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listings, 47 case studies)

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In July of 2006, the Minneapolis City Council (Resolution 2006R-381) directed that all new or significantly renovated City of Minneapolis facilities of 5,000 square feet or larger be built to LEED (Leadership in Energy and Environmental Design) Silver level of quality. Building upon the City's experience in green design including two green roofs, solar panels and high efficiency buildings, Council directed staff to evaluate the feasibility of the next planned municipal facility being built and certified LEED Gold. Additionally at least two City staff persons from the departments of Community Planning and Economic Development, Public Works and Regulatory Services are to be certified LEED AP (Accredited Professional).

After receiving staff evaluation of the Hiawatha Maintenance Facility, City Council has directed that it be build and certified LEED Gold. This new City facility, and those that follow, will showcase LEED building design and provide an example for other's within the Twin Cites metropolitan area.

A recent feasibility study showed the added cost of the 70,000 ft² Hiawatha Maintenance Facility (the next planned City facility) is \$58,000 to be built to a LEED Silver level of quality and \$247,000 to be built to a LEED Gold level of quality. Due to current environmental building practices employed by the City, additional construction costs to reach LEED Silver is minimal.

RESOLUTION 2006R-381

**By Benson, Ostrow, Gordon, Hofstede, Johnson, Samuels, Lilligren, Goodman,
Glidden, Schiff, Remington, Benson, Colvin Roy, Hodges**

Adopting the Leadership in Energy and Environmental Design (LEED) standards in the planning, design, construction and commissioning of municipal facilities financed by the City of Minneapolis and utilized by the City's Charter Departments.

Whereas, a variety of high performance, sustainable, or "green" building standards such as Leadership in Energy and Environmental Design (LEED) have been used in Minnesota and across the nation for the last 15 years and have proven to reduce the consumption of energy and other natural resources, improve building performance, cost efficiency, and building longevity; and

Whereas, the City's staff has successfully completed, starting in 2002, seven large projects utilizing green buildings standards and methodology; and

Whereas, Green Building can assist in meeting Sustainability Indicator Targets related to Air quality, Asthma morbidity, Reduced greenhouse gas emissions, Increased renewable energy, Improved water quality, Increased permeable surfaces, and Brownfield Site cleanup;

Now, Therefore, Be It Resolved by The City Council of the City of Minneapolis:

That the City will utilize the Leadership in Energy and Environmental Design (LEED) standards in the planning, design, construction, and commissioning of municipal facilities financed by the City of Minneapolis and utilized by the City's Charter Departments.

Be It Further Resolved that all new or significantly renovated municipal facilities (financed by the City of Minneapolis and utilized by the City's Charter Departments) of 5,000 square feet or greater, should be built to a LEED Silver level of quality with emphasis in LEED points related to "Energy and Atmosphere," unless otherwise directed by the City Council.

Be It Further Resolved that staff be directed to report back by the end of September on the feasibility of Certified LEED Gold level of quality for the Hiawatha Maintenance Facility.

Be It Further Resolved that at least five City staff members, including but not limited to Community Planning & Economic Development (CPED), Regulatory Services, and Public works, will be LEED Accredited within two years, and that the City, through the environmental services division host a one-day training for all interested and eligible employees on the LEED standards.

Be It Further Resolved that the City Attorney, Director of Accounting and Public Works develop implementation strategies to allow attainment of LEED standards for municipal facilities.

Adopted 7/21/2006.

**LEED® GOLD
FEASIBILITY ASSESSMENT**

FOR THE

**CITY OF MINNEAPOLIS
HIAWATHA PUBLIC WORKS FACILITY**

**Located at
1901 E. 26th St.
in
Minneapolis, Minnesota**

Prepared By

Property Services Division
Department of Public Works

October 2006

Description: Hiawatha Public Works Facility:

The City of Minneapolis, Department of Public Works, Property Services Division is currently planning a new Public Works Facility located at E. 26th Street and Hiawatha Ave. S., in Minneapolis. This Project will provide for the office, shop, storage and operational needs of the City of Minneapolis, Department of Public Works, Field Services Division including the following construction and maintenance functions: Street Maintenance, Paving Construction, Engineering Lab, Sewer Maintenance, Sewer Construction, and Bridge Maintenance. In addition, the Project will also consider the potential addition of operational space for Hennepin County Public Works, the Water Department, and Traffic Department. Specifically, the project will provide consolidated, functional working space for approximately 300 employees, including approximately 20,000sf of office space, 50,000sf of shop and interior storage space, and 250,000sf of yard space.

LEED® Feasibility Assessment:

On July 21, 2006 the City Council and Mayor approved Resolution 2006R-381 that adopted LEED® standards for planning, design, construction, and commissioning of municipal facilities financed by the City and that “all new or significantly renovated municipal facilities (financed by the City of Minneapolis and utilized by the City’s Charter Departments) of 5,000 square feet or greater, should be built to a LEED Silver level of quality”. In addition, the resolution stated in part, “that staff be directed to report back.....on the feasibility of Certified LEED® Gold level of quality for the Hiawatha Public Works Facility”. Since that time, the Property Services Division has worked with independent consultant Rick Carter (Senior Vice President of LHB) to assess the feasibility and potential costs of LEED® Gold Certification for this Project (see attached LEED® Checklist and cost matrix).

The proposed building program for the Hiawatha Public Works Facility along with the existing site was analyzed. Based on this analysis the feasibility assessment was completed by performing a scoring exercise using the LEED®-NC 2.2 Registered Project Checklist. Using current industry “best practices”, Property Services building standards, and experience from recently completed projects with successful sustainable features, points were awarded for meeting design and construction criteria in each of the LEED® “areas of emphasis”.

The LEED® scoring exercise resulted in the following (out of 69 total possible points):

- 44 points achievable
- 10 points possible
- 15 points un-achievable

Of the 44 achievable points, 33 points were deemed either required points or “fairly achievable without great effort or expense”. The remaining 11 achievable points were

considered difficult to achieve, involved an increase in cost, but were considered efforts potentially worth pursuing for this Project.

