

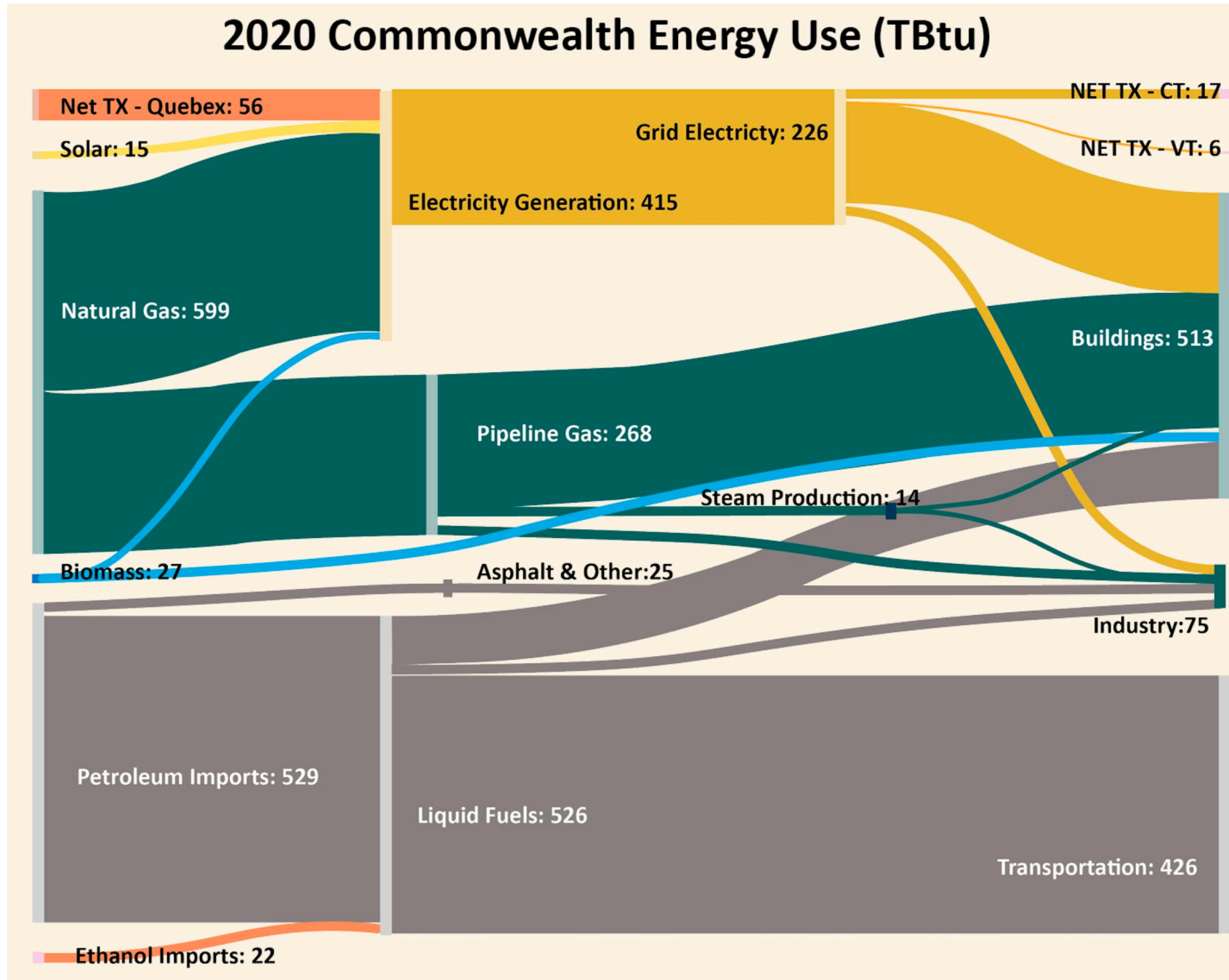


COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES
*Ian Finlayson – Deputy Director, Energy
Efficiency Division*

