

## Portland

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[http://www.greenroofs.com/Greenroofs101/industry\\_support.htm#North%20America](http://www.greenroofs.com/Greenroofs101/industry_support.htm#North%20America)

Currently the city of Portland, OR, is leading the way in the U.S. with aggressive sustainable design measures which include promoting greenroofs. In July, 2002, the City of Portland Office of Sustainable Development (OSD) introduced "Portland LEED," the first U.S. Green Building Council approved local supplement to the USGBC Leadership in Energy and Environmental Design rating system. You can download the new Portland LEED PDF and obtain further information, including the press release, at [http://www.green-rated.org/g\\_rated/grated.html](http://www.green-rated.org/g_rated/grated.html).

Two measures are in place in Portland to make greenroof, or ecoroof, construction easier on the wallet, and a third is being worked on. **First, "All building projects in the city that will result in at least 500 square feet (46 square meters) of impervious surface are required to implement stormwater pollution reduction and flow control measures, and ecoroofs are one of the acceptable measures,"** (Environmental Building News Vol.10, No. 11).

**Second, builders can now increase their floor area ratio (FAR) when they include a greenroof to cover a minimum of 60% of the roof surface. In March 2001 Portland**

**created a FAR bonus which grants an additional three square feet of floor area per square foot of greenroof to be added to the footprint of the building.**

**The Zoning FAR Bonus incentive** (taken from 2002 Stormwater Management Manual of Portland BES- Chapter 2: Simplified Approach)

<http://www.portlandonline.com/shared/cfm/image.cfm?id=43933>

FAR Bonus for Eco-Roofs in the Central City:

Under City Code Chapter 33.510.210: Floor Area and Height Bonus Options, Option #10 provides an eco-roof bonus option in the Central City. The option is provided below:

10. Eco-roof bonus option. Eco-roofs are encouraged in the Central City because they reduce stormwater run-off, counter the increased heat of urban areas, and provide habitat for birds. An eco-roof is a rooftop stormwater facility that has been certified by the Bureau of Environmental Services (BES). Proposals that include eco-roofs receive bonus floor area. A proposal may not earn bonus floor area for both the eco-roof option and the rooftop gardens option; only one of these options may be used.

a. Bonus. Proposals that include eco-roofs receive bonus floor area as follows:

(1) Where the total area of eco-roof is at least 10 percent but less than 30 percent of the building's footprint, each square foot of eco-roof earns one square foot of additional floor area.

(2) Where the total area of eco-roof is at least 30 percent but less than 60 percent of the building's footprint, each square foot of eco-roof earns two square feet of additional floor area.

(3) Where the total area of eco-roof is at least 60 percent of the building's footprint, each square foot of eco-roof earns three square feet of additional floor area.

b. The applicant must submit a letter from BES with the application for land use review. The letter must certify that the eco-roof is approved and must specify the area of the eco-roof.

c. The property owner must execute a covenant with the City ensuring installation, reservation, maintenance, and replacement, if necessary, of the eco-roof. The covenant must comply with the requirements of 33.700.060. The City is currently exploring options to expand the FAR bonus to other districts.

The **third** measure plans for Portland to reduce stormwater utility fees for buildings with greenroofs by July, 2006. The City's "Clean River Incentive and Discount Program" is aimed at ecoroofs atop commercial, industrial, institutional, multi-family and single family residential properties. They had hoped for the program to be in place by now, but logistics regarding the current utility billing system need to be worked out. Replacement of the system has delayed implementation of the new discount program (Linc Mann, personal communications, Public Information Officer, Portland Bureau of Environmental Services, June 2003). **Contact Dan Vizzini at [danv@bes.ci.portland.or.us](mailto:danv@bes.ci.portland.or.us) for additional information regarding the FAR bonus and proposed discounted stormwater utility fees.**

**Benefits of the above policies** [http://www.greenroofs.org/pdf/GRIM\\_Fall2004.pdf](http://www.greenroofs.org/pdf/GRIM_Fall2004.pdf)

\* Portland State University is installing a 17,000 square foot ecoroof that will be the largest in Portland. This project received additional floor space through our Zoning FAR Bonus incentive;

