BUILDING PASSIVE HOUSE:
COSTS & LONG-TERM PAYBACK

Strategies to Prepare for More Advanced Building Requirements

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THE CHALLENGE. In the last few years, states and municipalities have committed to becoming carbon neutral by a certain date. One of the first targets to achieve carbon neutrality is advancing building energy codes. But what is the cost to building owners? What long-term benefits will they see from building to the advanced codes?

BE PREPARED. Decarbonized construction comes with an initial price, but Consigli has the in-house pre-construction and construction resources to ensure long-term payback and best prepare your project for advanced net zero and Passive House requirements.

Take Massachusetts. The majority of the State uses a "stretch code" for minimum building energy performance requirements. Historically, the stretch code has been defined as 10% more efficient than base energy code.

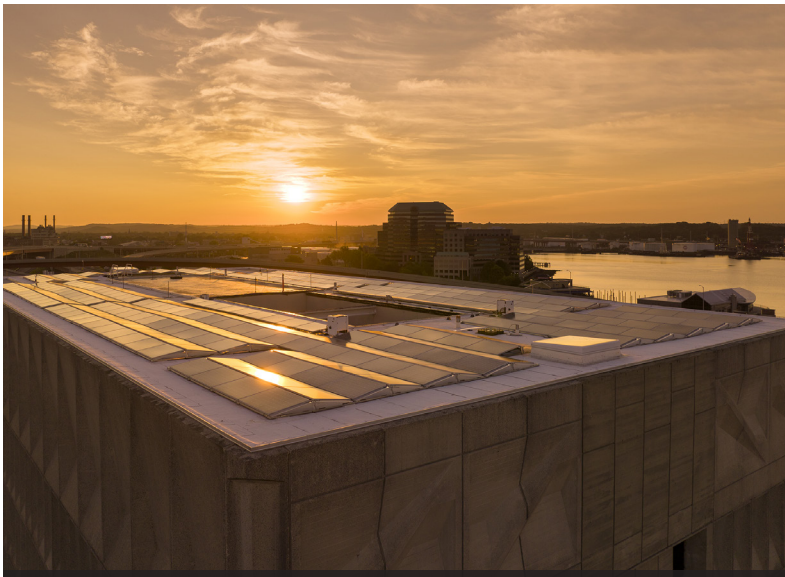
To study the feasibility of a more advanced stretch code, the Massachusetts Department of Energy Resources (MA DOER) contracted a group of consultants.

Consigli's Involvement: Consigli was selected to perform estimating services evaluating cost differences between baseline code compliant buildings, Passive House buildings and an optimized combination of the two. The estimates developed by Consigli's pre-construction team in collaboration with our in-house sustainability experts and engineering consulting partners will inform the State's updated stretch code and can be used to forecast future sustainable construction costs elsewhere.

NET ZERO HIGHLIGHT

Chelsea Soldiers' Home Community Living Center

< 1% COST PREMIUM



Hotel Marcel | America's First Passive House Hotel

NET ZERO & PASSIVE HOUSE

WHAT TO EXPECT

- Lower Energy per Square Foot
- Better Thermal Envelope Performance
- More Attention to Envelope Air Sealing
- Decoupling Ventilation Air from Heating and Cooling
- Improved Window Performance
- Reduced Thermal Bridges through the Envelope

What is Passive House?

Passive House is a performance-based building certification that focuses on the dramatic reduction of energy use for space heating and cooling. Passive House prioritizes a well-insulated and air-sealed envelope, natural light and solar gain and highly efficient HVAC systems.

MA STRETCH CODE ANALYSIS

Consigli's Analysis for the Massachusetts Department of Energy Resources (DOER)

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In the MA DOER study, Consigli performed nine unique pricing exercises, analyzing various office, school and multi-family prototypes, as well as differences between conventional and all-electric buildings. As a result, the team determined cost premiums for Passive House levels of energy performance across the prototype building options, as well as the cost to go all-electric in those scenarios.

As cities and states evaluate advanced building energy codes, Consigli's analysis of the MA stretch code can serve as a measuring stick for what to expect.

PASSIVE HOUSE PREMIUMS ABOVE CODE
2018 IECC + 10% (CURRENT MA CODE)

BUILDING TYPE	PH GAS	PH ELECTRIC	LIFECYCLE COST / SF
Large Office Core/Shell*	-0.7%	-0.2%	-$22
Lab Office Core/Shell	2.0%	2.5%	-$32
Small Office	6.2%	7.1%	+$9
Primary School	2.8%	4.6%	-$2
Secondary School	1.8%	2.2%	-$3
Multi-family High-Rise	3.2%	3.5%	-$1
Multi-family Low-Rise	5.2%	4.8%	-$7

2% - 6% AVERAGE PASSIVE HOUSE PREMIUM

* Cost savings in this prototype are due to elimination of perimeter heat

KEY TAKEAWAYS BASED ON THE STUDY

- Passive House is a good proxy for costs of Net Zero Ready but has more extensive requirements. With fewer requirements, Net Zero Ready typically costs less.
- Smaller projects will see more premium going to Passive House from 4-7%. Larger projects are in the 1-3% range, matching Passive House premium industry averages.
- Premiums will decrease slightly as new codes are adopted. Regions with outdated codes will see slightly larger premiums.
- The premium to switch to an all-electric building was either cost neutral or less than 1%.

Note: Values are reflective of the time this study was conducted in 2021. This analysis was first-cost only and did not take into account incentives available for reaching this level of performance.

HOW CONSIGLI CAN HELP

IN-HOUSE SUSTAINABILITY EXPERTS.

Consigli has multiple departments to assist projects pursuing Passive House and Net Zero. Our Quality Department, Sustainability Department and Arch Energy—Consigli's in-house energy division focused on decarbonization strategies—can all help guide the decision making process from concept to closeout for Net Zero and Passive House projects and evaluations.

BEST-IN-CLASS PRE-CONSTRUCTION.

On any project with high-performance energy goals, we deploy a detailed, rigorous review of important energy project components. Specifically, this means inspection checklist development, detailed drawing reviews for air barrier elements, outlines of test procedures and targets and kickoff and milestone documents pertinent to successful energy goal outcomes.

PROVEN PASSIVE HOUSE CONSTRUCTION PROCEDURES.

Consigli has in-house equipment crucial for performance testing including blower doors, thermal imaging equipment, duct blasters and manometers to test pressure differentials. Our tools ensure all quality and airtightness goals are being achieved—without necessarily needing to rely on a third-party auditor.