



North Carolina Housing Finance Agency

Attn: Tara Hall

3508 Bush St

Raleigh, North Carolina 27609

RE: 2023 North Carolina Housing Finance Agency Qualified Allocation Plan

Dear Ms. Hall:

Phius Alliance North Carolina appreciates the opportunity to provide comments suggesting an amendment to the 2023 Qualified Allocation Plan (NC QAP).

Phius Alliance North Carolina believes that the North Carolina Housing Finance Agency should incorporate Phius into its QAP because:

- **Buildings that meet the Phius standard use up to 90 percent less energy for space conditioning than conventional buildings, and up to 60 percent less overall energy.**
- **Buildings constructed to the Phius standard provide superior indoor air quality, resilience during power outages, and an extremely quiet, comfortable indoor environment.**
- **Buildings constructed to the Phius standard require less maintenance and reduce the impact on community infrastructure and resources.**
- **Affordable housing constructed to the Phius standard meets the intent embodied in Governor Cooper's Executive Order Number 246 by meeting and exceeding the Greenhouse Gas emission targets set for 2030 in a socially equitable manner.**
- **Affordable housing constructed to the Phius standard meets the intent embodied in Governor Cooper's Executive Order Number 80 by meeting and exceeding the Greenhouse Gas emission target set for 2025.**

By including Phius, the NC HFA can make these benefits available to residents. The suggested amendments are as follows, with supporting data and resources included as appendices.



1. Suggested Amendments to the QAP

In addition to the current minimum requirement of meeting ENERGY STAR Multifamily New Construction Program, Phius recommends adding additional points, which would apply to projects meeting the Phius CORE standard.

Phius requests that in the 2023 Qualified Allocation Plan developers should be allowed to pursue Phius CORE Certification to achieve 10 points.

The specific suggested amendment (in bold and italics) is as follows:

F. SPECIAL CRITERIA AND TIEBREAKERS

1. ENERGY STAR CERTIFICATION

New construction residential buildings must achieve ENERGY STAR Multifamily New Construction Program certification and comply with all energy efficiency standards as defined in Appendix B (incorporated herein by reference). Adaptive re-use and rehabilitation projects must comply to the extent doing so is economically feasible and as allowed by historic preservation rules.

2. *Phius CORE Certification (10 POINTS)*

An applicant is entitled to an additional 10 points for achieving Phius CORE certification.

Rationale:

We believe that adding the Phius standard into the QAP makes sense for the following reasons:

1. Buildings built to the Phius standard undergo a rigorous certification process.
2. Projects meeting the Phius standard provide a myriad of benefits to building residents.
3. Cost data from work done in other states show that Phius projects are cost-competitive using traditional construction methods.
4. The Phius standard is aligned with other programs such as the Energy Star program. The proposed points are based on the relative stringency of the programs as shown by the diagram in Appendix C.
5. This zero-cost amendment will aid in developing a workforce in North Carolina that is well-prepared to design and build net-zero buildings of all building typologies, including affordable housing.



Rigorous Certification Process

Buildings designed to the Phius standard achieve significantly higher energy performance compared against the energy code. The main standard, Phius CORE, is a system-wide, performance-based standard that aims to ensure that all the design components work together to achieve the intended energy savings through the use of comprehensive energy modeling, commissioning, and quality control.

Benefits to Residents

While the Phius building standard sets real, certifiable benchmarks for energy conservation, the benefits reach far beyond performance:

