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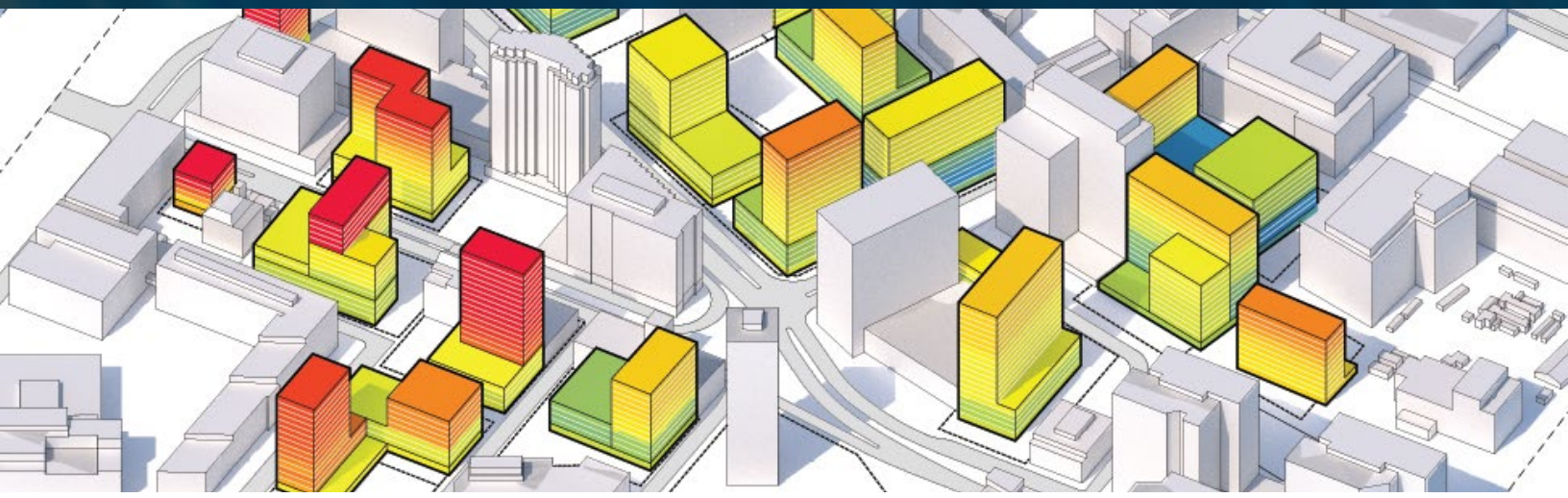


Achieving stunning architecture that's sustainable, too

Making the case for predictive energy modeling early and often in architectural design

BY JOHN H. MARTIN | DECEMBER 2021

Technology now informs every facet of modern life – from the mini-computers we carry in our pockets to smart home appliances. It is no surprise, then, that architectural design has embraced robust technologies that enhance every aspect of the design process. Digital visualization helps architects analyze land assets, 3D fabrication allows stakeholders to better conceptualize a project, and predictive modeling ensures designs will better meet building codes. With these technologies fully integrated into architectural practice, it's time to harness their power to reduce our carbon footprint in the built environment with the goal of mitigating the acknowledged effects of global climate change.

Through the 2030 Challenge[1], the American Institute of Architects (AIA) is helping developers, architects, and designers prioritize energy performance in new buildings and major reconstruction projects as a way to reduce the energy demands of buildings. According to the 2030 Challenge, our cities are responsible for 75 percent of annual global greenhouse-gas emissions, with buildings alone accounting for 39 percent. Eliminating these emissions is key to addressing climate change and meeting Paris Climate Agreement targets.

Fortunately, energy and performance analyses in architectural design have the potential to radically

[1] *The 2030 Challenge by Architecture 2030.* https://architecture2030.org/2030_challenges/2030-challenge/

The new MassMutual Boston building features a striking curvilinear façade with faceted panels that facilitate enhanced thermal performance of the building envelope, accentuate the building's curvature, and capture the shifting reflections of sunlight and shadow. Rendering © Elkus Manfredi Architects

improve a building's energy efficiency. It is all in the timing.

A striking, sustainable design

Architects at Elkus Manfredi find that including an energy modeler on the design team at the outset is an effective way to realize a sustainable design vision while also safeguarding the budget and maximizing efficiency. Predictive energy modeling empowers the design team to present informed recommendations and advocate for high-performance building envelopes and efficient mechanical systems with developers, builders, and subcontractors.

Case in point: MassMutual, a new architecturally striking office building in Boston's Seaport neighborhood.

Elkus Manfredi's CEO & Founding Principal David Manfredi, Principal and Director of Interior Architecture Elizabeth Lowrey, and Vice President Christian Galvao led the design for MassMutual and created a building on Fan Pier that establishes a larger Boston presence for the Springfield, Massachusetts-based company. MassMutual's design priority was to create a highly collaborative environment that would foster innovation and would become an example of sustainable design, as evidenced by its pending LEED Platinum certification.

