Environmental stewardship is a priority for Seattle. It was the first city to require all city buildings to achieve USGBC LEED® Silver rating or higher. The city’s urban village strategy seeks a high-quality environment for the downtown area by promoting mixed building use and concentrated, pedestrian-friendly and economically viable neighborhoods with enhanced public spaces to strengthen the sense of community. The new Seattle City Hall embodies these values.
The reflection of the glass fins creates an illusion of depth on the flat side of the building. It is animated in the changing light.
The support of the city set the stage for a collaborative process that included many talented designers contributing expertise to find the best solutions for the project. As a joint venture architectural team, Bohlin Cywinski Jackson led design and Bassetti Architects led analysis of sustainable technologies and LEED certification. The landscape team was instrumental in the conceptual planning of the project and the integration of building and site.

In addition to sustainability, Seattle established two criteria for the design of the new city hall. It should be open and welcoming to provide a gathering place for citizens, and it should be lasting to serve its users for at least 100 years. While sustainability motivated decisions in design and construction, openness and long life defined the shape and feel of the building.

The garden roof reduces runoff by soaking up Seattle’s abundant rainwater, allowing it to evaporate gradually.

High-quality materials helped create a lasting, easy-to-maintain adaptable building.
**Form and Function**
The 200,000 ft² Seattle City Hall houses offices of the mayor, city council and related departments, the council chambers, media studios and archive, retail and gallery spaces, and venues for public gathering. With views of Puget Sound and the Olympic Mountains, the building rises from the top of a hill between 4th and 5th avenues and overlooks the civic plaza, built in the footprint of the old building. The phased design allowed the existing municipal building to remain on the site while the new building was under construction less than 10 ft away.

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**Perceptions and Evaluations**

The dedication of Seattle City Hall’s civic plaza, marking the completion of the second and final phase of the building’s construction, was met with controversy regarding the new building’s energy consumption. Energy use was found to be higher than originally predicted for the new symbol of the city’s pursuit of sustainable design. The local press took up the story, setting off a flurry of criticism and rebuttal.

In the end, the data may have been gathered prematurely or may not have been suitable for the conclusions drawn. However, everyone involved learned valuable lessons from this experience.

A new study is now underway (expected for release later this year), but the city is being careful not to release information until the report is complete.

**Initial Data**

Initial energy data, gathered from 2003 through 2005, for Seattle City Hall shows a total annual use of 87,231 Btu/ft² at an annual cost of $234,517. This is all the data that is currently available until the city’s report is complete.

<table>
<thead>
<tr>
<th>Component</th>
<th>Annual Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>41% Natural Gas</strong> (35,765 Btu/ft² per year)</td>
<td></td>
</tr>
<tr>
<td><strong>59% Electricity</strong> (51,466 Btu/ft² per year)</td>
<td></td>
</tr>
<tr>
<td>25% Air Conditioning/Fans/Pumps</td>
<td></td>
</tr>
<tr>
<td>16% Lighting</td>
<td></td>
</tr>
<tr>
<td>10% Plug Load</td>
<td></td>
</tr>
<tr>
<td>2% Elevators</td>
<td></td>
</tr>
<tr>
<td>6% Special Use (Security, Television Station, Water Features)</td>
<td></td>
</tr>
</tbody>
</table>

According to this data, the energy use is higher than predicted. However, the information is not indicative of the optimum performance of the building as designed. Several reasons exist for this.

**Influences**

The collection period was the first two years of the new building’s operation. During this time part of the lower levels, the entire plaza, and the western extensions of the building were still under construction. The building was still in its shakedown period with many operational issues unresolved.

These included construction problems with the underfloor air-distribution system, such as faulty diffusers and leaks at shaft connections and between zones. Additionally, in response to user complaints, the DDC system had been reprogrammed and temperature setpoints reset without consideration of the intended operation or building systems as a whole.