\* Many developers are installing ecoroofs to qualify for the FAR bonus - a recent project proposes a 48,000 square foot ecoroof, and some developers are actually banking the FAR for use on other buildings;

\* Some developers think it's a good investment and are willing to pay the higher cost, even though they may not be in the district that offers FAR bonuses while some find the aesthetics alone to be compelling enough to install an ecoroof;

\* As for the City, we continue to investigate and document ecoroof benefits and concerns. Our stormwater monitoring shows that ecoroofs provide excellent stormwater management, but we have learned there is a potential for pollutants to drain out of certain substrate mixtures and other roof sources. We are working with growing media providers in our region to address this issue;

\* The City continues to investigate incentives and opportunities to promote ecoroof applications and prior to the 2004 Conference, the Portland offices of Sustainable Development and Environmental Services began a project to quantify the financial benefits of a mass application of ecoroofs in an old industrial district of Portland. We presented our preliminary findings at the Conference, finding that sewer fees would be reduced by \$500,000 and \$250,000 in energy savings realized annually;

\* Additional study is underway assessing the potential savings of using ecoroofs and other green

approaches to reduce stormwater runoff into the city sewer system; and

\* Portland has recognized ecoroofs as a stormwater management practice since 1999 and an increasing number of people from academia, municipalities, consulting firms, manufacturers, developers, and homeowners continue to inquire about them.

## Minneapolis

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### **Minneapolis Introduces Stormwater Feebate for Green Roof Infrastructure**

*Lisa Goodman, Minneapolis City Council Member*

[http://www.greenroofs.org/pdf/GRIM\\_Fall2004.pdf](http://www.greenroofs.org/pdf/GRIM_Fall2004.pdf)

Minneapolis experiences rainfall of about 26 inches (683 millimeters) of rainfall annually, making it ideal for a more extensive use of stormwater best management practices (BMP's).

Minneapolis is experiencing a building boom not seen in decades. This has given us the opportunity to revise our zoning code and comprehensive plan to incorporate incentives for building tools that both manage our stormwater issues as well as green the City. On November 5, 2004, city council enthusiastically voted to enact a stormwater utility fee with an aggressive credit system, which would allow for up to a 100 per cent credit in certain circumstances, for the installation and operation of green roofs, bioswales, and porous pavers. On the planning front, we have introduced two code changes, which will create a floor area ratio bonus (FAR) for the installation of green roofs downtown and on commercial corridors, and allow a variety of BMP's including green roofs as alternative compliance to general greening requirements.

While it is our goal to have both the development control issues and the credit system implemented by the end of this year, we believe strongly that residents and businesses need government to lead by demonstration. The City's first major success is the 18,000 square foot green roof on the new Downtown Central Library (designed by Cesar Pelli) set to open in 2006. We are also working in coalition with the Minneapolis Building Commission to install a green roof on the central courtyard roof of City Hall. Other ideas are being vetted including: requiring a green roof for projects receiving Tax Increment Financing (TIF) assistance; reduced development approvals of stormwater and erosion control plans if green roofs are part of a development; and an incentive and educational initiative dedicated to promoting stormwater BMP's for property citywide.

The Metropolitan Council Environmental Services has issued the "Minnesota Urban Small Sites BMP Manual" and it includes a chapter on greenroofs (available online at <http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm>). The Metropolitan Council is the regional planning agency for the seven county Minneapolis-St. Paul metro area who also operate the wastewater, transit, airport and regional parks systems. The BMP manual is intended for the nonpoint source technical assistance program, and will be used by the 180 or so communities in the region. The chapter was prepared by Barr Engineering Company as one of 40 BMPs that the metro area is focusing on (Gary Oberts, personal communications, May 2001). For further info, please contact Gary Oberts, Metropolitan Council Environmental Services, [gary.oberts@metc.state.mn.us](mailto:gary.oberts@metc.state.mn.us).



## Chicago

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[http://nw.org/network/pubs/brightIdeas/documents/issuesandideas\\_000.pdf](http://nw.org/network/pubs/brightIdeas/documents/issuesandideas_000.pdf)

The city of Chicago has installed green roofs on a number of its buildings, including city hall, and recently adopted a policy that encourages and, in some cases, requires green roofs in developments.