Ten (10) other points were identified as “possible”, but were considered to be very difficult to achieve without great effort and considerable expense. The final fifteen (15) points were unachievable due either to incompatibility with the Project or to current State Law or current building codes.

Cost of LEED® Gold Certification

Before a LEED® goal is established for this Project, the cost of LEED® Certification must be evaluated. Upon completion of the scoring exercise, each of the achievable 44 points was re-evaluated for costs considered to be above what would have been included in the original “scope of work”. These additional costs include USGBC registration fees, documentation costs, commissioning costs, and costs related to LEED® points required for certification. In addition, there are first time construction costs related to achieving those extra points needed to attain each subsequent level of LEED® quality. The attached Cost Matrix identifies those estimated costs.

Based on this analysis, the total estimated additional cost for each LEED level of quality is as follows:

- LEED® Silver (33-38 pts.).....\$58,000
- LEED® Certified Silver (33-38 pts.).....\$200,000
- LEED® Certified Gold (39-41 pts.).....\$247,000
- LEED® Certified Gold (Plus) (44 pts.).....\$1,685,000

Per the direction of Resolution 2006R-381, the current Project scope provides for a facility designed and constructed to a Silver level of quality at an additional cost of \$58,000. The additional costs required to achieve each subsequent LEED® Certified level are related to fees, documentation, commissioning and first time construction costs, using a strategy of point selection based on complexity and expense (low to high). The cost matrix indicates that the minimum number of points required for LEED® Gold Certification (39-41 pts.) can be achieved for a relatively small increase in cost from the LEED® Silver Certified level. A fourth category was included, LEED® Gold (Plus), that highlights three additional points that can be achieved at significant extra cost, but are in areas of great environmental impact with a high degree of public visibility (stormwater control, heat island effect, and renewable energy).

Conclusion:

Based on the assessment, LEED® GOLD Certification for the Hiawatha Public Works Facility is attainable, and given that the range for LEED® Gold Certification is 39 to 51 points, 44 achievable points is a feasible goal for this Project.

Per Resolution 2006R-381 the Hiawatha Public Works Facility shall be designed and constructed to a Silver level of quality, the costs of which can be supported by the current Project budget. However, the capital budget for the Hiawatha Public Works Facility was established prior to the inclusion of LEED® building standards. Without additional funding, or without making a significant change to the Project “scope of work”, LEED® GOLD Certification cannot be achieved under the existing budget.

**MINNEAPOLIS CITY COUNCIL
OFFICIAL PROCEEDINGS
REGULAR MEETING OF
NOVEMBER 17, 2006**

The **HEALTH, ENERGY & ENVIRONMENT, TRANSPORTATION & PUBLIC WORKS and WAYS**

& MEANS/BUDGET Committees submitted the following report:

HE&E, T&PW & W&M/Budget - Your Committee, having under consideration the planning and design of the Hiawatha Public Works Facility to be located at 1901 E 26th St, now recommends:

- a) That Public Works staff be directed to plan and design the facility to a level of quality that achieves Leadership in Energy and Environmental Design (LEED) Gold Certification;
- b) That Finance and Public Works staff seek additional funding sources, including grants, for the amounts necessary to achieve LEED Gold Certification, with the caveat that Gold certification is to be achieved regardless of obtaining additional funding sources; and
- c) That Public Works staff be directed to analyze changes in its return on investment strategy with regard to energy and stormwater that extends the period of time for the analysis from 10 to 15 years.

Adopted 11/17/2006.



**Request for City Council Committee Action
From the Department of Public Works**

Date: November 6, 2006
To: Honorable Scott Benson, Chair Health, Energy & Environment Committee
Referral to: Honorable Sandra Colvin Roy, Chair Transportation & Public Works Committee
Honorable Paul Ostrow, Chair Ways & Means/Budget Committee
Subject: **Feasibility of LEED® Gold Certification of the Hiawatha Public Works Facility**

Recommendation:

- A.** Direct Public Works staff to plan and design the Hiawatha Public Works Facility to a level of quality that achieves LEED® Gold Certification.
- B.** Direct Public Works and Finance staff to seek additional funding sources including grants for the amounts necessary to achieve LEED® Gold Certification and that these funding sources are identified by the time formal architectural design services begin in March of 2007.

Previous Directives:

- July 21, 2006 – Resolution 2006R-381 of the City Council
 1. Adopting the Leadership in Energy and Environmental Design (LEED) standards in the planning, design, construction, and commissioning of municipal facilities financed by the City of Minneapolis and utilized by the City's Charter Departments.

Prepared by: Paul Miller, Project Manager Property Services (612) 673-3603.

Approved by:

Steven A. Kotke, P.E., City Engineer, Director of Public Works

Presenters: Greg Goeke, Facilities Manager - Property Services

Permanent Review Committee (PRC) Approval _____ Not applicable NA

Policy review Group (PRG) Approval _____ Not applicable
NA

Financial Impact (Check those that apply)

X No financial impact - or - Action is within current department budget (If checked, go directly to Background/Supporting Information)

- Action requires an appropriation increase to the Capital Budget
- Action requires an appropriation increase to the Operating Budget
- Action provides increased revenue for appropriation increase
- Action requires use of contingency or reserves
- Business Plan: Action is within the plan. Action requires a change to plan.
- Other financial impact (Explain):
- Request provided to department's Finance Dept. contact when provided to the Committee Coordinator

Community Impact

Neighborhood Notification: NA
City Goals: NA
Comprehensive Plan: NA
Zoning Code: NA

Background/Supporting Information

On July 21, 2006 the City Council and Mayor approved Resolution 2006R-381 that adopted Leadership in Energy and Environmental Design (LEED®) standards in the planning, design, construction, and commissioning of municipal facilities financed by the City and that "all new or significantly renovated municipal facilities (financed by the City of Minneapolis and utilized by the City's Charter Departments) of 5,000 square feet or greater, should be built to a LEED Silver level of quality". In addition, the resolution stated in part, "that staff be directed to report back . . . on the feasibility of Certified LEED® Gold level of quality for the Hiawatha Public Works Facility". Since that time, the Property Services Division has worked with independent consultant Rick Carter (Senior Vice President of LHB) to assess the feasibility and potential costs of LEED® Gold Certification for this Project. The results of that work are contained within the attached Staff Report "LEED Gold Feasibility Assessment".

