Road to Making Phius the Energy Code Requirement in Massachusetts

Isaac Elnecave, Phius

ABSTRACT

With the increasing need for policies to drive energy efficiency in new construction, the typical approach of using model energy codes is proving inadequate. Simply put, the efficiency of national model energy codes, particularly residential energy codes, is not improving quickly enough. Consequently, many jurisdictions are moving beyond these national model codes. Massachusetts is one state that is doing so and has succeeded in establishing one of the strongest energy codes in the nation. The state now enforces the Passive House standard, which is significantly more efficient than the model codes, in over one third of the states. This will mean significant energy savings. How was this accomplished? This paper aims to provide the roadmap by describing: the current code landscape in the state, the Passive House standard itself and the process of reaching the current milestone. The paper will end with a brief discussion on how to properly enforce the increasing number of Passive House projects within the state.

Introduction

Building energy codes provide one of the key strategies for effectively addressing energy use in the built environment. However, while real progress has been made in lowering the allowable use in buildings, the national model codes[1] (particularly on residential buildings) have typically only made sporadic improvements over the last 50 years. (See Table 1)

Table 1: Efficiency Progress in the Residential National Model Codes[2]

Residential Code	Normalized Energy Use	Improvement
ASHRAE 90-1975	100	0.0%
MEC 1980	95.8	4.0%
MEC1983	96.48	-0.5%
MEC 1986	96.48	0.0%
MEC 1989	96.48	0.0%
MEC 1992	88.61	8.2%
MEC 1993	86.93	1.9%
MEC 1995	86.93	0.0%
IECC 1998	86.93	0.0%
IECC 2000	86.93	0.0%
IECC 2003	86.60	0.4%
IECC 2004	81.74	5.6%
IECC 2006	82.75	-1.2%
IECC 2009	76.21	7.9%
IECC 2012	61.64	19.1%

[1] The national model codes are the International Energy Conservation Code (IECC) and ASHRAE 90.1.

[2] https://www.energycodes.gov/codes-101

IECC 2015	61.64	0.0%
IECC 2018	60.97	1.1%
IECC 2021	55.28	9.3%
IECC 2024	50.96[3]	7.8%

Consequently, multiple states (the typical jurisdiction where energy codes are adopted) have started adopting their own specific set of energy codes. Massachusetts has been one of those states.[4] At the end of 2023, Massachusetts adopted one of the most innovative approaches to energy codes. For a specific class of buildings[5], the state allows municipalities to adopt a specific code that requires Passive House certification (either Phius or PHI). This paper will describe:

1. How Massachusetts achieved potentially the strongest energy code in North America
2. Description of the Phius standard
3. How other states could follow the state's lead.

How did Massachusetts Achieve the Strongest Energy Code in the Country?

According to the latest report by the American Council for an Energy Efficient Economy, Massachusetts enforces one of the most efficient codes in the country. (ACEEE 2025) Currently, the state has established three energy codes: the first tier (the base code) is the latest version of the IECC with modest amendments such as EV and Solar readiness, the second level is the Stretch Code which is designed to be significantly more stringent than the IECC, and the third level is called the Specialized Opt-in Code (Specialized Code). This structure has evolved since 2009 (the year that the original Stretch Code was adopted). The original Stretch Code came about as a result of legislation called the Green Communities Act which provided funding for municipalities that adopted a Stretch Code developed by the state. (Elnecave 2011)

The Base Code is the minimum code available to municipalities in Massachusetts. The Stretch Code, which was developed by the Department of Energy Resources[6], is enforced by individual municipalities once a given municipality supersedes the Base Code by affirmatively adopting it. Importantly, once a municipality adopts the Stretch Code, it must enforce any subsequent update to the Stretch Code unless it opts out. Prior to the adoption of the Specialized Code, almost 300 towns and cities had adopted the Stretch Code. At the end of 2023, DOER adopted a third tier, the Specialized Code. Much like the original Stretch Code, any municipal government that wants to enforce this code must affirmatively adopt it and, in this case, it either

[3] The residential model code is improving at an average rate of 1% per year. At this pace, it will reach net-zero by the year 2074.

[4] Other states include California, Washington, and Oregon.

[5] The code would apply to Group R buildings over 12,000 square feet.

