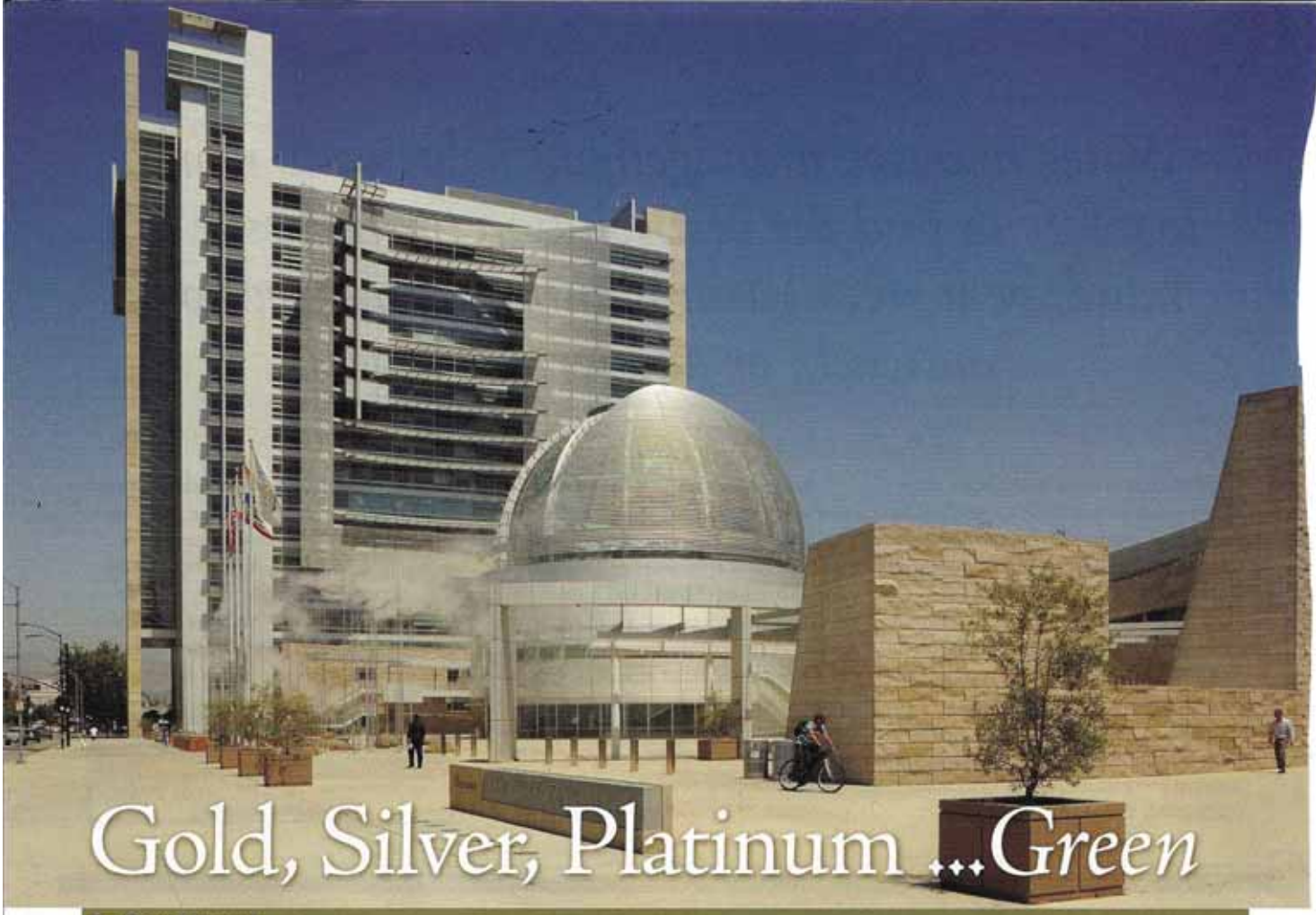


Gold, Silver, Platinum ...*Green*

By David Engle

Photos: City of San Jose

USGBC implements new LEED water incentives to address a chronic scarcity of times.

What started in 1998 with a tiny, all-volunteer crew cooking up a recipe for green-building design has, in just a dozen years, morphed into a national network of more than 350 earnest advocates and environmental professionals forming dozens of local green-building standard-supervising committees.

Meanwhile, the prototype design model is long gone, surpassed by a six-pack of others. Each focuses on sub-specialties—e.g., green design, green construction, green operation, etc.—deemed necessary in their own right, to ensure that every aspect of architecture and operation henceforth will demonstrate what is called "Leadership in Energy and Environmental Design"—better known, of course, by its acronym, LEED.

