Massachusetts is Ready for Net Zero
2022 REPORT, MARCH 18TH UPDATE

NET ZERO - 12.9 Million Sq Ft in MA

ENERGY EFFICIENCY
MINIMIZE FOSSIL FUEL
ON + OFF-SITE RENEWABLE ENERGY

NET ZERO READY - 16.5 Million Sq Ft in MA
What's this all about?

Built Environment Plus has been actively asking the Massachusetts Building Community for data on what’s happening around net zero buildings. We want to take an ongoing 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 our original call in nine short days and we released our first draft report on February 10th, 2021. An update in March 2021 unveiled even more progress as we confined the report to built or in-process projects in Massachusetts. Continued data collection increased the total of Net Zero or Net Zero Ready Projects included in the analysis in March 2022 to 16.5 Million GSF in MA. This represents a 130% increase in known square footage in just one year. It is clear from this analysis that Massachusetts is more than ready for net zero.

The bottom line is:

1. The Net Zero and Net Zero Ready building stock exceeds 16.5 million square feet and is growing at an exponential rate in the Commonwealth today.
2. Of the 4 million GSF with reported cost data, 85% reported <1% construction cost premium to achieve Net Zero Ready.
3. Affordable Housing, Multifamily Housing, K-12 Schools, and Labs & Tech are leading the way, employing heat pumps and on-site renewables to reach their net zero targets.
4. Affordable Housing makes up 78% of all residential Net Zero and Net Zero Ready square footage, up from 54% in March 2021.
5. Net Zero Ready buildings are highly energy efficient: 90% are at least 35% more efficient than the current stretch code baseline (up from 82% in March, 2021 with 26% more projects reporting energy data). 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.
6. Our list of companies working on these net zero projects has grown substantially in the past year, with a 135% increase to 313 companies working to make net zero buildings the standard in MA.

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 ongoing document as we gather more information.

* 25% of the project GSF and 55% of submissions shared cost difference for net zero. Of those, 85% of them reported <1% construction cost premium.
** 68% of the project GSF shared energy efficiency data. Of that 90% are at least 35% more efficient.
*** 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.
Net zero ready buildings are being built at the same cost as conventional buildings. Of the 4 million GSF with reported cost data, 85% of net zero ready buildings 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:** Of submissions reporting on cost data, net zero buildings often 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.

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**NET ZERO READY DATABASE SNAPSHOT**

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

<table>
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<tr>
<th>Category</th>
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**More Pending...**
The Companies Working on these Net Zero Projects: Sorted by Sq Ft

OWNER:
Boston Housing Authority
Alexandria Real Estate
City of Cambridge
Preservation of Affordable Housing
Somerville Community Corporation
Gate Residential
Somerville Housing Authority
Town of Belmont
Gate Residential Properties
Midwood Investment & Development
City of Arlington
Holyoke Soldiers’ Home
DLJ Real Estate Capital Partner
Leggat McCall Properties
University of Massachusetts Medical School
Boston University
Druker Company
MIT
Marcus Partners
Chelsea Soldiers’ Home
City of Watertown
Partners Properties LLC
Town of Stoneham
Town of Acton
Madison Park CDC
Trinity Financial
Town of Lincoln
Samuels & Associates P-12 Property LLC
Town of Swampscott
The Community Builders
Concord, MA
Just-A-Start Corporation
Town of Lexington
Town of Westwood
NeighborWorks Housing Solutions
Related Beal
Homeowner’s Rehab, Inc.

Boston Properties
Phillips Academy
Broadway & A St LLC
City of New Bedford
New Bedford Public Schools
Pennrose
Urban Edge
The Neighborhood Developers
Westborough Public Schools
Massbay Community College
Capstone Communities LLC
Hope Real Estate Enterprises LLC
North Shore Community College
Allied Health
Hawkins St Union Square LLC
Bunker Hill Community College
DCAMMM
Beacon Communities
Bristol Community College
Commonwealth of Massachusetts
The Neighborhood Developers
Traggorth Companies
Barlett Lot D Preservation Associates
Cape Cod Community College
Broadway Investments Realty, LLC
NSCDC
Clark University
Tlee Development
Elmwood Street Reality Trust
MassDevelopment
Rees Larkin Development
Cambridge Housing Authority
Franklin Regional Transit Authority
PT RED
Hampdentailor LLC
Woods Hole Research Center Corporation
Town of Eastham
Hampshire College
University of Massachusetts Amherst
E3 Development
213 Harvard Street Condominium Trust
Harvard University
Hitchcock Center for the Environment
Z Captial Investments
MA Dept. of Conservation & Recreation
Zero Energy Modular Affordable Housing Initiative (ZE-MAHI)
Marcella 120 LLC
Smith College
Ryan Bushey

(All Individual Homeowners are excluded from this list)
The Companies Working on these Net Zero Projects: Sorted by Sq Ft

