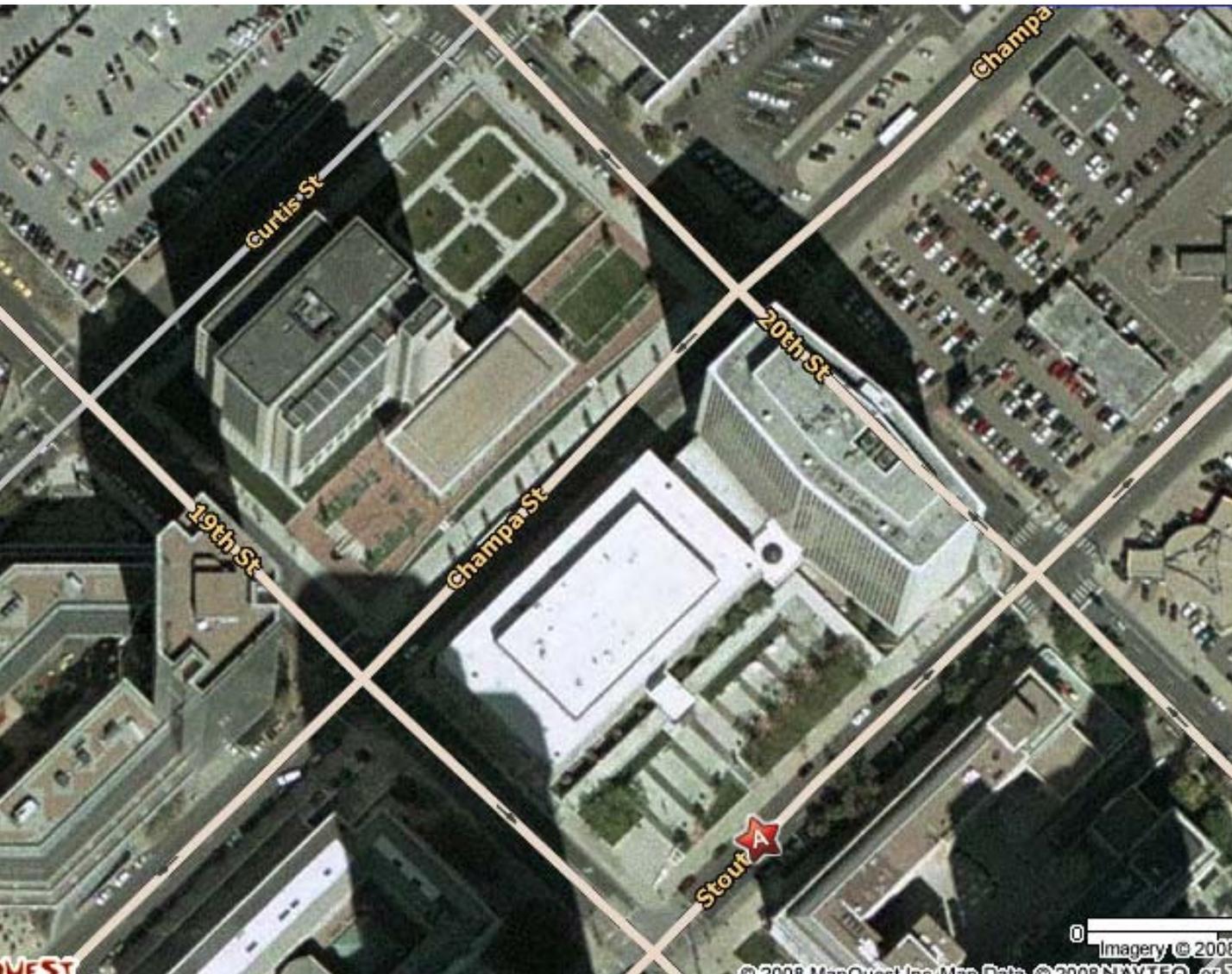


It's the Story of Two Federal Courthouses

Arraj Courthouse – Completed 2002



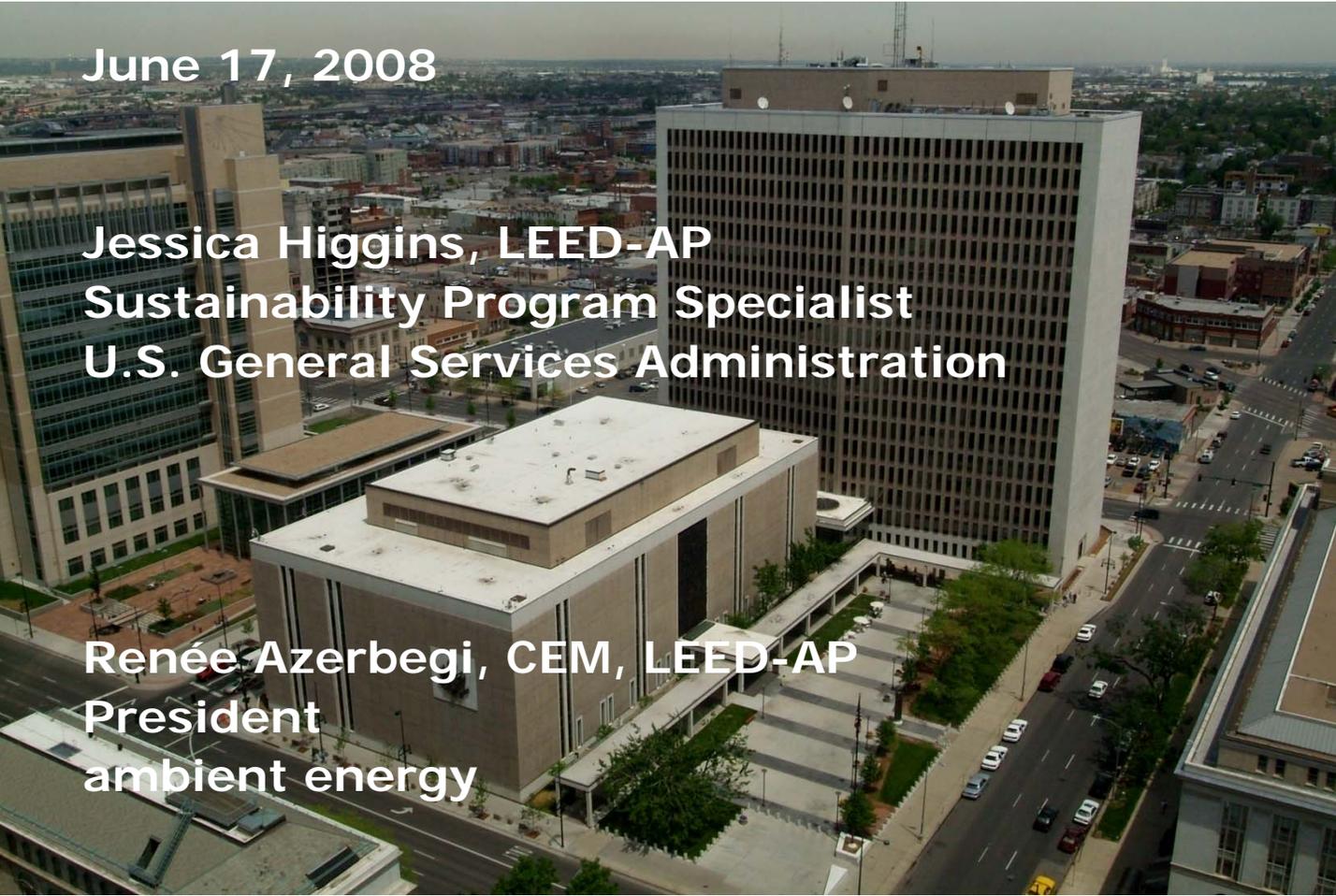
Rogers Courthouse Built 1965. Renovated 2006