And lately, one of the six is devoted entirely to water efficiency—a sign of evolving knowledge and also of changing times.

LEED also revises itself on a recurring basis: new versions have come forth periodically like popular software upgrades, advancing from a 1.0 to a 2.0, then 2.2, and now, as of mid-2009, LEED 3.0.

Two "flavors" are recognized now: LEED for new construction, and another for renovated existing buildings ("LEED-EB").

The purpose of it all is, of course, to normalize notions of resource conservation and sustainability, and to make these as fundamental to building praxis as laying a firm foundation or sealing a sturdy roof. In the LEED-seeking quest, which is overseen by the US Green Building Council (USGBC), architects try to win points on a scoring system by incorporating the above, peer-recognized green guidelines. After mastering the often time-consuming and exacting steps, project teams gain recognition for attaining basic certification, or, in most cases, winning higher distinction for "silver," "gold," or "platinum" green-ness.

Scoring emphasis is driven mainly by things like using recycled/recyclable construction materials and, above all, for energy conservation. However, water efficiency is also gaining much greater attention and earning a proportionally higher scoring weight. In LEED version 2.0 for example, a maximum of 100 base points were possible across all categories (with some bonuses), of which 10 points could be earned in three water-specific areas: for water use reduction, water efficient landscaping, and innovative wastewater technologies. That's considerably more attention than was given in version 1.0.

Concerning the new wrinkles found in 3.0 from a water standpoint, "We have now instituted a *prerequisite* for water use reduction that didn't exist before," says USGBC vice president of technical

development Brendan Owens. "Previously, you could win the cachet of the LEED label without dealing with water at all; now, every would-be green edifice must achieve at least a 20% reduction in water usage against a baseline—just to get in the door to apply.

More points can be racked-up in increments—one for every 10% in further water reduction.

The new standard also takes cognizance of differences between, say, rainy climes where they don't fret over water, and the arid Southwest, where they do. Previous LEED versions ignored such factors, but now, says Owens, "We've instituted a mechanism that allows project teams and chapter networks to identify the issues that are most important to their projects, based on region." He's anticipating that resulting scoring weights will be adjusted here and there to incentivize water savings, starting soon.

Winning Points for Fixtures

As for actually running up the tally for faucets and flushers, etc., the principles are simple. "Most people who are fluent in water savings would easily determine what they want to try to accomplish—without the need for doing some kind of extensive analysis," says Owens.

A documentation form from USGBC outlines "what it is that we're going to be asking project teams to prove and show us when they are submitting for project certification," he adds. These and other guidelines can be freely downloaded from **http://www.usgbc.org**.

Calculations begin with establishing baseline water usage. Next, to determine the savings impact of measures, charts are provided that show flow rates and performances of assorted manufacturers' plumbing goods. Lastly, a totaling of the net savings, followed by figuring the percentage improvement this represents, yields the point(s) to be won.

Regarding water closet hardware *selections*: USGBC doesn't set forth one "best available" standard, but leaves choices up to the architects. Owens explains, "We really have been purposefully 'technology agnostic' as to how project teams can go about achieving those percent improvements. So, if a project team wants to use dual-flush toilet, waterless urinals, or high-efficiency toilets, or wants to use recaptured rainwater to flush toilets, we've been liberal in our interpretation of what are the best ways of going about accomplishing those goals, in favor of having a performance target that teams strive for."

Technology options naturally run the gamut from costly and exotic apparatuses like stormwater collection system—which may be tough to cost-justify—to low-flow toilets, lavatories, and faucet aerators, that are now virtually *de rigeur*; the latter coming up "most often" in applications, especially "as product performance is still rapidly improving," he notes.

There's also budget-driven competition *between* LEED categories. Thus, for example, rooftop water collectors may lose out to rooftop solar panels. This is actually not at all uncommon, he says. So in recognition of this challenge, and in order to reduce such dilemmas, USGBC urges designers, he says, "to try to find solutions that leverage both opportunities. We want people to think about these features not as separate, but as potentially integrated."

For example, low-flow bathroom faucets can be installed in conjunction with water pressure-driven generator mechanisms hooked up as battery rechargers to power building system components like valves and solenoids. It's actually been done, "and that's an example of an integrated solution that saves water and energy as well," he says.

So, how exactly does the ever-evolving LEED "design-build-certify" process work in practice these days?