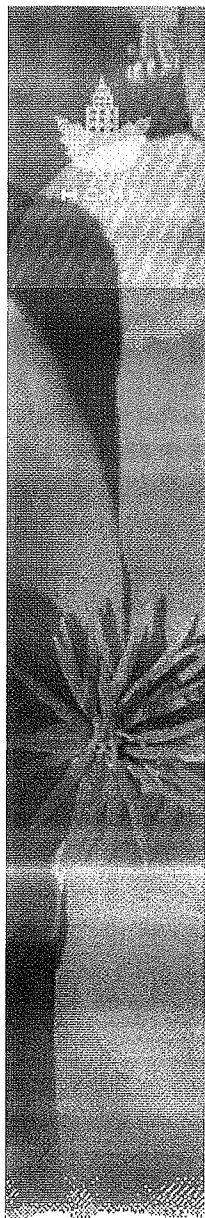
Per Resolution 2006R-381, the Hiawatha Public Works Facility is to be designed and constructed to a Silver level of quality, the costs of which can be supported by the current Project budget. The staff report finds that LEED® Gold Certification is an achievable goal for the Project but not without additional cost. Based upon the findings of the report, Property Services identifies the following cost impacts at each progressively higher level of quality:

- Project Goal: LEED® Gold Certification (39-41 pts.) at \$247,000 additional cost.
- Project Goal: LEED® Gold (Plus) Certification (44 pts.) at \$1,685,000 additional cost.

Public Works staff concludes that LEED® Certification at the Gold level can be achieved if additional funding can be acquired and committed to the Project. Public Works staff

will work with the HE&E Policy Committee to define the Sustainable Project Objectives desired for this level of quality.

Therefore, the City Council and Mayor shall direct Public Works staff to plan and design the Hiawatha Public Works Facility to a level of quality that achieves LEED® Gold Certification. Furthermore, staff shall be directed to work with the Finance Department to seek additional funding sources in the amounts necessary to achieve LEED® Gold Certification and that these funding sources are identified by the time formal architectural design services begin in March of 2007.



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Heat Island Effect

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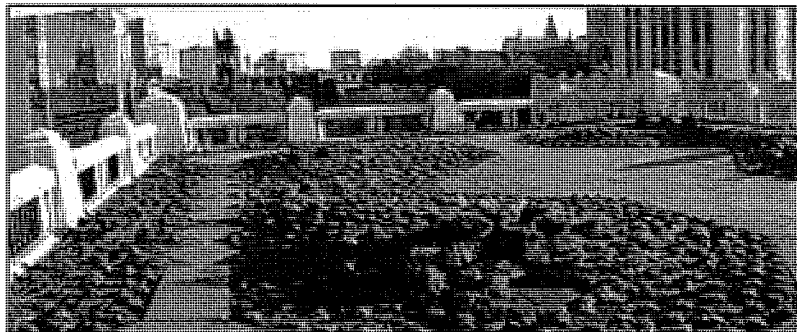
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Green Roofs

■ - Denotes link to glossary definition

Another alternative to traditional roofing materials is a rooftop garden, or "green roof." On hot summer days, the surface temperature of a vegetated rooftop can be cooler than the air temperature, whereas the surface of a traditional rooftop can be up to 90°F (50°C) warmer.



Atlanta, GA installed a green roof on its City Hall.

What Are Green Roofs?

A green roof consists of vegetation and soil, or a growing medium, planted over a waterproofing membrane. Additional layers, such as a root barrier and drainage and irrigation systems may also be included.

Green roofs can be used in many applications, including industrial facilities, residences, offices, and other commercial property. In Europe, they are widely used for their stormwater management and energy savings potential, as well as their aesthetic benefits.

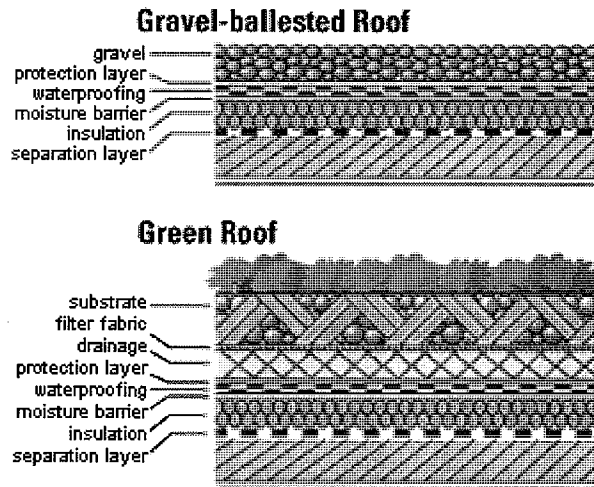
What Are the Benefits of Green Roofs?

Green roofs are an attractive roofing option that can reduce urban heat islands by providing shade and through evapotranspiration, the release of water from plants to the surrounding air. They also:

- Reduce sewage system loads by assimilating large amounts of rainwater.
- Absorb air pollution, collect airborne particulates, and store carbon.
- Protect underlying roof material by eliminating exposure to the sun's ultraviolet (UV) radiation and extreme daily temperature fluctuations.
- Serve as living environments that provide habitats for birds and other small animals.
- Offer an attractive alternative to traditional roofs, addressing growing concerns about urban quality of life.
- Reduce noise transfer from the outdoors.
- Insulate a building from extreme temperatures, mainly by keeping the building interior cool in the summer.

How Do Green Roofs Mitigate Storm Water Runoff?

As impermeable surfaces like buildings and pavement replace open space and vegetation, green roofs can play an increasingly important role in storm water management. During rainstorms, green roofs act as a sponge, absorbing much of the water that would otherwise run off. Researchers estimate that three to five inches of soil or growing medium absorbs 75% of rain events that are one-half inch or less.