- 1. Comfortable Indoor Environment:** The integration of superinsulation, air-tight construction, and high-efficiency mechanical systems allow Phius buildings to maintain a comfortable interior temperature and comfortable humidity levels year-round as drafts and cold spots do not exist within the units. Not only are the units within a Phius certified multi-family building more physically comfortable for residents, but they consume up to 90% less energy on space conditioning than a building of similar construction. Utility bills are also significantly lower, with the monthly cost savings passed on to residents.
- 2. Clean Air:** Phius buildings are thoroughly air-sealed, which provides two direct benefits. First, it prevents external air pollutants from leaking into the building. This is extremely important when buildings are located near areas with high automobile traffic or in neighborhoods with low air quality. Second, the mechanical systems included within a Phius project constantly cycle in fresh air, filter it, and circulate it throughout the buildings and the individual units. The continual replacement of interior air with fresh, filtered air rapidly removes odors and harmful airborne particles from the building. Finally, these mechanical systems maintain proper humidity levels, preventing the growth of mold and other respiratory irritants.
- 3. Noise Reduction:** Super Insulated walls and high-quality windows significantly increase the soundproofing capability of exterior walls. A joint study performed by NK Architects, a leading firm in Passive House design and SSA Acoustics, showed that exterior noise penetration in Passive House buildings is reduced by up to 10 decibels. Residents will experience a living environment twice as quiet as a typical building.



Cost-Competitive

Data from other states have shown that the initial construction cost of Phius designed affordable housing, on average, is not greater than construction of a code-level building—although it does take some time for the market to adjust. The adoption of substantive Phius related incentives within a state’s QAP drives significant growth in the number of Phius certified projects, which ultimately reduces the cost.

The Pennsylvania Housing Finance Authority (PHFA) first included Phius in its 2015 QAP and that year, of the 39 multi-family projects awarded funding, 8 were Phius projects (26 projects were completed, of which 7 were passive house projects). As of 2021, 50 Phius multifamily projects are in various stages of development across Pennsylvania. As increasing numbers of designers and builders adopted the standard (number of CPHC and Builders here), costs decreased in turn. A measurable effect was observed within 3 years when Phius projects came in, on average, at a lower cost than conventional construction. Similar data, gathered in Massachusetts, shows that the incremental cost of a Phius certified project ranges between 1-4%. (See Appendix D)

More Phius projects in North Carolina would also bring down construction costs in a comparable manner, hence the need for incentives.


Conclusion and Signatures:

Affordable housing projects designed to the Phius standard directly benefit residents through healthier environments and lower utility bills. These buildings place less demand on the utility grid and are better able to withstand outages due to extreme weather events. Finally, the initial cost for Phius buildings has proven to be competitive with code-built projects in states whose QAP’s promote it.

For these reasons, Phius Alliance North Carolina believes the NC HFA should include Phius as part of its QAP. Phius Alliance respectfully requests that the QAP be modified as suggested above.

Signatures



Name and Qualifications	Position/Title	Firm/Organization
	Project Manager, Certified Passive House Consultant	Appalachian State University - Planning, Design & Construction
Isaac Elnecave	Policy Specialist	Phius
Karan Gupta	Principal	Elemental Consulting LLC
Isaac Savage		HVAC Design Pros



Appendix A: Introduction to Phius Alliance and the Phius CORE Standard

Phius Alliance, the membership component of Phius (formerly Passive House Institute U.S.) Phius is a non-profit 501(c)(3) organization committed to making high-performance passive building the mainstream market standard. Phius trains and certifies professionals, maintains the Phius climate-specific passive building standard, certifies and quality assures passive buildings, and conducts research to advance high-performance building.

Project teams are increasingly adopting passive building principles and the Phius standard for single-family, multifamily, and commercial buildings to achieve Net Zero buildings, resulting in over 7,000 units certified, and totaling over 7.4 million square feet across North America.

Projects receiving the Phius certification¹ are not only among the most energy efficient buildings, but also reduce the energy burden on low-income households as well as local community resources and infrastructure, ensure a healthy living environment, and are durable. This combination of qualities leads to a longer, useful lifespan and provides resilience as Phius buildings will maintain their indoor temperature for a much longer time than comparable buildings built to minimum energy codes. Finally, as will be detailed in Appendix D, projects built to the Passive House standard are not more expensive to build.

