help industry overcome the many barriers to widespread building electrification?

PREPARE HOMES FOR ELECTRIFICATION

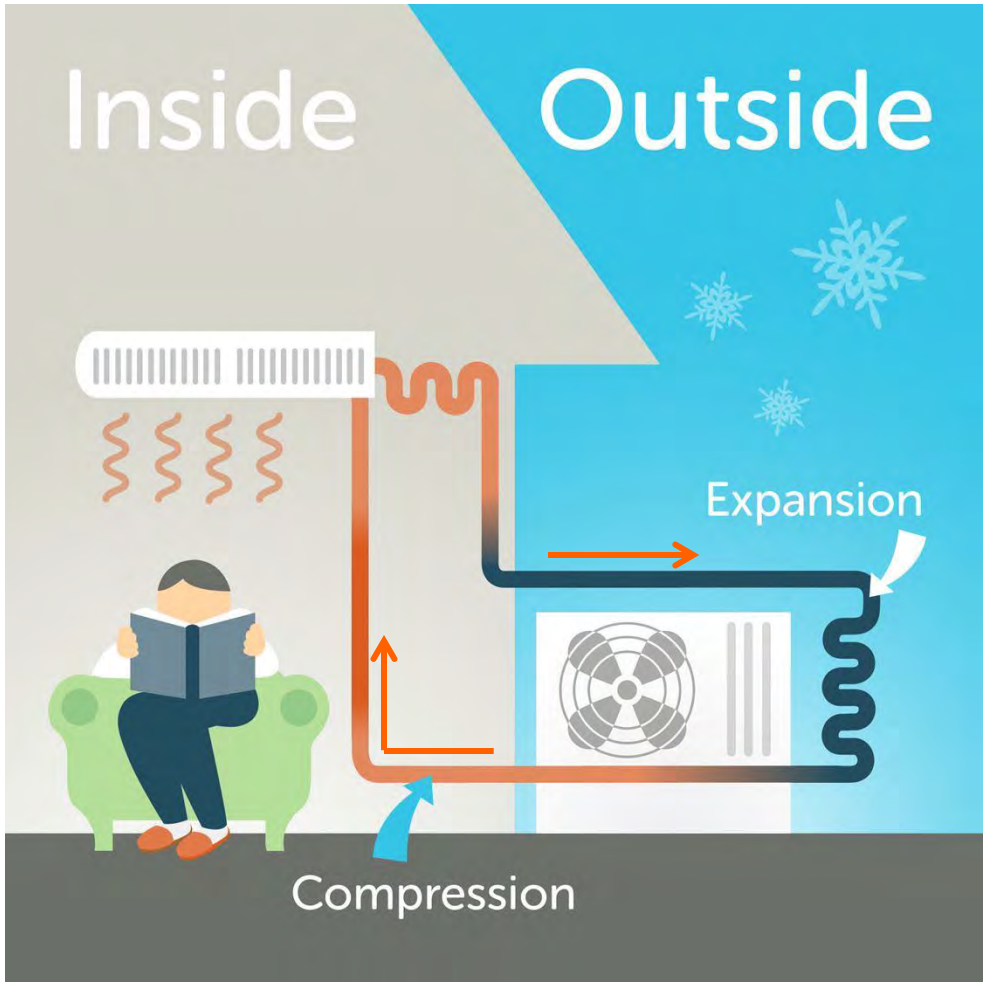
- Always start with aggressive insulation and air sealing
- More efficient envelope will translate to smaller, less expensive equipment to heat and cool
- If you can get to new construction levels of air exchanges or below (3 ACH 50) add heat recovery ventilation