Stretching the Energy Code: developments in MA

PHIUScon
October 14, 2021

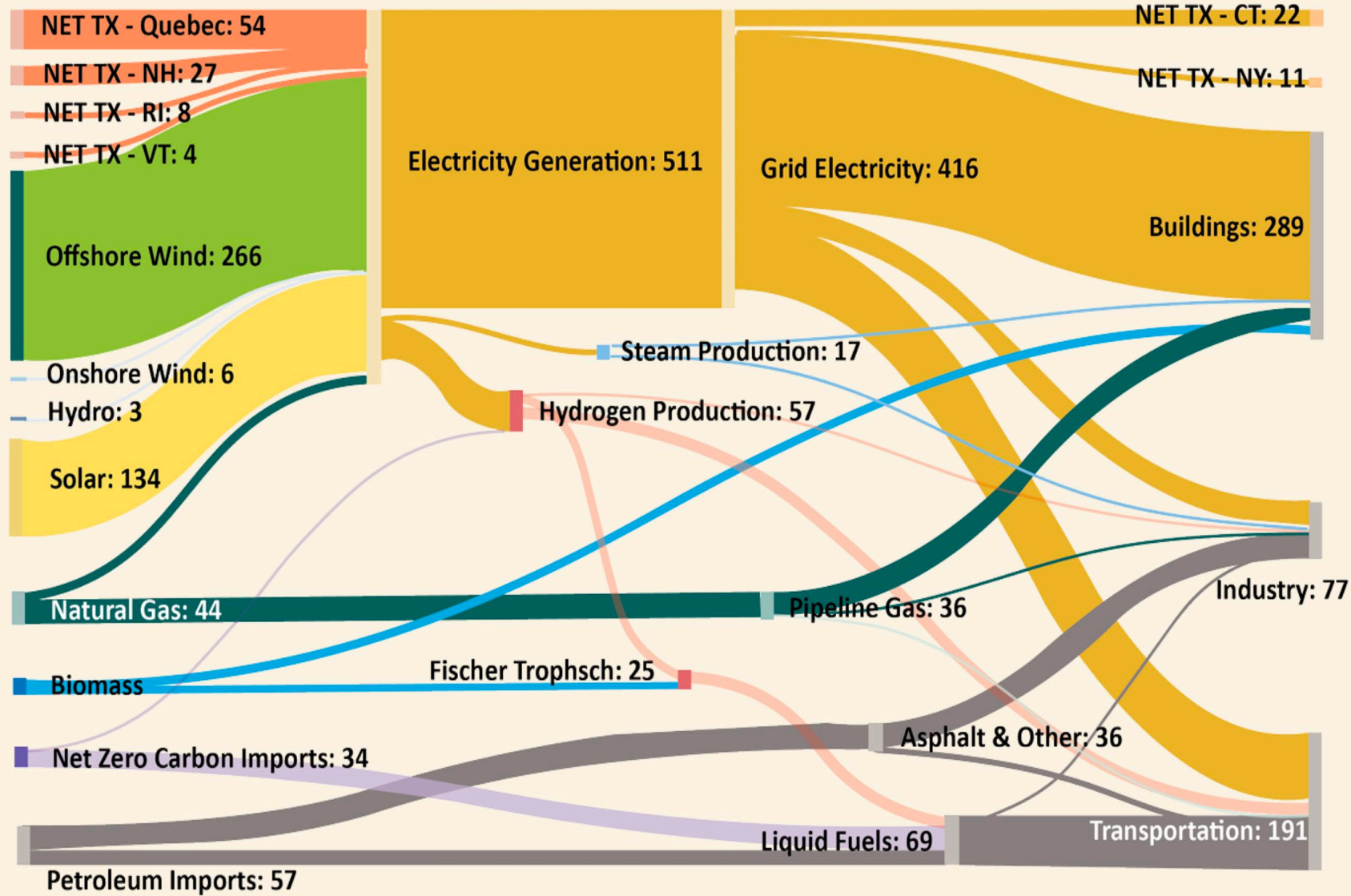
MA Sankey diagram: Energy use in 2020



<https://www.mass.gov/doc/ma-2050-decarbonization-roadmap/download>

MA Sankey diagram: "All options" 2050 scenario

2050 Commonwealth Energy Use (TBtu)



Electrifying Transportation requires disruption:

The Secret Tesla Motors Master Plan

Elon Musk, Co-Founder & CEO of Tesla Motors August 2, 2006

in short, the master plan is:

- Build sports car
- Use that money to build an affordable car
- Use *that* money to build an even more affordable car
- While doing above, also provide zero emission electric power generation options

Don't tell anyone.



2030 CECP sector level reductions to reach 45% by 2030

Sector	Gross Greenhouse Gas (GHG) Emissions (Million Metric Tons of CO ₂ e)			GHG Reductions in 2030 (from 2017)
	1990	2017	2030	
Transportation	30.5	30.5	22.5 - 22.7	7.8 – 8.1
Buildings	23.8	19.7	10.3	9.4
Electricity	28.1	13.6	8.5 - 9.4	4.2 – 5.1
Industrial & Non-Energy	12.0	9.2	7.8 - 9.7	(0.5)* – 1.4
Total	94.5	73.0	49.1 – 52.1	20.9 – 23.9
% Reduction From 1990	-	23%	45% - 48%	

*Negative reduction indicates an increase – this reflects partial mitigation of emissions growth

2021 Climate Act – updated 2030 mandate to 50% below 1990

Background of MA Legislative Requirements – Energy Codes



Green Communities Act of 2008:

- **Base Code:** Adopt latest IECC and strengthening amendments
- **Stretch Code:** All life-cycle cost effective energy efficiency and renewable energy

