



GREEN BUILDINGS: Costs and outcomes need more attention

September 2016

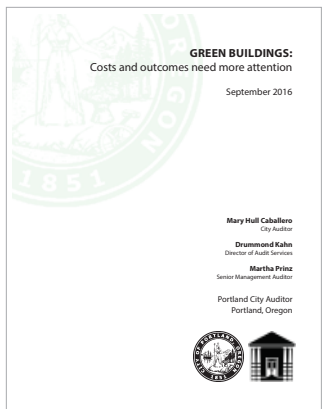
Mary Hull Caballero
City Auditor

Drummond Kahn
Director of Audit Services

Martha Prinz
Senior Management Auditor

Portland City Auditor
Portland, Oregon





Production / Design
Robert Cowan
Public Information Coordinator



September 1, 2016

TO: Mayor Charlie Hales
Commissioner Nick Fish
Commissioner Amanda Fritz
Commissioner Steve Novick
Commissioner Dan Saltzman
Susan Anderson, Director, Bureau of Planning and Sustainability

SUBJECT: Audit Report – Green Buildings: Costs and outcomes need more attention
(Report #480)

The attached report contains the results of our green buildings audit. Response letters from the Mayor and the Bureau of Planning and Sustainability are included in the report.

We appreciate the cooperation and assistance we received from the Bureau of Planning and Sustainability as well as the other bureaus we contacted during our work.

Mary Hull Caballero
City Auditor

Audit Team: Drummond Kahn
Martha Prinz

Attachment



GREEN BUILDINGS:

Costs and outcomes need more attention

Summary

Portland's green building policy is aimed at minimizing the environmental impact of constructing, reconstructing, operating and maintaining City buildings. The policy also aims to improve employee health and productivity and save money in the long run. The green building policy was adopted in 2001 and is currently in its fourth iteration. It contains specific provisions, ranging from energy and water use to waste disposal. The City has built or remodeled 11 buildings under the policy.

An important focus of the green building policy is whether City buildings are designed and constructed to meet Leadership in Energy and Environmental Design (LEED) standards. LEED standards are widely used, and buildings can become LEED-certified if they are designated by a third party as having a variety of environmentally-responsible features that use resources efficiently.

Key questions around the green building policy include the costs to follow the policy and how the city tracks the outcomes – what do green buildings cost, and is the City realizing the environmental and economic benefits it intended to achieve?

While the City made progress in achieving some specific goals from the green building policy, it pursues other goals without adequately considering costs and measuring outcomes. Given the City's limited resources, the costs and outcomes of the green building policy should be better understood, and reconsidered if they are either too expensive or not having the intended effect.

Our recommendations focus on identifying and reporting the costs and outcomes of the green building policy and considering future green building projects in the context of other City priorities and limited resources.

Audit Results

The City built or remodeled 11 buildings in the past 15 years under its green building policy, which covers many areas, including:

- Minimizing use of energy and water.
- Using “ecoroofs” on all City structures. An ecoroof uses plant material instead of traditional roofing substances that are less environmentally sound.
- Designing City projects to minimize the risk of birds flying into windows and provide covered bike parking.
- Providing disincentives to driving by limiting the number of parking spots associated with City buildings.
- Using practices that protect salmon habitat.
- Allocating work spaces within City buildings efficiently to reduce energy costs and using materials that can be re-used.
- Following construction waste prevention guidelines to meet the City’s goal of 85 percent waste diversion. Strategies include salvaging, reusing, and recycling construction waste.

Cost and outcome information for green buildings is incomplete

The green building policy has become an integral part of how the City approaches projects, but information about costs and outcomes is incomplete. There is no single source or function in the City that tracks it. Oversight of the policy is mostly decentralized, although some systems are in place to help ensure it is followed. The City provides training to alert project managers to policy changes. Some project managers expressed frustrations with aspects of implementing the policy, although they generally supported its goals.