It's the Story of Two Federal Courthouses

June 17, 2008

Jessica Higgins, LEED-AP
Sustainability Program Specialist
U.S. General Services Administration

Renée Azerbegi, CEM, LEED-AP
President
ambient energy



Agenda

- Overview of Sustainability Drivers
- LEED and LEED-EB Overview
- Project Team, Process and Schedule
- Arraj History and Sustainable Strategies
- Rogers History and Sustainable Strategies
- Cost Features
- Lessons Learned
- Changes with the new LEED-EB Operations & Maintenance



Sustainable Design

Photo: Elin Carlén

For GSA, this term describes the use of an integrated team approach to provide a building that through its design, construction and operation:

- Considers impacts to the natural environment
- Uses natural resources efficiently
- Improves building performance;
- And addresses the health and comfort of the occupants



Sustainability Drivers

- Laws and regulations
- Impact buildings have on the environment



U.S. BUILDINGS IMPACTS ON RESOURCES

39% of total energy consumption

71% of electricity consumption

39% CO₂ emissions

30% of raw materials use

30% of waste output

12% of potable water consumption

Federal High Performance and Green Buildings MOU

January 2006

- Signatory agencies commit to federal leadership in the design, construction, and operation of High Performance and Sustainable Buildings
- Guiding Principles:
 - Integrated Design
 - Energy Efficiency
 - Protect and Conserve Water
 - Enhance Indoor Environmental Quality
 - Reduce Environmental Impact of Materials
- Signatory agencies:
 - DOD
 - DOE
 - GSA
 - DOI
 - DOJ
 - DOA
 - NASA
 - DHS
 - HHS
 - DOT
 - Department of State
 - HUD
 - OPM
 - DOL
 - EPA
 - Tennessee Valley Authority

Executive Order 13423: Strengthening Federal Environmental, Energy and Transportation Management January 2007



- Mandate for federal agencies to:
 - Reduce energy and water consumption;
 - Purchase renewable energy;
 - Purchase bio-based and recycled products;
 - Support waste management practices;
 - Encourage sustainable practices in buildings;
 - Use alternative fuel vehicles; and
 - Purchase environmentally friendly electronics.



Energy Independence and Security Act (EISA)

January 2008

- Energy policy law that consists of provisions to increase energy efficiency and the availability of renewable energy and decrease U.S. dependence on oil.
- The Act encourages energy conservation and efficiency by:
 - Promoting residential energy efficiency
 - Increasing the efficiency of commercial appliances and products
 - **Reducing Federal government energy usage**
 - Modernizing domestic energy infrastructure
 - Increasing the use of renewable energy
 - Supporting a new generation of energy efficient vehicles



Energy Independence and Security Act (EISA)



Existing Buildings:

1. Reduce energy consumption by 3% per year FY06-FY15.
2. Designate an energy manager for each owned facility to perform water and energy evaluations.
 - DOE to develop a database to track this information and make it available to the public via the internet.
3. Develop a process to ensure the use of energy efficient designs, systems, equipment, and controls on large capital energy investment projects.
4. If feasible, replace existing lighting, heating and cooling technologies with cost effective alternatives at GSA owned and leased facilities.
5. In the normal course of maintenance, replace dead lighting fixtures and bulbs with energy efficient alternatives.

GSA Office of High Performance Green Buildings



What is LEED?



- Leadership in Energy & Environmental Design (LEED) is a **nationally accepted benchmark** for the design, construction, and operation of high performance green buildings.
- LEED is a point based system where projects can earn LEED points for satisfying specific green building criteria.
- U.S. Green Building Council – consensus driven, committee-based, nonprofit organization (1993)
- Setting the standards for what constitutes green design practices in the U.S.

- Three rules of LEED:
 - LEED™ certification and registration for BUILDINGS
 - LEED™ accreditation for PEOPLE
 - And there is no “s” in LEED



Benefits of LEED Certified Buildings

- Third-party verification that a building project meets the highest green building and performance standards.
- Lower operating costs and increased asset value.
- Reduce waste sent to landfills.
- Conserve energy and water.
- Healthier and safer for occupants.
- Reduce harmful greenhouse gas emissions.
- Owner commitment to the environment.

Green Facts

EPA Region 8 Headquarters
Denver, CO

LEED v 2.1 rating out of 69

Gold 48

Sustainable Sites 10/14

Energy Efficiency 9/17

Materials & Resources 7/13

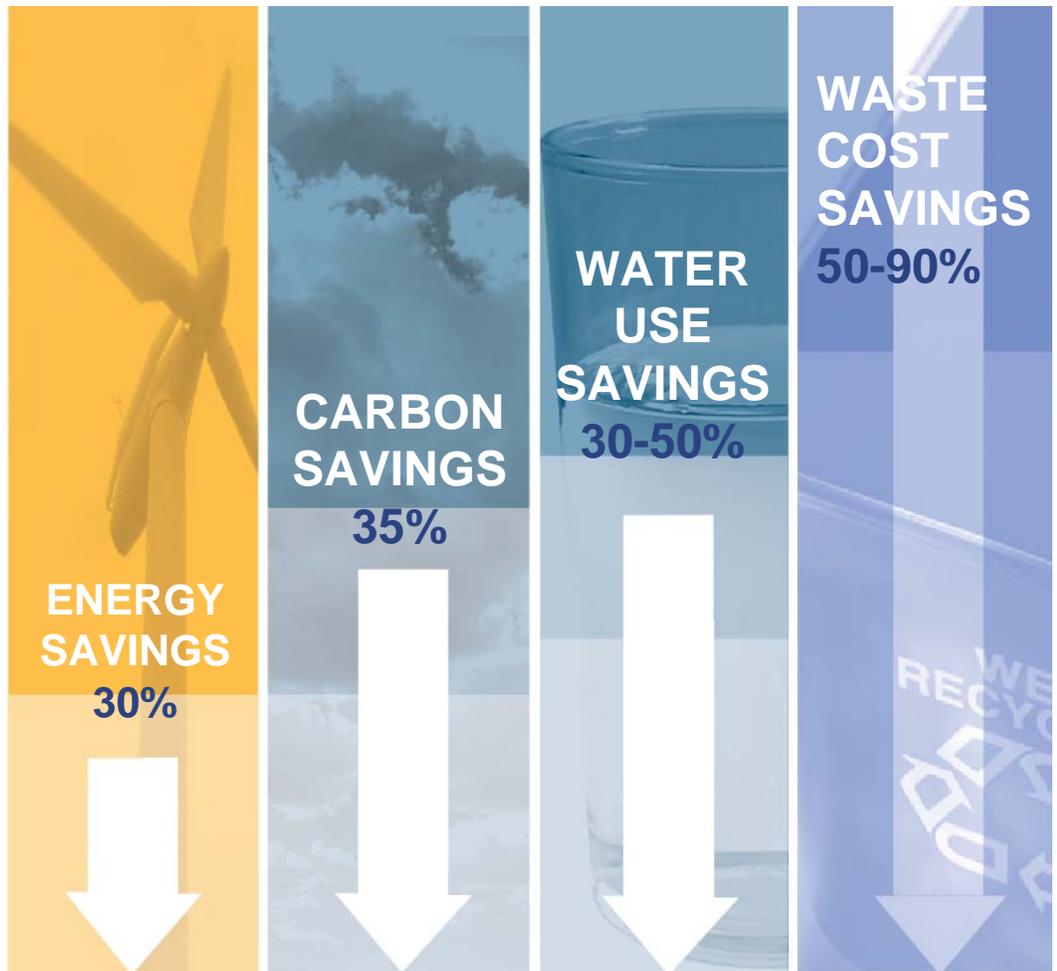
IEQ 14/15

Design Excellence 5/5

Safeguarding Water 3/5

USGBC LEED v 2.1 submitted May, 2007

Average Savings of Green Buildings



Economic Benefits:

- Reduced operating costs.
- Enhanced asset value and profits.
- Optimized life-cycle economic performance.
- Improved employee productivity and satisfaction.