Platinum City: San Jose, CA

In mid-2005, three new buildings for a gleaming City Hall went up together—an ensemble to showcase green efficiency in an urban setting.

During the design phase of the three—an 18-story high-rise, three-story annex, and five-story-all-glass rotunda, making, all told, half-a-million-plus square feet—the City Council thought of devising its *own* green building standard. In this, they borrowed heavily from the USGBC. At the time, the Council's idea and goal of *localization*, of what was then a national green code, made a lot of sense and still does; however, using it as a kind of blueprint ultimately caused some complication and necessitated revisions.

In any case, the localized version turned out to be so close to an equivalent national LEED level, that, as Jennifer Seguin, manager of the city's green building and climate action team recalls, "We were right on the [USGBC] certified silver border with it."

The City of San Jose, it should be noted, owns and manages more than 400 buildings and wants to make a lot of them much greener.

As construction proceeded, the Council came to appreciate that "certification of the third-party USGBC standard *was* important" after all, says one of her colleagues, Matt Morley, who is deputy director of San Jose's general services department. So, although the three buildings were designed with green concepts uppermost, the decision to remain independent was eventually reversed; and so it wasn't until a year or two after their commissioning, that certification was actually sought—under the "existing building" LEED-EB, rather than as "new."

In any case, the steps one should pursue in deciding what to do, says Seguin, are to begin by looking at what is *needed* for LEED points and compare this to what exists. "You do a gap analysis, and you look at the types of things that need to change," she says. For an existing building, these may include operational practices like cleaning or reviewing all the items that are purchased for use in the building.

As for structural remodeling or other construction-type features for points, Morley notes that a design team performed a similar assessment of candidates. The many opportunities were then graded for how easy or tough they would be to do—including, "things we thought we could knock-out fairly easily," others "that were going to need a little more effort or resources," and a third set that "were not really viable options," he recalls.

For the remainder of this discussion, the focus is on water-related measures, but, keep in mind, this dimension comprises only about a tenth of the total scoring strategy the city's LEED campaign undertook.

Right away, two water-related categories on the list jumped out to Morley: first, a point for low-flow faucets, and, second, three for doing outside irrigation.

The expense of upgrading 126 low-flow potable water fixtures (out of a total of 150 in the design) turned out to be a mere $2,280 total, parts and labor included. Payback would come in less than two years, and a point would be won; they're in now, and saving the city about $1,800 dollars a year. Hence it was, says Morley, a "no brainer."

However, regarding the outside irrigation: Here, the smallness of the City Hall's lawn did not attain the LEED threshold needed (5% of the site area) to qualify. Even so, LEED points or no, the city thought it worthwhile to use recycled water there because—in this unusual case—an existing recycled water loop passed nearby. This could be tapped quite cheaply.

At the other end of the cost-benefit analysis, "the biggie," says Morley, was the approximately $20,000 needed as a "one-time investment in recycled water for the cooling tower … together with ongoing

increased maintenance costs." This was initially deemed too steep, and was thus deferred.

Winning Points With (No Surprise) Water Recycling

In the overall project design, by far the most significant water piece was dual piping to distribute the reuse water campus-wide. Morley explains: "Every one of approximately 40 restrooms is plumbed for both potable and tertiary recycled water." The latter supplies 60 toilets for men, 86 for women, and 27 urinals. "That saves us obviously a ton of water and a ton of money in annual budget," he points out.

The treated water arrives—having 99% of impurities removed after an 18-hour process—into town, via a pre-existing "purple pipe" network, originating at a distant water control plant. The latter, notes Morley, is one of the largest advanced wastewater treatment facilities in the state; it serves a 300-square-mile area that is home to 1,500,000 residents. Most of the treated effluent gets discharged, but about 10% goes to the purple loop for use in agriculture, landscape irrigation, and industry. Comparatively, the cost of this reuse versus potable water comes out to between one-quarter and one-half that of the clean-water rate—but that's probably not as critical in this case, as conserving the region's scarce groundwater. Below-normal rainfall is not uncommon, and statewide, California, in 2009, declared a chronic water shortage emergency.

This reuse water pipe was thus already in town and in the ground a block away; trenching-in a short spur closed the gap.

Inside the three buildings themselves, the total expense of routing the second pipe added about $300,000; since then, paying only for cheaper instead of pricier water is recouping this cost at about $10,000 yearly.