The policy is considered binding, although the City uses some discretion in following it. Exemptions may be granted for either financial or feasibility concerns, but are not centrally tracked and are subject to City Commissioner approval. Without complete cost and outcome information, the City can’t fully determine the results of the policy or link the results to the City’s financial investment.

Green buildings usually cost more upfront, but may save money over time



Portland Building LEED plaque

Estimates of increased costs to comply with the green building policy varied. According to Planning and Sustainability, the upfront additional cost to construct a LEED Gold-certified building in Portland ranges from zero to 2.5 percent. Planning and Sustainability managers and project managers said that in some cases, the extra cost for green buildings was higher. One project manager said LEED-certified projects typically cost 2 to 4 percent more. Some project managers would like more attention paid to costs, especially when new provisions are added to the policy.

Beginning in October 2016, a new version of LEED will likely increase upfront costs, according to a study commissioned by the Office of Management and Finance. The study, which used a Portland fire station as an example, showed a cost increase of 2.35 percent from the current version of LEED to the new version. If that projection is accurate, the new requirements could add as much as 5 percent to the cost of projects. Another study of a project completed in another state showed an upfront cost increase of only 0.5 percent.

It can also cost more to maintain a green building. For example, the East Portland Community Center pool used an innovative heating and cooling system that sometimes requires outside help to maintain. One project manager said that it is becoming more challenging to get projects LEED-certified, because the requirements grow over time and easier paths to certification are no longer an option.

According to Planning and Sustainability, the Portland Building, when renovated for operations and maintenance, saved the City \$245,000 in avoided energy costs over two years. The Bureau also provided us with a study showing average operational savings of 19 percent in Federal government buildings that featured sustainable design elements. The Bureau of Environmental Services provided us with a study showing energy savings, as well as environmental and other benefits, from ecoroofs achieved over time.

In some cases, costs associated with the green building policy are difficult to isolate. Costs can also change during the life of a project, such as when building conditions become better understood during construction, or when a new construction material ends up not meeting performance standards and needs to be replaced.

There are also costs associated with hiring consultants to perform such tasks as studying the feasibility of green features, reviewing buildings

for LEED certification, or performing energy modeling. For example, when considering an ecoroof for an existing building, it is important to assess whether the building can support the roof. The costs to address structural concerns can be significant. Sometimes the ecoroof requirement is waived because of high costs, subject to the judgment of the commissioner-in-charge. In one example, the feasibility of replacing City Hall's five roof areas with ecoroofs was studied in 2008 and again in 2015, with the expectation that ecoroof costs would decrease over time. According to management, costs identified in the 2015 study were 50 percent higher than a conventional roof. Each of the feasibility studies consumed funds for both consultants and staff time.

Exemptions are granted for budget and feasibility reasons, subject to commissioner approval

Exemptions to the green building policy are not centrally tracked or quantified, making it difficult to know how often they are used. Planning and Sustainability managers said they encourage project managers to note exemptions in the project file, although we could not determine if that is always done.

Ecoroofs have been part of the green building policy for 10 years, and are required unless the commissioner-in-charge grants an exemption. Environmental Services managers said they used to follow up with bureaus when they heard about projects that lacked ecoroofs, but that type of follow-up is less needed now. As the policy has become common knowledge to project managers, the Bureau's role is more of an as-needed consultant, providing technical assistance when asked. A report on ecoroofs prepared by Parks and Recreation said that on average, a 2,000-square-foot ecoroof costs from 30 to 70 percent more than a conventional roof. In other documents, Parks managers made the case that in a park setting, the money spent on an ecoroof may be better spent elsewhere because the park itself – including trees and grassy areas – provides similar environmental benefits.

In one example, Parks received an exemption to omit an ecoroof on a small structure in a park. Parks managers noted that the design, construction, and maintenance costs of an ecoroof would outweigh the benefits, especially because the structure was in a park. Parks also received an ecoroof exemption in a park when staff noted it would increase costs from \$250,000 to \$348,000, a 28 percent increase that Parks managers said could be spent on other amenities in a part of the City underserved by park facilities.

