

The Passive House Standard - An Advocacy Resource Guide

The following list of information and links has been assembled to help those advocating for the incorporation of the International Passive House Standard into local, regional and national code and policy incentive programs. The information is offered as a shared resource to our NAPHN Community and beyond.

I. Cost

Cost implications for any building standard extend to design and certification. We cover that of certification and building costs in comparison to those attaining other standards.

A. Certification:

1. Cost of **certification varies** according to the specific certifier chosen, cost of third-party rater, and size of project. General range for certification only is \$3500.
2. Competition: International Passive House certification is offered by a large number of qualified Certifiers. **No territorial monopolies are granted to any certifier**, but generally speaking, Certifiers tend to certify projects in the regions they are located within. There are currently four active PHI Certifiers working within North America. Links to their sites may be found here: <http://naphnetwork.org/certification/>
3. An **online certification platform** is being developed by the Passive House Institute and will be particularly suitable for phased retrofits. The goal of this development is to streamline certification and develop opportunities for mid-process guidance and consulting to assist project teams to find optimized solutions: http://passivehouse.com/03_certification/02_certification_buildings/06_process/06_process.html

B. Verification:

On-site testing and verification protocols have been put in place for Passive House certification via the North American Certifiers Circle (a body of all PHI certifiers operating across our continent.) This may be viewed here: <http://naphnetwork.org/a-proposal-to-veriphy/>. Third-party verification services may be provided by a large array of existing professionals, including RESNET HERS raters, BPI certified professionals and Canadian raters certified via NRCan.

C. Building Cost Comparison (including Multi-Family) projects:

Laura Nettleton of Thoughtful Balance delivered this presentation that includes economic analysis (cost of construction and cost of operation) for three projects, one single family home plus two multi-family buildings, including measured performance data: http://nypassivehouse.org/wp-content/uploads/2012/06/LauraNettleton_NAPHN16.pdf

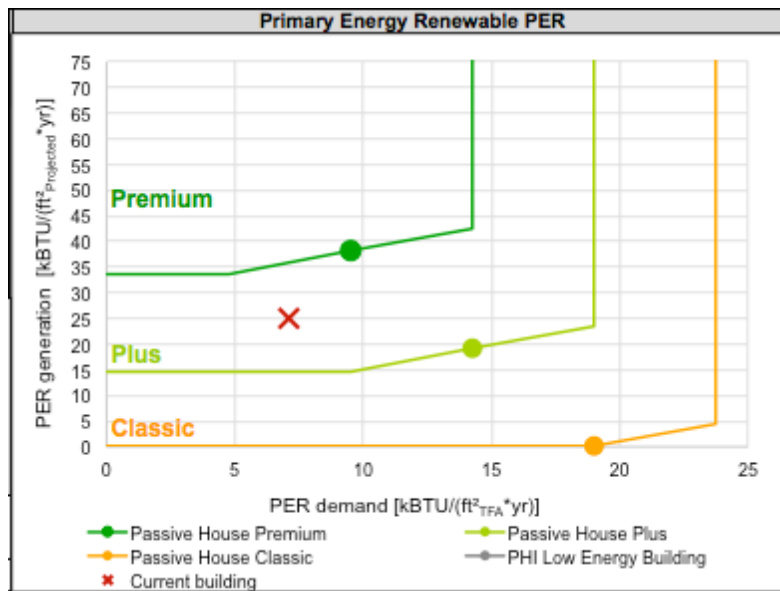
II. Range of Issues Covered by the Passive House Standard

Certification via the Passive House Institute (PHI) covers the following range of items:

A. Energy Efficiency:

Target requirements are absolute and apply equally to all building types and sizes. There are three primary criteria:

1. Heating Demand or Cooling Demand = to or less than 4.75 kBTU/sf.yr or alternately Heating/Cooling Load of less than or = to may be used ;
2. Airtightness of 0.6ach n50 for new builds (1.0ach n50 for retrofits);
3. Primary Energy (source) Energy = to or less than 38 kBTU/sf.yr. New PER criteria may be found here: http://passiv.de/downloads/03_building_criteria_en.pdf



Primary Energy Renewables Classes:	PER Energy Demand: kBTU/ft2(TFA).yr	PER Energy Generation: kBTU/ft2(PFA).yr
CLASSIC	<= 19	0
PLUS	<= 14.26	>= 19
PREMIUM	<= 9.5	>= 38