New technology involved in sustainable design often requires new operations and maintenance procedures, and a more complete understanding of the design parameters of the building. Sustainable design can also change how occupants experience the building. Lower footcandle indirect lighting, for example, while improving energy conservation and glare, creates a different interior ambiance and requires supplemental task lighting which was not initially purchased by the city.

Additionally, an underfloor air-distribution system requires users to understand a little about its operation. Not surprisingly, when feedback was solicited from the city’s staff in an initial survey during this period, staff found the building only marginally better than its predecessor.

**Comparing Old and New**

When the energy data from the new Seattle City Hall was released, it was seen by some as proof that the city’s visible push towards sustainability was ill-founded. The local press took up the story and declared that the new building, using a full 18% more energy than the old municipal building, was an “energy hog.”

A direct comparison of the old and new city hall is difficult to make because of the significant differences between the two buildings. Their programs were quite different. The municipal building, adapted from a design originally developed for a motel in Texas, had few public spaces and no civic stature. This is one reason the building was replaced.

In addition to conditioning large spaces, the new city hall is open for extended hours on weekends and outside of the normal workday. The building’s post 9/11 security measures require more cooling and a large separate uninterruptible power supply. Furthermore, the current building codes require significantly more HVAC than the old building with as much as three to five times the amount of fresh air intake.

The data for the old municipal building contained significant shortcomings that exaggerated the differences between the two. The municipal building was partially empty during the data collection period; lights were off on three floors. The municipal building was also heated by a steam plant shared with the adjacent public safety building which was not included in its overall energy calculation.

**Quantifying Success**

The collection of building performance data is a complex exercise that considers many disparate factors. When the data is gathered, its timing relative to the building’s construction, the final adjustments required and their continued maintenance can affect the data considerably. At Seattle City Hall, the initial energy report was useful for the finetuning of initial problems and for user awareness. The city’s new energy study will allow for further improvements of the building’s operation.

Just as sustainability considers more than reduction in a building’s energy bills, quantifying the success of a building is more than quantifying its energy performance. Building program size and the way in which it is used must, in the case of a civic building, be factored in along with its value to the community. Seattle is proud of its new city hall and committed to sustainability and environmental stewardship. The building is well used and its environmentally conscious features contribute to an overall building that is sustainable.
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The terraced limestone base and concrete landforms create public plazas of various sizes. Floors and terraces made of natural cleft Swedish quartzite shimmer like the water visible throughout the city. Stone anchors the building to the site and instills a sense of civic permanence.

The building’s structure above is steel and glass. In the lobby, closely spaced steel columns establish a scale both civic and humane. A grand stairway of sitting ledges leads to the council chamber entrance. A fireplace clad in bands of black granite creates an intimate gathering space outside a multipurpose room beneath the chamber. At the end of a red glass wall that defines the primary public gathering space, steel components such as those in the lobby create a trellis and lantern in the plaza, marking the street corner and northwest entrance to the building.

The council chamber, enclosed by two curved titanium clad shells, serves as a focus for the lobby and counterpoint to the office block. Its form extends through the ceiling, visible from the plaza outside. Across the lobby, a blue glass bridge designed by artist James Carpenter links the chamber and offices. The seven-story executive office block uses curtain wall and sunshades to respond to solar orientation. The curving southeast face imitates the form of the council chamber below, its structure cantilevering to support the elevator lobby and primary public corridor.

Throughout, material details reveal each component and its respective function. This can be seen from the...
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With the same materials used inside and outside, interior and exterior spaces flow together.

Primary functions are expressed throughout. The council chamber, for example, has a distinct form and finish and is seen to extend from the outside into the lobby. The office tower gathers administrative functions in a single block that visually slices through the lobby roof by means of a skylight. The mayor’s conference room is articulated as an oval, visible inside and outside and as part of the building’s roofscape.

The exterior glazing is clear with a low-e coating that achieves a high level of solar performance with as much transparency as possible. This allows one to see interior volumes within the glass skin and to see the street, the public plaza and the view while standing in the lobby. Research was done to select the best product for each application.