Leadership in Energy and Environmental Design

A leading-edge system
for certifying the
greenest performing
buildings in the world



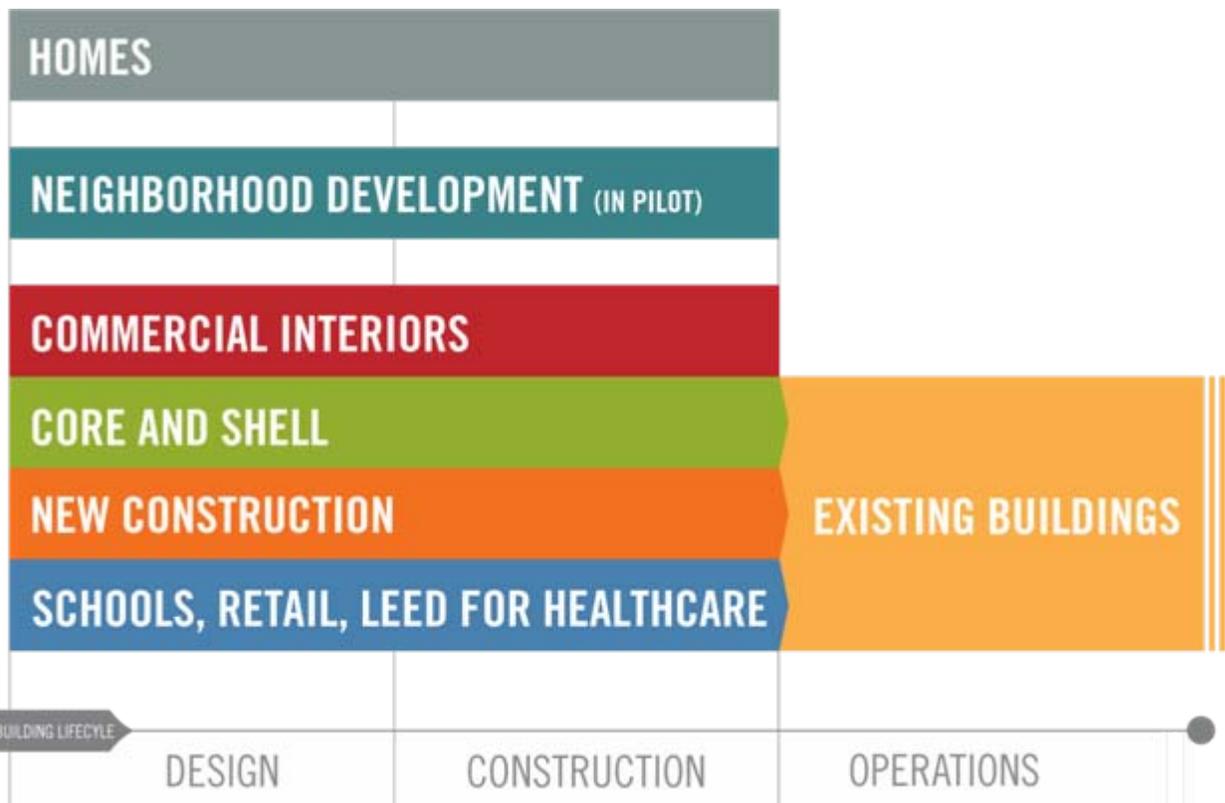
To date GSA has 24 LEED certified buildings:

- 6 Certified
- 8 Silver
- 10 Gold

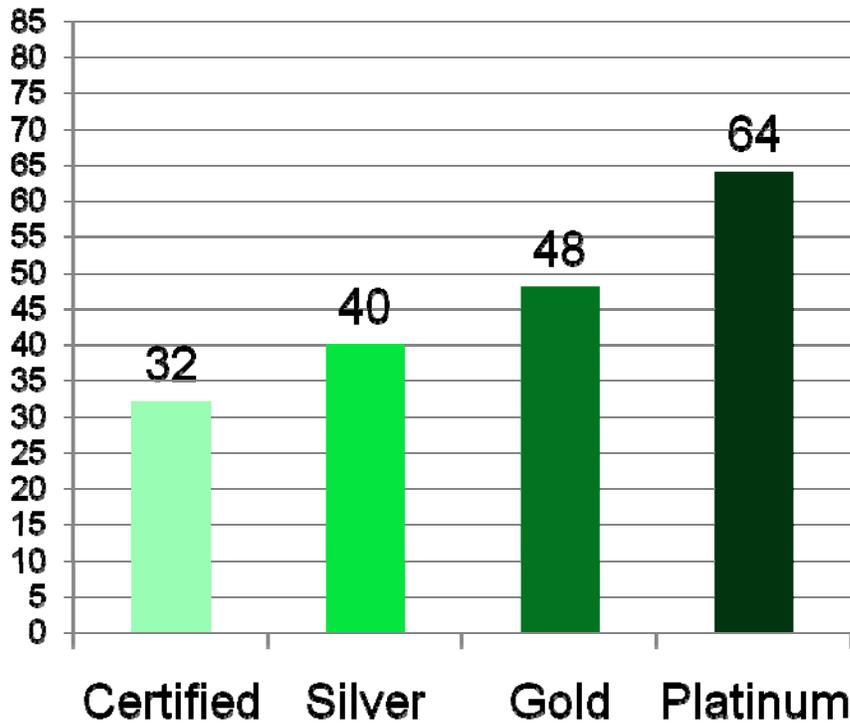
And over 50 registered projects working towards certification.

What is LEED-EB?

- Designed for Operation and Maintenance of Buildings
 - Focus on long term operation and planning
 - LEED-EB policy manual
 - Quarterly reporting
 - Utility bill analysis
 - Energy Star benchmarking and rating



LEED-EB Certification Levels



13 Prerequisites;
85 total points



LEED-EB Prerequisites

October 2004

- Designed for Operation and Maintenance of Buildings
 - Prerequisites:
 - Erosion and Sedimentation Control
 - Age of Building
 - Min. Water Efficiency
 - Discharge Water Compliance
 - **Minimum Energy Performance – Energy Star of 67 (2 points)**
 - No CFCs or limited leakage
 - Retro-Commissioning
 - Recycling and Waste Management
 - Toxic Material Source Reduction
 - Outside Air Introduction and Exhaust
 - Environmental Tobacco Smoke Control
 - Asbestos Removal or Encapsulation
 - PCB Removal

Sample LEED-EB Quarterly Report

Quarterly Reports	Year 1			
	Q1	Q2	Q3	Q4
Option A: Bus service available and within 1/4 mile (Y or N)	Y	Y		
Option B: Rail service available and within 1/2 mile (Y or N)	Y	Y		
Option C: Shuttle service available between the building and at least 2 bus lines, or at least one public rail station. (Y or N)				
Name of person currently responsible for making sure that access to public transportation measures continue to work well	Renee Azerbegi	Renee Azerbegi		
Date person responsible was contacted for the quarterly report information / provided quarterly report information listed below (MM/DD/YY)	04/01/06	08/31/06		
Questions to be answered each quarter by person responsible for making sure that access to public transportation measures continue to work well:				
Has the delivery of the selected type of public transportation access continued over the last quarter? (Y or N)	Y	Y		
Has the selected type of public transportation access continued to work well for building occupants over the last quarter? (Y or N)	Y	Y		
Are there any problems that need to be remedied? (Insert a numbered list of problems or insert "None")	See below	None		
If any problems were identified, how have these been remedied? (Insert a numbered list of remedies or insert "None")	A	None		
Are there any opportunities for improving the service or increasing the use of the service? (insert a numbered list of opportunities or insert "None")	None	None		
If any opportunities for improvements were identified, how have these been implemented? (List opportunities and how each has been implemented or "None")	None	None		

