

# There's an Easier Way!

## Using Optimization Modeling to Reduce Builder Resistance to High Performance Practices and Code Requirements

Jared Powell, NMR

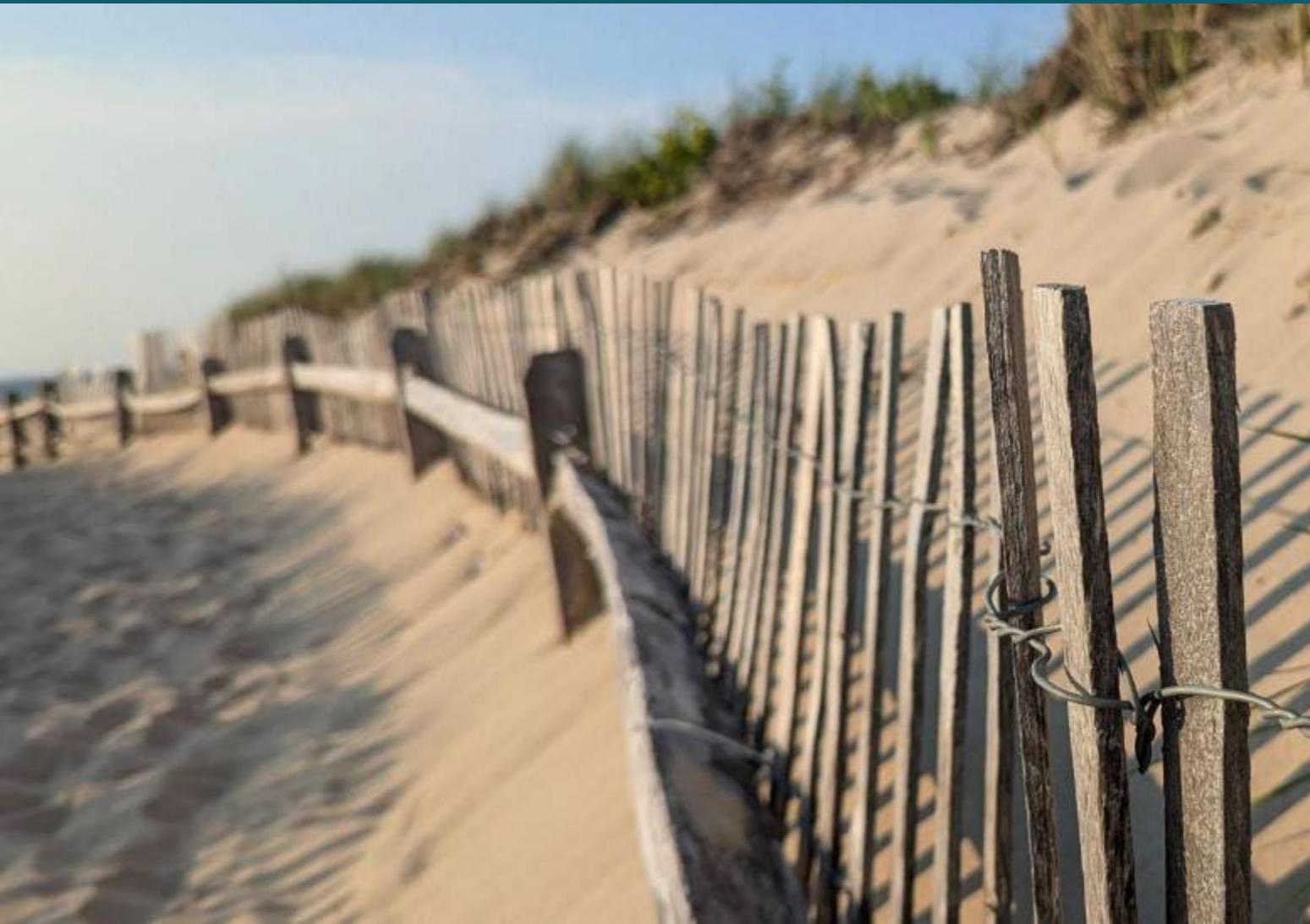
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Based on work performed for the Massachusetts Program Administrators

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# Welcome to Colorado Massachusetts!



- ✓ **High quality of life**
- ✓ **Robust energy code**
- !! **High cost of living**
- !! **Expensive housing**

# Complicated patchwork of energy codes

**Base Code:** HERS 52/55

legal minimum, includes prescriptive path

**Stretch Code:** HERS 42/45 (55 previously)

strict, mandatory when adopted by cities/towns

**Specialized Code:** HERS 42/45

electrification-friendly variant of Stretch

**Stretch and Specialized cover 90+% of the state**

Specialized Energy Code - 225 CMR 22.00 (appx. RC) and 225 CMR 23.00 (appx. CC) (55 c/t)

# Background

## Massachusetts Program Administrators' Residential New Construction Program

- **Long-running**
- **Single- and multifamily**
- **New program design**
  - All-electric
  - Market Transformation Initiative
  - Above-code tiers, including Passive House
  - Incentives, training, market actor engagement, code compliance support

Mass Save® is a collaborative of Massachusetts' electric and natural gas utilities and energy efficiency service providers including Berkshire Gas, Cape Light Compact, Eversource, Liberty, National Grid, and Unitil.