All buildings built to the Phius standard foreground five principles:

1. Using continuous insulation throughout the building envelope to minimize or eliminate thermal bridging.
2. Building a well-detailed and extremely airtight building envelope, preventing infiltration of outside air and loss of conditioned air while increasing envelope durability and longevity.
3. Using high-performance windows (double- or triple-paned windows, depending on climate and building type) and doors; solar gain is managed to exploit the sun's energy for heating purposes in the heating season and to minimize overheating during the cooling season.
4. Using some form of balanced heat- and moisture-recovery ventilation to significantly enhance indoor air quality.
5. Minimizing the space conditioning energy used because of lower space conditioning loads.

These principles ensure the energy efficiency and comfortable indoor environment of each project that receives certification.

¹ Phius provides two certifications: Phius Core for buildings meeting the strict energy efficiency targets and Phius Zero for building which achieve net-zero performance.



For residential projects to reach Phius certification, they must also meet the criteria laid out in these pre-requisite programs:

- US Environmental Protection Agency (EPA) ENERGY STAR Program
- EPA Indoor airPLUS program
- EPA WaterSense Program
- US Department of Energy (DOE) Zero Energy Ready Home program
- ASHRAE 62.2 ventilation requirements

In particular, Phius Alliance believes that the EPA WaterSense Program should be required of all projects submitting for the LIHTC given the very important need to conserve water in the state.

All buildings seeking Phius certification go through a two-part process: design review and post-construction verification. This process ensures timeliness from design through build and that the construction of each project is thorough and matches the original design.

PART 1:

First, Phius certification staff reviews construction drawings, product specifications, and modeling to ensure that the building energy use is below the stringent values specified in the standard. In addition to reviewing energy performance, building envelope components and details are evaluated for moisture and condensation performance. After all issues are identified and resolved, the project is design certified.

PART 2:

After design certification, actual construction is reviewed on-site by a Phius-trained Rater/Verifier who ensures that the building is constructed to the pre-certified plans and that it meets the criteria of the programs listed above. If changes to the design occur, the modeling is updated, and the new energy use of the building must still meet the Phius standards for certification. This process ensures both quality construction and deep energy efficiency. As a result, multi-family homes built to the Phius standard provide superior comfort, health, excellent indoor air quality, and resiliency. The focus on quality assurance, quality control, and building sciences provides for a long-lasting building with lower maintenance costs.



Appendix B: Phius Buildings Provide Benefits Beyond Energy Savings Including Resilience and Reduction in Energy Burden.

Energy Burden:

Housing meeting the high energy efficiency requirements of the Phius standard, offer far lower energy costs over their lifetime, and thus provide a strong opportunity to reduce the energy burden for North Carolina's low-income residents.

According to the report, "Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low-Income and Underserved Communities" by the American Council for an Energy Efficient Economy, low-income residents in Charlotte face among the highest energy burdens in the country. The median energy burden in the city is between 5 and 10% which is significantly higher than the median value for all residents, which stands at 4%.²

North Carolina has seen an increase in electricity prices year over year of 70% as of June 2022. This type of increase can be untenable for most low-income residents already living on thin margins. Living in a building built to the Phius standard would significantly lower that economic burden on residents over the life of the building.

Performance data compiled by Phius has shown that Phius buildings meeting the standard closely match the modeled/predicted energy savings calculated during the design stage. This data indicates that these buildings will use 40-60% less energy than a code-level building.³ Preliminary benchmarking data from Boston and Philadelphia has found the same result.⁴

Resilience:

Phius construction principles align with an increase in resilience. Phius buildings emphasize the reduction of air flow into and out of buildings along with the elimination of thermal bridges across the building envelope through the use of continuous insulation. This approach recognizes that the building's enclosure is like a battery that stores winter warmth and summer cooling. Maintaining the indoor temperature of a building at safe levels is particularly important in a climate subject to extreme temperatures. These buildings remain at safe and comfortable

² Drehobi and Ross, "Lifting the Higher Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities," Appendix B. April 2016
<https://www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf>