[http://www.greenroofs.com/Greenroofs101/industry\\_support.htm#North%20America](http://www.greenroofs.com/Greenroofs101/industry_support.htm#North%20America)

The **Chicago Energy Conservation Ordinance** went into effect on June 3, 2002 and includes a chapter from Chicago's Urban Heat Island Reduction Initiative which states minimum ASTM standards of solar reflectance and emissivity. The ordinance requires all new and refurbished roofs to install greenroofs or reflective roofing. The ordinance had originally been set for implementation for January, 2002, but the City allowed additional time for public awareness and offered workshops to developers, designers and other interested parties. The Ordinance is based on requirements from the International Energy Conservation Code (Green Roof Infrastructure Monitor, Winter 2002).

**Density Bonuses** - According to EPA Smart Growth Policy Information (<http://cfpub.epa.gov/sgpdb/policy.cfm?policyid=338>) , "To create attractive commercial and business districts, the City of Chicago increases development square footage, known as floor area premiums, when such developments include public amenities. Public amenities include plazas, pocket parks, block connections, greenroofs, transit improvements, and wider sidewalks among others." The Chicago Department of Zoning states, "A floor area premium shall be granted for a roof that is covered with plants that reduce the 'urban heat

island' effect and storm-water runoff of buildings in the central business district. To qualify for a floor area premium, a minimum of 50 % of the roof area at the level of the green roof or a minimum of 2000 square feet (whichever is greater) shall be covered by vegetation and shall meet..." certain standards.

### **Next Page: Building Green/Green Roof Matrix**

The City of Chicago's Building Green/Green Roof policy applies to construction projects that receive public assistance or are subject to review by the Department of Planning and Development as a "Planned Development" or a "Lakefront Protection Ordinance Development." The policy is summarized in the matrix below. The matrix illustrates what projects are subject to the policy and what green strategies are being promoted through the policy.

(Available online at <http://egov.cityofchicago.org>

The matrix page can be reached from:

[Home](#) > [Your Government](#) > [City Departments](#) > [Planning And Development](#)  
> [Programs & Services](#) > Building Green/Green Roof Matrix )

<b>Project Type</b>	<b>Public Assistance:</b> RFPs, Negotiated Sales with land write-down, TIF, Empowerment Zone Grants, DOH	<b>Public Assistance:</b> Bond Issues, Class 6b, SBIF, Enterprise Zone Facility Bonds, Bank Participation Loans	<b>No Public Assistance:</b> Planned Developments, Lakefront Protection Ordinance Developments
<b>RESIDENTIAL</b>			
Market Rate SF, TH, Multi-units < 4 units	Energy Star <i>or</i> LEED certification		
Market Rate => 4 units	50% Green Roof and Energy Star Certification <i>or</i> LEED Certification*	50% Green Roof and Energy Star Certification*	25% Green Roof*
> 20% Affordable Units or CPAN	DOH Green Criteria		
<b>INSTITUTIONAL</b>			
Hospitals	50% Green Roof <i>or</i> 25% Green Roof and LEED Certification*	>25% Green Roof <i>or</i> 10% Green Roof and LEED Certification*	25% Green Roof <i>or</i> 10% Green Roof and LEED Certification*
Community Centers & Schools**			25% Green Roof <i>or</i> 10% Green Roof and LEED Certification*
<b>INDUSTRIAL</b>	10% Green Roof <i>or</i> Energy Star Roof and LEED Certification	>10% Green Roof and Energy Star Roof	
<b>COMMERCIAL</b>			
Retail > 10,000 s.f.***	75% Green Roof <i>or</i> 50% Green Roof and LEED Certification*	50% Green Roof <i>or</i> 25% Green Roof and LEED Certification*	50% Green Roof*
Retail < 10,000 s.f.	25% Green Roof <i>or</i> LEED Certification*	Energy Star Roof	Energy Star Roof
Office > 80 feet	100% Green Roof	75% Green Roof*	50% Green Roof *
Office < 80 feet	50% Green Roof <i>or</i> Energy Star Roof and LEED Certification	Energy Star Roof	

**Legend:**

SF= Single family  
 TH= Townhouses  
 RFP= Request for Proposals  
 TIF= Tax Increment Financing  
 SBIF= Small Business Improvement Fund  
 DOH= Department of Housing  
 CPAN= Chicago Partnership for Affordable Neighborhoods

**Links:**

- [Green Roof Information](#)
- [Energy Star Roof](#)
- [Energy Star Certification](#)
- [LEED Certification](#)
- [CPAN](#)
- [DOH Green Criteria](#)

NOTE: All projects reviewed by the Department of Planning and Development are encouraged to use storm water best management practices, LEED and Energy Star building standards and residential green building standards where applicable.