[6] Link to Massachusetts Energy Codes: https://www.mass.gov/info-details/2025-massachusetts-building-energy-codes

supersedes the Stretch Code.[7] The Specialized Code applies to new construction and has specific requirements for new residential buildings over 12,000 square feet in area. Under this code, projects must receive a Passive House certification (either Phius or PHI) to receive a Certificate of Occupancy.[8] Currently, 60 towns and cities covering more than a third of the state's population are enforcing this code.[9]

The development of the Specialized Code and the subsequent adoption by municipalities is the end result of several years of activities designed to develop the construction industry infrastructure necessary for the adoption of the Specialized Code. Many construction industry professionals hesitate before working on Passive House projects due to a number of factors including: unfamiliarity with the Passive House standard itself and the belief that it is difficult to design and construct projects meeting the standard, lack of training/skills in specific Passive House construction techniques for both contractors and subcontractors, and the use of unfamiliar materials and construction techniques. These factors produce a perception of significantly higher incremental costs. However, as noted in Table 4, the incremental costs are quite modest. To address this challenge, a coordinated set of incentives were developed at the state level. These Massachusetts incentives included: generous utility programs, adding Passive House to the Qualified Allocation Plan which provides a path for significant funding for affordable housing, an innovative program termed the Passive House Design challenge which provided $4,000 per unit, up to $500,000 for building to the Passive House standard and the inclusion of an alternative compliance path in the Base and Stretch Codes.[10]

Through the incentives, a virtuous cycle developed. These incentives resulted in an increase in projects. The increase in projects, in turn, brought in a lot of architects, engineers, and energy raters into the Passive House sector and expertise developed. The importance of this effect cannot be overstated. Many firms working on first-time Passive House projects struggle; but once the first couple of projects are completed, the ability to complete future projects in a cost competitive manner greatly increases. This is reflected in how projects take less time to complete and, in turn, lower costs.

The next section will briefly detail the requirements behind the Phius[11] standard.

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[7] Prior to the introduction of the Specialized Code, each municipality either (for all buildings) enforced the Stretch Code or the Base Code. If a municipality adopts the Specialized Code, then the Specialized Code becomes the enforced code regardless of whether the municipality enforced the Stretch or Base code previously.

[8] The second tier of energy codes which covers both residential and non-residential buildings covers the majority of municipalities in the state. Residential buildings under the Stretch Code lie between the IECC and Passive House in efficiency.

[9] https://www.dimellashaffer.com/blog/mapping-our-way-through-the-massachusetts-energy-codes-in-2026/

[10] These policies will be described in more detail in Section 3.

[11] This paper will focus on the Phius standard due to the familiarity of the author. Many of the same descriptors apply to the PHI standard.

Description of the Phius[12] standard

The standard focuses on five features: exterior insulation, airtight construction, high-performance windows, balanced ventilation and minimal thermal bridges. Although it puts requirements on many of the same items included in the energy code, the requirements in the Phius standard work together to achieve the highest level of efficiency. The Phius standard is designed (much like the energy code) to be climate specific.[13]

Ultimately, Phius designs result in significant energy savings. An analysis by Phius compared energy use of both single family and multi-family buildings between code and Phius rated buildings for the various climate zones in the United States. For climate zone 5A (which covers all of Massachusetts), the following savings were calculated: (See Table 2)

Table 2: Modeled Energy Savings between Phius and the 2021 IECC for Climate Zone 5A[14]

Type of Residential Building	% Reduction in Site Energy
Single Family	50%
Duplex	41%
6 Unit Multi Family	31%

PHIUS CERTIFICATION PROCESS

Establishing robust design requirements is a necessary condition to achieve energy efficient buildings. The Phius certification process ensures all projects get a thorough review during both the design and construction stages. During the design review phase, Phius compares the drawings with the WUFI model[15] and determines that all the design requirements are met. Design certification is granted when the WUFI model indicates that all targets are met and the construction drawings match the WUFI model inputs.[16]

During construction, certified raters (for single family projects) or verifiers (for multi-family projects) review the actual construction work. This review includes visual inspections (complete with photographs) for envelope insulation, mechanical equipment, and appliances as well as testing (ventilation, blower door tests) to make sure the building as actually constructed still meets the requirements of the WUFI model and ultimately performs.

12 Phius provides certification for two separate standards. Phius CORE which is designed to maximize all cost-effective energy efficiency and Phius ZERO which can be layered on top of CORE to achieve Net-Zero status with the addition of on-site or off-site renewable energy.

13 Please see the Phius 2024 Guidebook for complete information on design and construction of Phius projects.

14 This data comes from modeling done by Phius.

15 The WUFI model is the software used by Phius to determine whether a given design meets Phius requirements. For more information, go to: https://www.phius.org/resources/tools-and-support/wufi-passive-design-tool.