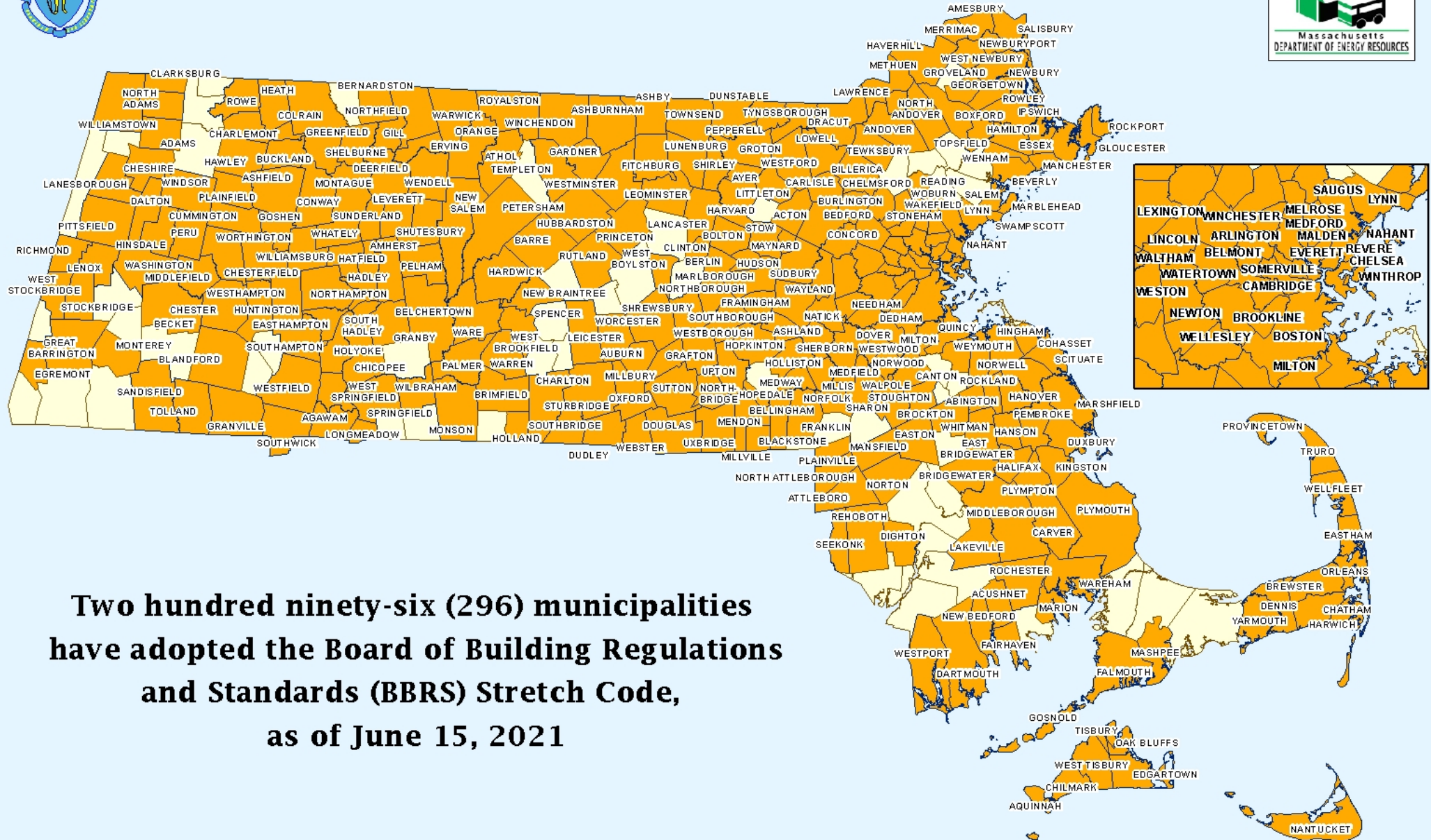
New in Climate Act of 2021:

- **Specialized opt-in municipal stretch code:**
 - Net-zero building performance standards
 - Definition of a net-zero building
 - Develop and promulgate by **December 2022**
 - The department may phase in requirements based on building types, uses, or load profiles