Initially, Viracon VE-2M was favored because of its high visible light transmittance of 70% (shading coefficient 0.44/solar heat gain coefficient 0.38). However, selecting VE-52, a slightly darker coating with only 50% visible light transmittance (shading coefficient 0.36/solar heat gain coefficient 0.31), reduced costs and increased solar performance. The savings funded curtain wall elements that had been eliminated as a result of value engineering. As an added benefit, the cool blue tint of VE-52 coating complemented the material palette of the building.

In many places a ceramic frit was added to further reduce heat gain and mitigate glare. This is most apparent on the south side of the tower where a 50% vertical pinstripe

scale of the steel and glass handrails to the exposed steel structure. The details serve as decoration and the natural colors of the materials form the palette.

**Transparency and Openness**

As desired by Seattle, the new city hall’s architecture expresses transparency, accessibility and openness. In many cases, sustainable principles, coupled with new technology, made possible the welcoming atmosphere.

Inside the building, visual barriers between spaces were minimized to allow for easy interaction among the staff and the public. Whenever possible, office space is open. Rooms that are divided, such as conference rooms and offices adjacent to the lobby, have extensive interior glazing.

The use of stone instills a sense of civic permanence. The red glass sun wall defines the main public plaza.
one moves along its length. Frit also sets apart areas of curtain wall to break down the building’s mass and solidity and reinforce its crisp planar quality. In all, 15 glass types optimized performance and refined the building envelope.

Bohlin Cywinski Jackson worked closely with the glazing subcontractor to develop the building’s curtain wall within a fixed budget. The design-build process used shop drawings to adapt details to optimize the curtain wall components. A standard stick system was selected as most cost effective for the tower’s small size. To achieve the layered articulation of each face, custom extrusions were attached to standard curtain wall sections. This modular approach helped control cost and achieve envisioned design features.

Sun shading and daylighting tools improve building performance. In the lobby, milled wood louvers on the interior of south- and west-facing window walls add visual warmth and a more human scale to the monumental space. On the tower, each face responds to its solar orientation. On the west, the horizontal exterior sunshades work in concert with lightshelves to protect workers from harsh afternoon light while reflecting and diffusing light deep into adjacent office space. The perforated aluminum plates form a horizontal counterpoint to the lobby columns, creating backdrop for the building’s main plaza and distinguishing the city hall from its taller neighbors.

On the north, translucent vertical glass fins catch and reflect late afternoon light into the space. The reflection creates an illusion of depth on this flat side of the building which is animated in the changing light. The fins are a good example of the collab-

SUSTAINABLE CHECKLIST

From project inception, Seattle City Hall was envisioned as a progressive urban building with LEED Silver as a project requirement. Through a process of making design and sustainability choices based on merit rather than LEED points, the project surpassed this goal to achieve LEED Gold (39 points). The following are some of the most significant strategies implemented.

Community Connection
- Open space increased by 4.8 times, green space by 6.5 times
- City offices consolidated into single campus
- Minimal structured parking (only 27 spaces); building shares adjacent city garage and vehicle pool
- Alternative transportation: electric vehicle charge station, bicycle storage facilities and showers
- Public transit is subsidized

Resource Efficiency
- Rainwater harvesting and gray water system for 100% of toilet flushing and irrigation
- Green roof with native and adapted plants
- Waterless urinals, low flow fixtures, drip irrigation with sensors/controls
- Reduced energy use: 24% below ANSI/AHMRAE/IESNA Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, base case
- High-efficiency glazing, external sunshades, thermal buffer
- High-efficiency indirect lighting and daylighting controls
- Solar modeling used to minimize heat loads and artificial light use
- Future pathways for rooftop photovoltaic panels

Occurrent Well-Being
- Rooftop fresh air intake with MERV-13 air filtration
- Underfloor HVAC with occupant control
- Low or zero VOC adhesives, sealants, and paints and carpet
- Interior daylight strategies bring natural light deep into building

Good Construction Practice
- 88% (by weight) of construction waste recycled
- 53% of construction materials manufactured regionally
- 15% of construction materials with recycled content
- Post-occupancy report focusing on cost analysis of sustainable design and occupant comfort
Water conservation, a visible concern in the Northwest, provides another example of Seattle City Hall combining design elements and sustainable strategies. Water conservation contributes eight points toward LEED, more than any other building system. The rainwater harvest system alone achieved all five water efficiency points for LEED plus an innovation in design credit for exceeding performance levels.