Green roofs also filter pollution from rainwater.

Green roofs: An Ecological Balance. (Courtesy of Albrect Duerr)

This is achieved by the root systems' bacteria and fungi, which utilize the natural filtering processes of bioremediation and phytoremediation. As a result, the non-point source pollutants, nitrogen and phosphorus, are broken down and detoxified. This beneficial process increases over time as rooftop plants and root systems mature.

What Kinds of Green Roofs Are Available?

There are two types of green roofs: intensive and extensive. Here are some characteristics of each:

Intensive and Extensive Green Roofs		
Characteristic	Intensive Green Roof	Extensive Green Roof
Soil	Requires minimum of one foot of soil depth	Requires only 1 to 5 inches of soil depth
Vegetation	Accommodates large trees, shrubs, and well-maintained gardens	Capable of including many kinds of vegetative ground cover and grasses
Load	Adds 80-150 pounds per square foot of load to building structure	Adds only 12-50 pounds per square foot depending on soil characteristics and the type of substrate

Access	Regular access accommodated and encouraged	Usually not designed for public accessibility
Maintenance	Significant maintenance required	Annual maintenance walks should be performed until plants fill in
Drainage	Includes complex irrigation and drainage systems	Irrigation and drainage systems are simple
Source: Schloz-Barth, Katrin. 2001. "Green Roofs: Stormwater Management From the Top Down." Environmental Design & Construction. January 15.		

Are Green Roofs Cost-Competitive with Traditional Roofing Options?

Currently, the up-front cost of an extensive green roof in the U.S. starts at about \$8 per square foot, which includes materials, preparation work, and installation. In comparison, the cost of a traditional built-up roof starts at about \$1.25 while cool roof membranes start at approximately \$1.50 per square foot.

Extensive green roofs cost more than traditional roofs because they require more material and labor for installation. Another factor affecting price is that green roof contractors are limited in number. As the demand for rooftop gardens increases in the U.S., and as additional contractors come into business, up-front costs will likely decrease.

However, it is widely known that up-front costs do not tell the whole story. Taking into account future summertime energy savings at the time of purchase brings the price of a green roof closer to that of a traditional roof. Depending on local construction codes, it also may be possible to do without storm water infrastructure investments.

Another factor reducing the cost of a green roof is that vegetation can extend the life of a roof. This is because less solar energy reaches the roof substrate, limiting damage from UV radiation as well as daily temperature fluctuations, which cause repeated contraction and expansion.

What Are Some Green Roof Examples?

- The Gap Headquarters in San Bruno, CA installed a 69,000 square foot extensive green roof in 1997.
- Ford Motor Company has installed green roofs on its corporate headquarters.
- The Church of Jesus Christ of Latter-Day Saints Conference Center in Salt Lake City, Utah installed a 348,480 square foot extensive and intensive

green roof in 2000.

- Contractors recently completed a 30,000 square foot extensive green roof project on the Montgomery Park Business Center in Baltimore, Maryland.
- Ducks Unlimited, a nonprofit organization dedicated to the conservation of waterfowl, included two green roofs totaling 28,190 square feet on its national headquarters.
- Private and public interests in the City of Chicago and the City of Portland have installed or are planning to install over 43 and 42 green roof projects, respectively.

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Last updated on Tuesday, January 16th, 2007
URL: <http://www.epa.gov/hiri/strategies/greenroofs.html>



City of Lillyput

The City of Lillyput wants to start a greenhouse gas (GHG) emissions inventory for their city owned facilities, buildings and mobile fleets. This is their first year attempting to construct a baseline so they decided to only include CO₂ emissions and need to understand their organizational/operational boundaries before getting started. The city has the following in it's town:

Buildings/Facilities

- One central office
- One police station
- One fire station
- One park
- Two public schools
- 100 residential houses

Mobile Fleets

- 20 city vehicles
- Ten police cars
- Two fire trucks
- Five school buses
- 150 personal vehicles registered

1. The City decided to base their Organizational boundaries using **Operational Control** of each facility within the City. Under this scenario, Lillyput does not have operational control of all the buildings and fleets located in the town. Which buildings and fleets most likely will not be a part of the city's inventory?

residential, schools, possibly the park
School buses & personal vehicles

2. Calculate the GHG emissions from the Central office building for 2006 using the following equation and information:

Equation		Calculating Indirect Emissions from Electricity Use	
CO₂ Emissions	=	Annual Electricity Use	× Emission Factor ÷ 2,204.62
(metric tons)		(MWh)	(lbs CO ₂ /MWh) (lbs/metric tons)
			(eGRID)

You need the following:

- Annual Electricity Bill (in megawatt/hour - MWh)
- eGRID Emission Factors by region (lbs CO₂/MWh) – see attached

Use this table to guide you:

Annual Electricity Use and Emission Factors for Indirect GHG emissions				
Facility	eGRID Subregion	Emission Factor	Annual Electricity Purchases (MWh)	Total per year CO ₂ lbs / MWh
Central Building			1,600	
Fire House			600	
Police Station			800	

3. Calculate the Direct GHG Emissions from the City's mobile fleet of the 20 city vehicles using the following equation and information:

- The city purchased 10,000 gallons of gasoline for their city vehicle fleet in 2006.
- The city will use the default emission factors per transport fuel – see attached table.

Equation	Calculating CO ₂ Emissions From Mobile Combustion		
Gasoline CO₂ Emissions (metric tons) $= 10,000 \times 8.72 \div 1,000 =$ (gallons) (kg CO ₂ /gal) (mt/kg) (mt CO ₂)			
Diesel CO₂ Emissions (metric tons) $= \quad \times 10.04 \div 1,000 =$ (gallons) (kg CO ₂ /gal) (mt/kg) (mt CO ₂)			
Total CO₂ Emissions = (metric tons)	+ (mt)	= 2,181.6 (mt) (metric tons CO ₂)	

INDIRECT ELECTRICITY

Step 1: Determine annual electricity consumption

Records of your annual electricity purchases in megawatt-hours (MWh).