Rather than employ an energy modeler at the final stages of design, Elkus Manfredi enlisted Samira Ahmadi, principal and founder of enviENERGY Studio, at the outset of the design process. She and her team at the woman-owned energy and sustainability consulting firm evaluated the design to determine optimal opaque wall-to-window ratios, along with the MEP systems needed to achieve the desired LEED energy credits at every iteration of the design. These calculations offered concrete data points to support specific material choices, which proved to be a boon as the team navigated the balance of cost, design goals, and efficiency. For example, when it was determined that triple glazing did not fit the project budget, in order to still reach the desired building performance, architects could confidently advocate for the lower-cost alternative of double glazing with a room-side, low-e coating on the glazing coupled with a chilled-beam HVAC system. Achieving MassMutual's vision for a distinctive LEED Platinum design necessitated fluid adjustments to the exterior envelope and MEP systems throughout the design process. The predictive modeling allowed for informed decisions at every iteration, saving money and unnecessary confusion later in the design process.

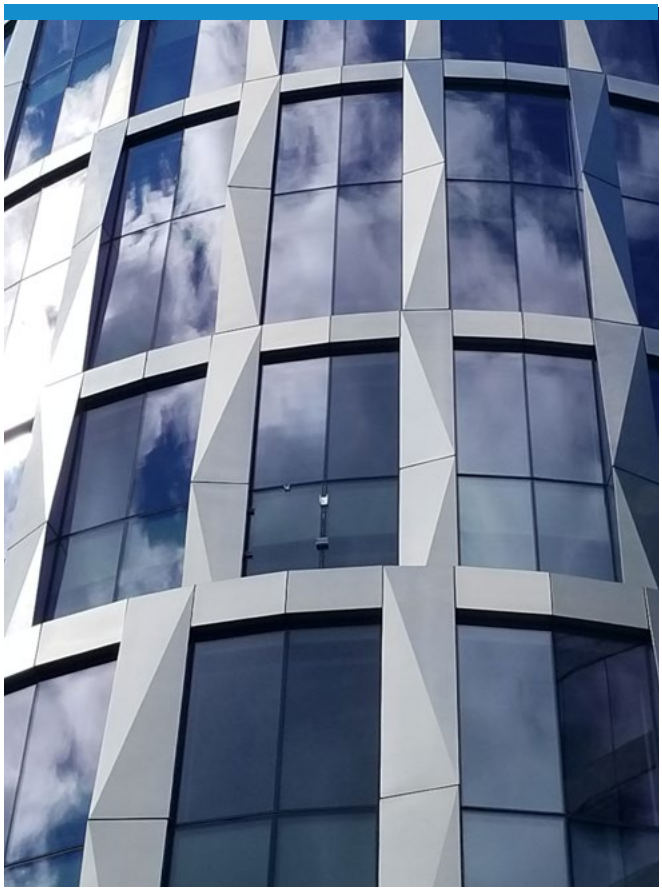
The results? The office building features a curving exterior envelope with faceted glass set in a stainless-steel frame that accentuates the building's curvature. The panels accommodate twice as much insulation as the current building code requires and – when coupled with low-e-coated glazing and other sustainability strategies – meet the energy-performance goals outlined in the AIA's 2030 Challenge. Not only did the predictive modeling guide the design, it also gave

the design team the data to advocate for its energy-efficiency strategies. The early energy modeling helped optimize window/wall ratios, which then translated into the dimensions, proportions, and patterns of the faceted panels in a way that integrated aesthetics and energy performance.

Considering the cost

Elkus Manfredi's experience with MassMutual demonstrates the value of this investment throughout the design process. Early energy modeling is a comparatively inexpensive design cost with a high-value, predictive return for helping evaluate a project's performance/cost basis. Its holistic, iterative approach gives architects the ability at every step to explore ways to achieve design goals while optimizing energy efficiency. Equally important, it helps the team develop a rapport, strengthen communication, and avoid costly miscommunications that can lead to problems during construction. Including the analysis from the start also assures other members of the project team that pursuing more sustainable options is feasible and cost-effective in the long run – no last-minute scrambles to meet code ahead of permitting, and no falling back on traditional building strategies when the challenges of more energy-efficient strategies seem insurmountable. In these and other ways, the practice meets the owner's needs while working toward the energy-performance goals outlined in the AIA's 2030 Challenge.

By taking a small, calculated risk upfront and bringing the energy modeler onto the design team early in the process, developers, architects, and designers can lead and challenge the entire project team to a higher level of performance.



Not only did the predictive modeling guide the design, it also gave the design team the data to advocate for its energy-efficiency strategies. The early energy modeling helped optimize window/wall ratios, which then translated into the dimensions, proportions, and patterns of the faceted panels in a way that integrated aesthetics and energy performance. Photo © Elkus Manfredi Architects

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