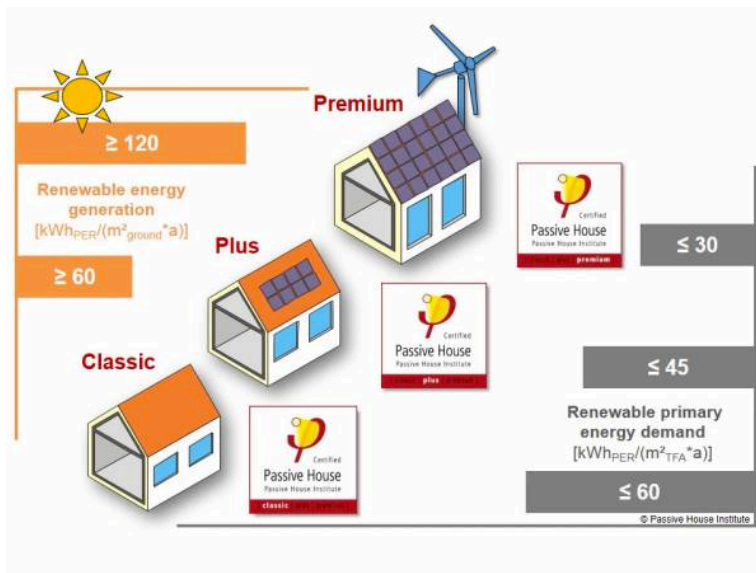


Figure 1. Three Passive House Certification levels utilizing the Primary Energy Renewables (PER) calculation

B. Ventilation Air Leakage:

(see above) There are additional specific recovery rate, noise and fan efficiency requirements for the ventilation units installed in certified Passive House projects. It is recommended (but not required) that PHI certified units are installed as these have met the stringent component certification requirements for this important item of equipment. Small ventilation certification requirement info may be found

here: http://passiv.de/downloads/03_Reqs_and_testing_procedures_ventilation_en.pdf. Larger ventilation units, plus ERV requirement info available

here: http://passivehouse.com/03_certification/01_certification_components/02_certification_criteria/02_certification_criteria.htm

C. Water Efficiency:

Water efficiency is peripherally covered in source energy via the primary energy criteria. Optimized domestic hot water use and heating energy are required in order to meet the Primary Energy target. Typical Passive House projects include some form of on-demand re-circulation pump and fully insulated interior water lines.

D. VOC's:

These are not explicitly required via Passive House certification. The balanced ventilation system is designed to keep VOC build-up to a minimum via constant fresh air supply, coupled with continuous exhausting of the stale air.

E. On-site renewable energy:

New certification from PHI (PHPPv.9) includes credit for on-site and off-site renewable energy sources. These are calculated as a function of total building footprint so as not to penalize multi-story buildings with proportionally smaller roof area. Further details may be found

here: http://passipedia.org/certification/passive_house_categories/per

F. Sound attenuation:

This is covered in the ventilation installation unit requirements and is also tested as part of the ventilation unit commissioning and balancing report that is a requirement for all PHI certifications. The air-tightness and window performance requirements to meet PHI certification provide additional sound attenuation benefits.

G. Operation & Maintenance: none typically required except for filter changes of the H/ERV but not part of certification.

H. Landscaping etc.: PHI certification focuses on comfort and efficiency. Location, materials and site conditions outside the building envelope are not covered.

Other: Fuel source factors are assigned based on local grid energy mixes and calculated by specific region. This is used specifically in the calculation of the Primary Energy metric eg. fossil fuel-derived energy such as natural gas is assigned a higher multiplication factor than wind or solar-generated electricity. Local grid-tied electrical supply also receives an efficiency factor based on the mix of

renewable energy used by the local utility eg. Vancouver has much lower efficiency factor due to their 80% renewable energy grid supply mix. This calculus favors and *encourages designs for an all-renewable energy future, now.*

III. Comfort and Energy Efficiency Focus

1. Standard from which PHI certification is derived is a comfort standard: ISO 7730, developed in parallel with ASHRAE Standard 55. Info here: <https://www.iso.org/obp/ui/#iso:std:iso:7730:ed-3:v1:en>
2. Absolute baseline: PHI uses no baseline building. The targets themselves are absolute and measured in treated floor area per annum.
3. Energy metrics used: see certification criteria above. The metrics and energy modeling software is available in metric or IP units and in over 30 different languages.
4. Modeled or verified: PHI's standard combines modeled metrics with measured air-tightness and ventilation unit commissioning (measured.)

IV. Health and Indoor Air Quality

The path to achieve good IAQ requires a combination of air-tightness, volumetric flow calculations, sound attenuation and equipment design and installation. Details for ventilation design requirements may be viewed on Pg. 22 here: http://passiv.de/downloads/03_building_criteria_en.pdf

V. Applicability to Multi-Family and Commercial Building

PHI certification favors multi-family buildings over single-family dwellings in its calculation of both thermal conductivity and air-tightness measures. Larger volumes with more efficient surface-to-volume ratios are much easier to achieve the target metrics. Protocols for testing air-tightness of larger buildings varies from smaller buildings. These may be viewed on Pg. 19 of this checklist here: http://nypassivehouse.org/wp-content/uploads/2016/01/NYPH_A-Developers_Guide_Final_01_2016.pdf

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