The preferred sources for determining annual electricity use are monthly electric bills or electric meter records. Both sources provide the number of kilowatt-hours (kWh) or megawatt-hours (MWh) of electricity consumed, giving a measure of the energy used by electric loads, such as lights, office equipment, air conditioning, or machinery.

Record the electricity consumed each month at each facility. Then aggregate monthly bills to determine annual electricity use (in kWh or MWh) for each facility

Step 2: Select electricity emission factors that apply to the electricity purchased

To find the appropriate emission factors for your facility, determine your eGRID subregion from the map. If you are unsure of your facility's subregion, use the EPA Power Profiler tool, available at: <http://www.epa.gov/cleanenergy/powerprofiler.htm> to find your facility's subregion based on its zip code. Then, based on your subregion, find the appropriate emission factors for each gas in Emission Factor's table.

Note that the emission factors in our table represent 2004 emission factors, which are currently the most recent data available from eGRID. When possible, use emission factors that correspond to the calendar year of data you are reporting. Use the 2004 emission factors provided in our table as a proxy for more recent years until new eGRID emission factors become available.

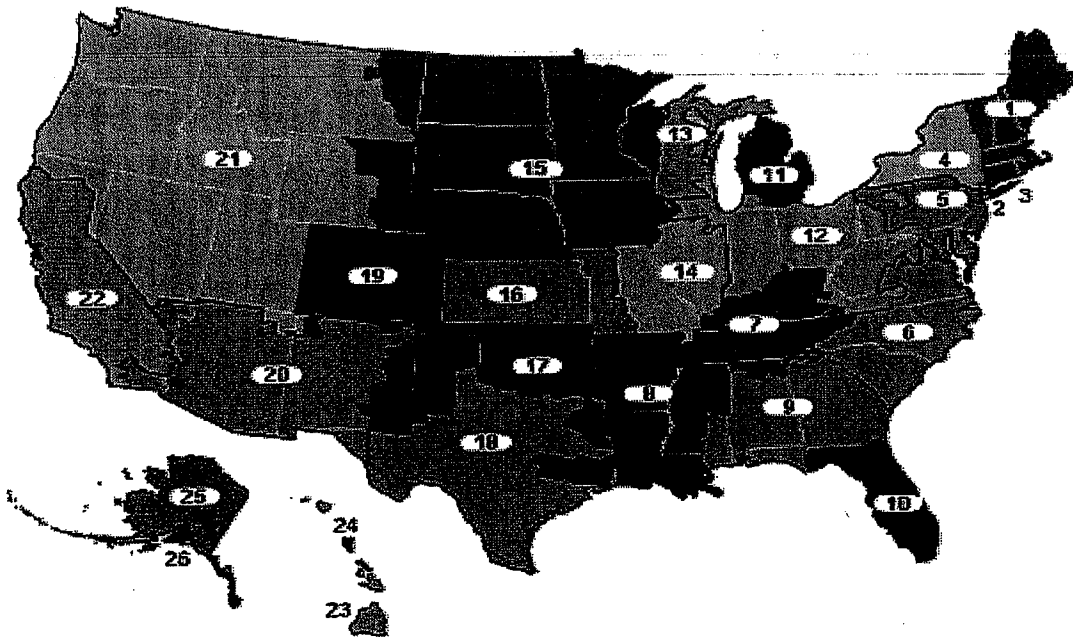
Step 3: Determine total annual emissions and convert to metric tons of CO₂ equivalents

Annual Electricity Use and Emission Factors			
Facility	eGRID Subregion	Annual Electricity Purchases (MWh)	CO ₂ lbs / MWh
Central Building	RFC West	1,600	
Fire House	RFC West	600	
Police Station	RFC West	800	

RFC West Emission Factor for CO₂: 1556.39 lbs of CO₂/MWh

Equation		Calculating Indirect Emissions from Electricity Use	
CO ₂ Emissions (metric tons)	= Electricity Use (MWh)	× Emission Factor (lbs CO ₂ /MWh)	÷ 2,204.62 (lbs/metric tons)
CO ₂ Emissions For the Central Building	1,600	× 1556.39	÷ 2,204.62 = 1129.5
	(MWh)	(lbs CO ₂ /MWh)	(lbs/mt) (mt CO ₂)