16 Phius also checks the datasheets for insulation and HVAC equipment.

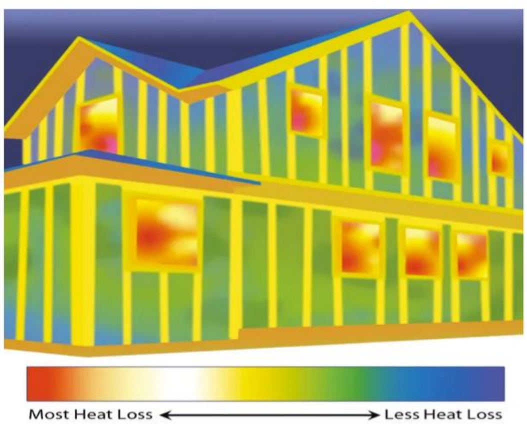
Phius projects also account for thermal bridging and hygrothermal concerns during both the design and construction reviews, issues that are very salient to high efficiency projects.

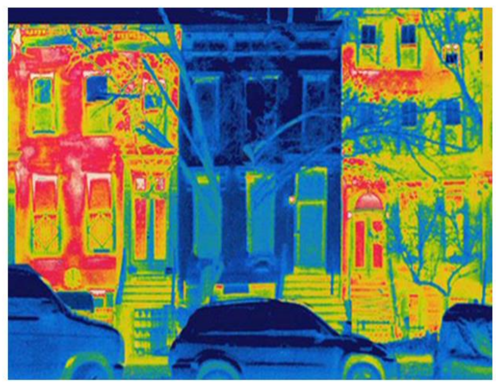
THERMAL BRIDGES AND HYGROTHERMAL CONCERNS

Thermal Bridges

Thermal bridges are areas or components of an assembly that have higher thermal conductivity (heat flow) than surrounding materials. The higher heat flow undercuts the efficiency of the project. An example of a thermal bridge is the wall studs in between cavity insulation where no continuous insulation is provided. (See Figure 2)

Figure 2: Picture of Thermal Bridges and its Mitigation (Picture on Right) by Continuous Insulation.





With respect to thermal bridging, Phius reviews every detail and picks out the components that have the potential to be a thermal bridge. At that point, a THERM model is used (either by the CPHC[17] or Phius) to determine whether there is a thermal bridge. If the model indicates a thermal bridge, then the heat loss is included in the WUFI model. As an alternative, instead of adding heat loss to the WUFI model, the project team can also, if possible, amend the details. This is a simple, straightforward way to incorporate thermal bridges into the review and ensure that it does not derail the project.

Hygrothermal Analysis

Because of the increased amount of insulation in walls and roofs/ceilings required by Phius, the potential for the envelope assembly to dry out is diminished leading to increased potential for moisture concerns. This situation can lead to the development of mold or degradation of envelope components such as wood sheathing. To determine whether there is a hygrothermal issue, Phius developed (based on research by the Building Science Corporation) a

[17] The CPHC is the Certified Passive House Consultant; the person responsible for creating the WUFI model and the required details necessary for the design.

set of guidelines for roofs/ceilings, walls, and floors.[18] [19] (Lstiburiek 2011). For walls and roof/ceilings, these design guidelines are based on the ratio between exterior and interior insulation. However, these design guidelines are not always met, so a robust construction review is necessary. Many designers/builders are unaware as to the reason behind the requirements for minimum amounts of insulation in the assembly and will often value engineer a decrease in the insulation; often reintroducing hygrothermal issues. If a design (or final installation) does not meet the appropriate ratio laid out in the Guidebook, then the design must be amended. Either a WUFI Plus[20]hygrothermal analysis will be run to confirm the design will not result in moisture issues or a professional engineer submits a letter stating that the design is safe.

NON-ENERGY BENEFITS

Passive house projects add significant value on top of energy savings. Due to the high efficiency windows and insulation levels, the buildings tend to be exceptionally quiet. The stringency of Phius designs also tends to ensure that projects are often fully electrified. Typically, the only major component that is not electric is the demand hot water heater in multi-family buildings.[21]

Recent research has borne out the increased resilience of residential buildings achieving the Phius standard. Modeling done by the Pacific Northwest National Laboratory (PNNL) (Franconi; 2021) indicated that across the country residences built to the Phius standard maintained their conditioned interior temperature for dramatically longer periods of time than for homes built to the 2021 IECC.

