A Gensler research team based in London and Los Angeles has led a series of applied research initiatives around high-performance buildings. The result is a new approach to building design that’s being applied across the firm.
Gensler sees building architecture at a turning point. As Hall gives an example of a California office complex: "If the building is five stories tall and it’s in Santa Monica, he says, “given what we know about the weather in Santa Monica, how much energy is it going to use? What’s its carbon footprint?” The results from energy modeling are tied back to the design process, where they allow architects to come up with better and more sustainable buildings. "The focus of Gensler’s R&D effort on high-performance building design is to get this feedback loop going from day one," Hall observes. Knowing what strategies are possible lets designers make more informed decisions and encourages them to bring technical consultants into the design process sooner, adds Olivier Sommerhalder. “You know very quickly what the questions are, so you turn to specialists to address them in more detail. That used to occur later in the process, but now everyone is on board from the start.”

Developing a high-performance toolkit Gensler’s two-year effort to create the toolkit began with an exploration of their current performance to uncover the opportunities for design interventions that would deliver the highest return on investment. Both used their analyses to inform and support client decision-making about the directions to be taken.

New methods, new possibilities Gensler sees building architecture at a turning point. As Rob Jerrigen observes, “Whenever you look today, there’s a desire for higher performance. Our building architects have access to many more innovative materials and technologies than were on the market even 10 years ago.” The availability of sophisticated new building skins, systems, components, and strategies opens up an array of possibilities when it comes to higher performance. At the same time, the increasingly technical nature of building design means that project teams have to stay almaned of a burgeoning number of innovations—including the ways in which they collaborate with others in an increasingly integrated design and delivery process. All of this makes up-front research more critical than ever, says Hall. “We’re informing design thinking with analytical thinking. That’s changing the way that Gensler approaches projects.”

The greatest departure from older practice involves energy modeling—computer simulation of building performance. While early generations of design software simply mimicked the process of designing by hand, building information modeling (BIM) enables designers to overlay three-dimensional building information with climate and other site-specific data to predict how a building will perform over time. For example, a building can be analyzed under scenarios for a year’s worth of weather conditions, yielding a valuable prediction of its actual performance.
High-performance case studies address systems, components, elements, and materials. A Gensler-wide initiative in 2003 began to pool knowledge “that was mostly in people’s heads,” Rob Jernigan explains. “Collecting it systematically and disseminating it widely makes it accessible to teams so they can come up with better solutions earlier in the design process.”

Future-context information gives building designers an immediate sense of likely influences, from potential carbon-footprint and energy-related regulations to end-user research like WIPI that suggests how the building’s uses and activities may change in the future. The goal, Shannon Gibble says, is to give teams and clients a shared understanding of the building’s future context.

Performance modeling lets the team evaluate the performance of the evolving building design against the metrics that matter most to the client. Here, the toolkit exploits the integration and collaboration tools that are part of Gensler’s design-and-delivery approach. The analysis can be initiated by the core team or by specialist consultants, with the results shared by all.

“The performance is not just about operating efficiency,” notes Adams. “Human and organizational performance are even more important. Rising productivity is a potentially huge payoff.” For that reason, Gensler turns to tools like the Workplace Performance Index (WPI) and Activity Analysis to home in on the specific needs of the organization and the end users. “Connecting those findings with the other factors shaping the building’s use,” Adams says, “is a revolution in the making.”

Application of research: Energy modeling helps GSA hit target

Gensler’s comprehensive renovation of the 22-story Leland Federal Building, which first went into service in 1983, will be phased while it stays in operation. A new façade cuts heat gain and brings daylight to the interior. New HVAC, lighting, and photovoltaic systems improve energy performance. A new entry pavilion secures the building and gives it civic presence. The design team began using energy modeling and other tools in the proposal stage to test strategies and hone its approach. Above right: The new secure entry pavilion and parking garage walkway will have green roofs.

Gensler used energy modeling to show GSA how different renovation options cumulatively improved the Leland Building’s energy performance relative to a baseline: meeting GSA’s own target zone of 40–50 KBTU/SF/YR.

Cumulative energy consumption is lower than ASHRAE 90.1.2007 by

Cumulative impact of renovation options on energy use

Gensler’s Shanghai Tower is a breakthrough, 121-story superhighrise project that combines structural and exterior façade innovations to reduce overall weight and provide sky gardens for its vertical neighborhoods. Gensler’s Shanghai-based design team used ongoing computer-based modeling to support wind-tunnel testing of the overall tower form and the detailed development of the exterior façade. Building information modeling (BIM) software and plug-ins generated the data needed for real-time analysis of how potential design choices would impact energy performance and human comfort. Now under construction, Shanghai Tower is scheduled for completion in 2014.

Facade and structural innovations cut tower wind loads by 32% Total reduction in the tower’s carbon footprint, in metric tons per year, due to these strategies: 36,000