Stretch Code Adoption, by Community

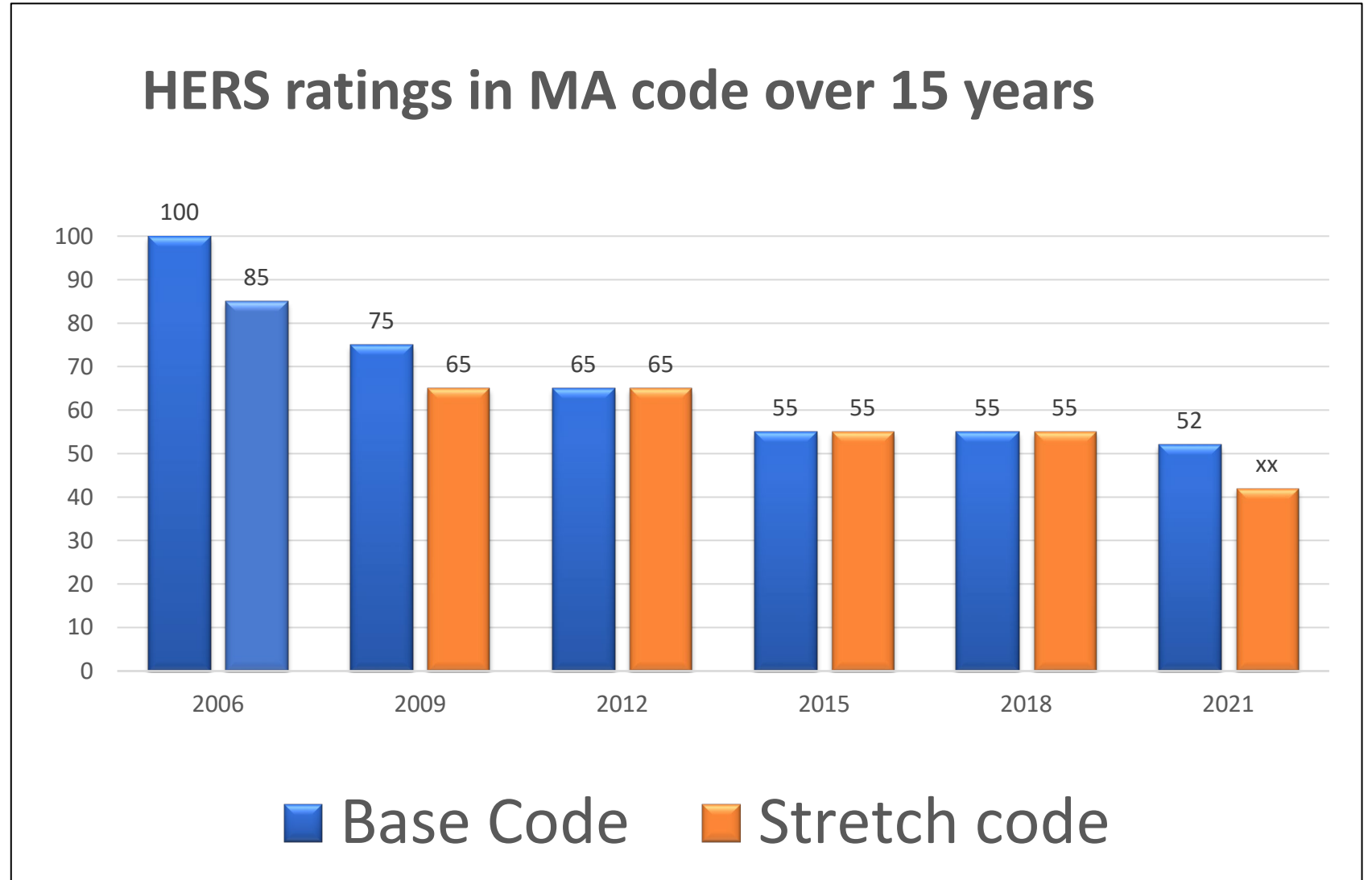


**Two hundred ninety-six (296) municipalities
have adopted the Board of Building Regulations
and Standards (BBRS) Stretch Code,
as of June 15, 2021**

Residential Stretch Code - Context

Context:

- In 2020, 87% of new homes in MA used the 'Home Energy Rating System' (HERS) code pathway, with an average of HERS 51



Passivehouse Multi-family – Growing rapidly in MA

State	PHIUS projects since 2014	PHIUS projects 2020 to date
New York	120	28
Pennsylvania	93	6
Massachusetts	87	54
Connecticut	66	36
Maine	22	6
Vermont	15	1
New Hampshire	15	5
Rhode Island	15	8
New Jersey	13	2
Maryland	12	6
Delaware	1	0

Source: Isaac Elnecave, PHIUS



*Winthrop Center
Boston, MA*



*The Distillery
Boston, MA*



*Bunker Hill
Boston, MA*



*North Commons
North Hamptons, MA*



*Harbor Village
Gloucester, MA*



*Depot Village
Hanson, MA*

Passivehouse Growth:

- Over 5,000 units in the Mass Save[®] program pipeline
- 133 MA firms have Certified Passivehouse consultants
- \$1.7m for Mass Save training of 3,600 people in 2022-2024 3-year plan