In another example of an exemption, City Council approved a very limited budget for a Police training center in 2012. A consultant helped the bureau and stakeholders come up with a plan that was only as “green” as the budget would allow. The commissioner-in-charge made clear that the budget the bureau was given was all that was possible, and the project went forward.

Only some green building outcomes are known

Since 2001, the City has constructed or remodeled 11 buildings that either met or are on-track to meet LEED standards. Planning and Sustainability also reported that 60,000 square feet of ecoroofs and 600 kilowatts of solar panels have been installed on City facilities, as well as “multiple green improvements” to City-owned office spaces.

Figure 1 City-owned LEED certified green buildings

Building	Bureau	Rating
Charles Jordan Community Center	Parks	LEED Certified
East Portland Community Center	Parks	LEED Platinum
Meter Shop	Water	LEED Gold
Portland Emergency Coordination Center	Water/Emergency Management/ Management and Finance	LEED Gold
Fire Station 18	Fire	LEED Gold
Fire Station 21	Fire	LEED Gold
Columbia Building	Environmental Services	LEED Gold
Interstate - maintenance building (registered)	Water	Tracking LEED Gold
Interstate - shop, stores, warehouse (registered)	Water	Tracking LEED Gold
The Portland Building	Management and Finance	LEED Gold (existing building operations and maintenance)
Providence Park	Management and Finance	LEED Silver (existing building operations and maintenance)

Source: Bureau of Planning and Sustainability

The City's green building policy requires that new, occupied buildings be built to LEED Gold status or the equivalent. A few projects have approached or achieved the higher LEED Platinum status. LEED certification provides some, but not total, assurance about a building's performance.

Green building outcomes can be difficult to track because other related programs address some of the same issues. For example, the green building policy directs Planning and Sustainability to track implementation and provide progress updates as part of a larger effort known as Sustainable City Government, which targets issues like carbon emissions, energy use, renewable energy, and waste recovery. The City and County also have a Climate Action Plan, which has some overlap with the green building policy.

Planning and Sustainability or the bureau in charge of a project can track outcomes of the green building policy. Some examples of tracking are:

Energy and water

Planning and Sustainability staff said that compliance with energy-related aspects of the green building policy is mostly accomplished for new buildings using energy modeling provided by outside architecture and green building firms that contract with the City. For larger projects, the energy goals in the green building policy include meeting LEED Gold standards, as well as exceeding Oregon Energy Efficiency code by 15 percent and using a certain amount of renewable energy.

Planning and Sustainability staff said that they are qualified to confirm the validity of the models, but that the firms have the technical skills to best perform the modeling. A Planning and Sustainability staff member helps bureaus qualify for rebates from Energy Trust of Oregon, and tracks compliance with a state requirement to spend a certain percentage of the budget for each new project on green technology.

Bureau staff also said that compliance with water use reduction goals is part of the LEED certification process, and that the Bureau tracks water use by bureau, but not by building.

A manager in the Office of Management and Finance's facilities division said their tracking of energy and other utilities has been fragmented, but will soon improve once they use new software. Facilities managers also said they plan to upgrade systems controls within buildings, which will enable better tracking of a building's performance. The planned Portland Building renovation will serve as a pilot program for more outcome tracking, according to Planning and Sustainability.

Swan Island pump station ecoroof



Source: Bureau of Environmental Services

Ecoroofs

Environmental Services conducted a study on the effects of three ecoroofs. The study attributed a significant reduction of stormwater runoff, which often carries pollutants and can contribute to flooding, to the ecoroofs. Data for the three projects showed a multi-year reduction in peak water flow of between 88 percent and 97 percent. Environmental Services managers said other ecoroof benefits are easy to overlook, such as reducing the release of heat absorbed from sunlight by conventional roofs into

the atmosphere. However, a project manager from a different bureau expressed concern that the useful life of ecoroofs has not yet been established, and that the replacement costs are not yet known.