LEED-EB Project Team

Core Team:

- Owner/Project Manager
- LEED Consultant/Project Administrator
- Contracting Officer
- Property Manager
- Building Engineer
- Energy Manager
- Utility Engineer
- Janitorial Contractor
- Site and Grounds Contractor
- Operations and Maintenance Contractor
- Sustainability Specialist

Support Team:

- Upper Management
- Tenant Representative

Typical LEED-EB Federal Process

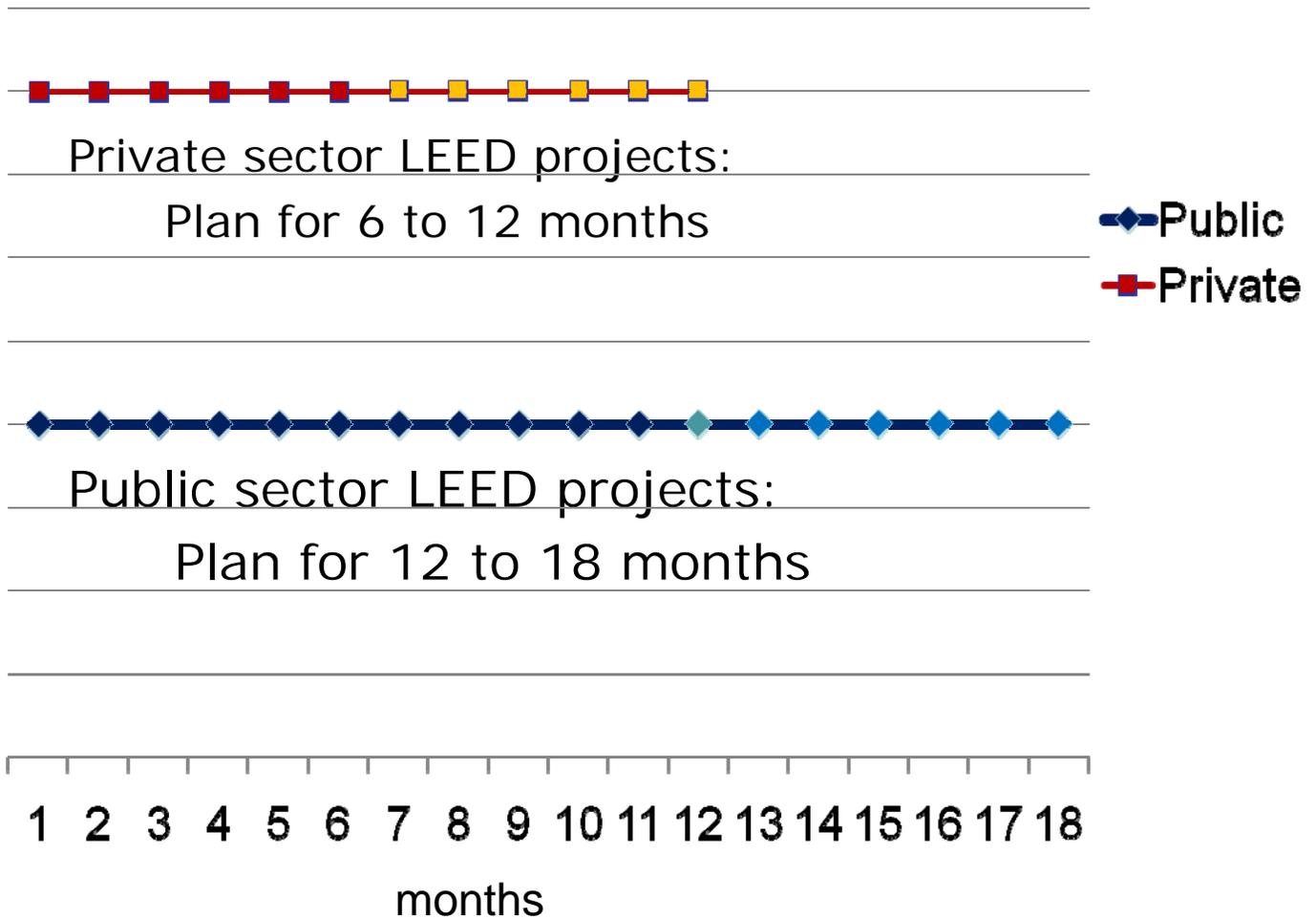
- Verify interest in pursuing LEED-EB with management and facilities staff.
- Hire a sustainability consultant for feasibility study.
- Conduct a preliminary LEED-EB feasibility study including perform preliminary Energy Star Rating, conduct site visit, and identify major costs.
- Confirm with management whether or not to pursue LEED-EB certification.
- Hire a sustainability consultant for project facilitation and documentation.
- Hire a commissioning agent if needed.
- Host a sustainable design charrette.



Typical LEED-EB Federal Process

- Get to work!
 - Develop a schedule
 - Change or mod contracts for Site, O&M, Janitorial
 - Develop / approve environmental policies
 - Complete equipment upgrades if necessary
 - Develop / perform quarterly or annual reporting
 - Upload LEED Online templates and documentation
 - Final review of templates and documentation
- Submit first submittal to the USGBC
- Submit final re-submittal of pending credits
- Celebrate rating awarded!

Typical LEED-EB Schedule



History

Alfred A. Arraj U.S. Courthouse

Overview

- Location: Denver, CO
- Building type (s): Public order & safety
- 319,000 sq. feet
- Urban setting
- Completed November 2002
- *Sustainability Team:* GSA (owner), HOK/AMD (architects), RMH Group (mechanical/electrical), E-Cube (commissioning), AEC (energy and daylight modelers, sustainability LEED-NC consultants during design), ambient energy (LEED-EB sustainability consultants)



History

Alfred A. Arraj U.S. Courthouse

- A showcase for sustainable design and GSA's commitment to environmental stewardship
- Two-story pavilion and a 10-story tower which houses five floors of district courts, two floors of magistrate courts, offices for the U.S. marshal and clerk of the court, a jury assembly area, a special-proceedings courtroom, and a GSA office



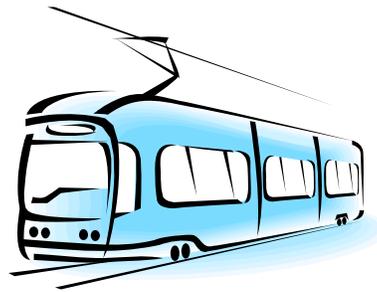
LEED-EB

Alfred A. Arraj U.S. Courthouse



Sustainable Sites

- Close proximity to mass transit
- Ecompass-ID
- 100% underground parking-ID
- Over 30% of tenants use mass transit



Water

- 34% water use reduction due to low flow sinks, toilets and urinals
- 29% decrease in stormwater runoff due to detention ponds and landscaping
- Native plantings in the plaza



LEED-EB

Alfred A. Arraj U.S. Courthouse

Energy

- Individual task lighting and thermal comfort controls for occupants
- Underfloor air displacement ventilation system
- 45% of energy use is offset with Renewable Energy Credits
- 14kW PV system produces 3% on-site energy
- Building retro-commissioning



LEED-EB

Alfred A. Arraj U.S. Courthouse

Materials

- Recycling program launched resulting in 54% recycling rate
- Mercury lamp purchases were reduced
- 20% of building materials included recycled content
- 13% of building materials were extracted and manufactured regionally
- 75% of construction waste will be recycled on future construction/tenant improvement projects