³ Phius Monitored Projects Presentation; <https://www.phius.org/phius-monitored-projects-presentation>

⁴ Apigian, Michele et al. *At the Finish Line: How Two Affordable passive Projects Crossed the Hardest Hurdles*; BuildingEnergy Boston, February 28, 2022
[file:///C:/Users/phius/Downloads/bos22-202_at_the_finish_line%20\(4\).pdf](file:///C:/Users/phius/Downloads/bos22-202_at_the_finish_line%20(4).pdf)



indoor temperatures for longer periods of time during electricity outages, which are becoming more common in North Carolina.

Appendix C: Phius' Connection with Government, Industry and Community Leaders

In an effort to continually improve the Phius standard, Phius has aligned itself with renowned institutional partners, and developed partnerships with other building certification bodies. For example, working with the **US Department of Energy (DOE)**, Phius aligned its Phius Passive Building Certification program with the **DOE's Zero Energy Ready Home (ZERH)** program. In addition, several projects in Pennsylvania have received (or are in the process of receiving) concurrent certifications by both Phius and **Enterprise Green Communities**. In fact, Phius provides an important avenue for buildings seeking the operational energy requirement of the EGC + standard. A Phius certified building is getting the most rigorous quality assurance and quality control on the market from design all the way through certificate of occupancy.

Phius' connection to the Energy Star and ZERH program means that all new Phius projects would be eligible for the energy efficiency credits enacted under the Inflation Reduction Act. The new law provides an energy efficiency (under Section 45L) of either \$500 for a unit meeting the requirements of the Energy Star Multifamily New Construction Program or \$1,000/unit for meeting the Department of Energy Zero Energy Ready Home program. These credits would help defray any incremental cost that might come from building to the Phius standard. (However, as noted in Appendix D, the incremental costs tend to be very low).

*See chart below



					Renewable Energy to Get to Zero
				Electrification Readiness	No Fossil-Fuel Combustion On-Site
				Electric Vehicle Readiness	Electric Vehicle Readiness
				Balanced Ventilation HRV/ERV	Balanced Ventilation HRV/ERV
			SOLAR READY Depends on climate	SOLAR READY ALWAYS	SOLAR READY ALWAYS
			Eff. Comps. & H ₂ O Distrib	Eff. Comps. & H ₂ O Distrib	Eff. Comps. & H ₂ O Distrib
			EPA Indoor airPLUS	EPA Indoor airPLUS	EPA Indoor airPLUS
			Ducts in Condit. Space	Ducts in Condit. Space	Ducts in Condit. Space
	HVAC QI w/WHV	HVAC QI w/WHV	HVAC QI w/WHV	Micro-load HVAC QI	Micro-load HVAC QI
	Water Management	Water Management	Water Management	Water Management	Water Management
	Independent Verification	Independent Verification	Independent Verification	Independent Verification	Independent Verification
IECC 2012 Enclosure	IECC 2009 Enclosure	IECC 2012 Enclosure	IECC 2012/15 Encl./ES Win.	Ultra-Efficient Enclosure	Ultra-Efficient Enclosure
HERS 70-80	HERS 65-75	HERS 55-65	HERS 48-55	HERS 30-40	HERS < 0
IECC 2012	ENERGY STAR v3	ENERGY STAR v3.1	ZERO	phius CORE	phius ZERO

Appendix D: Cost Effectiveness as Shown by Data from Projects in Pennsylvania and Massachusetts.

The Phius standard is designed to achieve deep energy savings and cost savings both from a first cost and across the building’s life cycle. Recent experience of the Pennsylvania Housing Finance Authority (PHFA) demonstrates that building an affordable, multi-family home to Phius standards does not result, on average, in a higher construction first cost per square foot once there is significant market adoption. Other states have seen this cost-reducing rapid market adoption as a result of incentivization in the QAP.