Goal of Energy Code Analysis: Least-cost decarbonization

Commercial & large multi-family team



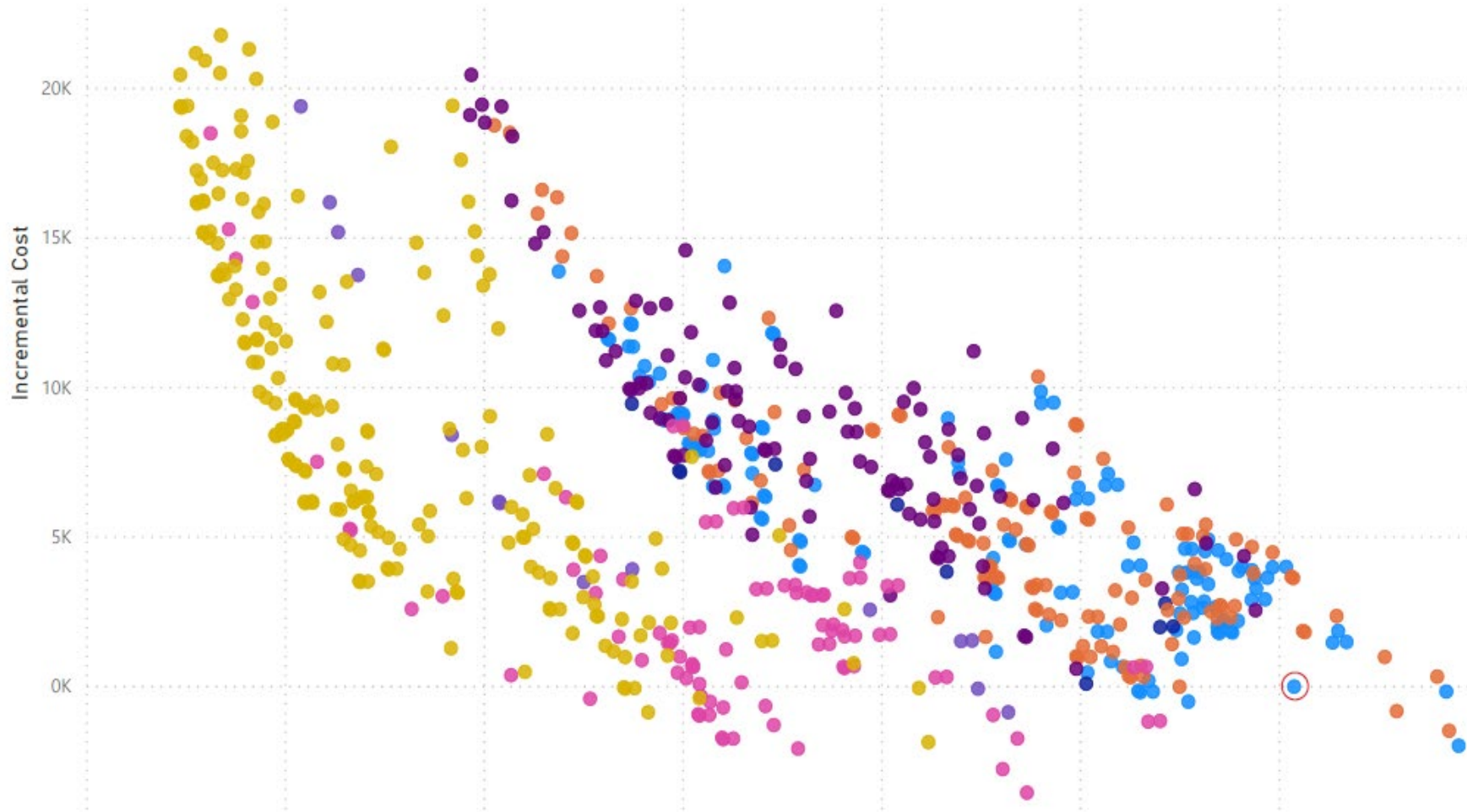
Residential low-rise team



- **MA Stretch code Analysis.** DOER commissioned analysis in 2019 of different building code standards specific to the Massachusetts climate.
- **Variety of Building Types.** 12 different typical MA buildings modelled in-depth