A 50% green roof and LEED certification are required for all public projects except community centers and schools.

LEED certification plus a 10% green roof or a 25% green roof will be required for Public Community Centers and Schools.

Community centers and schools will also focus on indoor air quality and daylighting.

\*Remainder of roof must meet Energy Star levels for reflectivity.

\*\*Church buildings serving multiple purposes will be considered a community center.

\*\*\*Run-off coefficient value reduction will be required for big-box retail projects more than 100,000 square feet.

## Upcoming policies and programs

[http://www.greenroofs.org/pdf/GRIM\\_Fall2004.pdf](http://www.greenroofs.org/pdf/GRIM_Fall2004.pdf)

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**New York:** New York City is in the process of adapting and adopting the International Building Code and technical and advisory committees are working to write allowances for environmentally friendly materials and techniques. *As part of its ongoing work to promote green roofs, the Earth Pledge Green Roof Initiative is collaborating with City officials to include green roof language in this new code.*

**Pennsylvania:** The Pennsylvania Association of Conservation Districts identified green roof infrastructure as a stormwater best management practice in their *Pennsylvania Handbook of Best Management Practices for Developing Areas*. (Available online at [http://www.pacd.org/products/bmp/bmp\\_sect\\_8.htm](http://www.pacd.org/products/bmp/bmp_sect_8.htm) )

**Seattle and Portland** are developing stormwater management standards that incorporate green roofs. Efforts are also underway in Washington, D.C. to evaluate the stormwater benefits of green roofs.

The **City of Toronto** is working to develop the *Wet Weather Flow Management Master Plan* (available online at <http://www.toronto.ca/wes/techservices/involved/wws/wwfmmmp/index.htm>), a partnership between agencies, the public and the City to improve the water quality of its rivers and lake Ontario. The plan will find ways to prevent reduce and control the pollution in stormwater runoff. This presents an opportunity for Toronto to exhibit leadership in

advancing the Canadian green roof infrastructure market. Currently, Green Roofs for Healthy Cities is working with other green roof researchers to develop a protocol for evaluating the city-wide benefits of green roof infrastructure.

### Germany:

[http://www.greenroofs.com/Greenroofs101/industry\\_support.htm#top](http://www.greenroofs.com/Greenroofs101/industry_support.htm#top)

Federal environmental laws require mitigation or compensation for the destruction of natural open space caused by development. Because of high urban density to real estate values, Germany provides indirect and direct subsidies and ordinances for the installation of greenroofs. In 1996 a survey done by Zentralverband Gartenbau e.V. (ZVG), The Gardening Central Association, revealed that approximately 50% or over 80 cities in Germany offered incentives to building owners utilizing greenroofs.

Taxes are collected on anticipated storm water control or usage fees, and are used to cover constructing, maintaining and replacing stormwater management facilities. A 100% utility surcharge is levied against owners of impervious roof covers (Dr. Michael Krebs, 1999), and thirteen German cities allow a reduction between 50% and 80% of the utility fee for using a greenroof. Over a 36-year period, the reduction in the usage fee alone can compensate the building owner for as much as 50% of the additional capital cost (ZVG, 1996).

Another type of indirect subsidy lets developers use greenroofs as mitigation for the provision of open space. Depending on the type of proposed plant material, **local land development ordinances allow greenroofs to compensate for lost open space at a ratio of .50 to .70. This creates a very attractive alternative in areas of high real estate prices.** Alternatives for mitigation include the restoration of existing impervious surfaces to

create open space or improving the biodiversity of existing open space ("Vegetative Roof Covers: A New Method for Controlling Urban Runoff in Urbanized Areas", C. Miller. Villanova University, October 1998.)