Pennsylvania:

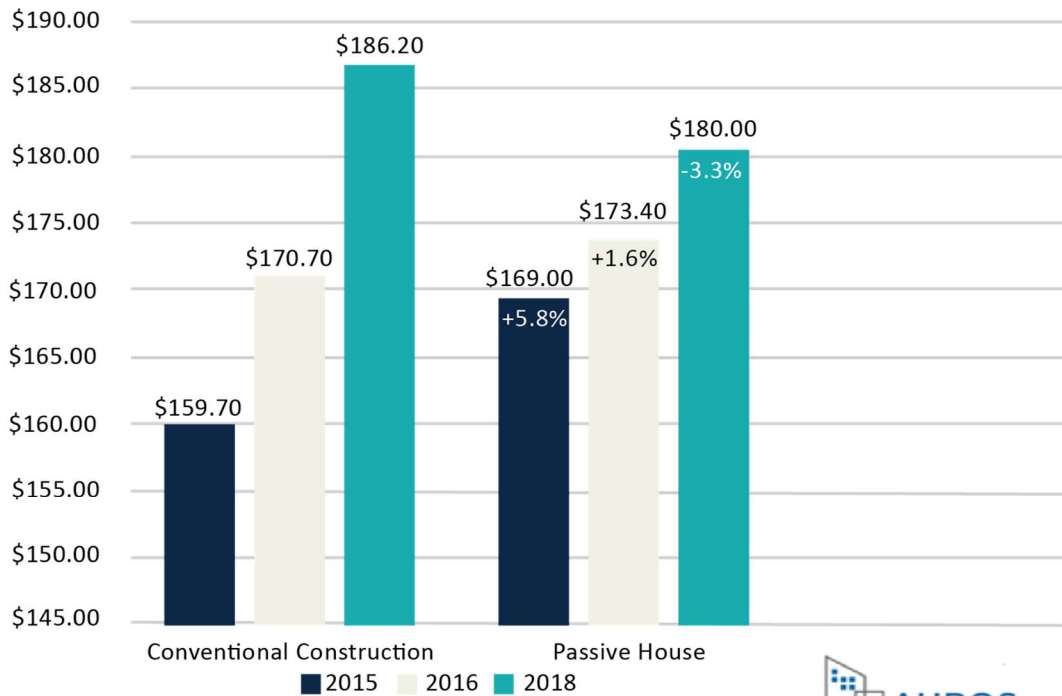
A comparison of the costs associated with passive house and non-passive house projects indicated that, on average, there was no cost premium in relation to building passive house certified projects. High efficiency housing meeting the Phius standard, offering far lower energy costs over their lifetime (and drastically reduced emissions), are thus a strong opportunity to reduce the energy burden for North Carolina’s low-income residents.



A cost analysis by the PHFA found an important and intuitive result. The first few passive house projects were somewhat more expensive than conventional construction. **By the third round of projects (in 2018), Phius projects were, on average, less expensive than conventional construction.**

TABLE 1: Cost Comparison Between Passive House and Non-Passive House Projects⁵

Passive House Costs Less with Experience



Note: Low-income housing tax credits were not awarded in 2017

Source: "How a PA affordable housing agency is molding ultra-efficient buildings mainstream" Pittsburgh Post-Gazette December 31, 2018 & Pennsylvania Housing Finance Agency (PHFA)

⁵ Source Pennsylvania Housing Finance Agency. <https://passivehouseaccelerator.com/articles/2019-new-gravity-housing-conference-july-1st-2nd>



Massachusetts:

A similar result has been found in Massachusetts. Massachusetts, through both its QAP and a robust incentive program, has seen a sharp rise in the number of multi-family buildings meeting the Phius standard (through 2021 there are 43 are in various stages of development). The Massachusetts Clean Energy Center funded a challenge to better understand the cost and energy savings of Phius projects. The agency provided incentives aimed at building 8 low-income multi-family structures to the Phius standard. For these 8 projects, it ranged between 1% and 4%. Following is a chart showing the individual incremental costs.⁶