Newton Net Zero Residence .4 kBtu/sf/yr

Architecture: ZeroEnergy Design

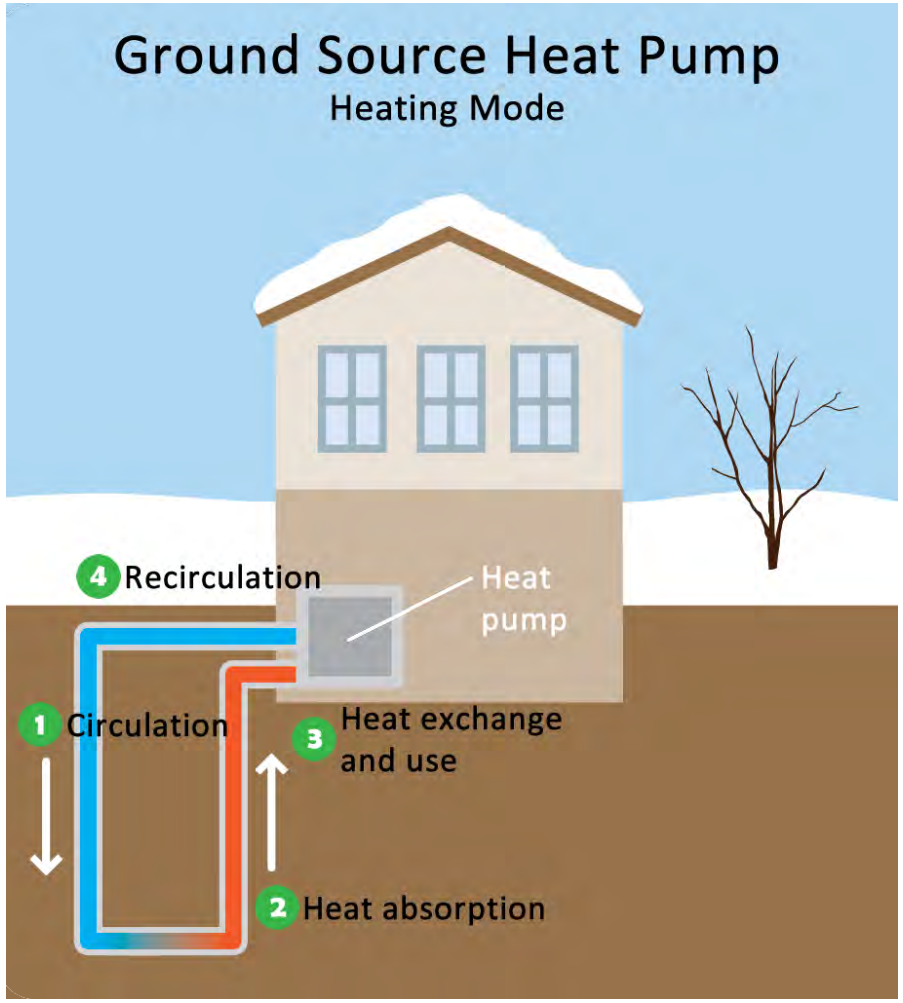
Photo: Damianos Photography

AIR-SOURCE HEAT PUMPS



Credit: Efficiency Vermont

GROUND-SOURCE HEAT PUMPS



Credit: EPA

START BY GETTING THE MOST OUT OF MASS SAVE

- Mass Save provides no cost Home Assessment, free air sealing, and 75% of cost of insulation with no cap
- If it's been more than 2 years since last assessment, homeowner can get another
- 2 Paths

    1) Central Mass Save Contact

    2) Home Performance Contractor

Lincoln Net Positive Farmhouse -6.3kBtu/sf/yr

Architect: ZeroEnergy Design

Photo: Chuck Choi Photography

MASS SAVE RENOVATIONS AND ADDITIONS PROGRAM

- Incentive to upgrade energy performance of whole house instead of just addition or renovation
- Go to HERS Rater with experience in the program
- Provides HERS Rater's expertise for upgrades to whole home
- Upgrades are 0% HEAT Loan eligible
- Potentially up to $10,000 incentive for deep energy retrofit (must contact HERS rater before demo)
- Average about $3K
- Approved HERS raters: https://bit.ly/2vRodmf

HOME MVP
WHOLE HOUSE PILOT

- Home Contractor designed Pilot Program
- Rebate based on energy savings vs. prior utility bills
- Average $5,000/ home
- HEAT loan – 0% up to $25,000
- Available to all MA homeowners (even those not eligible for Mass Save)
- Ends November 2020
- Can combine with some Mass Save rebates – e.g. Heat pumps, but not Mass Save insulation
- List of 20 contractors: https://www.mass.gov/guides/home-mvp

DOER
Massachusetts Departme
of Energy Resources

Energy Savers Home Performance

WHICH OF THE FOLLOWING HAVE YOU (OR YOUR LANDLORD) DONE IN YOUR HOME?

A) Home Energy Assessment

B) Air Sealing and Insulation

C) Solar PV

D) Heat Pumps

E) Electric Vehicle

INTRODUCING: CLEAN ENERGY LIVES HERE

NEW!

1. **Engage** with consumers: increase awareness of solutions
2. **Educate** consumers and industry members: help people understand opportunities and benefits
3. **Pledge & Plan:** support consumers to commit and plan for "zero over time" building decarbonization
4. **Facilitate consumer action:** help consumers engage with industry to implement solutions

Target Audience: Residential consumers, industry members

Technologies Considered: Whole building approach including clean heating & cooling, weatherization, building appliances (hot water, cooking, etc.), EV charging.

CLEAN ENERGY LIVES HERE PUBLIC AWARENESS CAMPAIGN LAUNCHING IN APRIL

Branded campaign

Downloadable guides

Microsite

Digital ads

Streaming radio

Out of home advertising

EXAMPLE: PETER

IN YOUR OPINION, WHAT PART OF THE CLEAN ENERGY LIVES HERE CAMPAIGN WOULD BE THE MOST EFFECTIVE IN INCREASING AWARENESS OF THE GENERAL PUBLIC ABOUT BUILDING ELECTRIFICATION?

A) Downloadable guides

B) Website

C) Advertising

D) Pledge

E) Clean Energy Home Plan

INTRODUCING: TRIPLE DECKER DESIGN CHALLENGE

- Existing triple deckers have high energy costs and GHG emissions
- Prizes starting at **$15,000** for winning submissions; 9 prizes potentially including a "bring your own building" (BYOB) category
- Seeks to identify scalable models for decarbonizing triple deckers by integrating weatherization, electrification, and renewables

Prize Money!

