

ASHRAE & Passivehaus

NEOGBC

High Performance Building Committee

SUMMARY GOALS

- ⦿ The purpose of the following summaries should be to evaluate if and then how the HPBC could implement these particular design guides in Northeast Ohio.
- ⦿ Each guideline will require further group discussion in regards to:
 - ⦿ Applicability to our region
 - ⦿ Potential economic limitations
 - ⦿ Potential “industry” reservations
 - ⦿ How and when to implement certain strategies
 - ⦿ As a USGBC chapter, then ultimately how do these strategies apply to LEED.

PASSIVHAUS

- ③ Passivhaus Institut Darmstadt
 - ③ Development of the Passivhaus Concept, Dr. Wolfgang Feist.
 - ③ PHIUS – Passive House Institute US
- ③ Building concept which focuses on a very well insulated and very tight envelope design.
- ③ Requires fresh air intake and conditioning

PASSIVHAUS

- ⊙ Design Parameters
 - ⊙ Building shell: ≤ 0.6 ACH (air changes per hour) @ 50 pascal (under a controlled pressure test)
 - ⊙ Annual Heating Requirement: ≤ 15 kWh/m²/year (4.75 kBTU/sf/year)
 - ⊙ Primary Energy: ≤ 120 kWh/m²/year (38.1 kBTU/sf/year)
 - ⊙ Other recommendations:
 - Window U value ≤ 0.8 W/m²/K
 - Heat Recovery with $\geq 75\%$ and electric consumption of 0.45 Wh/m³
 - Thermal Bridge free construction ≤ 0.01 W/mK

PASSIVHAUS

- ⊙ What does it all mean
 - ⊙ Decreasing infiltration (or air leakage) will reduce the overall energy consumption. Imagine leaving a window open in winter.
 - ⊙ Super-insulating the envelope will result in less energy spent heating the building.
 - ⊙ Well insulated, 'air tight' building will require introducing fresh air, thus requiring a heat recovery device. This equipment pre-heats incoming air with the exhaust air from the building.
 - ⊙ Total energy reduction will come from reducing energy applied to heating, as well as incorporating day-lighting (made easier with low U value glazing).

PASSIVHAUS

- ⊙ Benefits
 - ⊙ These values can be achieved.
 - ⊙ Building products are available (even locally) to implement this design strategy.
 - ⊙ Overall advantage in our region
 - Reduction of expense on utility bills
 - Reduction of burden on our utility infrastructure
 - Existing structures can be “upgraded” to (or very near) Passivhaus standards
 - Depending on the client, can even be implemented on commercial projects (schools, offices, etc)

ASHRAE

- ◎ Currently the basis of energy measurement for building simulation and modeling for LEED.
 - ◎ ASHRAE 90.1 – 2007 (90.1-2007 Appendix G)
- ◎ Focus should be on two new initiatives
 - ◎ Building Labeling Program
 - ◎ Standard 189.1, Standard of Design of High-Performance Green Buildings Except low-rise Residential Buildings

- ◎ Building Labeling Program
 - ◎ Building Energy Quotient
 - Measures the energy use per the building's design and the energy actually consumed for its operation.
 - Provides a better measure for building "performance" unlike Energy Star that measures energy use in comparison to other existing structures.
 - Focuses on the monitoring of energy use as a tool to measure performance (M&V, Ongoing CX)

ASHRAE

- ① ASHRAE Standard 189.1P
 - ① ASHRAE's version of LEED
 - ① Essentially this document, still in Draft, re-writes most of the design criteria defined by the USGBC, even using the same basic design categories; Site Sustainability, Water Efficiency, Energy Efficiency, IEQ, and Materials and Resources.

ASHRAE

- ⦿ Some new features:
 - Air infiltration – Continuous Air Barrier
 - Better defines expectations for construction and operations.
 - Equipment Efficiency minimums are higher than code.

ASHRAE

- ⊙ In general ASHRAE is the accepted benchmark for energy use in buildings. Standard 90.1 defines acceptable levels of equipment and insulation efficiencies. Most Local Code Authorities defer to ASHRAE 90.1.
- ⊙ What does this mean....
 - ⊙ Will Standard 189.1 become code?
 - ⊙ Is Standard 189.1 any better than LEED?

CONCLUSION

- Passivhaus is a viable, low energy consumption design strategy. In my opinion, we should continue looking at PH for implementation in Northeast Ohio.
- ASHRAE 189.1
 - ⊙ ASHRAE defines the commonly accepted method for measuring energy use and performance improvement.
 - ⊙ ASHRAE standards are the most commonly recognized *Baseline* design.
 - ⊙ ASHRAE standards will need to be included in any design application for the purpose of comparison.