How Other States Can Follow Massachusetts' lead

State agencies in Massachusetts followed a staircase strategy to reach the ultimate goal of a Passive House based energy code for multi-family residential buildings. The state implemented a series of interconnected policies and programs that were built on each other and that overcame the barriers to constructing high efficiency buildings such as Passive House.

INCENTIVES

The State Energy Office (SEO) or utility provides funding (See Table 3) for either single family or multi-family projects. For projects teams trying Phius for the first time, there will undoubtedly be an increase in cost arising from both the fact that Phius will require more insulation and more efficient equipment and also from a lack of familiarity by project teams

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[18] These guidelines are found in Appendix B of the 2024 Phius Guidebook.

[19] https://www.phius.org/sites/default/files/2025-09/Phius%20Certification%20Guidebook%20v25.1.0.pdf

[20] WUFI Plus is the software used to determine moisture in an assembly. It is related but more powerful the WUFI Passive.

[21] Single family projects universally include a Heat Pump Water Heater. Multi-family projects will typically include a gas boiler or electric resistance water heaters.

(everyone from the developer to subcontractors). The availability of utility program funding; including early-stage feasibility study grants, as well as a per-unit final incentive, helps overcome the reluctance of project teams that are unfamiliar with Phius but would still like to try it out. It has been shown in multiple studies that the incremental cost associated with a Phius project diminishes rapidly as project teams become conversant with Phius. (Auros 2018, Craig 2022) Table 3 shows the funding provided by the MassSave incentive program.

Table 3: Passive House Incentives from MassSave[22]

Incentive Timing	Activity	Incentive Amount	Maximum Incentive
Pre-Construction	Feasibility Study	Up to 100% Feasibility Cost	$5,000
	Energy Modeling	75% of Energy Modeling Cost	$500/unit, max $20,000
	Pre Certification[23]	$750/unit	N/A
Post Construction	Certification	$3,000/unit	N/A

Another program that had an important effect was the Passive House Design Challenge run under the Massachusetts Clean Energy Center. Under this program, developers received an incentive of $4,000 per unit, up to $500,000 to build a project to the Passive House standard. 8 projects were funded (7 completed Passive House certification). This demonstration program helped with increasing professional construction expertise when few construction professionals were familiar with Phius. Also, the program required the project professionals to provide information on incremental costs as well as information on strategies to achieve Passive House certification. This was an important demonstration showing that the incremental cost of meeting the Phius standard was not as high as expected. It provided an important set of data points on the road to establishing the Specialized Code R-use requirements. (Craig 2022) Table 4 is a chart of the incremental cost increase for the Passive House Challenge Projects.

Table 4: Incremental Cost for Projects involved in the Passive House Design Challenge[24]

Owner & Project	Location	Units	Award	Incremental Cost
Old Colony Phase 3	South Boston	55	$220,000	3.5%
North Commons at Village Hill	Northampton	53	$212,000	4.1%
Finch Cambridge	Cambridge	98	$147,000	1.4%
Holbrook Senior Center	Holbrook	72	$131,200	1.6%
Harbor Village	Gloucester	30	$120,000	1.8%

[22] Please see: https://www.masssave.com/residential/rebates-offers-services/passive-house-incentives

[23] Pre Certification at Phius has been renamed Design Certification

[24] Data can be found at: https://www.masscec.com/program/passive-house-design-challenge

Loop at Mattapan Station	Mattapan	135	$540,000	2%
Kenzi at Bartlett Station	Roxbury	52	$168,000	1%