A garden roof planted over the lobby portion of the building reduces runoff by soaking up Seattle’s abundant rainwater, allowing it to evaporate gradually. Excess water is harvested in a 220,000 gallon rainwater cistern built in the basement of the demolished municipal building. Three pumps in the mechanical room deliver water to toilets and the landscape sprinkler system. Waterless urinals along with low flow automatic flush toilets and lavatory fixtures reduce overall water use. Landscape irrigation is a drip system with an automated controller connected to a soil moisture sensor for maximum efficiency. In an average year, the harvested rainwater will accommodate 100% of irrigation and toilet water.

The garden roof was bid as an alternate to the base bid for a conventional roof with concrete pavers. The alternate was $3/ft² more than the base bid. When bids for other building elements came in below estimate, the city reallocated the money to include the green roof.

In a native Puget Sound forest, 25% of the annual rainfall is evaporated or transpired. The garden roof over the main lobby of Seattle City Hall evaporates and transpires enough water to equate to one-third of this aspect of the native forest condition.

Precipitation managed on site 83%
Total water used indoors 844,500 gallons per year
Total water used outdoors 33,200 gallons per year
Percent of total water from reclaimed sources 31%
Calculated annual potable water use 3 gallons/ft² per year

<table>
<thead>
<tr>
<th>Water Use Breakdown</th>
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<tbody>
<tr>
<td><strong>Irrigation</strong></td>
</tr>
<tr>
<td><strong>Surplus to Storage</strong></td>
</tr>
<tr>
<td><strong>Toilets</strong></td>
</tr>
</tbody>
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In a native Puget Sound forest, 25% of the annual rainfall is evaporated or transpired. The garden roof over the main lobby of Seattle City Hall evaporates and transpires enough water to equate to one-third of this aspect of the native forest condition.
tially analyzed. The elements of the building simultaneously contribute to its expression, functionality and energy performance.

**A 100 Year Building**

Seattle’s goal was to build a 100 year building. Creating a lasting, easy-to-maintain adaptable building was a sustainable strategy that formed the basis of many design decisions and sustainable solutions for Seattle City Hall.

High-quality materials were selected for durability and ease of maintenance. Stone is used in the lobby and plazas. The durable natural material is treated only with a penetrating sealer that requires little maintenance and will wear well over time. Custom steel casings enclose the fireproofed lobby columns. The columns are simply painted and can withstand impacts requiring only repainting as a repair. Wood is used more sparingly and located where abuse from occupants will be limited, e.g., in the ceiling. Where wood is accessible, as in the sunshades around the council chamber, it is a solid stock maple that can withstand impact.

Titanium panels highlight the council chamber volume. Although the material is costly, less material was used than comparable metals because its strength allows for application of thin sheets. The titanium is formed in small panels to reduce waste and conform to the tightly curved shape, interlocked to conceal fasteners as in a traditional metal roof. Titanium is extremely durable and was used in its unfinished state with a natural protective coating. Although the unfinished

Horizontal exterior sunshades work in concert with lightshelves to protect workers from harsh afternoon light while reflecting and diffusing light deep into adjacent office space.
titanium panels on the interior of the building show fingerprints, this is easily maintained with mild soap and water. The natural materials complement the Pacific Northwest character of the building and form a strong connection to its surroundings.

