

# Zero Energy Buildings

Steven Nadel, ACEEE

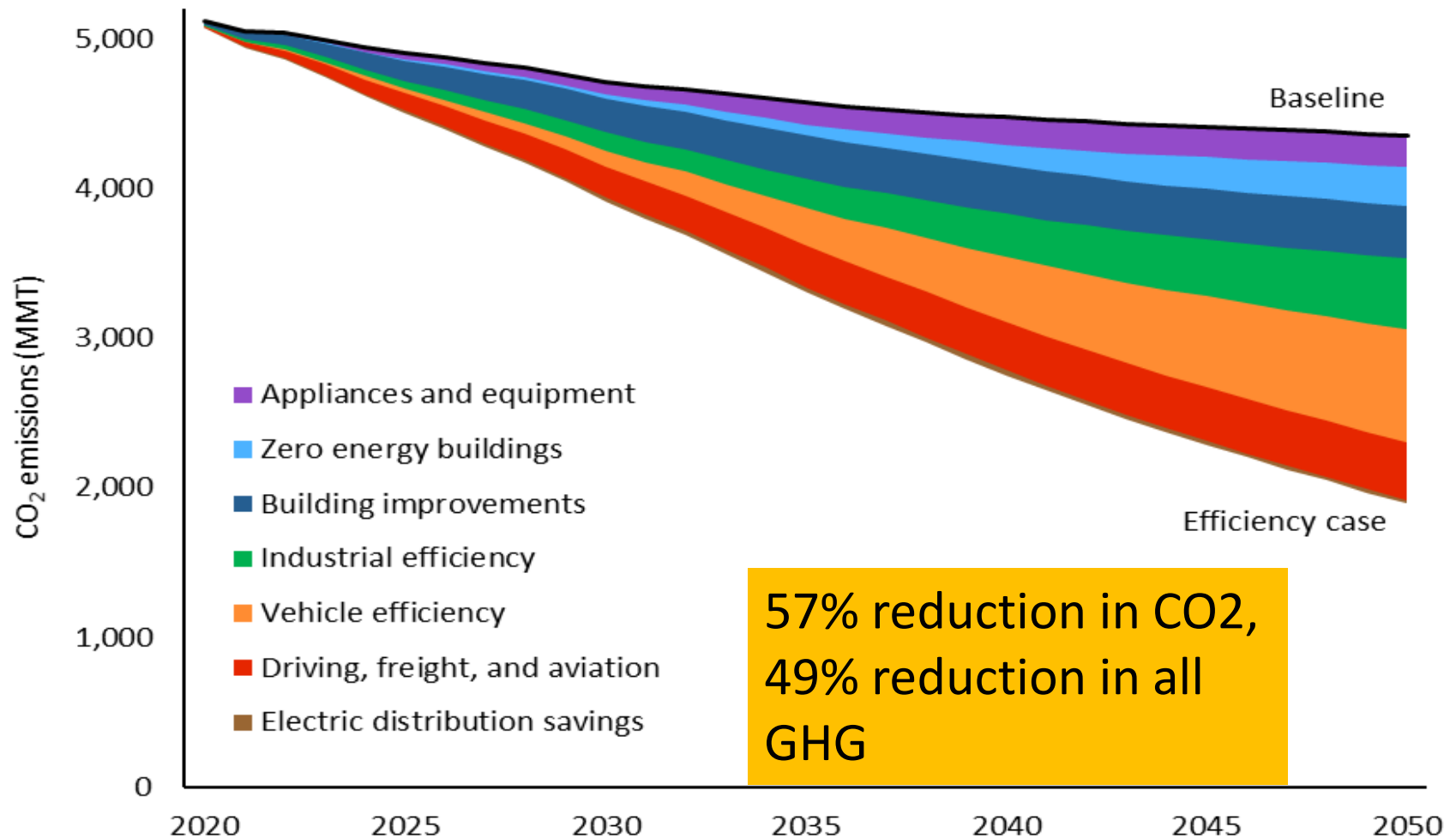
Ralph DiNola, NBI

ACEEE Summer Study Informal Session

August 2020



# Opportunity Analysis: Emissions Reductions



# Zero Energy and Zero Ready

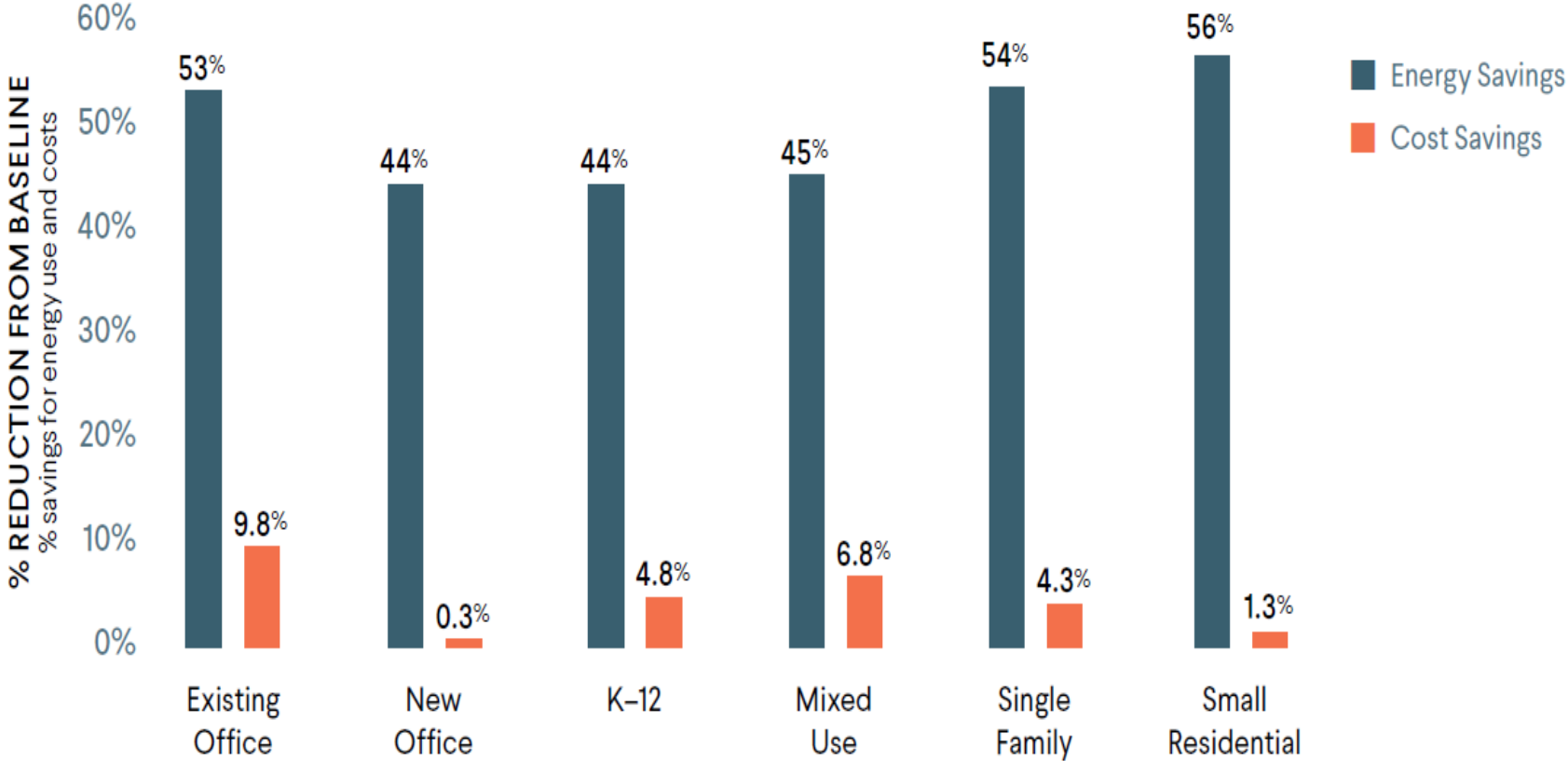
- A zero energy building is “an energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy” (DOE 2015).
- Zero energy ready means ultra-efficient (e.g. at least 30% better than code) and designed to make future installation of solar systems relatively easy