Residential Study Process

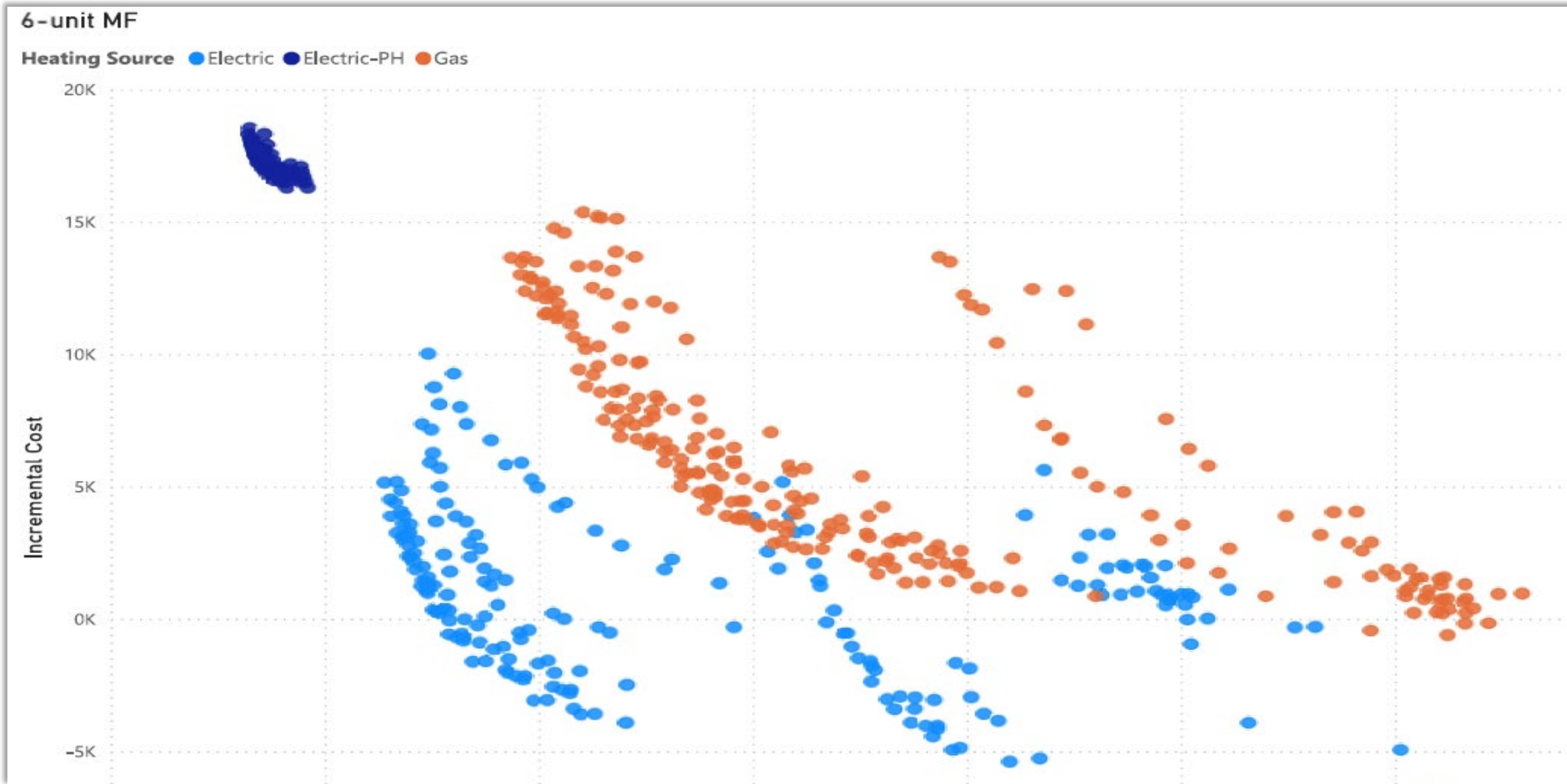
- Over 100,000 model runs to find least cost HERS 'Optimized' path