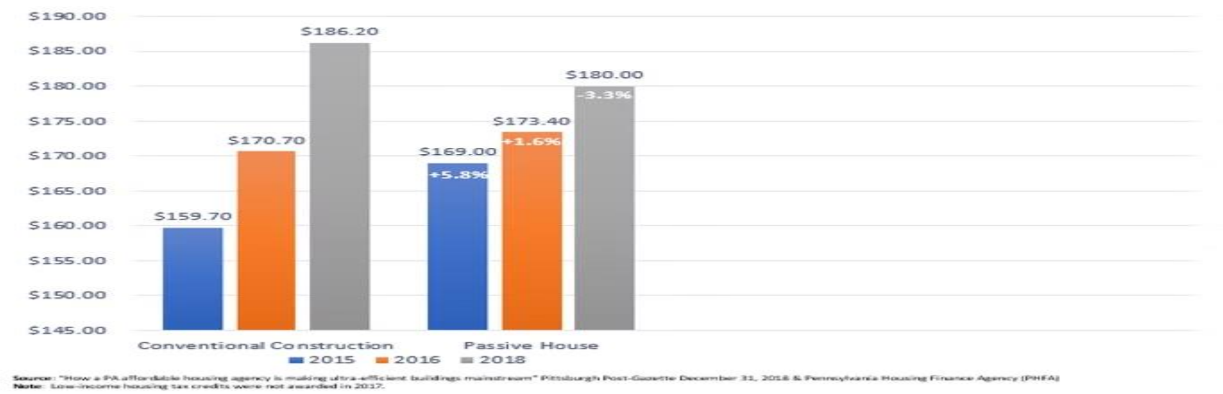
LOW INCOME HOUSING TAX CREDIT

A second incentive program introduced by the state was the inclusion of Phius and PHI certification in the competitive points awarded through the state Qualified Allocation Plan (QAP). In 1986, Congress adopted the Tax Reform Act of 1986 to spur the construction of affordable housing through a mechanism called the Low-Income Housing Tax Credit (LIHTC). While the tax credits derive from federal government funding, states administer it. Each state receives a funding allocation, and affordable housing developers vie for the annual available tax-credit funding. The tax credits are typically allocated via a competitive process using criteria set in the state's QAP.

The QAP sets criteria developed by the state housing agency that provides a framework for incentivizing the types of components and standards that developers should include in their applications. These types of requirements can include (but are not limited to): transit-oriented development, the inclusion of minority owned, or women owned businesses and energy efficiency requirements. The energy efficiency requirements can come in the form of individual items such as Energy Star appliances or in the form of energy efficiency standards such as Phius, Enterprise Green Communities or LEED. Depending on how the incentive framework is structured, it could strongly encourage developers to include Phius in their applications.[25] Currently, Phius is included in the QAPs of 18 states[26]. (See Appendix A) Much like cash incentives, LIHTC provides the funding to encourage developers and construction professionals to work on advanced energy buildings such as Phius. As noted, experience leads to lower costs. In 2016, the Pennsylvania Housing Finance Authority (PHFA) included Passive House in its QAP. Figure 3 is data from the PHFA that shows this effect. (Auros 2018)

Figure 3: Data on Cost of Phius Projects versus Conventional Construction

[25] As an example, the Illinois QAP follows a point structure. Strong applications that maximize the number of points can achieve a maximum of about 100 points. Including Phius in the application provides the developer either 10 or 13 points making Phius an attractive option to include in the application.
[26] While Phius is included in 18 states, the strength of the incentive for a given QAP varies widely per state.



Both utility program incentives and the LIHTC are structured to help overcome first mover reluctance. While useful, they are administered on a case-by-case basis as an owner or developer must apply to the appropriate implementing agency for each project. That sets a limit on how many projects can receive funding. In this way, incentives differ from energy codes.

ENERGY CODES

Energy codes are requirements enforced by either state, county or municipal governments that govern the type of building measures necessary to achieve a specific energy use target. As energy codes are legal requirements enforced by a municipality, they apply to all new construction projects in a given jurisdiction. Because of this, incorporating Phius into the energy codes has the potential to significantly alter the market. Therefore, before imposing energy codes on the construction community, jurisdictions tend to start with the incentives described above. It is only after the establishment of a functioning construction infrastructure familiar with the Phius standard that energy codes can be readily adopted and enforced. The ultimate aim is for building energy code requirements to drive the construction of high efficiency buildings. There are multiple ways that energy codes can be used to interact with the Phius standard.

This paper will explore three avenues for incorporating Phius into energy codes.

1. Incorporating aspects of the Phius requirement into energy codes.
2. Using an Alternative Compliance Path to streamline Phius projects
3. Adopting Phius as the minimum code requirement.

The Massachusetts Stretch Code goes a long way towards incorporating the first approach while explicitly adopting the second two. Moreover, it is a path for many energy code approaches that would like to go beyond the model codes.

Incorporating aspects of Phius requirement into energy codes.

The Phius standard requires a strong envelope, efficient heating cooling and ventilation equipment, efficient windows, minimization of thermal bridges and attention to possible hygrothermal concerns. Work to incorporate some of these requirements into existing code structures (such as the IECC) has already begun.

For single family projects, Phius provides a prescriptive path that sets out insulation requirements for walls, ceilings, floors, foundations, slabs, and efficiency requirements for windows across all the climate zones in the United States. As an example of how Phius can move codes forward, these enhanced requirements could be part of the prescriptive requirements in the IECC. Table 5 will show how the Phius prescriptive path compares with the current prescriptive requirements in the 2024 IECC.

Table 5: Comparison between Phius Prescriptive Requirements and IECC Table 401.2.2.