TRIPLE DECKER DESIGN CHALLENGE

- Retrofits will be focused on strategies for weatherization and building electrification in cost optimized ways
  - ✓Cost Optimized Retrofit Using Existing Layout
  - ✓3+ Retrofit: Space Additionality
- If interested, fill out MassCEC survey: https://bit.ly/2QNYylv

WHOLE-HOME AIR-SOURCE HEAT PUMP PILOT

MASSACHUSETTS CLEAN ENERGY CENTER®

- Incentive for blower door test and installation of whole-home air-source heat pump systems
  - ✓New construction homes with no fossil fuel hookup
  - ✓Existing buildings replacing natural gas

- Lessons from MassCEC's monthly blogs: bit.ly/WHPblogs
  - ✓Inaccurate manual J calculations through incorrect assumptions
  - ✓Many oversized systems
  - ✓Decreased efficiency when connecting many indoor heads to one outdoor head

MassEnergize helps communities engage residents take action to address our climate emergency

1. Customizable community engagement software , working with:

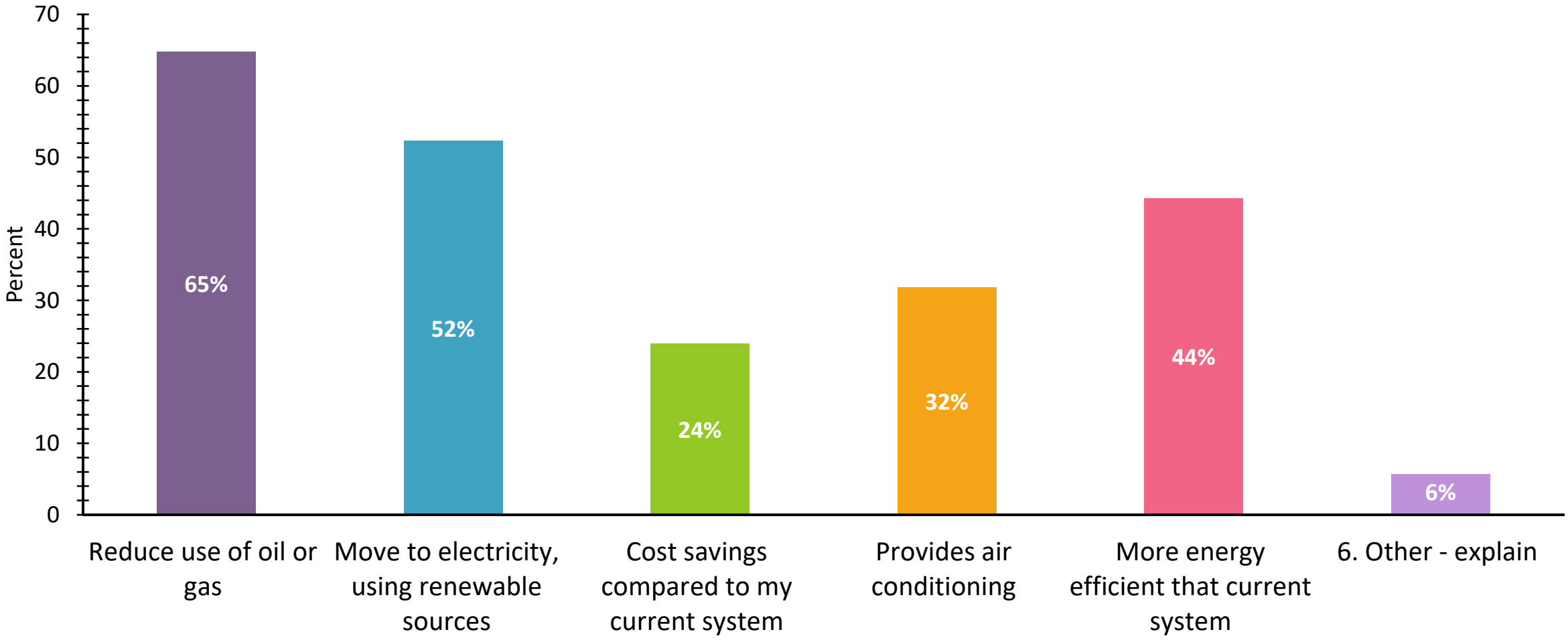
2. Resources for campaigns

3. Collaboration with Heat Smart Alliance

Mass ENERGIZE

What are the greatest benefits of heat pumps?

Majority want to reduce oil, gas and energy use. 32% were drawn to air conditioning. Cost savings are a lower priority.



Concerns about heat pumps

55% worry about installation **costs** and 20% about operating costs

30% don’t know which contractor to choose or **worry about making a mistake**

21% don’t know how they work and 17% are **not sure they work in our climate**

18% are confused about rebates

Our amazing team! Contact ellen@massenergize.org