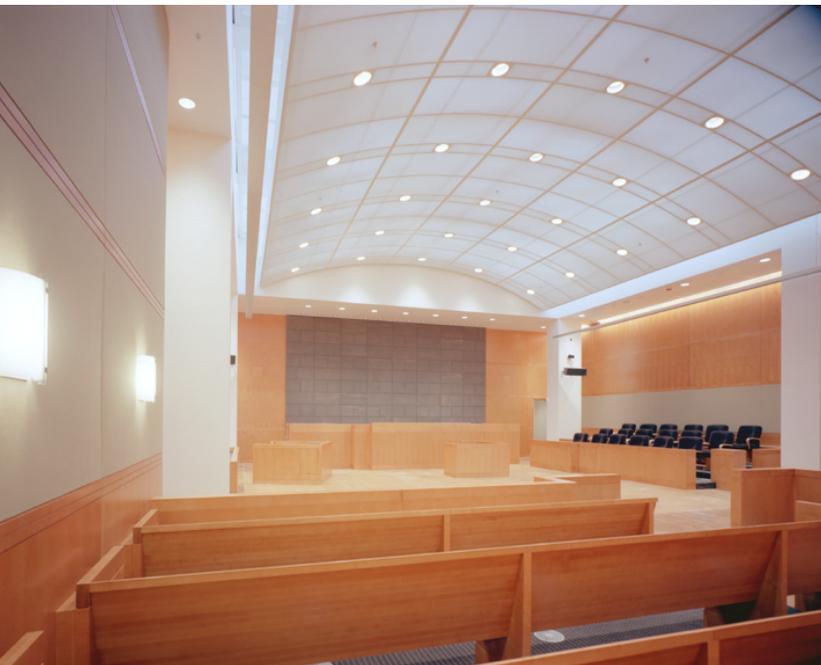


LEED-EB

Alfred A. Arraj U.S. Courthouse

Indoor Environmental Quality

- 90% IEQ compliant purchases
- 60% sustainable cleaning material purchases
- Entryway grilles and mats and separately exhausted/hard ceiling copy rooms and janitorial closets reduce indoor air contaminants
- 60% of workstations have access to views
- 76% of multi-occupant spaces have access to views
- SPOT Survey: thermal comfort, air quality, lighting, acoustics, cleanliness and maintenance-ID



History

Byron G. Rogers U.S. Courthouse

Overview

- Location: Denver, CO
- Building type(s): Public order & safety
- 260,000 sq. feet including 5 floors of courtrooms and offices and 2 floors of underground parking
- Constructed in 1965 and designed by James Sudler Associates and Fisher and Davis, the Courthouse is considered to be a “Formalist masterpiece” by local historians
- Modernized 2002-2005
- LEED-EB Pilot Gold Rating in 2006
- \$36 million renovation
- *Sustainability Team:* GSA, Bennett, Wagner, and Grody Architects, PCL, RMH Group MEP, E-Cube , Lime Green Design, ambient energy



History

Byron G. Rogers U.S. Courthouse

- Building reuse and historical preservation were key sustainable strategies.
- Not yet 50 years old, but believed to have historic significance and projected to qualify for the National Register of Historic Places.

Northwest from southeast
DESCRIPTION OF PHOTOGRAPH
Progress April 1, 1963
TYPE & DATE OF PHOTOGRAPH
Court House & Fed. Office
BUILDING
FISHER AND DAVIS & JAMES SUDLER ASSOC. - ARCHITECTS
Arthur Vennerli Company
CONTRACTOR
Denver, Colorado
CITY, STATE
Doug Johansen
CONSTR. ENGINEER



LEED-EB

Byron G. Rogers U.S. Courthouse

Sustainable Sites

- LED interior and exterior art display by Jim Campbell
- Public transportation abounds
- No new parking added
- The existing plaza with its large trees attracts birds and squirrels and other wildlife
- Xeric and native plantings added so 50% of exterior is open space
- Low impact maintenance



42%	16	Drive individually
5%	2	Carpool with others
50%	19	Take public transportation
0%	0	Bike
3%	1	Walk

LEED-EB

Byron G. Rogers U.S. Courthouse

Water Efficiency

- Low-impact xeric and native landscaping added to three sides of the courthouse with plaza on fourth side
- Low-flow lavatory faucets and water closets
- P-trap primers added to p-traps
- Results:
 - 20% plumbing fixture water savings predicted
 - 50% landscape water savings predicted
 - Overall savings of 32% based on actual utility bills!



LEED-EB

Byron G. Rogers U.S. Courthouse

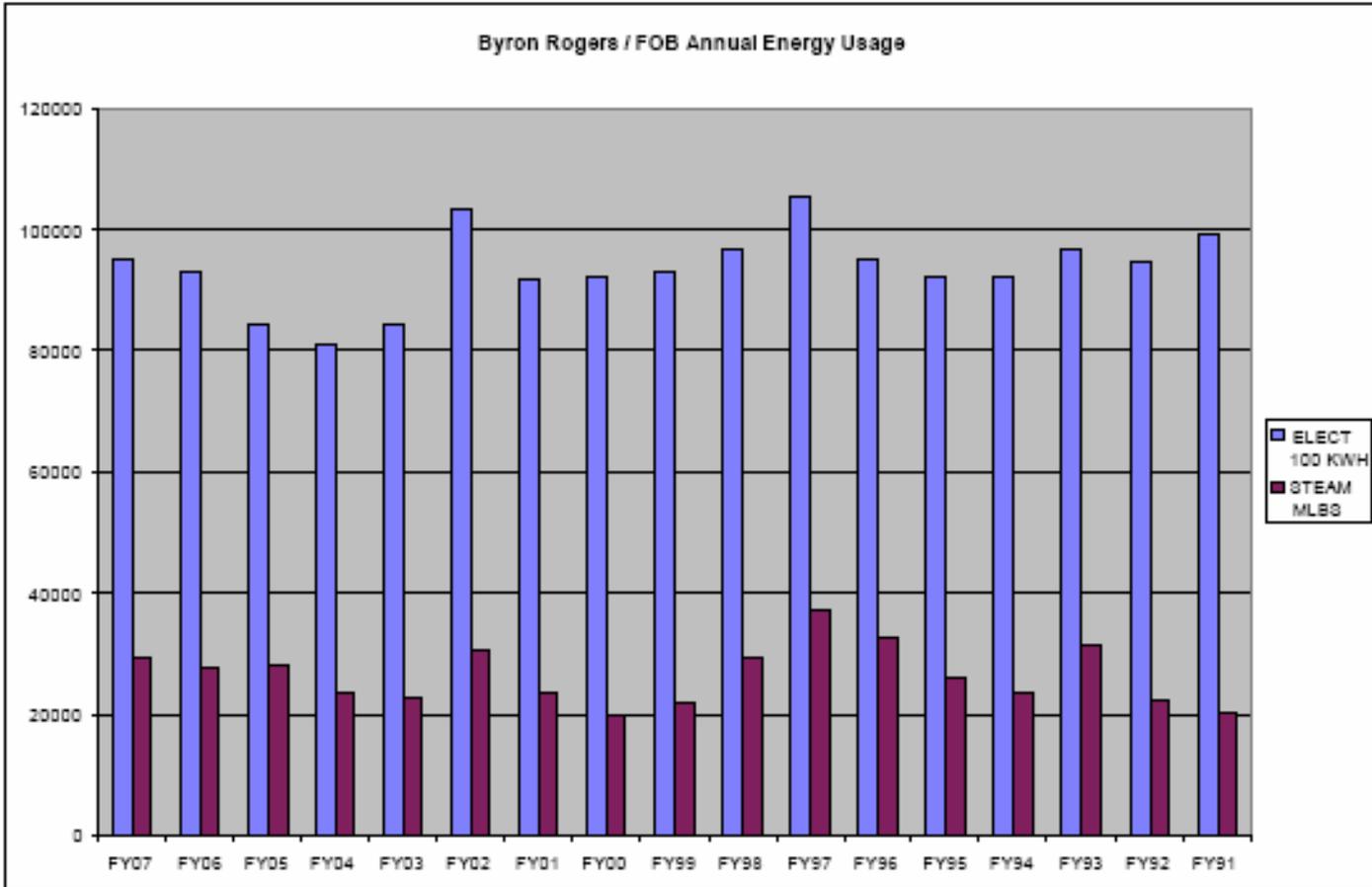
Energy

- Energy Efficiency Upgrades
 - Retrofitted a constant volume dual duct system to a single duct variable air volume system
 - Adding direct evaporative cooling to reduce the amount of chilled water
 - Replacement of existing T-12 fluorescent lighting system with T-8 fluorescent lighting and electronic ballasts
 - Replacement of the existing roof insulation with a R-30 insulation roof
 - Demand-controlled ventilation to base outdoor air rates on occupancy levels.
 - 100% green power offset for electricity!
Green power offset alone is equivalent to not driving 4,015,829 miles in an average car, taking 7 cars off the road, and planting 502 acres of mature trees.