Piping this much-cheaper source into the 40 restrooms, was also originally thought sufficient to avoid the need for low-flow fixtures, so, the architects specified conventional ones. However, as Morley recalls, "Through the green building certification process … we realized we needed to change those out and actually replace them with a 0.5-gpm [gallon per minute] flow-rate aerator to reduce the flow." Designers wanted that LEED "technology bonus point," which could be credited toward platinum; it had to be earned this way.

There was even talk of using waterless urinals, which would have been really "over the top," conservation-wise; but this was rejected, "because at the time, that technology wasn't proven enough that we were willing to undertake it," says Morley.

Now for some reckonings.

Under the USGBC score calculator, San Jose's administrative complex is matched against comparably sized buildings, assuming *potable* water in standard fixtures; by this formula, the city shatters the water-use norm with an impressive 80% reduction. USGBC is willing to award a point for attaining just 30% savings, so San Jose blew away this metric.

Another point for "innovation" was earned for achieving the next level, 40%, in connection with technology (the 0.5-gpm ultra low-flow aerators).

Next, putting water efficiency into the larger perspective with the scoring campaign: Out of the 92 total points available under LEED 2.0, 10 were allotted for water measures. San Jose got 69 out of 92—enough for platinum.

In the water category itself, the city won six of the possible 10, including:

- Three for volume usage reduction, as noted, including the bonus point for the aerator innovation
- One for installing a whole building water meter

San Jose City Hall was the first municipal building and first city hall in the country to "go platinum" under LEED-EB.

- One for subsystem metering. Morley amplifies: "What they're looking for here is the ability to track water usage, and to see when there's drastic changes that might alert you to something [i.e., isolated leaks somewhere]. So, we tracked the metering of our water features separately," especially for keeping watch on an outdoor irrigation system (using recycled water, too).
- One point for a water management system used for a cooling tower. Specifically, the system saves water "by insuring that the water is used as long as possible" before flushing and replenishing efficiently.

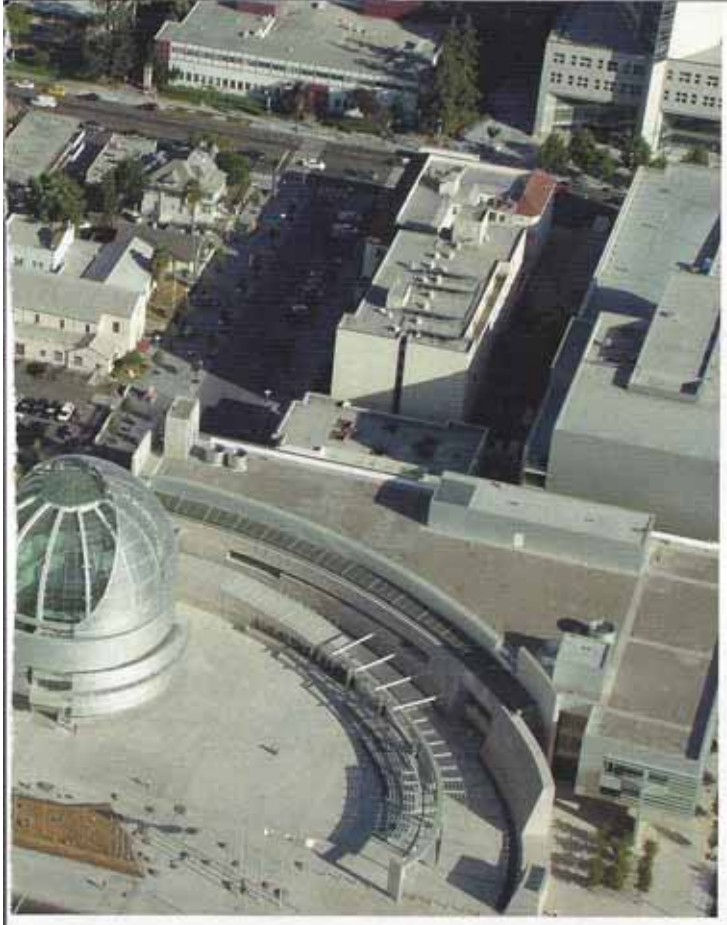
Three of the remaining four points possible were *not* given, because they're allocated for water savings in landscape irrigation, and, as noted earlier, the plot size was too small to qualify.

The last potentially earnable point was for piping recycled water to the cooling tower. To win, this would necessitate doing increased system monitoring and more onsite water treatment and filtration. Even though the city didn't really need the point for its award, it's going ahead and doing the tower loop anyway. Morley reports: "We've done the study and identified the cost of monitoring and tracking [about $20,000]. Hopefully, within the next 12 months, or so, it will be in effect."