eGrid Subregions, 2004



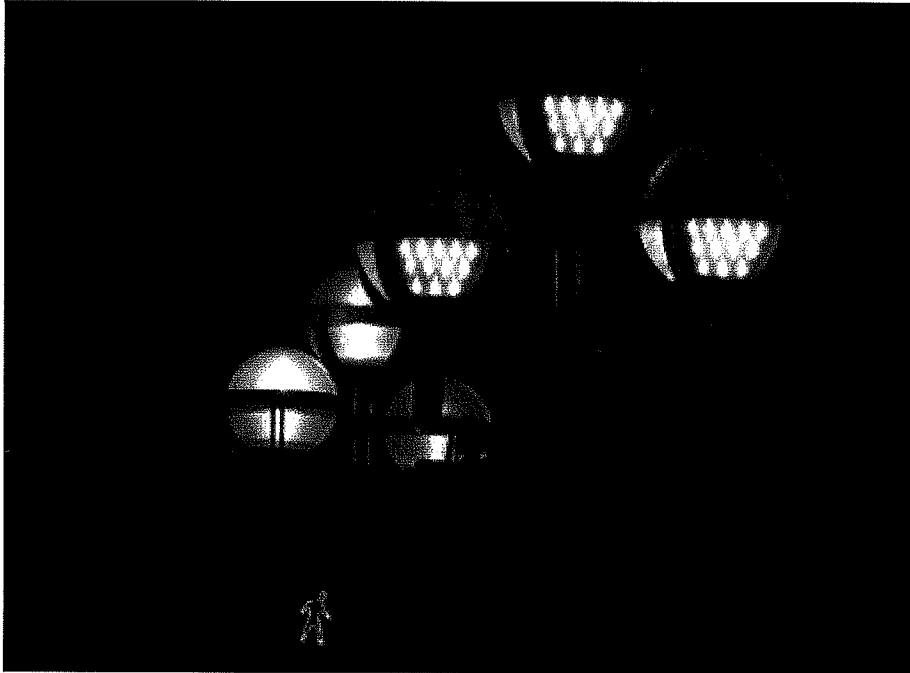
Emission Factors by eGrid Subregion

Map No.	eGRID 2006 Subregion	eGRID 2006 Subregion Name	2004 Emission Rates		
			(lbs CO ₂ /MWh)	(lbs CH ₄ /MWh)	(lbs N ₂ O/MWh)
1	NEWNE	NPCC New England	908.90	0.080	0.015
2	NYCW	NPCC NYC/Westchester	922.22	0.038	0.006
3	NYLI	NPCC Long Island	1,412.20	0.102	0.016
4	NYUP	NPCC Upstate NY	819.68	0.024	0.011
5	RFCE	RFC East	1,095.53	0.028	0.017
6	SRVC	SERC Virginia/Carolina	1,146.39	0.029	0.019
7	SRTV	SERC Tennessee Valley	1,494.89	0.023	0.024
8	SRMV	SERC Mississippi Valley	1,135.46	0.042	0.013
9	SRSO	SERC South	1,490.37	0.040	0.025
10	FRCC	FRCC All	1,327.66	0.054	0.016
11	RFCM	RFC Michigan	1,641.41	0.035	0.025
12	RFCW	RFC West	1,556.39	0.020	0.024
13	MROE	MRO East	1,858.72	0.041	0.030
14	SRMW	SERC Midwest	1,844.34	0.021	0.029
15	MROW	MRO West	1,813.81	0.028	0.029
16	SPNO	SPP North	1,971.42	0.024	0.030
17	SPSO	SPP South	1,761.14	0.030	0.023
18	ERCT	ERCOT All	1,420.56	0.021	0.015
19	RMPA	WECC Rockies	2,035.81	0.024	0.030
20	AZNM	WECC Southwest	1,254.02	0.018	0.015
21	NWPP	WECC Northwest	921.10	0.022	0.014
22	CAMX	WECC California	878.71	0.036	0.008
23	HIMS	HICC Miscellaneous	1,456.17	0.101	0.018
24	HIOA	HICC Oahu	1,728.12	0.0911	0.0212
25	AKMS	ASCC Miscellaneous	480.10	0.0239	0.0044
26	AKGD	ASCC Alaska Grid	1,257.19	0.0266	0.0064
US Average			1,363.00	0.0305	0.0198

Data Source: US EPA eGRID2006 Version 2.1 (2004 data); CH₄ and N₂O factors provided by EPA Climate Leaders based on US EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, April 2007 (Annex 3, Table A-69).

Ann Arbor to install LED street lights downtown

Filed by [spepple](#) October 17, 2007 08:00AM



ALAN WARREN/ANN ARBOR

NEWSThe LED street lights provide a whiter light compared to the existing incandescent ones.

Once completed, project officials estimate converting all its downtown lights will save the city \$100,000 a year in energy costs and reduce greenhouse gas emissions by the equivalent of taking 400 cars off the road for a year.

Mayor John Hieftje on Tuesday proclaimed Ann Arbor to be the first city in the country to pledge to fit all its downtown street lights with the more efficient LED light bulbs.

Then with the [CTN](#) cameras rolling at a afternoon press conference, Hieftje turned to Mike Bergren, the city's assistant field operations manager, and asked, "First in the world, maybe?"

Bergren shrugged. "Possible."

As part of its goal to be a national leader in energy efficiency, the city announced that it will replace all 1,046 of its 120-watt incandescent street lights downtown with the 56-watt light-emitting diode. Hieftje estimated that would take two years.

It will cost \$630,000 to do the installations, which is being paid for by the Downtown Development Authority. Eventually, Hieftje said the entire city will have LED lights.

Once completed, project officials estimate converting all its downtown lights will save the city \$100,000 a year in energy costs and reduce greenhouse gas emissions by the equivalent of taking 400 cars off the road for a year. The LED lights also provide better light quality for improved visibility and safety, according to LED City, an organization of government and industry parties that is promoting their use.

Raleigh, N.C., and Toronto are two other cities that have installed LED lights in their downtown, according to Chris Merritt, a spokesman for CREE, the company that manufactures semi conductors in LEDs. They just haven't committed to doing the entire downtown like Ann Arbor has, Merritt said.

Ann Arbor recently completed converting all of its traffic signal lights to LEDs.

Like those traffic lights, a big savings with the street lights will be with maintenance, Bergren said.

The older street lights have a two-year life after which they all had to be replaced. The LEDs have a seven-year warranty and are expected to last as long as 10 years.

The LEDs also don't contain mercury, something that is in the city's common street lights, Bergren said.

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Categories: Breaking News

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Traffic Signal/Street Lights

Installation of LED Traffic Signal Bulbs

Abington Township is in the process of updating all of the Traffic Signals in the Township to L.E.D. (light emitting diodes). The reasons for these updates are as follows:

- Lower operating costs (smaller electric bills)
- Bright lights that can be seen in adverse weather conditions
- Longer lamp life (fewer bulb outages)
- Reduced maintenance costs
- Reduced sun glare (these bulbs are able to be seen in bright sunshine)
- Lower power consumption (5 to 22 watts as compared to 90 to 169 watts in older bulbs)
- Fewer traffic disruptions (personnel not tying up in traffic replacing bulbs)
- Personnel safety (lower exposure to traffic)

To report a Traffic signal problem, contact Traffic Signal Maintenance at (267) 536-1000 ext 1538 or you may send email. You may be asked for specifics such as location, direction of travel, is light on a pole or on mast, what color is the defective light, etc.

