net-zero design on a budget

by Chad Edwards and Terry Liette

The term Net-Zero conjures up images of big budgets and expensive building systems; however, this conception couldn't be further from the truth. As architects and engineers, we have everything we need to design Net-Zero Ready buildings for the same cost as buildings that meet basic code. All it takes is the right mindset and the right approach.

make sure the owner is all in

Like all project goals, creating a Net-Zero Ready building will not happen without buy-in from all parties, especially from the owner. As designers, we can educate owners about the affordability and practicality of Net-Zero strategies, but if Net-Zero is not a natural outgrowth of the client's mission and goals, then it is unlikely to be embraced and actualized.

For example, architects from emersion DESIGN and engineers from Fanning Howey are collaborating on a Net-Zero Ready campus addition for Bethany School, a private school in Cincinnati, Ohio. Because of Bethany's strong commitment to sustainability, Net-Zero strategies are a natural outgrowth of the overall vision for this project. Even though we are delivering a Net-Zero Ready design for less than $225 per square foot, it is the client's culture of sustainability that makes Net-Zero viable and is key to the project's success.

assemble the right design team

You don't need exotic building systems to reach Net-Zero Ready, but you do need a design team with the right mindset. Architects and engineers need to be comfortable sharing ideas and working outside of their given disciplines. This is important because Net-Zero Ready buildings require extreme creativity and laser-focused attention to the specifics of each building and site. A team member who says, "Well, this is the way we've always done it," isn't going to thrive in this environment.

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The best-idea-wins mindset defined the team approach on Bethany School. From the very beginning, every team member was in the room giving input. Before there was even a floor plan, the team explored seven different window-to-wall ratio profiles and multiple construction profiles, including glazing and solar coefficients, all evaluated with the team's energy modeling data. Architects acted as engineers, and engineers acted as architects. This collaborative approach, with a large amount of brain work very early in the process, is the only way to set yourself up to create a cost-effective, Net-Zero Ready building.

do not be constrained by rules of thumb

Net-Zero Ready buildings require perfectly-sized systems to be cost effective. Rules of thumb are not nearly specific enough to achieve this goal. During early conceptual design efforts, the entire team needs to explore building- and site-specific solutions using energy modeling tools.

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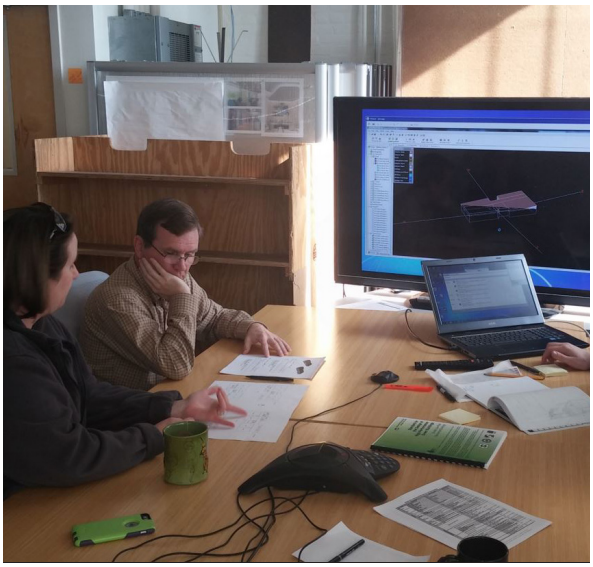
For example, conventional wisdom says that a high performing building should have more glazing on the south than the north. But during the energy modeling process for Bethany School, our team found the opposite to be true. For this building, on this site, more glazing on the north meant fewer glare issues, and less glazing on the south meant less heat gain and the ability to eliminate solar shades.

By going beyond rules of thumb and customizing design strategies to the site, the Bethany School addition is projected to be 18.7 percent more energy efficient than the average local vacant building. Right now, the project's Energy Use Intensity is tracking at 17 kBtu per square foot, making Bethany School one of the most energy-efficient schools in the nation.

understand all project costs

Understanding all available cost-savings strategies is a big part of making Net-Zero Ready buildings affordable. If you are considering solar panels for renewable energy, find a contractor who will help establish your dollars per watt, which becomes your go/no go rubric for energy efficiency strategies. If you can implement an energy-efficiency strategy for below the renewable dollars per watt, then you do it.



Also, you should be aware of potential funding sources for high performing buildings. Depending on the marketplace and the type of client, there may be funding in the form of tax breaks, grants or rebates. Make sure to include these additional funding sources in your analysis of first costs and long-term operating costs. The website www.dsireusa.org is a great resource to explore available funding related to energy efficiency and renewable energy in your area.

test and retest

Constant evaluation is a critical part of the Net-Zero approach. As part of the Bethany School project, the design team continually tested the energy efficiency of the design using energy modeling. The initial modeling provided a framework for broad concepts. Modeling during design development and construction documentation allowed the team to stay on target and make sure that we were still achieving our goals. The team will also be working with Bethany School to evaluate to the building's performance after construction. The goal is to achieve true Net-Zero Energy usage, not just a target in a model.

continuously improve

Designing a Net-Zero Ready building is similar to running a marathon. You must build up to your goals by improving over time. If you don't have a client who is ready to embrace Net-Zero, you can still improve the overall energy efficiency of your designs. Practice the techniques outlined in this article, and you will start down the path of design for Net-Zero Ready buildings.

Just remember, as a design industry, we have the technology and tools to create high performing buildings on almost any budget. You just need the right mindset and the right approach. And you can start today.

about the authors

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Chad, is president and CEO of emersion DESIGN, the world's first architecture and engineering firm to have a LEED Platinum office. He strives to lead with integrity, from a heart of service, and to be the best steward possible for his clients and staff.

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Prior to becoming Fanning Howey's Chief Engineering Office and sitting on the Board of Directors, Terry specialized in K-12 planning and design. WIth over two decades of experience, he is an expert in sustainable design, keeping ROI at the forefront.

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