Table 5A: Envelope Values for Phius Prescriptive Path

Climate Zone	0	1	2	3	4	5	6	7 & 8
Fenestration U-Factor	0.5	0.5	0.23	0.23	0.20	0.18	0.13	0.09
Fenestration SHGC	0.25	0.25	0.25	0.25	0.40	NR	NR	NR
Ceiling R-value	42	49	57	59	67	71	74	105
Wall R-value	20	21	27	29	36	40	42	71
Floor R-value	12	12	15	17	22	25	27	51
Basement Wall R-value	7	7	10	12	17	20	22	46
Slab R-value	7	7	10	12	17	20	22	46
Crawl Space R-value	7	7	10	12	17	20	22	46

Table 5B: Table 402.1.2.2 of the International Energy Conservation Code

Climate Zone	0	1	2	3	4	5	6	7 & 8
Fenestration U-Factor	0.5	0.5	0.4	0.3	0.3	0.28	0.28	0.27
Fenestration SHGC	0.25	0.25	0.25	0.25	0.40	NR[27]	NR	NR
Ceiling R-value	30	30	38	38	49	49	49	49
Wall R-value	13 or 10ci	13 or 10ci	13 or 10ci	20 or 13+5ci 15 ci	30 or 20+5 ci 13+10ci 20ci	30 or 20+5 ci 13+10ci 20ci	30 or 20+5 ci 13+10ci 20ci	30 or 20+5 ci 13+10ci 20ci
Floor R-value	13 or 7+5ci 10ci	13 or 7+5ci 10ci	13 or 7+5ci 10ci	19 or 13+5ci 15ci	19 or 13+5ci 15ci	30 or 19+7.5ci 20ci	30 or 19+7.5ci 20ci	30 or 19+10ci 20ci

[27] NR stands for No Requirement

Basement Wall R-value	0	0	0	13 or 5ci	13 or 10ci	19 or 13+5ci 15ci	19 or 13+5ci 15ci	19 or 13+5ci 15ci
Slab R-value	0	0	0	10ci	10ci	10ci	10ci	10ci

The above tables indicate that there is a lot of room for efficiency to increase before the current model code prescriptive path reaches Phius levels. With foresight, a residential model code such as the IECC or ASHRAE 90.2 will take advantage.

Making a comparison for multi-family buildings is much harder as Phius does not have a prescriptive path for multi-family buildings. However, a review of recently completed multi-family projects in Massachusetts shows that the average insulation values for these types of projects are as follows[28]:

Table 6: Mean Assembly Insulation Values for Projects in Massachusetts

Mean Roof/Ceiling R-value	Mean Wall R-value	Mean Slab Insulation R-value
R-54	R-35	R-13

These R-values give a starting point for the amount of insulation necessary to meet the Phius standard in multi-family buildings in Massachusetts. Similar work can be done for other parts of the country (especially those places with completed Phius projects)

This approach can also be adopted with state level amendments in any state that adopts the IECC. There are several current examples of the model code requirements approaching Phius requirements. For example, the IECC now requires balanced ventilation for northern climate zones, while the MA Stretch Code requires energy recovery or heat recovery ventilation. Energy standards, such as ASHRAE 90.1-2022[29] and again the MA Stretch Code have begun incorporating significant thermal bridge requirements. Section R408 of the IECC also includes components such as enhanced air sealing that start to approach Phius levels.

Overall, this approach allows updated codes to incorporate important and useful portions of the Phius standard and should be encouraged. Incorporating Phius requirements in the model codes prepares the ground for further improvements. However, the Phius standard is designed as a comprehensive and holistic standard. Energy codes using only portions of it fail to take full advantage of its benefits.

Alternate Compliance Path.

The Alternate Compliance Path (ACP) functions more as an awareness and incentive program. (See Appendix A for a full list of jurisdictions that have adopted the ACP). Massachusetts, itself, introduced an ACP early in the stretch code development to recognize

[28] These R-values are for projects certified under Phius 2024. Earlier projects would have been certified under prior versions of the standard and would have produced different results.

[29] See: https://climaspec.com/blog/ashrae-thermal-bridging/

early adopters. Once the ACP was introduced, energy code training in the state had to explain the passive house process and how to demonstrate code compliance. The ACP is a "deemed" compliance requirement in that a project that receives Phius certification is deemed to comply with the energy code section. It is included as an add-on to the code not as a replacement to the energy code. As an example, Massachusetts incorporated an ACP into its commercial code as early as 2012. This has resulted in an uptick in the construction of schools to the Phius standard.