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FOR IMMEDIATE RELEASE
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FOR MORE INFORMATION:
Jill Vohr, US Environmental Protection Agency
(202) 564-9002

ENERGY STAR® LAUNCHES NEW ENERGY-EFFICIENT TRAFFIC SIGNALS

While state and local governments grapple with power shortages and rising energy costs, one government program is offering a solution. ENERGY STAR, established by the US Environmental Protection Agency (EPA) and the US Department of Energy (DOE), has recently announced its new specification for energy-efficient traffic signals (available on the Internet at www.energystar.gov). ENERGY STAR labeled traffic signals incorporate light emitting diode (LED) technology, which uses electrical energy very efficiently and therefore emits large amounts of light from small inputs of power. GELcore, LLC and Leotek are the first two manufacturers to adopt the ENERGY STAR specification for their LED traffic signal products. ENERGY STAR labeled traffic signals offer a significant opportunity to reduce energy consumption and utility bills.

Operational 24 hours a day, seven days a week, traffic signals that use high-wattage incandescent bulbs create a sizeable power bill for state and local governments. For a medium-sized city like Anaheim with a population of about 300,000, the power bill from traffic signals alone can exceed \$400,000 a year. Larger cities like New York and Los Angeles have annual power bills from traffic signals that can exceed \$10 million. According to power companies, recent increases in power rates in some states could double these costs.

Built with highly efficient semiconductor devices, LED traffic signals use about 6 to 25 watts under nominal operating conditions (77°F or 25°C), depending on the shape and type of signal, while incandescent bulbs use about 70 to 150 watts. As a result, LED modules can save more than 90 percent in energy bills for traffic signals. Through the use of ENERGY STAR qualified traffic signals, cities could save 1 million kWh of energy and nearly 70,000 dollars a year for every 100 signalized intersections replaced, saving money and improving the environment at the same time. LED traffic signals have lower maintenance costs because they can last more than seven years, while incandescent bulbs may last only one year. Because LED traffic signals rarely fail prematurely, they also reduce the risk of accidents at intersections and associated liability costs for government agencies. So even with a higher initial investment, dollar-savings and quality-improvement benefits significantly outweigh costs.

The ENERGY STAR label helps consumers identify products that save money and help protect the environment. The label is already displayed on more than 30 product categories, including residential heating and cooling equipment, major appliances, office equipment, lighting, and consumer electronics. Recent additions to the ENERGY STAR family include dehumidifiers, water coolers and set-top boxes. By

signing voluntary agreements with EPA, manufacturers and retailers may place the ENERGY STAR label on products that meet or exceed energy-efficiency guidelines set by EPA and DOE. More than 1,200 manufacturers have signed voluntary agreements to produce and market energy-efficient equipment, and the list is growing. Only traffic signals that comply with ITE standards and operate at low wattage levels under normal conditions can qualify to receive the ENERGY STAR label. For more information on ENERGY STAR labeled traffic signals, visit the ENERGY STAR Web site at www.energystar.gov.

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Buildings designed in cool shades of 'green'

By John Ritter, USA TODAY

PORTLAND, Ore. — Step inside a new condominium at The Henry, an upscale residential tower in the chic heart of this city's flourishing downtown.



Natural light and ventilation are in abundance at The Henry, a "green" condominium tower in Portland.

Courtesy Bruce Forester

See the doors and kitchen cabinets made of pressed straw. Notice no new-building smell from paint, glue and carpet. Puzzle at the funny toilets with two flush buttons. Be aware that incandescent lights are nowhere to be found. Stroll down the hall to the handy recycling bins. Turn on tap water heated by exhaust from clothes dryers and ranges. Marvel at the abundance of natural light and ventilation. Tap on hardwood floors cut exclusively from sustainable forests.

Welcome to Portland's newest "green" building — energy-efficient, water-stingy and full of features stressing the natural over the chemical, the recycled over the new and the renewable over the finite. The 123-unit Henry is part of a wave of green projects sweeping the country and revolutionizing the way we design and build.

Whether the tag is "eco-friendly," "sustainable" or "high-performance," green buildings are going mainstream in a big way. In three years, the U.S. Green Building Council has certified 89 office or apartment buildings, manufacturing plants, condos, convention centers, schools and libraries. More than 1,100 buildings have applied for the council's Good Housekeeping-type seal of approval.

"It's not like putting on a hair shirt and moving into a cave," says Dennis Wilde, senior project manager for The Henry. "A green building doesn't look any different than what people are used to."

Once a fringe movement, a legacy of the 1970s energy crisis that never quite caught on, the

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green building boom is attracting converts as disparate as New York Gov. George Pataki, a Republican, and Chicago Mayor Richard Daley, a Democrat who has vowed to make his city the USA's greenest.

A growing number of cities and states insist on green features in buildings that get tax dollars. The government requires its new buildings to meet green standards. Foundations are making green development a condition for grants. Local governments are adding "sustainability" to the job titles of planners and architects. Architecture students are pressuring universities for more courses in green design. Americans dissatisfied with poor indoor air quality and "sick-building syndrome" are demanding fresher environments to live a

'Green' design elements

Many features of The Henry development promote environmentally conscious living. Some examples:

Windows: Specially treated glass and sun shades reduce heat from sunlight in summer. That helps keep the building cool and saves energy.

Woodwork: The hardwood floors in The Henry are cut from sustainable forests. Doors and cabinets are made with wheatboard, a product similar to particleboard but without the toxic resins.

Bike rack: The development provides secure bike storage to encourage residents to ride instead of drive.

Plumbing: Showers, toilets and other fixtures have low-flow designs that save up to 30% of the water typically used.

Source: Gerding/Edlen Development

Manufacturers and suppliers of green building materials are rushing to cash in on an expanding market. The initial cost to go green may be slightly higher, but the payback in energy efficiency, water conservation and worker productivity easily recoups those outlays, experts say.

"To build a green building is only very marginally more expensive, and that margin is decreasing as it goes," says Scott Lewis, a green building consultant here.

The right thing to do

As cost fades as a hurdle, green building is gaining virtually unassailable status as the right thing to do. There's carping from a few critics that standards are sometimes too restrictive. Libertarians grouse that tax credits or grants subsidize green projects — though that's not what's fueling the trend, nor are such subsidies typically large.