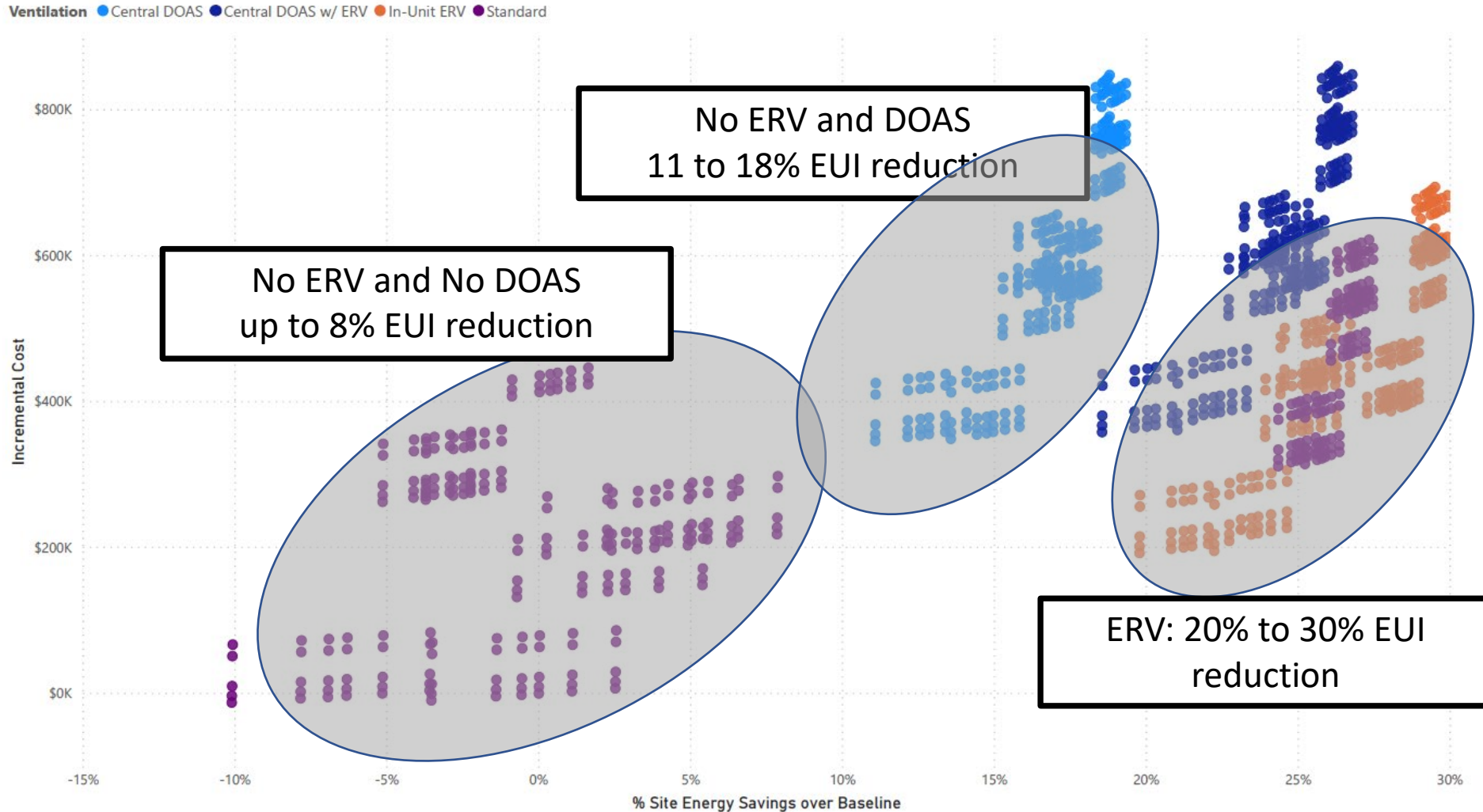
BEopt software used to analyze a multitude of building permutations

- HVAC
- Windows
- Infiltration
- Mechanical Ventilation
- Finished Roof
- Unfinished Attic
- Wall Sheathing
- Basement
- Water Heater