Construction waste management

The 2015 version of the green building policy contains more specific requirements about managing construction waste than previous versions. Planning and Sustainability has not yet determined the extent it will measure outcomes of the new policy provisions.

Bird-friendly design, space allocation standards, Salmon Safe certification, limited car parking

According to Planning and Sustainability, any analysis of these provisions is likely to consist of whether the new policy provisions are followed, but will not attempt to measure the impact of the new provisions, such as whether there were fewer bird strikes or more use of transit.

Oversight of outcomes clearer in short-term, but lacking overall

In addition to LEED certification, some processes help ensure the green building policy is followed, especially during the early procurement and permitting phases of a project. For example, a project manager at the Water Bureau said that through early assistance offered by the Bureau of Development Services, bureaus have the opportunity to meet with other bureaus as needed, such as Environmental Services, to discuss the feasibility of an ecoroof. Development Services also assigns a liaison to guide Water through the permitting process, including permits related to the green building policy. Other project managers said that Procurement keeps them on track. Planning and Sustainability and other bureaus also provide training on the green building policy, especially when there are new provisions.

Planning and Sustainability scans the capital plans of the City's infrastructure bureaus and the text of each bureau's budget proposals for any references to capital projects. They also informally check on some projects and provide technical assistance to the City's project managers, especially when a new policy provision is introduced. The green

building policy calls on Planning and Sustainability to convene bureaus to create and maintain a Citywide Policy Implementation Guide, but that has not taken place yet for the current version of the policy.

On more specific provisions, it can be difficult to know with certainty that the green building policy is always being followed. For example, a cleaning or maintenance contract may require specific products to be used, but it may be difficult to determine whether vendors use them consistently.

Project managers are committed to following the green building policy, but some have concerns about costs and outcomes

We spoke to project managers at Environmental Services, Parks, Water, Office of Management and Finance, and Fire & Rescue. Some of them said the green building policy is one of many City policies they are expected to follow without enough consideration of the added costs. Project managers provided suggestions to improve implementation of the policy, such as:

- More discussion about how proposed policy provisions will be accomplished and how much they will cost
- Trying ideas as pilot projects before new provisions are added to the policy
- Developing in-house performance standards rather than relying on outside entities to certify green building projects

Portland Fire & Rescue Station 21



Source: Audit Services Division

Recommendations

With many demands on the City's limited resources, the cost and effectiveness of City policies should be well understood, and reconsidered if they are too expensive in light of other City priorities, or if they are not having the intended effect. To ensure that the green building policy is both affordable and effective, we recommend the Mayor direct the Bureau of Planning and Sustainability to:

1. Develop a process for bureaus to better track information about costs and outcomes of green building provisions. Information specific to each provision of the policy should be available to City Council for use in adopting the next iteration of the green building policy. The information should also be available to the public on the City's website.
2. Develop and implement a plan to regularly solicit and track input from a variety of bureaus to better understand challenges related to the green building policy.
3. Consider centralized tracking of exemptions to better understand instances where a provision of the green policy was unworkable or unaffordable. That information should be used in developing the next iteration of the green building policy.

Objectives, scope and methodology

We conducted this audit to determine if green building costs and outcomes are tracked and considered, whether there is oversight of the City's green building policy, and to determine how Portland's policy compares to policies in other cities. Our audit scope focused on administration of the green building policy by the Bureau of Planning and Sustainability, as well as by select bureaus responsible for carrying out the policy. We did not exhaustively study all tracking and oversight activities at all bureaus mentioned in the report.

To accomplish these objectives, we analyzed the City's current and past green building policies, related policies, supporting documents, transcripts of City Council proceedings, and meetings concerning the 2015 green building policy. We reviewed information on the City's sustainable city government program, budget information, literature on green building best practices and certifications, audits from other jurisdictions, and news articles. We analyzed reports from Planning and Sustainability, Environmental Services, and Parks; and

architecture, engineering, and green building firms contracted by the City. We interviewed staff and managers from Planning and Sustainability, Office of Management and Finance, Environmental Services, Parks, Water Bureau, and the City Budget Office. We paid particular attention to information about and data pertaining to the City's sustainable city government program because of the overlap of that program with the green building policy.

