Massachusetts is Ready for Net Zero

2021 REPORT, MARCH 1ST

NET ZERO - 5.5 Million Sq Ft in MA

ENERGY EFFICIENCY

MINIMIZE FOSSIL FUEL

ON + OFF-SITE RENEWABLE ENERGY

NET ZERO READY - 7.2 Million Sq Ft in MA

DRAFT
MAR 01, 2021
What's this all about?!

Built Environment Plus sent a request out to the Massachusetts Building Community for data on what’s happening around net zero buildings. We wanted to take a pulse on:

1. How many Net Zero projects exist or are in development in and around Massachusetts.
2. Does it cost more to build these projects?
3. What building types are achieving net zero?
4. Who is bringing these projects to reality?
5. How are they getting it done?

The Building Community answered the call in nine short days and we released our first draft report on February 10th, 2021. Continued effort has increased the total of Net Zero Ready, or Net Zero Projects, collected in the analysis to 7.2 Million GSF in MA. These represent built or in-process projects, and we have since removed out-of-state projects. It’s clear from this survey that Massachusetts is more than ready for net zero.

The bottom line is:

1. The Net Zero and Net Zero Ready building stock exceeds 7 million square feet and is growing at an exponential rate in the Commonwealth today.
2. The vast majority are doing this with little to no added cost. 85% reported <1% construction cost premium to achieve Net Zero Ready.**
4. There are dozens of builders, architects, engineers and owners already bringing these projects to reality. Some are developers.
5. Net Zero Ready buildings are highly energy efficient: 82% are at least 35% more efficient than the current stretch code baseline and all rely on heat pumps as the primary source of heat.*** Net Zero buildings also procure on-site and/or off-site renewable energy to offset 100% of consumption on a net annual basis.

To be listed as Net Zero Ready in this database, buildings must be:

- Located In Massachusetts
- Highly Energy Efficient (25% total energy reduction vs. the ASHRAE 90.1 baseline).
- All electric for building heating operation*

To be listed as Net Zero, buildings must meet the Net Zero Ready criteria and:

- Procure renewable energy (from on-site and/or off-site) equal to 100% of the site energy consumption on a net annual basis.

We know there are additional Net Zero Buildings in Massachusetts, and for the projects we do have, the data is not 100% complete. We intend to update this document as we gather more information.

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* All electric for building heating operation means that electricity is used for heating during “normal operation” when systems are operating as intended and ambient temperature is above the ASHRAE 99% design condition. Special use buildings such as health care facilities and laboratories are given more leeway and may be included if the building relies primarily on heat pumps for building heating and through efficiency and electrification achieve ≥90% fossil fuel reduction vs. the ASHRAE 90.1 baseline.

**47% of the project GSF shared cost difference for net zero. Of those, 85% of them reported <1% construction cost premium.

***54% of the project GSF shared energy efficiency data. Of that 82% are at least 35% more efficient.
HOW MUCH DOES IT COST TO BUILD NET ZERO READY?

*47% of GSF reported on % cost difference

Net zero ready buildings are being built at the same cost as conventional buildings. 85% of net zero ready buildings reported have less than a 1% construction cost premium.* This is consistent across all building types and sizes, including high-rise buildings that are hundreds of thousands of square feet.

FEAR: Net zero is expensive.  
REALITY: The vast majority of net zero buildings carry little to no added construction cost and significantly reduce operating cost. This means that net zero buildings typically have lower total cost of ownership than conventional buildings. The financial case is even more compelling when construction is financed via loans or bonds; in this scenario the operating savings more than offsets the loan payment premiums. This results in positive cash-flow from day one.

*47% of the project GSF shared cost difference for net zero. Of those, 85% of them reported <1% construction cost premium.
NET ZERO READY DATABASE SNAPSHOT

7.2 Million Sq Ft in Massachusetts Currently Documented. More Pending...

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### The Companies Working on these Net Zero Projects:
#### Sorted by Sq Ft

**OWNERS:**
- City of Cambridge
- Preservation of Affordable Housing (POAH)
- Somerville Community Corporation (SCC)
- Gate Residential
- Somerville Housing Authority (SHA)
- Town of Belmont
- Alexandria Real Estate
- Gate Residential Properties
- Midwood Investment & Development
- Leggett McCall Properties, DLJ Real Estate Capital Partner
- University of Massachusetts Medical School
- Boston University
- MIT
- Chelsea Soldiers’ Home
- City of Watertown
- Acton Boxborough Regional School District
- Madison Park CDC, Trinity Financial
- Samuels & Associates P-12 Property LLC
- Just-A-Start Corporation
- Town of Lexington
- Homeowner’s Rehab, Inc.
- Penrose
- Westborough Public Schools
- Massbay Community College
- Capstone Communities LLC
- Hope Real Estate Enterprises LLC
- North Shore Community College
- Bristol Community College
- Commonwealth of Massachusetts
- The Neighborhood Developers
- Traggorth Companies
- Cape Cod Community College
- Broadway Investments Realty, LLC
- Fred Gordon
- NSCDC

**PUBLIC HIGHER EDUCATION:**
- Clark University
- Tlee Development
- Rees Larkin Development
- Hampdentaio LLC
- NOW Communities, LLC
- Town of Eastham
- Hampshire College
- Cambridge Housing Authority
- E3 Development
- MassDevelopment Finance Agency
- Hitchcock Center for the Environment
- Z Capiital Investments
- Mass Audubon
- MA Dept. of Conservation & Recreation
- Chunga Cha
- Harvard University
- Ryan Bushey
- Deborah Frieze