Twenty-nine German cities in the ZVG survey provide a direct monetary subsidy to developers who use greenroofs. The amount of the subsidy varies widely, ranging between \$0.51 to \$6.20 per square foot (\$5.5 to \$67/m<sup>2</sup>). Most cities have adopted a financial aid ceiling for individual projects, ranging from \$280 to \$11,250 per municipality. The subsidies are based on estimates of the avoided costs associated with infrastructure maintenance and replacement. The subsidy structure provides the greatest incentive to residences and small building owners (Charlie Miller publication, 1998).

According to Penn State's Dr. Dave Beattie, by late 2002, 15% of all of Germany's flat roofs are now greenroofs, with 22% of Stuttgart's roofs being greenroofs, and all new roof construction will require greenroofs (personal communications, September, 2002). In 1989, twenty-seven cities had established zoning districts that require greenroofs to be installed on flat roofs. Such a requirement on flat-roofed industrial buildings was included in Stuttgart's 1989 Law of Building Book (The London Ecology Unit, 1993). Since 1982, the greenroof industry in Germany has grown an average of 15-20% (Green Roofs For Healthy Cities, [www.peck.ca](http://www.peck.ca); presently [www.greenroofs.ca](http://www.greenroofs.ca)).

Since 1984 Munich has included greenroofs in its building ordinance, and in the subsequent 15 years approximately 4.2 million square feet of rooftops have been greened. In 1992 a direct subsidy program was started, providing \$3.13 per square foot (\$33.70/m<sup>2</sup>), paying up

to 50% of the capital cost of installing a greenroof (Charlie Miller publication, 1998). By 1996, over 10 million square meters of greenroofs were constructed in Germany alone (Green Roofs For Healthy Cities, [www.peck.ca](http://www.peck.ca)).

The ZVG has estimated that the lifetime cost of an extensive greenroof (based on a 36 year service life) in Germany is 15% lower than a comparable bituminous roof with gravel ballast. This estimate includes savings achieved through the elimination of stormwater detention basins, and takes into account higher real estate and construction costs than those present in the U.S. (Charlie Miller publication, 1998).

Due to the legislative and financial support of European state and municipal governments, the greenroof industry has grown into a vibrant, multi-dollar market in Germany, France, Austria and Switzerland among others. This public support recognizes the many tangible and intangible advantages of greenroofs, and we in North America could certainly benefit from this forward thinking.

### **Tokyo:**

[http://www.greenroofs.com/Greenroofs101/industry\\_support.htm#top](http://www.greenroofs.com/Greenroofs101/industry_support.htm#top)

In a concerted effort to combat the ever rising urban heat island in Tokyo, the new "Tokyo Plan 2000" was implemented on April 1, 2001, requiring new buildings greater than 1,000 square meters (10,000 sf) or over one-quarter acre to green at least 20% of its useable roof space. The Plan was designed by the municipal government to provide a set of development guidelines for future administrative and financial management of the city. Also known as the "Green Tokyo Plan," the ordinance describes the metro area's present ecological state of Tokyo, addressing topics such as the natural environment, greenery in Tokyo, urban

greenery and the heat island phenomenon, and global warming. According to the website <http://www.kankyo.metro.tokyo.jp/kouhou/english2003/> , "the plan outlines goals for greening projects and the direction measures should take during the next 15 years." In the Green Tokyo Plan the target for rooftop and other greenery is 1,200 hectares by 2015. Garden roofs are highly touted as an excellent measure to bring nature back into the city and ease various ecological problems. Six effects of rooftop greenery are listed: 1) Mitigating the heat island phenomenon; 2) Serving as a greenery dam to temporarily store rainwater; 3) Easing air pollution; 4) Preventing global warming; 5) Softening a barren urban landscape; and 6) Supporting the existence of various living creatures.

"According to the ordinance on natural preservation, greening areas must be provided on the premises and on rooftops when buildings are newly constructed or extended in an area larger than 1,000 m<sup>2</sup> for private facilities and in an area larger than 250 m<sup>2</sup> for public facilities. Plans must be also submitted to include rooftop greenery for new construction with a total floor area exceeding 10,000m<sup>2</sup> according to the Ordinance on Environmental Preservation". The entire English version of the site can be accessed at <http://www.kankyo.metro.tokyo.jp/kouhou/english2003/> .