The ACP provides an incentive for a project to try for a Phius certification instead of meeting the specific energy code in the jurisdiction. The procedure for using the ACP will tend to vary between jurisdictions, however, the City of Chicago provides a good model. Developers in Chicago, prior to beginning their project, are given a form where they choose the compliance approach they plan to use. (There are several ways to meet the energy code in Chicago). This allows the Department of Buildings to know, a priori, how to enforce the code. If the Phius ACP is chosen, the Department will wait for the appropriate letter from Phius; both the Design Certification Letter at plan check and a Certification Letter at the end in order to receive the Certificate of Occupancy.

Unfortunately, while several jurisdictions have adopted a Phius ACP, it is not typically used. The main reason appears to be that developers are hesitant to commit to using Phius at the outset of a project. They may not have the confidence that they will achieve certification. Moreover, as Phius requirements will be more stringent than the energy code requirements enforced by the jurisdiction, the developer or owner may simply go with the standard approach and not aim to meet the more efficient set of requirements regardless of the possible administrative advantages. However, this situation may change as a jurisdiction that includes the ACP advances its energy code and the difference between the energy code and Phius diminishes.

The County of Boulder has included an ACP (County of Boulder, 2025) in its energy code. Its energy code is based on a continuously diminishing HERS /ERI Index rating that aims to reach an Index of zero. With this structure in place, the Phius ACP path may become more attractive over time.[30]

Phius as Code Requirement.

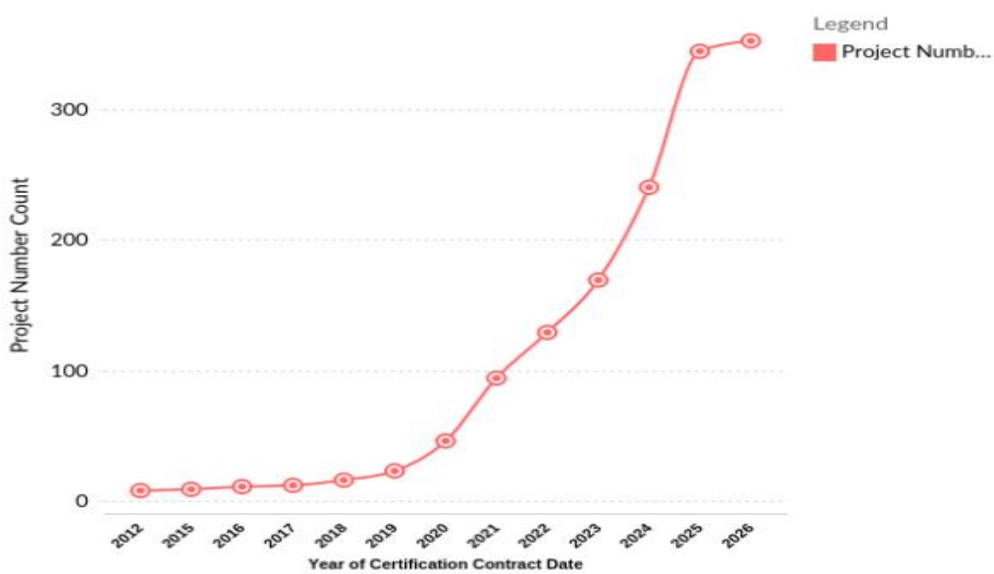
As was noted above, there is one jurisdiction where Passive House is the code requirement, Massachusetts. Achieving this unique goal was the result of several related steps. First, the state had to pass legislation (Green Communities Act of 2008) allowing the adoption of stretch codes. The Green Communities Act also provided monetary incentives to municipalities that adopted a Stretch Code along with other requirements in the Green Communities Program. Without the Green Communities Act, Massachusetts would only have been able to adopt the

[30] Currently, there has been some growth in Colorado. This growth will result in the development of construction infrastructure (architects, engineers, builders, raters) with experience in Phius. This improvement in the construction industry is a necessary precursor to taking advantage of the County of Boulder ACP.

IECC. Second, the establishment of strong incentive programs (both MassSave and LIHTC) encouraged the construction of Passive House projects which, in turn, helped grow the construction infrastructure around Passive House projects. Third, there was strong support from state government. The Department of Energy Resources wrote the appropriate code-language and provided detailed analyses to justify the adoption.[31] This included an initiative called the Passive House design challenge where funding was provided to build Passive House projects described earlier.). Finally, a broad coalition of industry professionals and non-profit groups formed to advocate for incentives and then to support energy code adoption once the Passive House proposal was made. Support from the state government and coalition partners has continued beyond adoption to protect against the inevitable backlash from industry groups. Finally, working with building code officials is essential. Ultimately, code officials are the people who will approve projects, and they need to be familiar and comfortable with the Phius standard and process. Otherwise, they will oppose the adoption of the Specialized Code or, if the code is adopted, slow up the approval process.