**ARCHITECT:**
- Arrowstreet
- ICON Architecture, Inc
- NBBJ
- Perkins & Will
- Perkins Eastman
- Adrian Smith + Gordon Gill Architecture
- SGA
- Architectural Resources Cambridge
- ZGF
- KPMB
- Kieran Timberlake
- Payette
- William Rawn Associates
- AIA Architects
- DHK Architects
- Placetailor
- Eikus Manfredi Architects
- DiMella Shaffer
- Sasaki
- Mount Vernon Group Architects
- Bruner/Cott
- Utile
- Architerra

**HMFH Architects**
- Oudens Ello Architecture
- Cambridge Seven Associates
- Monte French Design Studio
- ZeroEnergy Design
- Studio G Architects
- Charles Rose Architects
- William McDonough + Partners
- DiNisco Design Architects & Planners
- Donald Powers Architects
- Miller Pollin Architecture
- designLAB architects
- Urbanica
- Interface Studios
- Mills Whitaker Architects
- Maple Hill Architects
- Maryann Thompson Architects
- Franziska Amacher, FAIA
- Snahetta
- Ryan Bushey
- Next Phase Studio

**ENERGY CONSULTANT:**
- Thornton Tomasetti
- Steven Winter Associates
- The Green Engineer
- New Ecology
- Marc Rosenbaum
- Linnaen Solutions

**ENERGY CONSULTANT:**
- Callahan Construction Managers
- Consigli Construction Co.
- Brait Builders
- Moriarty
- Gilbane Building Company
- Placetailor
- Brait Builders
- WT. Rich
- TR White Company
- Haycon
- Skanska
- NEI GC
- Shawmut
- Stack + Co
- Groom Construction
- Olive Branch Builders
- NPS Contractors
- Bond Brothers
- Wright Builders
- MCR Contraction
- Columbia Construction Co.
- Lee Kennedy
- Walsh Brothers
- Transformations, Inc.
- One Way Development
- DeJlbrook JKS
- Suffolk
- Eastward Homes
- Auburndale Builders
- South Mountain Company
- Fontaine Brothers

**BUILDER:**
- Drew Gillett
- South Mountain Company
HOW MUCH BETTER CAN WE DO THAN THE CURRENT CODE?

MUCH BETTER!

Efficient buildings are far surpassing the current Stretch Code. Compared to the code baseline, 82% of submissions achieved at least 35% savings*, whereas the current Stretch Code only requires a meager 10% savings.

FEAR: Isn't the current Stretch Code difficult enough already?
REALITY: The current Stretch Code is not a stretch. Well insulated building envelopes and high performance heat recovery easily outperform the current stretch code. With the addition of heat pumps, the energy consumption is slashed.

*54% of the project GSF shared energy efficiency data. Of that 82% are at least 35% more efficient.
HOW ARE BUILDINGS USING ELECTRICITY FOR HEATING?

*87% of GSF reported on type of heat pump

GROUND AND AIR-SOURCE HEAT PUMPS!

7 million square feet of buildings are using heat pumps as the primary heating source. This spans all building types and sizes reported, including high-rise buildings that are hundreds of thousands of square feet.

FEAR: Net zero buildings must be 100% electric with no exceptions.
REALITY: Net zero standards promote electrification, but allow flexibility for fossil fuel use where appropriate. Examples include: back-up systems, lab buildings, healthcare facilities, commercial kitchens, large domestic hot water systems, and others.

FEAR: The electric grid can’t support electric buildings.
REALITY: New net zero buildings have lower peak electric demand than their peers.
HOW ARE BUILDINGS ACHIEVING NET ZERO?

ON-SITE AND OFF-SITE RENEWABLE ENERGY!

Of the 7+ million SF of net zero ready buildings, 5.5 million SF anticipate achieving net zero energy. Net zero buildings procure on-site and/or off-site renewable energy to offset 100% of annual consumption.

FEAR: Net zero buildings must produce all energy on-site.
REALITY: Net zero buildings can procure renewable energy from off-site.

FEAR: Renewable electricity costs more than grid electricity.
REALITY: There are many procurement methods for renewable energy. Some marginally increase cost. Others cost less, such as: power purchase agreements and virtual power purchase agreements.
This Report is still a Work in Progress...

For questions related to this report, please reach out to communications@builtenvironmentplus.org

To learn more about Built Environment Plus check out our website https://builtenvironmentplus.org/ and to check for updates to this report visit https://builtenvironmentplus.org/road-to-net-zero/

We are continuing to add to the database. Use this form to contribute additional projects or contact the email address above to request a spreadsheet.

Thank you to the many people and organizations who contributed to this effort, especially the Boston Society for Architecture. The building community united to provide this data swiftly.

The 2019 Cost Report

Our report, Zero Energy Buildings in MA: Saving Money from the Start, assessed in 2019, zero energy (ZE) upfront building costs, model performance, and life-cycle costs in Massachusetts. With buildings being a major source of greenhouse gas emissions, scientists, advocates, and local leaders are working to curb emissions and reduce energy use in the built environment by both retrofitting existing buildings and constructing new buildings to achieve Zero Energy Standards. While stakeholders and decision makers frequently cite high costs as the primary barrier to ZE buildings, we and report lead Integral Group found that many types of ZE buildings can be built with no added upfront cost and some commercial buildings can see return on investment in as little as one year.

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