Getting Certified

Validating the results for certification was done in-house, with some help from an outside consultant.

In the water-specific areas, this consisted of looking at a few minor things like making sure that the 0.5-gpm aerators were properly installed and functioning. As for the actual water savings (again, that is about $10,000 per month), these are confirmed by water bills—one for each loop.



Also, because the LEED award was properly for *operational* efficiency rather than an original design, there's a bit of added "dedication required on an ongoing basis," says Morley. So, for example, if a spare part is needed, the replacement must be equivalent to the original. USGBC also does periodic recertification every one to five years (increment to be chosen by the owner), consisting of comprehensive metered usage reports for the interval.

"That's the commitment," he says, "that we will continue to operate this facility in sustainable fashion and be able to report out in the future on how we're doing."

Though the buildings were in use by 2005, it wasn't until two years later that Morley, Seguin, and others on the team submitted the LEED application. Officially, the announced turnaround time by USGBC is a minimum of 30 days. But, Seguin notes, "it often goes a lot longer than that." Verification on one design or operational element might run smoothly, "or, [USGBC] may ask for clarification and come back with questions."

"So, on the short end, [the process] might take six months after construction is complete, up to a year, or longer," she says. "But, there could be some going back-and-forth before certification is granted."

In San Jose's case, two years elapse before approval finally came, in March 2009—thus making the site the *first* municipal building and *first* city hall in the country to "go platinum" under LEED-EB.

Part of the lengthy delay stemmed from the learning curve, notes Seguin, but with each successive application that she has undertaken since, the time has speeded up dramatically. Meanwhile, Seguin herself has also passed a LEED Accredited Professional exam.

For its part, USGBC has responded to processing bottlenecks, by now allowing applications to be submitted piece-meal as construction phases are still being finished, "to try and shorten the timeline," she says.

Another reform that should soon be in place is programs by which organizations that own many building (like governments and corporations) can *batch* their LEED applications. They may replicate some aspect of processing *en masse*, in order to win certifications in multiples rather than singly. Called the "portfolio program," when it's fully implemented, it will allow a manager to design one operational standard that works for multiple buildings, and, once this prototype standard is LEED-certified, *every* building that conforms thereafter is also good to go.

This approach should help green-conscious organizations dramatically. San Jose, for one, has committed itself to certifying four more sites by June 2010, and, within a few years, two dozen more, for a total of 30. "So, assuming that everything goes well and we see a value in the certification itself, we will continue to do that—while, of course, also looking at the budget," says Seguin."

Cost Processing and Containment

On that score, regarding LEED expenses, the fees she has encountered come with an interesting "carrot-and-stick" incentive, at least in San Jose's case.

Basic LEED registration costs $450; then, the certification process itself carries a fee of $17,500. *However,* upon earning the platinum award, the latter becomes refundable. If San Jose had *not* earned earn platinum, but only gold or silver, it's Seguin's understanding that the city would have forfeited $17,500.

She observes: "I don't think a lot of people know that if you certify at platinum, you get your money back," and she suggests that the provision may have been devised to "try to encourage over-achievement."

Critics of USGBC fees structures have pointed out that the money spent for considerable staff time and paperwork processing to get the certificate could instead be more directly invested into green material costs. There's also some complaint that the high standards demanded, and fees, have surged faster than staff support from USGBC.

On the other hand, LEED defenders note that the certificate is now a well-known mark of achievement. It adds prestige and probably commercial value to a property. "And really, the cost premiums associated with achieving LEED have come down substantially over the past several years, as the market ability to deliver services have expanded," USGBC's Owens points out. "The other piece that I would encourage people to take a harder look at, with respect to [cost], is the use of the LEED framework as a basis for integrated design.

"The possibilities here are significant," he adds, giving as an example the interconnection of a green roof, with stormwater collection and indoor plumbing reuse.

Finally, just over the horizon in terms of water conservation interests, USGBC is looking at the comparatively high volumes of water consumed in acquiring and generating certain kinds of energy and trying to factor this into a LEED formula. "We're working to make sure we have a system that looks at water, not just as a single resource issue, but a multiple resource issue, because there's a huge energy link that we've been cognizant of," says Owens. "We want to be able to definitively say—and I think we can say—that water savings technologies can contribute to reducing a building's carbon footprint."

He sums up: "On a national, regional and global level, you'll see the importance of water continue to rise within LEED." we

David Engle, a writer based in La Mesa, CA, specializes in construction-related topics.