LEED-EB

Byron G. Rogers U.S. Courthouse

- Results:
 - 52 kBtu/sf/yr Energy Star extrapolation (Ecube)
 - 49 kBtu/sf/yr 2006 estimated (Ecube)
 - 60 kBtu/sf/yr 2007 estimated (Ecube)



¹ Heating Degree Days - FY07 5% above 30yr avg.(1971-2001), FY06 average; Cooling Degree Days – FY07 32% above average, FY06 30% above average

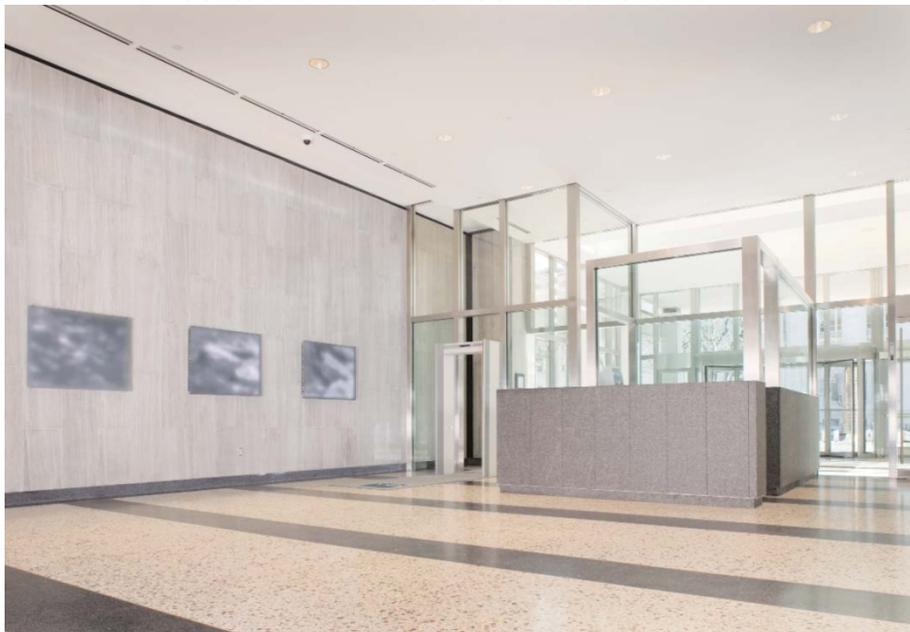


Jim Campbell's Art in Architecture commission using energy efficient LED lights





Continued on the inside.



LEED-EB

Byron G. Rogers U.S. Courthouse

Recycling

- Improved recycling program
- Performed waste stream audit
- Provided recycling bins on each floor
- Added recycling to janitorial contract

Results:

- Recycling rate increased from 3% in 2003 to 32% in 2007

By recycling 40 tons of waste in 2006 GSA saved:

➤ **\$4,718 in waste bill and tipping fee avoidance**

➤ **680 trees**

➤ **279,860 gallons of water**

➤ **2,399 pounds of air pollution**

➤ **15,192 gallons of oil**

➤ **163,918 kWhrs of electricity**

LEED-EB

Byron G. Rogers U.S. Courthouse

Materials

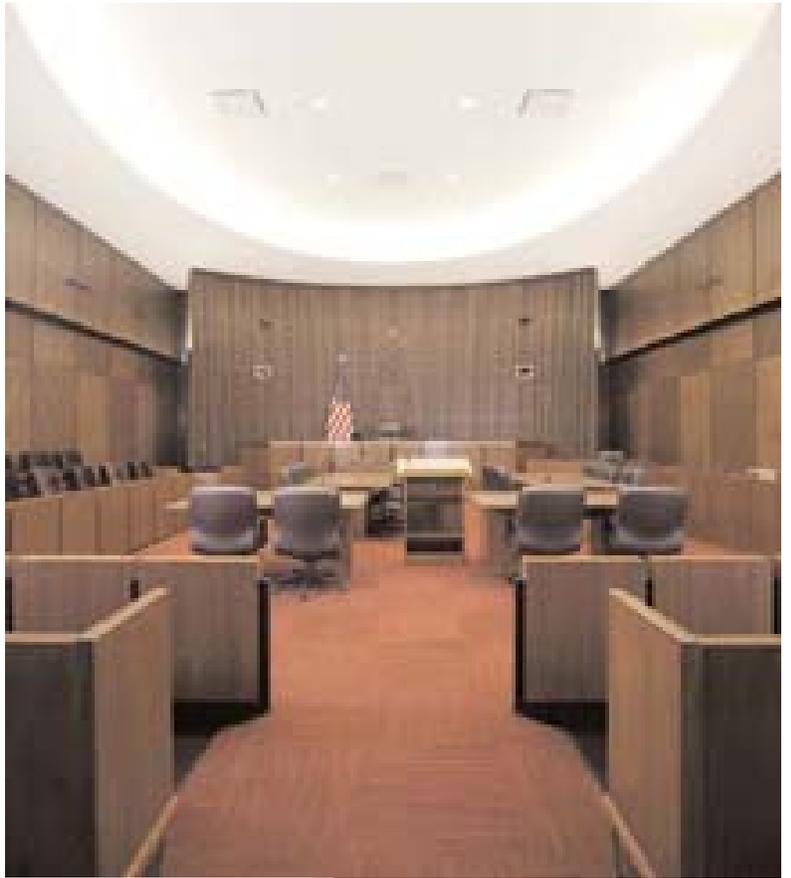
- Building reuse
 - Wood wall paneling
 - Marble panels and terrazzo floors
 - Stainless steel and brass elevator doors and frames
 - Painted metal decorative reveals
 - Decorative radiator covers
 - Existing mail chute system
 - Public art
- Clean up
 - Asbestos abatement or encapsulation
 - Lead removal
- New materials
 - FSC wood
 - Cork flooring
 - R-30 white roof



Results:

- 50% of wood FSC
- 50% of Div. 2-16 with recycled content

The Courtrooms
with reused wood
paneling (right) and
cork flooring
(bottom)