**ARCHITECT:**
- Stantec
- Arrowstreet
- Elkus Manfredi Architects
- SGA
- DREAM Collaborative
- Perkins & Will
- NBBJ
- Payette
- CBT
- ICON Architecture, Inc.
- Perkins Eastman
- Adrian Smith + Gordon Gill Architecture
- HMFH Architects
- Utile
- ZGF
- Architectural Resources Cambridge
- KPMB
- Kieran Timberlake
- Ai3 Architects
- SMMA
- Placetailor
- William Rawn Associates
- Prellwitz Chilinski Associates
- DHK Architects
- Lavallee Brensinger
- Davis Square Architects, Inc.
- DiMella Shaffer
- Sasaki
- Dore & Whittier
- Stefanov Architects Inc.
- Mount Vernon Group Architects
- Bruner/Cott
- Architerra Inc.
- Union Studios
- Oudens Ello Architecture
- Hawkins St Union Square LLC
- Cambridge Seven Associates
- Sebastian Mariscal Studios
- Monte French Design Studio
- Studio G Architects
- Brown Lindquist Fenuccio & Raber Architects Inc.
- Charles Rose Architects
- William McDonough + Partners
- DiNisco Design Architects & Planners
- NOW Communities, LLC
- ZeroEnergy Design
- Miller Pollin Architecture
- Urbanica Design
- designLAB Architects
- Interface Studio Architects
- Franziska Amacher
- Mills Whitaker Architects
- Maple Hill Architects
- R. Carter Scott
- Maryann Thompson Architects
- Scott Payette Architects
- David Miller
- Steven Baczek
- SimpleCity Studio
- Ben Nickerson
- Rachel Stevens
- Kraus Fitch Architects
- Maclay Architects
- Peter Stevens
- Boston Green Building
- Coldham & Hartman Architects
- Snøhetta
- Hutker Architects
- John Livermore
- Ryan Bushey
- Peter Brooks
- BrightBuilt Homes
- Peter Kane
- Edy Ambroz
- Matt Coffey
- Mary Kraus
- Next Phase Studios

**ENERGY CONSULTANT:**
- Thornton Tomasetti
- The Green Engineer
- New Ecology
- Steven Winter Associates
- enviEnergy
- Marc Rosenbaum
- InPosse
- CLEAResult
- McPhail Associates
- Northern Power Systems
- Transsolar, Inc.
- Building Science Corporation
- Linnaen Solutions
- Conservation Services Group
- Michael Duclos
- VEIC
- Solar Design Associates
- Daniel Roy
- Taza Vercruysse
- Sean Welch
The Companies Working on these Net Zero Projects: Sorted by Sq Ft

**MEP ENGINEER:**
- Petersen Engineering
- BR+A
- Cosentini Associates
- Garcia, Galuska & DeSousa
- WSP
- Arup
- Skanska
- Wozny Barbar
- Rist Frost Schumway
- AKF
- Bohler Engineering
- BALA
- BLW Engineers
- RW Sullivan Engineering
- CES
- SGH
- RFS Engineering
- LVR Corp.
- Places Associates
- Merrill Civil Engineers
- VAV International, Inc.
- Buro Happold
- Zade Associates
- StudioNYL
- Van Zelm
- Vanderweil Engineers
- Ripcord
- Norian Siani, Inc
- Griffith & Vary, Inc.
- 2RW Consulting Engineers
- Bala Consulting Engineers
- Kohler & Lewis Engineering
- Bensonwood
- Engineering Design Build
- RSE Associates
- Allen & Major Associates
- Drew Gillett
- Ryan Hellwig
- Adam Kohler
- McBrie Consulting Engineers
- David Fink
- South Mountain Company
- Ben Brungraber
- Center for Ecological Technology

**BUILDER:**
- Callahan Construction Managers
- Brait Builders
- Skanska
- Fontaine Brothers
- Suffolk
- Erland
- Lee Kennedy
- Moriarty
- Consigli Construction Co.
- Gilbane Building Company
- W.T. Rich
- TR White Company, Inc.
- Delphi Construction Inc.
- Haycon
- Sean Ford
- NEI GC
- The Community Builders
- Shawmut
- Stack + Co
- Groom Construction
- Olive Branch Builders
- NPS Contractors
- Bond Brothers
- Wright Builders
- GFC Development
- MCR Contraction
- Transformations, Inc.
- Columbia Construction Co.
- Walsh Brothers
- Pioneer Valley Habitat for Humanity
- Metric Construction
- Consortium for Advanced Residential Buildings (CARB)
- One Way Development
- Boston Green Building
- BOND
- Chapman Construction
- Dellbrook JKS
- Decumanus Green Design/Build, Inc.
- Synergy Construction
- Holden Builders
- Farley Pedler
- Edy Ambroz
- Caleb Ewing
- Bill Hallaren
- Dunhill Companies
- Karston Construction
- Pascal Albanese
Efficient buildings are far surpassing the current Stretch Code. Compared to the code baseline, 90% 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.

*68% of the project GSF shared energy efficiency data. Of that 90% are at least 35% more efficient.
HOW ARE BUILDINGS USING ELECTRICITY FOR HEATING?

*85% OF GSF REPORTED ON TYPE OF HEAT PUMP

**GROUND AND AIR-SOURCE HEAT PUMPS!**

14+ million square feet of buildings reported 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 often have lower peak electric demand than their peers.
How are buildings achieving net zero? On-site and off-site renewable energy!

Of the 16.5 million SF of net zero ready buildings, 12.9 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 continuing to grow...

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, and have proven very committed to our ongoing collection efforts!

Our 2019 Cost Report that Started it All.

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.

READ IT HERE