The adoption and enforcement of this energy code have had profound effects. Upon adoption of the new Specialized Code, the number of projects exploded. To give an idea of the timeline, the original ACP came into effect in 2012 with only limited success. MassSave was added as an incentive in August 2019, which resulted in an uptick of projects. The Opt-In code came into effect in 2023. Figure 4 indicates, as recently as 2019, that there were only about 25 registered Phius projects in the state. By 2026, over 425 projects have registered with Phius. (Hernandez; 2022)

Figure 4: Cumulative Number of Registered Projects in Massachusetts by Year



[31] Please see: https://www.mass.gov/info-details/building-energy-code

This growth has changed the nature of projects as well. Because the original policy focused on incentives and LIHTC, the majority of the first Phius multi-family projects belonged in the affordable housing category. Within that context, a family of construction professionals developed expertise and became increasingly comfortable designing and building to the Phius standard. However, now that Phius is the code requirement in over one third of the state, new firms have entered the Phius market.

An increasing number of projects are market rate. Market rate projects bring a whole new set of challenges. First, efforts to train professionals (those professionals who focus on market rate projects) in Phius need to be accelerated. Construction professionals include: architects, engineers, contractors (subcontractors) as well as energy raters and verifiers. Although evidence indicates that existing construction firms have been absorbing the increased work; eventually new firms (those without much experience) will have to work on Phius projects. Second, as a third-party reviewer, Phius itself will need to find ways to accommodate the growing workflow. Third, new developers will undoubtedly differ from the way affordable housing developers approach design and construction.

As an example, market rate developers focus more on constructing in-apartment water heaters rather than centralized units. This means that they are more reluctant to install heat pump water heaters than affordable housing developers, which negatively affects the overall efficiency of the project. This issue has to be addressed when designing a market rate project. Moreover, the pressure to finish projects more quickly will grow as developers cannot recoup their investment until tenants start moving in. Being cognizant and responding to these concerns is vital for the overall success of the effort.

Conclusion

There have been, unsurprisingly, significant pushbacks from parts of the construction industry claiming that Passive House certification is too difficult and costly. However, the various groups in the pro Specialized Code coalition have developed a strong defense of the policy. Specific groups such as Passive House Massachusetts (the state affiliate) provided studies showing that municipalities that have adopted the Specialized Code have not seen any drop in construction starts. This rebuts the claim of opponents that strong energy codes will inevitably cause a reduction in construction activity. Another key rebuttal involves tying the code to Passive House certification relieves building departments of energy code enforcement; an important consideration given the perennial budgetary problems of these departments. Finally, because there is a significant number of completed projects, contractors and developers can confidently state that incremental costs are minimal. As of now, only one municipality (Worcester) has considered reversing their decision to adopt the Specialized Code. Finally, there have been opportunities for opponents to express their opposition during formal comment processes, and they have not done so. At this point, the Specialized Code appears safe from rollback, but constant vigilance will continue to be required.

Over time, it is likely that Passive House will move from a niche standard to simply the norm. This result can have profound effects. Currently, there are a number of states and cities that have incorporated parts of the stairstep. If it can be shown to work in Massachusetts, the opportunity to introduce this approach to the rest of the country becomes real. At which point, 100s of projects will turn into 1000s of projects changing the entire complexion of energy efficiency in new construction for North America.

Appendix A Table 5 is a list of Passive House Related Policies along with jurisdictions. Please see the Resources section of the Phius website (www.phius.org)

Table 5: List of States that Incorporate Passive House Policies

State/Utility Incentive	Low Income Housing Tax Credit	Alternative Compliance Path	Energy Code
California	California	Boulder	Massachusetts
Colorado	Connecticut	Chicago	
Connecticut	Idaho	Denver	
Massachusetts	Illinois	Illinois	
Minnesota	Indiana	Maine	
New Jersey	Massachusetts	Massachusetts	
Texas (Austin)	Michigan	New York	
	Minnesota	Washington	
	New Hampshire	Washington DC	
	New Jersey		
	New York		
	Pennsylvania		
	Rhode Island		
	Vermont		
	Virginia		

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