Project	Number of Units	Incremental Cost
Bartlett Station/Kinzie	52	1.0%
Depot Village/Hanson Village	48	4.1%
Finch Cambridge	98	1.4%
Harbor Village	30	1.8%
Mattapan Station	135	2.0%
North Commons	53	4.3%
Old Colony; Phase 3C	55	2.8%

Appendix E. Several states have included Phius in their QAP

Over the last several years, multiple state housing agencies have recognized the value of constructing a building to the Phius standard and have included the Phius standard into their QAPs. Currently, 16 other states have explicitly included the Phius standard in their QAPs due to the significant benefits buildings meeting the Phius standard provide to its residents. See Table3.

⁶ <https://www.masscec.com/emerging-initiatives/passive-house>

Craig Beverly: *At the Finish Line: How Two Affordable Passive Projects Crossed the Hardest Hurdles (Slide 3); BuildingEnergy Boston Conference, February 28, 2022.*



TABLE 3: States that Include Passive House in Their QAPs

State	Agency	QAP Link
Arizona	Arizona Dept. of Housing	https://housing.az.gov/sites/default/files/documents/files/QAP%202022-2023%20-%20Final%2011.5.21.pdf
California	California State Treasurer	https://www.treasurer.ca.gov/ctcac/programreg/2020/20201221/regulations.pdf
Connecticut	Connecticut Housing Finance Authority	https://www.chfa.org/assets/1/6/FINAL_2022-23_QAP_(July_2021).pdf?10215
Delaware	Delaware State Housing Authority	http://www.destatehousing.com/Developers/lihtc/2021/2021_qap.pdf
Idaho	Idaho Housing and Finance Association	https://www.idahohousing.com/documents/2021-final-qap-governor-approval-3-26-2021.pdf
Illinois	Illinois Housing Development Authority	https://df7qosnywqs6g.cloudfront.net/wp-content/uploads/2021/09/QAP_2022-2023_Website.pdf
Indiana	Indiana Housing and Community Development Authority	https://www.in.gov/ihcda/files/DRAFT-2022-2023-QAP.pdf
Maine	Maine State Housing Authority	https://www.mainehousing.org/docs/default-source/qap/2021-2022-qap.pdf?sfvrsn=2fc58c15_2
Massachusetts	Commonwealth of Massachusetts Department of Housing and Community Development	https://www.mass.gov/doc/2022-2023-qap/download
Michigan	Michigan State Housing Development Authority	https://www.michigan.gov/mshda/-/media/Project/Websites/mshda/developers/lihtc/assets/liqap/mshda_li_qap_2022_2023_qap_final.pdf?rev=db31cac47b7d458ca72bf1783912f5d9&hash=9BD84DFDED17EA8BE7F844791036B737



TABLE 3 (continued)

State	Agency	QAP Link
New Hampshire	New Hampshire Housing	https://www.nhhfa.org/wp-content/uploads/2020/03/2021-2022-Qualified-Allocation-Plan_FINAL.pdf
New Jersey	New Jersey Housing and Mortgage Finance Agency	https://nj.gov/dca/hmfa/dca/hmfa/developers/docs/lihtc/qap/tc_qap_proposed_2019_2020.pdf
Pennsylvania	Pennsylvania Housing Finance Agency	https://www.phfa.org/forms/multifamily_program_notices/qap/2021/2021-lihtc-allocation-plan.pdf
Rhode Island	Rhode Island Housing	https://www.rihousing.com/wp-content/uploads/2022-Final-QAP-ATT-B.pdf
Vermont	Vermont Housing Finance Agency	https://www.vhfa.org/documents/developers/2022_qualified_allocation_plan_february_1_2021_signed.pdf
Virginia	Virginia Housing	https://www.novoco.com/sites/default/files/atoms/files/virginia-lihtc-qap-proposed-changes-2022-062021.pdf