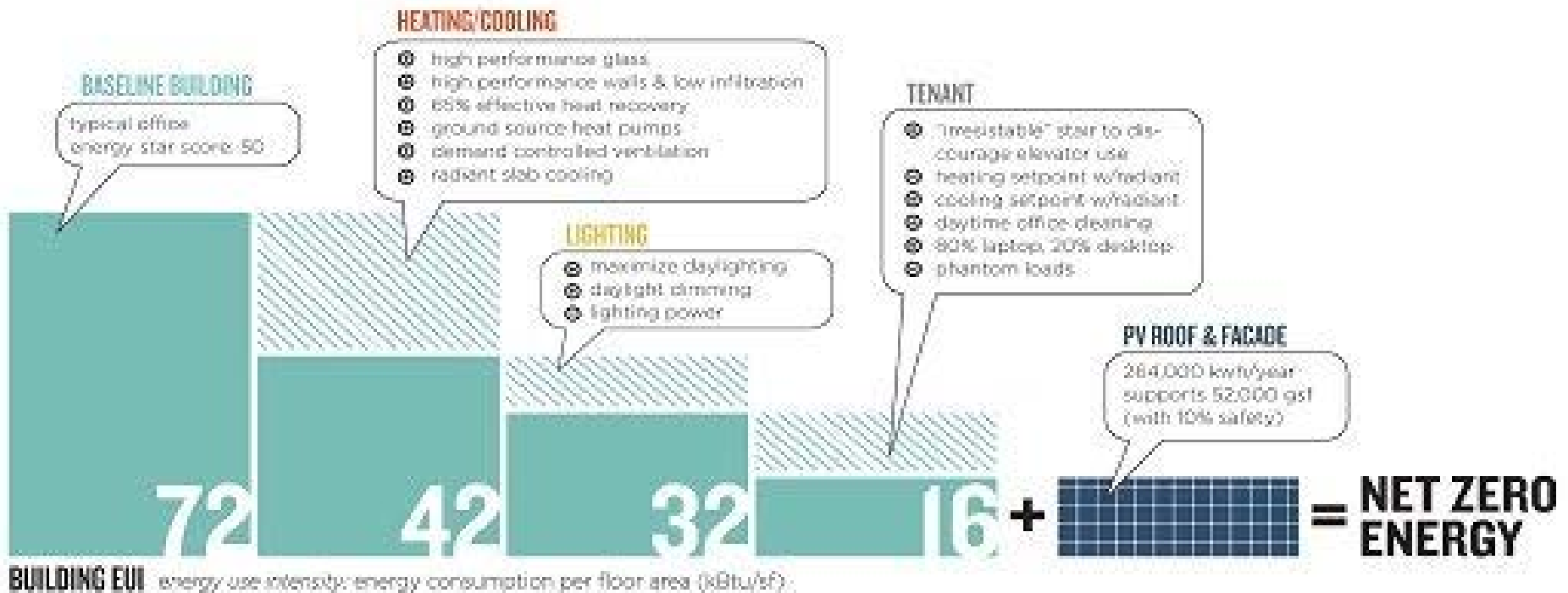


Also see:

<https://newbuildings.org/decarbonizing-buildings-a-changing-lexicon/>

# ZEB Energy and LCC Cost Savings (for Massachusetts)

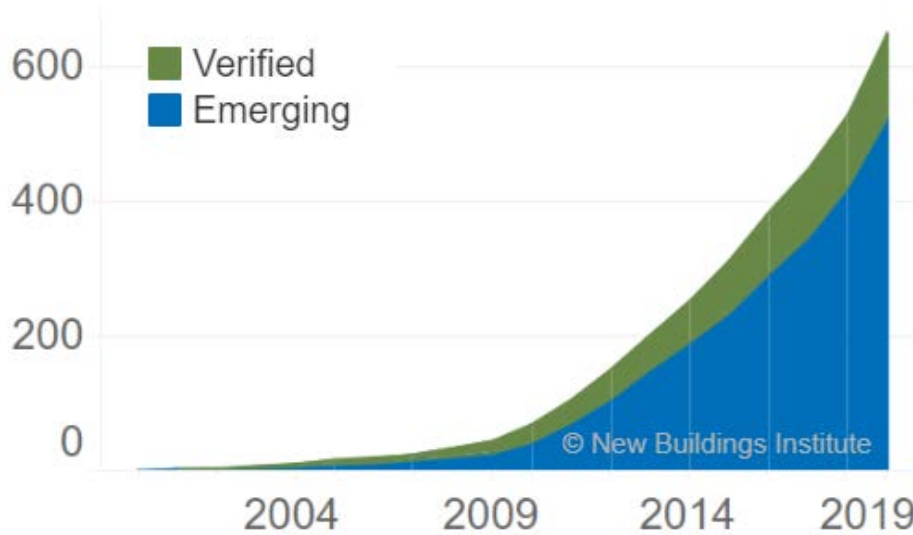




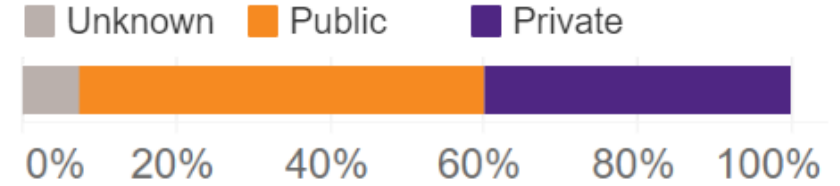
# THE PATH TO NET ZERO ENERGY

Source: Whole Building Design Guide

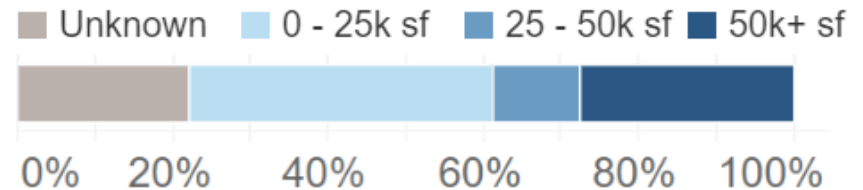
## Market Growth



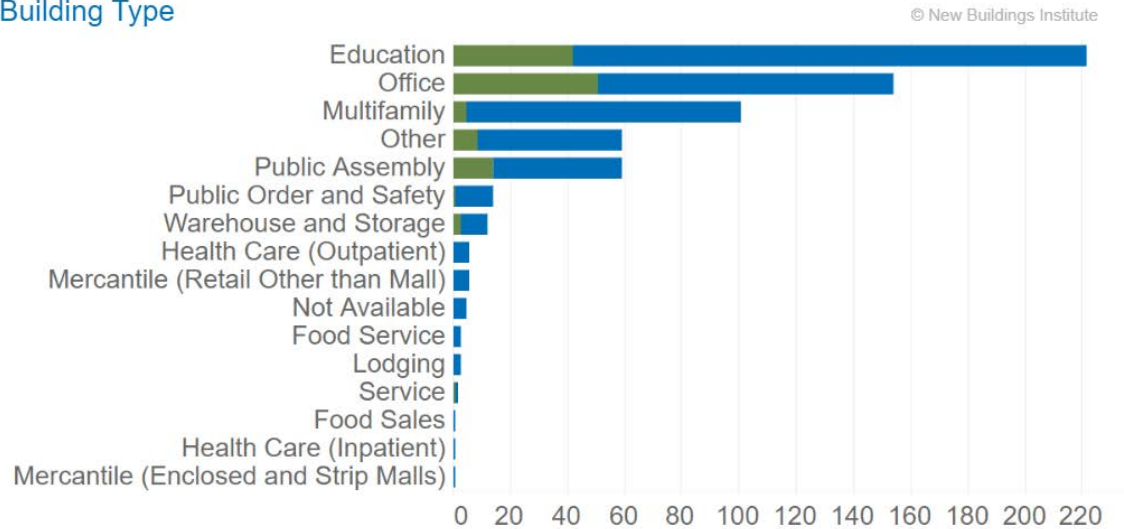
## Ownership Type Breakdown



## Building Size Breakdown



## Building Type



<https://newbuildings.org/resource/getting-to-zero-database>

# Discussion Questions

- What programs are being offered to promote zero energy buildings and homes?
- What are jurisdictions and code bodies doing to develop, adopt and implement zero energy codes?
- Should we be targeting zero energy, zero carbon or both?
- What are key challenges and how should we address them?
- What are key next steps to mainstream ZEB?

# Programs

- Full scale
  - Energy Trust of Oregon
  - NYSERDA
  - Efficiency Vermont
- Pilots
  - Consumers Energy
  - National Grid Rhode Island
  - Mass Save
  - Energize Connecticut
- Planning
  - California RFP
- NJ zero energy



## HOW IT WORKS

We can help you get started on the Path to Net Zero in just a few simple steps.



### 1 Start the Conversation

Tell us about your project and enroll during the earliest stages to access the full suite of incentives and resources.



### 2 Set Your Target

Your kick-off meeting with an Energy Trust outreach manager will establish the preliminary EUI target and energy-efficiency strategies that best fit your project.



### 3 Apply for Incentives

Once your energy-efficiency goals are defined and the path for achieving Net Zero is set, your outreach manager will work with you to identify the most relevant incentives and resources.