LEED-EB

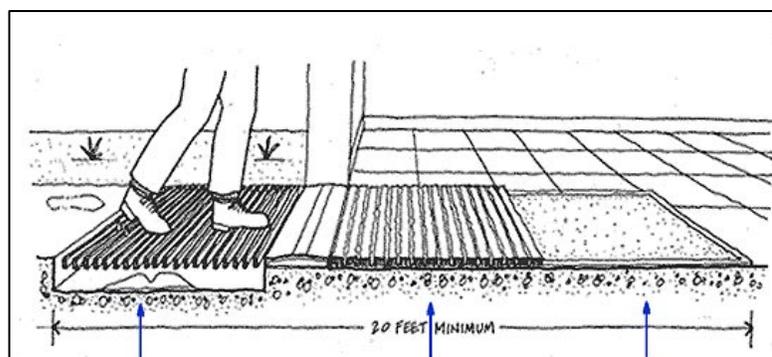
Byron G. Rogers U.S. Courthouse

Indoor Environmental Quality

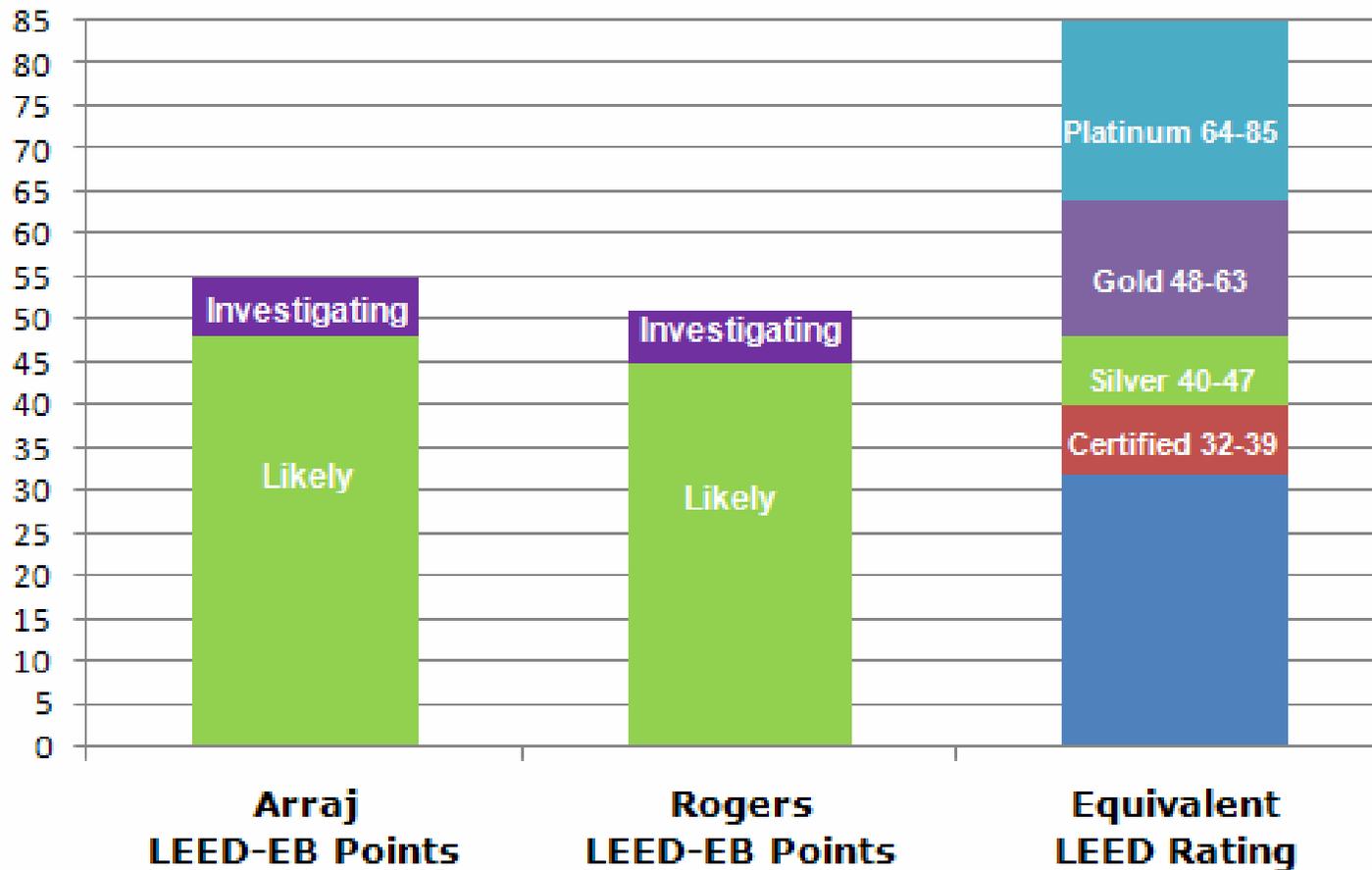
- Improved daylighting by addition of windows on first floor
- Improved ventilation rates
- Entryway grilles help to collect dust from people walking in from the street
- During construction, all the ducts were sealed, with a final duct cleaning at the end to make sure debris from ductwork does not get into the air stream
- Building was flushed with outside air for two weeks to remove all
- Volatile organic compounds from the installation of carpet, paints, adhesives, and sealants

Innovation

- Transportation management program
- Education



LEED-EB v2.0 Comparison



LEED-EB

Green Policies

- Site and erosion control policy
- Management plan for maintaining site and building exterior to reduce impact on local environments
- Water use reduction
- Occupant recycling and recycled office materials policy
- Low mercury-containing lamps policy
- Construction waste management policy
- Resource reuse policy
- Recycled content materials policy
- Rapidly renewable materials policy
- Certified wood policy
- No smoking policy
- Construction IAQ management policy
- Low environmental impact cleaning fluid and housekeeping policy
- Low environmental impact house keeping disposable product policy
- Low environmental impact pest management policy
- Outdoor chemical storage policy
- Paint policy (Exterior & Interior)
- Carpet policy
- Adhesives and sealants



LEED-EB Cost Features



Soft Costs for LEED-EB Process

- Project Registration fee (\$450 for members)
- Project Certification fee (based on building sq. footage)
- Commissioning
- Energy Star SEP
- Green Power
- Sustainability/LEED Consultant
- Internal Staff time
- O&M Contractor
- Grounds Contractor
- Janitorial Contractor
- Controls Contractor
- 5 year recertification fee

Hard Costs for LEED-EB Process

- Signage and Displays of Green Features
- System Efficiency Upgrades
- System Sustainability Upgrades (water conservation retrofit)
- LEED Requirement (Tracer gas test)
- Future green purchases by contractors
- Future green purchases for all tenant improvements

Lessons Learned

Project Specific

Byron G. Rogers US Courthouse

- Don't "value engineer" the window replacement and the separate meters for heating and cooling systems
- Post rating documentation difficult to start up
- Contractors contracts need to be modified
- Design a place for the plaque!

Alfred A. Arraj US Courthouse

- Security is an issue in occupied federal courthouses
- LEED-EB documentation is completely different than LEED-NC documentation

Lessons Learned

Pre-certification Coordination

- Determine LEED project team and roles and get management approval to ensure team accountability.
- Get management support and buy-in and keep them in the loop on progress and challenges.
- Discuss funding sources for potential LEED expenses.
- Develop a realistic schedule and decide how often to meet.
- Conduct a charrette to:
 - Discuss sustainability drivers and project goals
 - Provide a training overview of LEED-EB
 - Share a contractor testimonial about LEED implementation (video or in person)
 - Engage the team as active participants in the process
 - Outline a communications protocol
 - Introduce team members and discuss responsibilities
 - Address questions and concerns up front
- Invite O&M, janitorial and grounds contractors, GSA project team members and management to the charrette.

