



Wayland Town Meeting Article: *Resolution Energy and Carbon Savings in Municipal Building Construction* April 2018

Frequently Asked Questions

Do high performance buildings always cost more?

No, high performance buildings do not necessarily cost more than traditional construction. As Passive House and Net Zero standards have become more widespread, we have seen a corresponding reduction in the cost of related construction materials.

In 2014, The New Buildings Institute published a financial study of the Net Zero and Living Building Challenge in DC.¹ The study found that the additional construction cost of these very high-performing building examples at that time four years ago was between 1% and 12% and 5%-19% for net zero buildings. According to the Passive House Institute U.S. (PHIUS), whereas a passive building may cost about 5-10% more than a conventional one does, the larger the building the less of a cost difference there may be.²

The City of Santa Monica California conducted a study of the cost effectiveness of high performance buildings in 2015.³ They compared LEED v4 Platinum buildings to the average traditionally constructed Santa Monica building and found a 2%-7% increase in total project costs. The study noted that the additional costs stemmed primarily from “renewable energy systems, an efficient building envelope, and healthy building materials.” They calculated the simple payback as 17 years.

A study from the National Renewable Energy Laboratory (NREL) in 2012 analyzed the cost of high efficiency office buildings.⁴ It found that the whole-building first costs achieved for constructing “marketable, high-performance office buildings that achieve LEED Platinum, save more than \$1/ft² annually in energy costs, and reach net zero energy goals” were competitive within the marketplace. The study included an appendix with examples of projects nationwide.

What are the benefits?

High performance buildings provide a range of benefits to the occupants and community as a whole, including:

¹ New Buildings Institute. 2014. Net Zero and Living Building Challenge Financial Study: A Cost Comparison report for buildings in the District of Columbia. <https://newbuildings.org/wp-content/uploads/2015/11/ZNECostComparisonBuildingsDC1.pdf>

² PHIUS. 2018. Passive House FAQs. <http://www.phius.org/what-is-passive-building/passive-house-faqs>

³ City of Santa Monica. 2015. High Performance Building Cost Effectiveness Study. https://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Green_Building/SantaMonica_HighPerformanceStudy_Final.pdf 2015.

⁴ NREL. 2012. Controlling Capital Costs in High Performance Office Buildings: 15 Best Practices for Overcoming Cost Barriers in Project Acquisition, Design, and Construction. https://www1.eere.energy.gov/buildings/publications/pdfs/rsf/controlling_costs_in_high_performance_office_buildings.pdf



- ❖ **Energy Cost Reductions**
 - Energy efficient and low carbon buildings have lower energy needs, which translate into significant annual energy cost savings.
- ❖ **Maintenance Cost Reductions**
 - Building controls help use facility equipment efficiently and effectively, prolonging system lifetimes and identifying areas for proactive maintenance before equipment fails.
- ❖ **Improved Health**
 - The same strategies that reduce carbon in buildings also serve to improve indoor air quality through measures, for instance, that increase air filtration and reduce toxins in materials.
- ❖ **Better Resiliency**
 - Well insulated buildings maintain appropriate temperatures for longer during a power outage or gap in service.
- ❖ **Comfortable Working Spaces**
 - A strong building envelope and clean heating and cooling technologies both help maintain a consistent comfortable temperature.
- ❖ **Educational Resource**
 - Building controls and energy efficient buildings can tie into school curriculums around energy and the environment and make for engaging field trips.
- ❖ **Opportunities to Demonstrate Leadership**
 - Municipal buildings embody the community's carbon-reduction goals and can set a good example for other proposed developments.

Why not aim for net zero buildings?

There are a range of similar terms that can apply to goals for energy efficiency and carbon mitigation in buildings. The language in this article was chosen both to provide the flexibility needed for innovation in design, and to articulate priorities in construction practice. The term 'Net Zero' sets a specific target for carbon mitigation, but does not inherently set prioritized methods for how this is accomplished.

This article clarifies the broader steps to achieve carbon mitigation, in line with best practices. By focusing first on the building envelope and reducing the energy needs of the building, this practice ensures the resiliency and health benefits that go along with a strong envelope. The same logic is behind the best practice of conducting an energy audit before installing a solar system.

What other cities and towns are doing something similar?

A few examples:

- ❖ **Cambridge, MA**

In 2013, there was a citizen-sponsored initiative to require all new construction in Cambridge meet a net zero standard. As a result of this initiative, climate activists, neighborhood leaders, and city staff formed a Net Zero Task Force. Since then, Cambridge has formed the Net Zero Action Plan,⁵ a 25-year roadmap of measures to achieve net zero in buildings community-wide.

⁵ Cambridge Net Zero Action Plan Infographic:
http://www.cambridgema.gov/~media/Images/CDD/Climate/NetZero/netzero_20150408_infographic.jpg



- ❖ **Boston, MA**
The City of Boston has an overall target to reduce greenhouse gas emissions by 80% by 2020. In 2007, Mayor Thomas Menino issued an executive order with policies for reducing greenhouse gas emissions from municipal operations.⁶
- ❖ **Arlington, MA**
Like Wayland, Arlington has been working on energy efficiency through the Green Communities program. They were the winner of the DOER's Leading by Example Award in 2013 and recently renovated the Highland Fire Station to a LEED silver designated building. They recently joined the Metro Mayors Climate Taskforce. This group now of 15 communities has committed to a regional target to be Net Zero by 2050.
- ❖ **New York, NY**
In 1999, New York City put forth building standard guidelines for their capital projects, both new construction and renovations. They define "High Performance Buildings" as those that, from the beginning of the project, "are committed to maximizing operational energy savings, providing healthy interiors, and limiting the detrimental environmental impacts of the buildings' construction and operation."⁷
- ❖ **Washington State**
Washington State has a High Performance School Buildings Program that is managed by the School Facilities and Organization section of the Office of Superintendent of Public Instruction. The program is a result of the Revised Code of Washington Chapter 39.35D,⁸ which requires that state-assisted major building projects be built to a high-performance or green-building standard.
- ❖ **Greensburg, KS**
Greensburg has committed to Architecture 2030 Challenge goals, setting a target of 60% energy savings relative to the national average for each building type. Toward this goal, they have built a City Hall Building to LEED Platinum standards.⁹

⁶ Boston Climate Action Plan Update. 2011: https://www.cityofboston.gov/Images_Documents/A%20Climate%20of%20Progress%20-%20CAP%20Update%202011_tcm3-25020.pdf p.4

⁷ City of New York. 1999. High Performance Building Guidelines. <http://www.nyc.gov/html/ddc/downloads/pdf/guidelines.pdf>

⁸ Washington State Legislature. Revised Code of Washington Title 39 Chapter 39.35D. <http://apps.leg.wa.gov/RCW/default.aspx?cite=39.35D>

⁹ U.S. Department of Energy: Rebuilding it Better: Greensburg, Kansas. <https://www.nrel.gov/buildings/assets/pdfs/53539.pdf>