For the other city comparison, our scope focused on policy documents for each city as well as supporting materials related to those policies, and we focused our choice of cities on those recommended by the Bureau of Planning and Sustainability or included in a list of cities we have compared to Portland in our prior work. We found that many cities have green building policies, and that Portland's policy is similar in its level of detail to the policies in cities Portland is often compared to, including Seattle and San Francisco. The policies in Minneapolis and Washington, D.C., were also similar to Portland's. Because there is no national standard for green building policies, we make no recommendations based on this review of other cities.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

RESPONSES TO THE AUDIT



Office of Mayor Charlie Hales
City of Portland

August 25, 2016

Ms. Mary Hull Caballero, City Auditor
Office of City Auditor
1221 SW 4th Ave., Room 140
Portland, OR 97204

Re: "GREEN BUILDINGS: Costs and Outcomes need more attention" audit

Dear Ms. Caballero,

I appreciate the opportunity to respond to the "GREEN BUILDINGS: Costs and Outcomes need more attention" audit. The report provides insight into the City's Green Building Policy and acknowledges the benefits of viewing construction project costs from a lifecycle perspective. When we design, build and operate buildings that conserve natural resources and protect the health of occupants, the City wastes less and saves more.

The report highlights the City's successful implementation of the policy and identifies opportunities to improve tracking of costs and outcomes. Susan Anderson, the Director of the Bureau of Planning and Sustainability, and I are committed to ensuring the policy is cost-effective and yielding savings for the City. I have reviewed the bureau's letter from August 22, 2016 detailing their response and find it to be sufficient. I concur with their approach and encourage BPS to work with other bureaus to create more tracking tools and ensure the policy is meeting its goals.

Thank you for your office's attention to this important policy.

Sincerely,

Charlie Hales
Mayor, City of Portland



Bureau of Planning and Sustainability
Innovation. Collaboration. Practical Solutions.

August 22, 2016

Mary Hull Caballero, City Auditor
Office of City Auditor
1221 SW 4th Ave., Room 140
Portland, OR 97204

Dear Ms. Caballero,

Thank you for the opportunity to respond to the "GREEN BUILDINGS: Costs and Outcomes need more attention" audit. My staff and I appreciated the opportunity to provide additional information to your team and for their attentiveness to our feedback. We are pleased that the City's Green Building Policy is generally being followed and agree that there are opportunities to improve tracking of costs and outcomes. I will work with my staff to fully consider your recommendations.

Building construction, remodeling, and operation are major contributors to carbon emissions, air and water pollution, deforestation and other environmental and human health hazards. Improving the performance of buildings can reduce these harms and save the City money through increased operational efficiencies. Since the City owns and operates its buildings over the long term, the City's Green Building Policy guides project managers to make capital investments that have the lowest costs over the full life cycle of a project. It also supports decisions that consider the full range of impacts, including human health, workplace productivity and environmental quality.

The audit finds that the bureaus need more tools to track the costs and outcomes of the policy. I agree and will direct staff to work with other bureaus to ensure the Green Building Policy is meeting its goals. As the steward of the green building policy, BPS relies on their input and feedback to make sure the policy is efficient and can be easily implemented.

Please extend my appreciation to your staff for their thoughtful review of a world-recognized policy that reflects Portland's strong commitment to green building and sustainable development.

Sincerely,

Susan Anderson
Director



**Audit Services Division
Office of the City Auditor
1221 SW 4th Avenue, Room 310
Portland, Oregon 97204
503-823-4005
www.portlandoregon.gov/auditservices**

Green Buildings: Costs and outcomes need more attention

Report #480, September 2016

Audit Team: Martha Prinz

Mary Hull Caballero, City Auditor
Drummond Kahn, Director of Audit Services

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