Lessons Learned

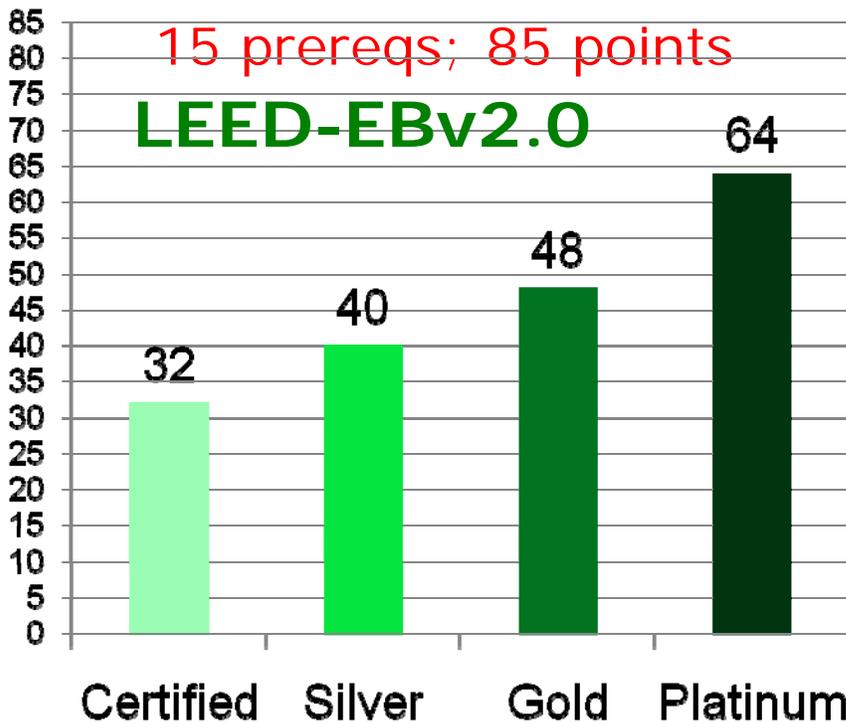
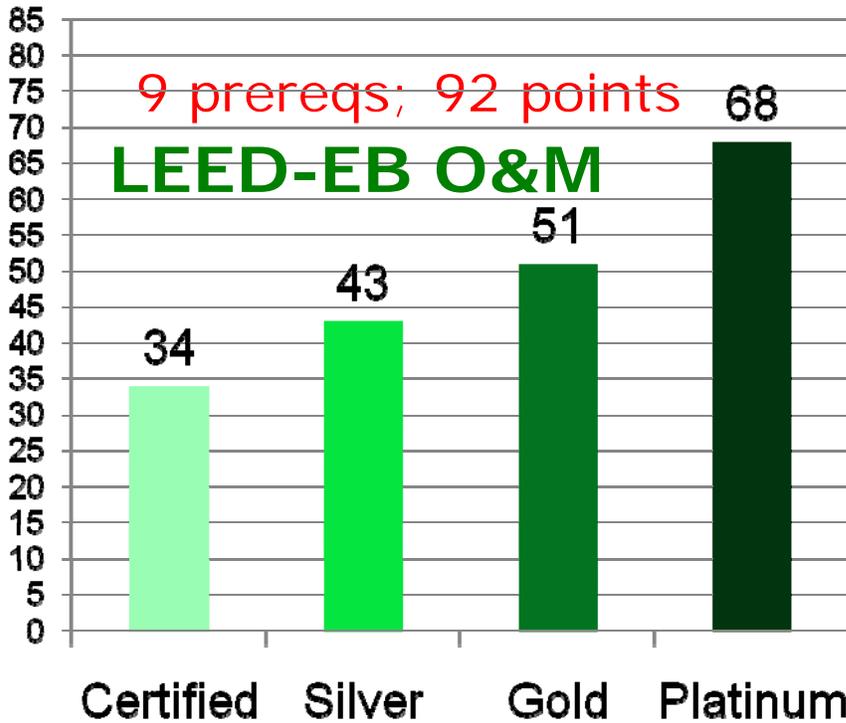
Certification Coordination

- Combine existing environmental procedures with new LEED procedures.
- Coordinate with contracting reps early on to work on incorporating environmental/LEED requirements into contracts.
- Provide a training and demo of LEED Online and review how to upload templates and documentation.

Post-Certification Coordination

- Recertification requires ongoing annual reporting for the life of the building.
 - In house vs. consultant
- Establish a LEED reporting champion.
- Determine time period for reporting for recertification every 5 years.
- Build in operational funding:
 - Recertification fee every 5 years
 - Green Power
 - Energy Star
 - Recommissioning every 5 years

LEED-EB: Operations & Maintenance



LEED-EB: Operations & Maintenance

Major Differences

- Fewer prerequisites, more credits possible
- Reporting system at least annual (instead of mandatory quarterly)
- 15 credits possible for EAc1
- 2 times as many water efficiency credits
- Registration fees the same
- Separated categories into subcategories:
 - Materials and Resources into Solid Waste Management and Sustainable Purchases
 - Indoor Env. Quality into IAQ Best Management Practices, Green Cleaning and Occupant Comfort

LEED-EB: Operations & Maintenance

Prerequisite Differences

- Removed prerequisites:
 - SS p1 Erosion and Sedimentation Control
 - SS p2 Age of Building
 - WE p2 Discharge Water Compliance
 - EQ p4 PCB Removal
- Changed prerequisites:
 - EA p1 Existing Building Commissioning (changed to Energy Efficiency Best Management Practices, Commissioning moved to credits)
 - EAc1 69 points required as a prerequisite two credits, up to 15 points possible
 - MR p1.1/1.2 Source Reduction & Waste Management - Waste Stream Audit and Storage & Collection (changed to Solid Waste Management Policy, audit changed to credit)
 - MR p2 Toxic Material Source Reduction - Reduced Mercury in Light Bulbs (changed to Sustainable Purchasing Policy, changed to credit)
 - EQ p3 Asbestos Removal or Encapsulation (changed to Green Cleaning Policy)

LEED-EB: Operations & Maintenance

Credit Additions

- SSc1 LEED Certified Design and Construction
- SSc4 Tracking Alternative Commuting
- WEc1.1-1.2 Water Performance Metering / Submetering
- WEc4.1-4.2 Cooling Tower Water Management, Treatment/Non Potable Water
- EAc2.1-2.3 Commissioning, Investigation, Analysis, Implementation, Ongoing
- SPc1 Ongoing Consumables based on Purchases
- SPc2 Durable Goods, Electric, Furniture
- SPc5 Food
- SWMc8 Durable Goods
- SWMc9 Facility Alternations and Additions
- EAc1.4 Reduced Particles in Air Distribution
- EQc3.2-3.2 Custodial Effectiveness Assessment

Overall LEED-EB Recommendations and Resources

References

Reference agency existing environmental policies
Create reporting template
Confirm reporting mechanism
In-house vs. consultant responsibilities

Resources

www.usgbc.org

LEED-EB cost study

Reference LEED-EB: O&M Rating System and
Templates

Thank You!



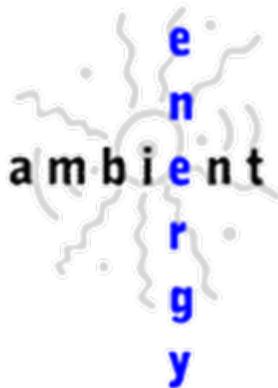
U.S. General Services Administration

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*solar and sustainable
design solutions*

Does LEED cost more?

- What is the customer's design goals, scope and budget? School vs. EPA
- What is the market? California (125) vs. South Dakota (0)
- First costs vs. operational savings
- Certified vs. Platinum certification
- Registration (members vs. non-members) and certification fees (based on square footage)
- Soft costs
 - Documentation (LEED consultant and contractors completing templates and providing submittal documentation)
 - Energy modeling
 - Commissioning

Does LEED cost more?

“There is no significant difference in the average costs for green buildings as compared to non-green buildings. The contracting community has embraced sustainable design and no longer see sustainable design requirements as additional burdens to be priced in their bids. ” *The Cost of Green Revisited, Davis Langdon, 2007*

“No, green buildings do not have to cost a penny more. LEED certified projects to date demonstrate that you can achieve LEED certification and reap its many benefits with a common-sense approach to design with no additional dollars. Depending on your green building strategy and the level of certification your project is targeting, there may be mid- and long-term ROI associated with additional green features that merits an investment in first costs.” *USGBC*