An \$800,000 fund Portland set aside in 2001 to help green projects is nearly spent, and city officials plan to renew it. Long a hub of environmental activism and green values, Portland has a sustainable building ethic that is deep-rooted: 44 green buildings totaling 4 million square feet.

The \$48.5 million, 15-story Henry, one of the country's first large residential buildings to go green, was the most expensive condo project: Prices range from \$280,000 for one-bedrooms to \$1.3 million for three-bedroom penthouse units. But it also sold out quicker than any other — the last condo was snapped up months before completion. Similarly, all 293 units in the 27-story Solaire green apartment building Ground Zero in New York rented quickly — most at 4% to 5% above market rates.

"Sustainability was very important to us," says Mary Krueger, a database administrator who with her husband, Phil, bought a two-bedroom Henry unit after selling their four-bedroom suburban house. She is notorious as an avid recycler, just real conscious of what we use and what we do to the environment.

Industry standards and a scoring system, adopted in 2000, brought accountability and accelerated green building. The 4,000-member Green Building Council's Leadership in Energy and Environmental Design program (LEED) has become a benchmark followed by developers, architects and elected officials across the USA. Its sought-after silver, gold and platinum ratings verify the "greenness" of a project.

Just as studies show better test scores by students who learn in well-lighted spaces and higher re

stores with skylights, many experts suspect that worker productivity also improves in eco-friendly offices. Some employers report lower absenteeism and higher retention rates in green buildings.

"In our old space, people complained constantly about bad air," says John Zmolek, executive vice president of Verity Credit Union in Seattle. "We haven't had a complaint in six years."

Saving energy

Because energy is a big-ticket operating cost, saving it is a key green goal. The Henry, with a roof-top "chiller" to cool water for air conditioning, saves an estimated 35% over a conventional building. The Solaire in New York cuts energy use by 67% at peak times, says developer Timothy Carey, president of Battery Park City Authority.

"All things being equal, I can't imagine that you wouldn't make an ethical or moral choice to buy something that had green features," says Henry developer Robert Gerding, whose company has \$1.5 billion in green projects completed or in the works, 90% of its portfolio. "Obviously, I'm a true believer, but this is something that has to happen."

Sustainable building is by no means confined to green bastions such as the Pacific Northwest and California. Pittsburgh has more green buildings than any other U.S. city, including its new convention center, which achieved LEED gold. The nation's highest profile construction project, the Freedom Tower and other buildings around the World Trade Center site in New York, will use green principles.

At least 10 states and 23 cities and counties — Los Angeles; Seattle; San Diego; Dallas; Kansas City, Mo.; San Jose, Calif.; Chicago and Portland among them — require or are considering requiring a LEED rating for all public buildings.

As of October, the General Services Administration, builder of non-military federal buildings, requires LEED certification on structures that cost \$2 million or more. "As an agency, our goal is silver," GSA architect Don Horn says. "Some have taken the challenge and gone for gold."

Green doesn't have to mean exotic. Developers earn points for low-tech basics such as positioning buildings to maximize sunlight inside and to lower the wind's effect on heating needs. Retro ideas such as office-building windows that open to let in fresh air are in vogue. Tall windows with "light shelves" to bounce daylight into interior spaces and motion sensors to shut lights off when people leave rooms trim energy costs.

Green, or planted, roofs that insulate and reduce runoff have made the jump from Europe, as have low-pressure heating and air-conditioning vents that run under raised floors. Directing builders to recycle construction waste earns points. And using recycled and natural materials — adding the coal byproduct fly ash to concrete, for example — is a LEED goal.

Those pressed-straw cabinets in The Henry are wheatboard, similar to particleboard but without the toxic resins. Wheatboard was more expensive than particleboard until Home Depot began stocking it and drove the price down. Paints that don't emit gas from VOCs — volatile organic compounds — once added tens of thousands of dollars to building costs. Now they're price-neutral. Natural-fiber carpets are becoming more competitive with the petrochemical-based standard.

"It's an exploding market," Portland consultant Lewis says. "Many vendors are chasing it."

Vying for top rankings

Some green designs are pushing the envelope. Pittsburgh's convention center, the world's largest green building, purifies sink and toilet water with ultraviolet light and recycles it for flushing and irrigation. Biotech giant Genzyme's headquarters in Cambridge, Mass., has rooftop mirrors and solar panels to direct sunlight inside and light fire-escape stairwells.

Toyota's sprawling new complex in Torrance, Calif., has a solar-energy system that generates up to 20% of demand. Chicago's Center for Green Technology, a renovated former factory, has floors made of recycled rubber tires and an elevator that runs on canola oil instead of polluting hydraulic oil.

During rebuilding of 7 World Trade Center at Ground Zero, all large diesel engines had to have filters and use low-sulfur fuel to cut emissions. New York City later made that mandatory in all public construction. Plans for Freedom Tower include wind turbines to produce up to 10% of the building's electricity.

No sooner had the Audubon Society announced early this year that its Los Angeles center was *the* most environmentally friendly building in the nation — more LEED platinum points than any other — than the Natural Resources Defense Council trumped it. Despite producing all its own energy and touting features such as organic linoleum floors and steel rebar made with melted-down handguns, the society's building came up short to the NRDC's three-story Santa Monica, Calif., offices — 53 points to 56.

As the boom progresses, companies see that in the 50- to 100-year life cycle of a green building, costly upgrades such as solar devices and super-efficient mechanical systems pay for themselves many times over. But speculative developers who must recoup costs more quickly are coming around, too. Gerding, a partner in Portland's Gerding/Edlin Development, is proof of that. He bought a Henry unit himself.

David Miller, a University of Washington architecture professor, says even practitioners of so-called "high design," the superstars of the profession, are integrating sustainable concepts to stay competitive.

But green enthusiasts say that despite remarkable progress in a short time, no one has built a truly sustainable building, one that is a net producer of energy, one that gives more back to the environment than it takes away.

"What we're doing isn't green building and it isn't sustainable — yet," Lewis says. "It makes me wince when someone says they're building a sustainable community. A sustainable community is an Indian tribe in the Amazon."

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