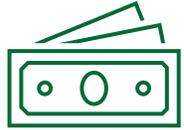
# Objectives



- **Provide concrete guidance to help home builders...**
  -  Keep up with new codes
  -  Balance their needs with those of customer
  -  Boost savings using favored construction practices
- **Support PAs' market transformation work**
  - Improve market actor skills
  - Inform program design
  - Help municipalities avoid backsliding from Stretch/Specialized

# Methodology





## Local pricing to feed into optimization models

- Web scraping, contractor surveys/interviews for HVAC
- NREMDB + COL adjustments



Results

# Recent RNC ISP: good enough, but not for long!

## Strong ISP under Stretch Code

- 4 HERS points better than required
- More efficient for most key measures

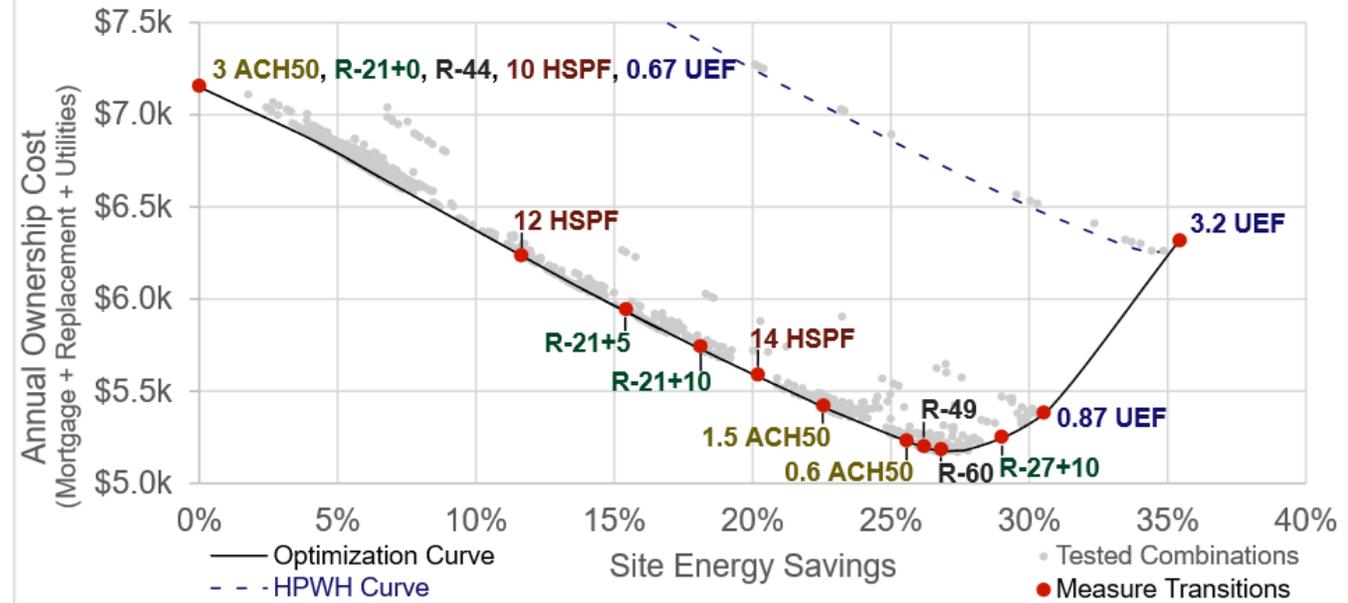
	A	B
Code	2018 IECC	
	Recent ISP	Past Stretch
ERI	51	55
Air leakage (ACH <sub>50</sub> )	2.2	3
Ventilation (SRE)	<5%	–
TDL (CFM <sub>25</sub> /100 ft <sup>2</sup> )	5.7	4.0
Flat ceiling (eR)	41.4	38.5
Above grade wall (eR)	20.6	16.7
Window U-factor	0.28	0.3
Frame floor (eR)	31.4	30
Pipe insulation (R)	1.3	3
DHW (UEF)	0.92	0.81 / 2.04
Heating, gas (AFUE)	95	80
Heating, elec. (HSPF2)	10.7	7.0
Cooling (SEER2)	13.3	12.4

## Results help builders...

- Reduce upfront costs
- Boost savings, go all-electric
- Add little operating cost

# Optimization models – iterating toward goals

- Figure out when certain measures become cost effective



# Conclusions

- 1 EO helps you meet code and reduce costs**  
regardless of fuel (best margins with all-electric)
- 2 Current tech can achieve new targets**  
without unduly burdening builders, inflating costs
- 3 PA support will be critical to move markets**  
to help builders improve practices and  
keep municipalities from backsliding from Stretch



# Thank You!

**Jared Powell**

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A photograph of a brick wall with a brown sign. The sign features the letters 'NMR' in large, green, 3D block letters. Below a horizontal line on the sign, the words 'Group, Inc.' are embossed in a smaller, grey font. The background shows a blurred window and the texture of the red brick wall.

**NMR**

Group, Inc.

# Link to Paper