Residential HERS vs. Passivehouse Results

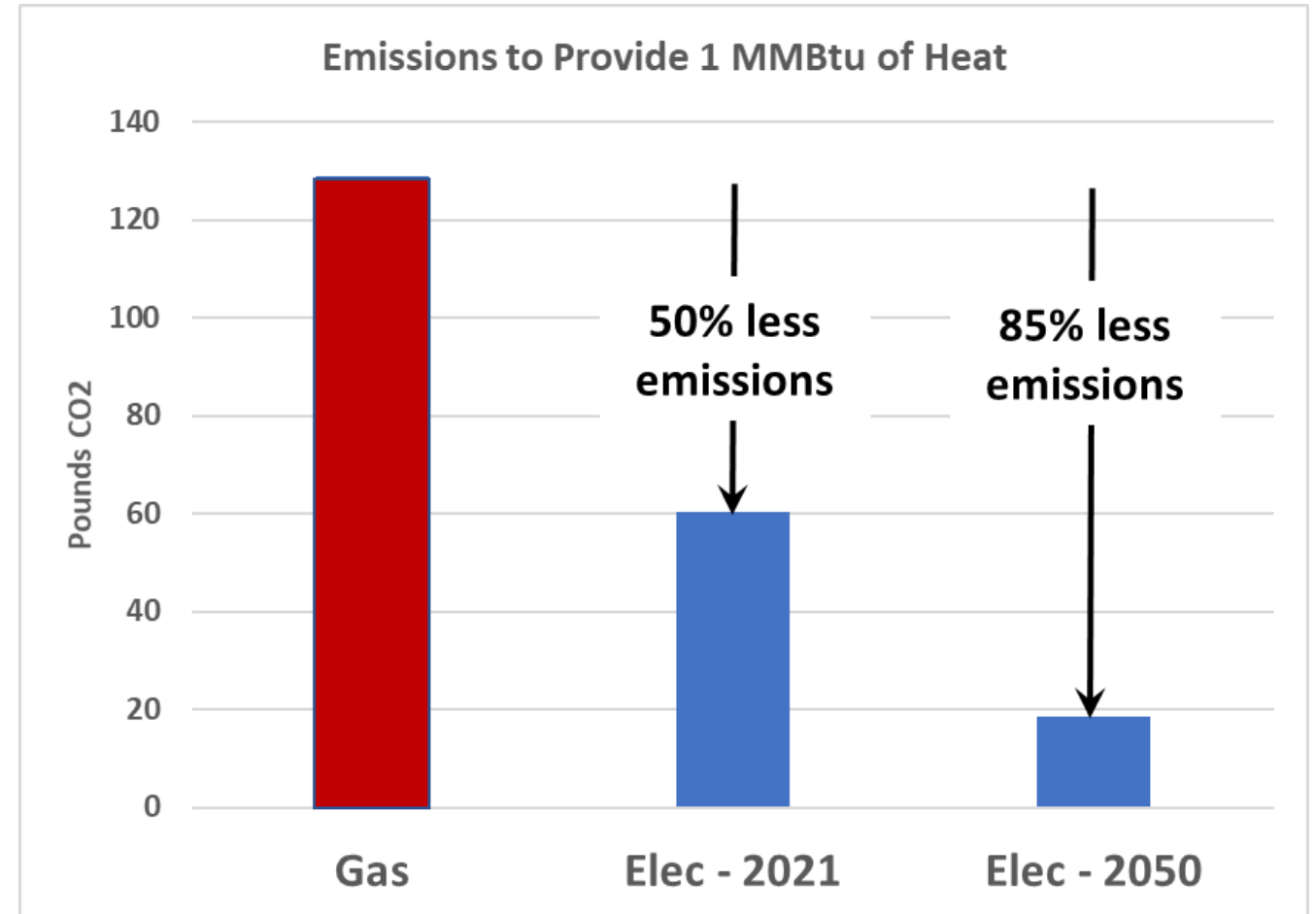


Ventilation heat recovery is a key energy strategy



Electrification is a key emissions strategy

- Electric heating in MA
 - 50% less emissions today (2021)
 - 85-100% lower emissions in 2050
- Critical that buildings migrate toward electrification



Incentives matter

- Mass Save® – Multi-family Passivehouse program: Soft costs support plus \$3,000 / unit
- New – 1-4 unit all-electric program in 2022 ~\$1x,xxx / home
- MEPA – large project review – demonstrate GHG mitigation
- Affordable Housing Tax Credits – QAP points
- Federal tax credits – Section 45L

Residential New Construction Passive House
Multi-family buildings with five units or more

Take energy efficiency to a new level.

The Sponsors of Mass Save® have launched a new way to drive market transformation in the energy efficiency industry to meet and exceed energy savings targets across Massachusetts. We are offering incentives and assistance to support the construction of multi-family buildings (five units or more) with deep energy savings. Certification and performance incentives are available to assist builders and developers in achieving Passive House certification or similar levels of efficiency.

What is Passive House?

Passive House refers to the ultimate goal in high-efficiency design: buildings that minimize energy consumption and have added comfort and durability features. The Passive House Institute US (PHIUS) and the Passive House Institute (PHI) have established two independent standards and provide certifications for such buildings: the PHIUS+ Passive Building Standard and the International Passive House Standard.

High-efficiency incentives available

The Sponsors of Mass Save support Passive House and related high-efficiency construction in Massachusetts through enhanced incentives. We offer incentives for multi-family buildings that achieve certification through PHIUS or PHI and those that pre-certify and build to high efficiency without obtaining certification.

Design and performance incentives

The Sponsors of Mass Save offer incentives for super-efficient shell or building envelope designs and optimized energy systems. We will follow the incentive structure detailed below and offer incentives for pre- and post-construction activities once all requirements are met. If you qualify for the Passive House incentive offering, it will replace the standard incentives.

Passive House Incentive Structure for Multi-Family (5 units or more)			
Incentive Timing	Activity	Incentive Amount	Max. Incentive
Pre-Construction	Feasibility Study	100% of Feasibility costs	\$5,000
	Energy Modeling	75% of Energy Model cost	\$100/unit, max. \$20,000
	Pre-Certification	\$500/unit	
Post-Construction	Certification	\$2,500/unit	
	Net Performance Bonus	\$0.75/kWh, \$7.50/therm	N/A

The Net Performance Bonus is calculated by determining the final pay for design incentives and subtracting the pre- and pre-certification incentives. The result is the Net Performance Bonus. Projects that are certified but do not achieve certification are eligible for the pre-certification incentive and Net Performance Bonus. Projects with 100 units must be pre-approved by the Massachusetts Sponsors of Mass Save.

Passive House trainings

The Sponsors of Mass Save, in partnership with Passive House Massachusetts, provide Passive House trainings to support workforce development and market transformation in the energy efficiency and building construction industries. Please contact us for more information.

WE ARE MASS SAVE!

Ready to get started? We are here to help:
1-866-527-SAVE (7283) • multifamily@masssave.com • MassSave.com/PassiveHouse

Energy Code development in MA: It's not boring, but it's not rocket science

in short, the master plan is:

- Build *Demonstration projects*
- Use *Energy Efficiency programs* to incentivize more efficient buildings
- Use *Stretch codes* to build even more efficient buildings
- While doing above, also provide zero emission electric power generation options

Try it at home.

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PHIUS

Ready to
1-866-3