### 4 Request Payment

Energy Trust reviews each incentive application as it is submitted. Once approved, the cash incentive is paid when the associated work is completed. Submit a W-9 upon completion of each stage to receive your incentive check.



# Codes

- California has zero net electricity code for residential; targeting ~2030 for commercial code
- ASHRAE is targeting zero net energy for 90.1-2031
- 2021 IECC will have optional zero energy appendices for residential and commercial
- British Columbia has a step code; highest step is ZER
- Washington State developing roadmap for a zero energy code
- Other roadmapping exercises underway; e.g. NYS

# Zero Energy vs. Zero Carbon

- Zero energy just looks at annual energy, not when and how it is produced
- Zero carbon looks at where the energy comes from, which needs to consider time of day and season
- Carbon harder to do but directly addresses GHG goals
- Also questions of net zero vs. absolute zero
- Then there's embodied energy/carbon...

# Challenges

- Perceived costs
- Limited number of ZEB whole-building programs
- Not all buildings designed for net zero achieve it
- Diffusion of interests – zero energy, zero carbon, all-electric
- Building/grid integration



# Next Steps to Mainstream ZEBs

- Expand number and scope of programs
- Upgrade codes on an orderly path to ~2030
- ACEEE publishing ZEB program report in Sept.
- NBI/RMI Getting to Zero Forum, March 2021
- ACEEE and NBI establishing a ZEB Program Utility Workgroup
- Financing for green MF buildings (Fannie, Freddie, FHA)
- Advanced energy design guides for zero (offices, K-12, MF, more in future?)
- Documentation, local case studies, address myths
- Certification (Living Buildings Inst., LEED Zero)
- Refine ZEB & ZCB definitions (ASHRAE 228)
- Better educate A&Es including students, Solar Decathlon
- Federal tax incentives

# Contact Information

Steven Nadel

[snadel@aceee.org](mailto:snadel@aceee.org)

Ralph DiNola

[ralph@newbuildings.org](mailto:ralph@newbuildings.org)