Flexible design also created a building that will be useful for a long time. The city hall’s office tower has a small floor plate. To maximize usable space, a single large contiguous office area was created by placing the circulation core to one side with the remaining space being column-free. An under-floor air-distribution system contributes to the flexibility of the layout and the easy distribution of wiring, with the added benefits of reduced energy use and improved user comfort.

The tower floors originally were envisioned as open office space that would be easy to reconfigure as functions changed. A late change in the layout of the second floor required the substitution of an open space for the support staff with nine council member offices. As a result, this floor of the tower is completely subdivided with office suites. The introduction of sidelights, interior windows and glass panels at the tops of walls brings light and views into interior spaces.

An equally important aspect to creating a flexible and sustainable building is carefully attenuating the size of spaces with respect to their programmed functions. When successful, the right-sizing of spaces makes them suitable for multiple purposes but not larger than needed. This was accomplished in the building’s central meeting room, the council chamber. Designed to accommodate large public proceedings of up to 140 people, the room includes a fixed conference table in

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Translucent vertical glass fins catch and reflect late afternoon light into the building.
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Lessons Learned

Start with Sustainability If sustainability is considered early in the project it can be integrated naturally into all other elements of the design. Utility, aesthetics and sustainability can be mutually supportive.

LEED Although LEED favors only a small portion of the possible sustainable technology, it serves as a good basic framework for incorporating important fundamental strategies. It also quantifies their value in a way that can be understood by owners and users. At Seattle City Hall, this was manifest in tangible architectural features that might otherwise have been seen as unessential.

Users Adapt Priorities of users and owners differ. At Seattle City Hall, it was one of the owner’s priorities to reduce energy consumption. This was achieved with sustainable strategies that, in some cases, changed how occupants experienced the building and required new operations and maintenance procedures.

The use of lower footcandle indirect lighting reduces overall lighting levels and adds supplemental task lighting only on work surfaces where needed. This strategy reduced glare. However, it created an interior ambiance different from the direct recessed lighting users were accustomed to in the old building. An underfloor air distribution system requires different temperature setpoints and adjustment procedures than a traditional system. Initial changes were made by overriding the setpoints instead of adjusting diffusers, creating more user comfort problems than were solved. This led to initial negative feedback that should improve as users adapt and the correct procedures are implemented.

Plan for Flexibility Not all sustainable elements incorporated into the building remain as effective as originally planned. One example is the lightshelves on the western face of the tower. Where perimeter offices were added to the program, the light bounced from the shelves is trapped in the offices themselves, and the scale of the shelves overpowers the smaller spaces. Although the lightshelves were designed so that they could be unbolted and removed, their size makes this difficult.

Conclusion Despite technological advances in how buildings respond to our demands and minimize environmental impact using sophisticated internal control, there is a place in the sustainability equation for good design based on fundamental human values. Things that make us happy, calm, productive and comfortable remain the same from one generation to the next. Seattle City Hall exemplifies this idea through its cohesive and accessible approach, palette of natural materials, tectonic expression and sustainable building strategies.

When Seattle City Hall’s sustainable attributes were measured against the LEED for New Construction (NC) rating system, addition to a council dais for smaller boardroom style meetings that often have a public audience.

For special events, extra capacity is available. Large operable panels at the back of the room allow an overflow crowd to spill out into the ambulatory around the outside of the chamber. In addition, a two-way audiovisual link established to the large multipurpose room below, by means of the closed-circuit television system used to record council proceedings, allows the audience to participate and give testimony. These paired meeting rooms can accommodate groups from nine to 140, and more than 300 for the city’s variety of events. These features reinforce the purpose of the building and play a part in the sustainable future of the city and neighborhood by creating a focal point that is active and accessible.
certification above the city’s target was achieved. A careful balance of functional utility, sustainable technology and sensitivity to circumstance made the higher rating possible. In the end, of course, the most sustainable strategy of all was creating a building that people will love and value. This ensures that the building will remain useful and enjoyed for a long time to come.

When large crowds gather, a grand stairway leading to the council chamber provides seating.